OPENING THE ELECTROME

Redefining Home for Energy Studies through Design Practice

Aalto University publication series
DOCTORAL DISSERTATIONS 3/2016

School of Arts, Design and Architecture
Aalto ARTS Books, Helsinki
books.aalto.fi

GRAPHIC DESIGN
Samuli Saarinen

MATERIALS
Keaykolour recycled Hazel 300 g
Cyclus offset 115 g
Galerie art gloss 130 g

TYPEFACES
yyy by Mikko Varakas
Pitch by Klim Type Foundry

ALL PHOTOS IN THIS PUBLICATION WERE TAKEN BY
THE AUTHOR EXCEPT THE FOLLOWING
Fig. 01 Photo credit: Yiying Wu
Fig. 02 Photo credit: Samir Bhowmik
Fig. 12 and colour plates of the Collective Garden board game
Photo credit: Prathap Nayak and author
Colour plate 2: Samir Bhowmik and Yiying Wu

Printed in Unigrafia, Finland, 2016

ISBN 978-952-60-6399-7 (printed)
ISBN 978-952-60-6400-0 (pdf)
ISSN-L 1799-4934
ISSN 1799-4934 (printed)
ISSN 1799-4942 (pdf)

To Saraswathi, my grandmother

KARTHIKEYA ACHARYA

OPENING

REDEFINING HOME FOR
ENERGY STUDIES THROUGH
DESIGN PRACTICE

THE

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ELECTROME

ABSTRACT

This design thesis presents a field-based practice as inquiry, for prototyping, and as a form of discrete activism. It builds on four prior approaches from design, art and architecture: Empathic Design, Interrogative Design, Relational Aesthetics and Critical Regionalism. Positioning the thesis as an issue-based design study, it is presented as a piece of practice-based energy research. It approaches domestic energy use measures as information and conceptualizes such measures as holding both an ecological and an informational concern. This coupling within domestic energy use measures becomes the subject for design practice. Based on this coupling, referring to on-going changes within domestic energy systems and viewing the home from three different theoretical positions, the thesis presents a hypothetical construct of the home, referring to it as the Electrome. Against this background, the study introduces its first field-based research within the Indian domestic context. Using interviews and design exercises with Indian apartment residents, the study demonstrates that as dwellers give meanings to their domestic appliances, artefacts and electro-home, these artefacts contain and hold a number of social relations. In this context, the flow of energy into domestic appliances, artefacts and the home allows energy use to be seen as information. When such information is combined with the social relations inferred from domestic artefacts, a conception of dwelling with data emerges. This is presented as a characteristic of the Electrome. Proceeding with two further field studies, the design practice prototypes a series of domestic services based on energy information, resulting in making people's private energy use information public. By "opening" the private energy use measures of appliances, artefacts and the home by design, the practice firstly infers and presents the social relations and orders contained within the homes and their inherent intertwining with everyday energy practices. Secondly, the opening of energy use measures as design practice presents how otherwise latent larger social concerns that go beyond the walls of the home emerge. Then, calling for a difference at the scale of the electro as a universal technology, in order to negotiate control of the material agency within everyday dwelling, the design practice demonstrates a design tactic termed the de-electrofication of data. With these results from the design practice as inquiry, for prototyping, and as activism, the thesis demonstrates that practising design can generate multiple agendas as coherent action.

ACKNOWLEDGMENTS

Long journeys are best undertaken in company and with the support of others. Obtaining this doctorate has been no different. My intent to pursue doctoral studies was first encouraged by Dr. Jan Blom at the Nokia Research Centre in Bangalore. He introduced me to my advisor, Professor Ilpo Koskinen, who got me into the Department of Design at Helsinki. It was in the formative phase of my doctoral studies that I met Professor Jack Whalen who since then has advised this research as a field based practice. Learning mindfulness from him was invaluable while undertaking this work. Jack's guidance for field research and Ilpo's patience during the writing phase have been essential for completing this work. I am thankful and grateful to both.

Thanks to Suresh Chande, who was in charge of Nokia University Collaborations, for arranging the initial funding of my research here in Helsinki. Acceptance onto the Design Connections Doctoral Program in the Department of Design at Aalto ARTS facilitated the advancement of my research. Professor Turkka Keinonen's guidance as supervisor and Associate Professor Maarit Mäkelä's nurturing of the program have been most useful. Opportunities provided by Maarit made me venture out boldly into artistic explorations. I am thankful for the opportunities and encouragement provided by Associate Professor Sampsa Hyysalo helping my work to emerge as a design practice-based energy study. Having Professor Pekka Korvenmaa, Associate Professor Tuuli Mattelmäki, Professor Peter McGrory and Professor Alastair Fuad- Luke as part of the research faculty has only benefitted my work at Helsinki.

Being nestled within the research community of Design Connections has allowed me to exchange and build ideas with my peers, Haian Xue, Krista Kosonen, Marketta Heinonen, Pekka Murto, Sandra Vina, Tatu Marttila, Tjhien Liao and Zagros Hatami. Having Dr. Antti Pirinen, Assistant Professor Jung-Joo Lee, Dr. Katja Soini, Associate Professor Kirsi Niinimäki, Dr. Kirsikka Vaajakallio, Dr. Petra Ahde Deal, Salil Sayed, Associate Professor Salu Ylirisku, Dr. Susanne Jacobson and Dr. Yuri Na as seniors has been inspiring. This work, as both a written piece and a design practice, received much useful input from Dr. Tero Heikkinen through discussions, reviews and design experiments. Having Dr. Cindy Kohtala as a fellow academic and friend and Dr. Tiina Härkäsalmi as a practitioner ally has been vitalizing to my work and life in Helsinki. Working with Jussi Mikkonen, Lutz Gegner, Dr. Sari Kujala and other present and past members of the Embodied Design Group has been a rich learning experience. Jussi Mikkonen's input has been especially crucial in the development and execution of a number of prototypes for my design practice. I must extend my gratitude to Martin Hackenberg for helping me with well-crafted and robust prototypes. I would like to thank Samir Bhowmik for the experience and learning that both of us gained through the 'Light is History' project. Aalto Media Factory was supportive in funding two projects related to this work, the 'Talking Trashlab' project and the 'Media of Energy and Emotions' project in 2012. I wish to thank Juhani Tenhunen for his support.

As a field-based design practice, this doctoral research was carried out in three different cities in the state of Karnataka in southern India. The fieldwork was spread over three and a half years from 2010-2013. During these periods, I was a visiting researcher at Manipal University. Dr. Harishchandra Hebbar, Director of Manipal Centre for Information Sciences, not only provided me with ample research and infrastructure support but also helped in widening my academic network at Manipal. Professor Nishant Manapure, Head of the Institute at the Faculty of Architecture, provided me with working space and facilities. During the field visits, discussions with Professor K.P. Rao in Manipal were always constructive and he continues to inspire me. I also wish to thank L.N. Tallur for his insightful views on conceptual art practice. For documentation during the interviews, setting up prototypes on site and taking care of travel logistics, I cannot forget the help rendered by my friend Prathap Nayak. Shobha Bhat assisted me with data sorting in Manipal. Vasant Rao from the Udupi Art Gallery introduced me to Mahesh Suttar, an Indian national award-winning Rangoli artist. The collaboration with Mahesh was particularly joyful in shaping the final field-based case at Manipal.

I am truly indebted to all the apartment residents, the infrastructure service personnel and domestic service personnel who placed trust and confidence in me and consented to be research participants.

I wish to thank Professor Eli Blevis and Professor Pekka Isomursu, the pre-examiners of this dissertation. Then I am thankful to Dr. John Vines from Newcastle University for kindly agreeing to act as the opponent for the public defence of this dissertation. Sanna Tyyri Pohjonen, the publisher from Aalto ARTS Books and Samuli Saarinen as the graphic designer have been instrumental in producing this work as a welldesigned book, and my thanks go to them.

During the writing phase, this research received funding from the Nokia Foundation and the Aalto Energy Efficiency Project. Then during the final stages of my dissertation writing, I sought an opportunity to work as a visiting researcher at the Finnish energy corporation, Fortum. I wish to thank Dr. Heli Antila for the opportunity and Janne Happonen for being a considerate colleague.

Finally, I am grateful to my family, Vasanthi and Satish Acharya for being supportive and patient parents all along. Thank you to Bhagya and Rahul, my sister and her husband, for letting Rithika, Rishab and me play, which always provides a perspective on life. I would like to express my thanks and admiration to Bowrani, as we continue to learn and love life.

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əlɛktrhom is both a dwelling process and a place. It is where the sensorial experiences of people by the means and measures of the electro as a standardized technology form, normalize and are justified. For and through the Electrome, everyday bodily practices get converted into universal and standardized measures, becoming part of technical, economic and legal processes. It is when and where energy use from everyday domestic practices is transformed into information. The informative measures originating in the personal and private realm move into various electro and non-electro-networks, whereby the authorship, ownership, destination and even purpose of the measures remain ambiguous. The destiny of the Electrome is the human body, its normalization and justifying electro-control.

CHAPTER 01—INTRODUCTION

LIGHT IS HISTORY: A HELSINKI EXPERIMENT

FIG. 01 'Light is History', a light and energy use information-based public art installation at Hakaniemi square in Helsinki.

'Light is History', an urban art installation, was carried out in Helsinki in 2012. It was installed as a light and energy use information-based display in the public square of Hakaniemi for a period of eight days at the end of November. The lamps of the installation, made from old recycled electricity meters, were designed to simulate bright light therapy lamps in the public space. Sixteen families from in and around the local neighbourhood of Kallio volunteered to participate in the project. These families made a note of their daily domestic energy use for a period of ten days. They then sent this information through a specially designed mobile and web application. The differences in their daily energy readings were used to determine the brightness of the individual lights assigned to each family on the light installation. Each of the lamps brightened and simulated functioning as a bright therapy lamp if the corresponding family's energy use was less than on the previous day. Otherwise, the corresponding lamp inverted and dulled. The participants also provided images and textual narratives of their own electrical artefacts from their homes. These were displayed next to their corresponding lamp on the installation. This meant that the identity of the participating families was anonymous, but yet provided a glimpse of contemporary Nordic urban domestic life with electricity. An energy-art place (Acharya, Bhowmik, & Mikkonen, 2013) was made in a Nordic city square as a dialogue between the practices of the home as a private place with its energy use information and public well-being.

As a designed artefact, this column was created in the form of a simple rectangular box made from used construction plywood. Lamps made from hollowed-out old analogue electricity meters were bolted on to the box. Inside the electricity meter[1] shells were LED strips that acted as light sources[2] for the lamps. Around these lamps were smaller lamp boxes, made from smaller electricity meters, with photos of

1 Based on their size, the electricity meters could be divided into two sets, large and small. Both of these sets were taken from the waste yard of Mitox Oy, the local electricity meter manufacturer in Helsinki. A waste yard of old meters was a result of the smart meter drive that lasted from roughly 2009 until 2012 in Finland. The first set of meters, larger in size, were grey steel base and transparent polycarbonate covered Valmet analogue induction meters. These were used for making the bright therapy lamps. The second set, smaller in size, with a steel base, were painted black with a Bakelite cover. This smaller set also included electronic meters from the 1980s. The second set housed pictures of appliances given by the participating residents.

2 The LED lights were put in strips such that they gave out a brightness of 10000 lux at 15 cms from the source, thus simulating the characteristics of bright light therapy lamps.

the participating families' electrical appliances and their corresponding textual narratives. Within the rectangular wooden box was an electronic micro-controller to control the intensity of the lamps according to the daily consumption of domestic energy use of the sixteen participants. As an object, it was composed partially from thrown away waste materials and off the shelf and customized electronics. It was an ad hoc bricolage artefact, with lamps glowing in patterns based on the daily energy use of the homes of sixteen families, composed together with pictures and small textual narratives about the participating families' electrical appliances.

'Light is History', carried out as a small-scale urban design research intervention through its design can be considered as an 'opening' of private energy use information as measures from the domestic environment. The opening of the measures was into the public realm, yet retaining the anonymity of its participants. Being concerned with the matter of the public and private interaction, it also dealt with the design of domestic energy use feedback. In this case, the form of energy use feedback through lamps was by design integrated with a regional practice from the Nordics of using therapy lamps for well-being during the winter. Whether seasonal affective disorder should be considered as a physiological concern or if bright therapy lamps help or not is left to popular debate. By simulating bright therapy lamps made with LED lights in the Nordic winter context, the project, as an output of a design practice, brought forth the matters of the disposition of a known practice from the place and presented it within the design of energy use feedback.

With such a designed artefact, the experimental design research practice inquired, prototyped and activated its context. Thus, the practice of design is presented here as generating not one but three positions: for inquiry, for prototyping and for a type of activism. So here, design practice should be considered as a particular set of actions that can be composed, experienced from multiple standpoints and also affecting a plurality. The context is treated with prudence, since the design practice's central engagement is with a universal and standardizing technology, the darling of development and progress, electricity; as energy and more closely pertaining to measures of its energy use. As an uneven but steadily spreading technology over the history of humanity over the last two centuries, electrical technology can be considered to be a force of standardization, from its units to its uses. As a standardizing technology encounters growing human experience, it is logical to see this as resulting in a multiplicity of viewpoints rather than being overrun by any singular agency. So I bring attention at the beginning to this position of plurality, multiplicity and difference generated from a run of universal and standardizing technology, although it should become evident in the working and presentation of this thesis.

DESIGN PRACTICE FOR INQUIRY

With that clarification I return to the three positions for design practice, I mention above, design practice for inquiry, for prototyping and for a particular type of activism. The 'Light is History' project as part of a design practice for inquiry raised questions. Questions were not only raised for the residents who participated in the project and for the viewers of the installation in the public place, but it also raised questions and refined the questioning process for the design practice in parallel. What is the nature of people's domestic energy use information? Who actually owns such information? The householders who have paid for their electricity or the companies that produce the electricity who collect and store this information as data? How far might residents be willing to share information on how much energy they use in their homes? How might people think if there was an amplification by design for a moment every day reminding them that their daily energy practices within their homes could affect the well-being of strangers in a public square? It is these questions that became translated into a design artefact like the one in 'Light is History'. The approaches of academic design practices in reframing problem spaces rather than solving known problems (Koskinen et al., 2011) or for raising and refining discussions (Seago & Dunne, 1999) are by now a well-traversed track in academic design practice. A design practice's ability to raise and refine questions, to generate discussions, is what I refer to as design practice for inquiry.

DESIGN PRACTICE FOR PROTOTYPING

As questions arise and take the form of design concepts and artefacts, they begin to transform into prototypes and reach a stage where they can be put out in the wild, to be tested and experienced and to result in interactions that can be observable and documentable as part of the inquiry. The 'Light is History' project can be considered as one such prototype: a prototype that was put to test in a snowy, stormy Nordic November winter, where passers-by from small school-going kids to the elderly would stop by to glance, spending time reading the textual accounts or have a cup of the glögi[3] served by us, the design researchers, discussing what these lights were about. Putting the installation out in the public square enabled direct access to the challenges and gave directions for future changes. An artefact with hundreds of electrical connections with changing light patterns was put out in the stormy weather for over a week in a public square. Sixteen participating households provided their energy use information which was fed into this artefact. Onlookers and passers-by stopped and read the texts, experienced the light on their

3 A warm Northern European Christmas drink

faces and shared their views over a warm Christmas drink. On the other end, the participating family members who provided the information daily through their mobile phones and computers gave accounts about the user interface and their experience of seeing and reporting their homes' energy use information daily. All of this enabled the design team members, citizens and users to gain first-hand experience of a design idea that began as a number of questions by actively engaging with a prototype (Suri & Jane, 2003) (Buchenau & Suri, 2000). All technical problems that arose were corrected and resolved (Kurvinen et al., 2008) through the prototyping process. This is how the project can be considered to have undertaken experience and design prototyping whereby such a process became integral to its practice.

DESIGN PRACTICE AS DISCRETE ACTIVISM

The making public of private information is a unique form of subversive practice which has been gaining traction as a form of activism in the present Internet era. In this practice, though, this aspect is still considered as related to academic inquiry. What I see as a form of academic design activism (Fuad-Luke, 2009; Markussen, 2013) lies in integrating the making public of private energy use information through the existing visual practices of a place, through the 'peculiarities of a particular place'. For example, in the 'Light is History' project, it was a subversion of the winter practice of light therapy use, for design of feedback on private energy information. It identified an existing visual cultural practice of a place which has a suspended meaning from before, looming above its everyday practitioners and the collective that experiences it and hacking it to communicate about energy use using information. When I refer to the 'existing visual practices of a place', this term is deliberately left broad, because it provides a large set of existing practices to compose from. From a Christmas star lamp with twelve spokes whose lengths reveal a home's monthly energy use information to Scottish Tartan patterns that could open a county's energy use for a region, all such elements from various visual cultural practices begin to come under the scope of design action and can be made to hold, reveal and open energy use information. This can be seen as a form of discrete activism through design practice rather than through conventional political action.

With a brief description of a design case that was carried out in Helsinki, I have presented three different positions for a design practice, for inquiry, for prototyping and as discrete activism. The multiple standpoints stance is intended to all discussion of the standpoint that practising design holds the ability to generate multiple agendas as coherent action.

FIG. 02
Visitors at the 'Light is History' installation

OPENING FOR A DESIGN PRACTICE

Next I will return back to the 'Light is History' project with a more descriptive account. Through this, I will discuss the concerns of one of the participants of the project, Patrick.[4] After the descriptive account, I will clarify the use of the term 'opening' for this design practice. Then I will use the account of Patrick's concerns to introduce the main design approaches from which I build my own body of field-based design practice. Furthermore, within this introduction I will highlight how the use of the term opening within this design practice has been interpretively framed through the prior theoretical design approaches.

ACCOUNTING FOR PATRICK'S CONCERNS WITH THE 'LIGHT IS HISTORY' PROJECT

At the beginning of the project, it seemed that it was at the behest of his wife that Patrick had agreed to participate in the exercise. It was also his wife Jane who was sending in their home's daily energy use data. Even in the initial interview before agreeing to participate, after it was clarified how each lamp would be assigned to one family, Patrick had his concerns about data privacy and its security. When we mentioned that the data and lamp assigned to each family would be made anonymous, Patrick agreed and signed the agreement to participate in the project.

The first day the artefact was lit up was made into an event. All sixteen families were invited to the opening of the art installation at the public square in Hakaniemi. When the lamps were turned on for the first time, traditional Christmas glöggi was served to all of the guests and participants who had gathered around the installation. People were introduced to each other: some people knew each other already and some were content to be quiet and just curious about their participation. The event could be seen as bringing the participants of the project together. Patrick was present with his wife. Then we felt he seemed convinced, as he congratulated us warmly. Over the week, since it was on his way home, Patrick visited the site of the installation again and pleasantries were exchanged.

At the end of the project, during the final interview session with the participants at home, Patrick was more open in expressing his opinions about our approach. Firstly he expressed that during November in the Nordics, it was difficult to cope with the winter darkness, and light was a luxury and affected one's well-being. Regarding our approach, he mentioned that he was not comfortable with the idea of measuring moral

4 While many of the participants were open and had given their signed agreement to be quoted with their real names, all names that feature in this dissertation have been anonymized.

superiority through a simple metric: that if one consumed less, one was morally better than the others. Then he expressed that he did not like the social dynamic of serving strangers. On sharing private energy use information, he said that if he had to share his energy use data with his neighbours, an anonymous comparison was OK, otherwise it could lead to 'ego tripping' and these feelings could feed into interactions with the neighbours. So he preferred aggregated data, and he would not want losers, who consumed more than the others, to be punished but preferred to reward in such a way that everyone worked for the winner.

The above description indicated how, Patrick a middle-aged male working in the information technology sector living in an apartment with his wife in Helsinki, viewed and expressed his feelings about the design project through his participation in it. It presented his initial concern with his home's private energy use data being made open to the public and later his acceptance because of the data being made anonymous. It also indicated how he thought the related information could be shared within a community. Then it discussed what Patrick thought was a reasonable way in which to reward actions relating to his energy use in comparison with others in his immediate community.

From such a position, Patrick's idea can be seen as countering the idea of sharing energy use information to convert it to the public good of giving bright therapy light to passers-by in a public place, which was integral to the intention of the design prototype. His mentioning of the difficulty of coping with the Nordic winter, light as a luxury that affects well-being, measuring moral superiority because of consuming less, the idea of serving strangers in a public space by consuming less at one's home and such connected issues were matters that emerged from Patrick's interpreting the nature of the design prototype of 'Light is History'.

Rather than being interpreted as a more universal moral and ethical stance taken by an individual, the issues addressed by Patrick are better addressed here as connected issues that are specific to an individual in the urban context of a Nordic city. The discussion also shows how Patrick's opinion of the project and its central design idea are intrinsically woven together with his understanding of the concept of the interactive urban art object that was created to simulate therapy lamps based on daily domestic energy use and its information. The project with the design object, the working of the artefact, as a composition and as a platform in itself, held within it elements, practices and practical dispositions of the region that made Patrick interpret it, thereby becoming wary and cautious, expressing his concern and then also providing his own alternative approach. The

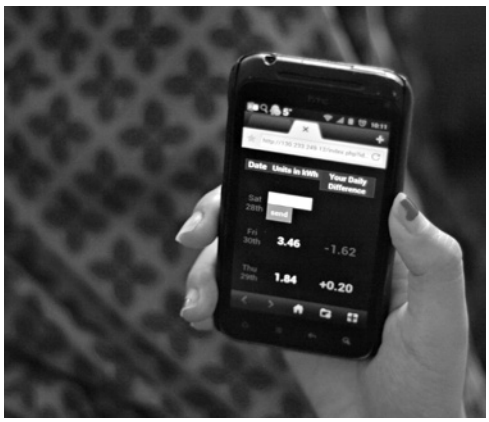


FIG. 03
A project participant's mobile interface for sending her home's daily energy use information, which was used to determine the brightness of her lamp on the installation.

design artefact as a prototype, as a hypothesis, its placement within the public square, the event and the interaction with Patrick and its interpretation allowed one to delve into and interpret what Patrick felt. These set of objects and events allowed entry into a person's inner world, bringing an exchange through a sustained interaction, made through a project as an event place. It brought forth issues relating to the private practices of the home and of public good, on a manageable scale through one person's interpretation. The prototyping, as an inquiry, by making his home's daily energy use public, resulted in an 'opening' with Patrick.

OPENING AS AN EVENT PLACE AND AS A DESIGN PROCESS

Before moving further into how the 'Light is History' project can be read with respect to prior design approaches, there is a need to clarify the term 'opening' that I introduced above. This term is important: it is a language tool appropriated by the design practice to describe its process and working, thus needs elaboration.

As a term, opening when used as a noun can be imagined as a fenestration, as a visual void that allows one to look and see through to the other side, like a window, a removed brick from a wall, a keyhole. This is a 'place', because there is a window, there are stacked bricks around a missing one, and there is a door with a keyhole in it. In this way, an opening can connote a place to observe. Here, I request you to consider this as an allusion to a relation between the self and the others, observing through an opening, from the outside, with the other's gaze inside, or, then, from the inside looking out at others through an opening as a place.

Then, an 'opening' can also be understood as an event, an occasion, a gathering of people, such as the opening of a store, an exhibition, a venue, a place and time purposing a sense of newness, with a ring of conviviality, something almost celebratory. This opening as an event can be considered as involving many people, a get-together for a something new as a common cause, being involved within a joyous motley, in a participative spirit. Both of these interpretations of the term, as a place and as an event in their noun forms, require action and practice. Opening here should be considered as a form of practice, wherein it transforms into a verb. Thus the term opening when considered as a verb is seen as generating and making a place-event combine with opening as a noun. I use the term opening interchangeably as a noun and as a verb throughout this book, where both forms become integral to this design practice.

The term is primarily a conceptual tool to present the design practice approach. It begins with the designer's role of the other, the outsider watching and observing as a bystander, and later moves into the participative mode, moving inside to engage and participate. As a term for a practice, it becomes a socializing transition for inquiry for prototyping and for activism.

Opening is thus a place-event resulting out of design practice as an approach. It is appropriated for and by design to engage and question the orders and relations held within everyday practices within the context of energy use. When routine everyday domestic electro-practices are subject to 'opening', it is with the intent to make them unusual, for mild provocation and slight disruption, and should be received such. Within the context of this design practice, as seen in Patrick's case, an opening makes a situation 'unusual'. It involves information on homes and on families of a private kind. The reference to making 'unusual' or provoking is not new to design. Critical Design (Dunne, 2005) and the practitioners of Design for Debate (Kerridge et al., 2009) have discussed it. It has been popular within academic design approaches over the past decade and a half. Andrew Blauvelt's (2003) exhibition catalogue curates a number of familiar everyday examples 'made strange and unusual' by design. Making the domestic realm strange through technology design has been addressed in terms of literary means by Genevieve Bell (2005). More recent institutional-scale approaches for participatory innovation have been proposed through provotypes (Boer & Donovan, 2012). Following these approaches here, as an inquiry by design, opening makes unusual and mildly provokes in order to infer from everyday domestic energy practices. Since such approaches by now are well-traversed and discussed within design methods, I need to clarify the decision by reflectively retracing the route taken by my design practice.

The beginnings of this practice, or rather its inspiration, can be found in my reading of *Reassembling the Social* (Latour, 2005) in which there is "a list of situations where an object's activity is made more visible" (ibid: 79-82). Before listing the situations in the book, Latour presents the idea that in the study of any socio-material order, one should begin with a *tabula rasa* and not box in 'social' onto a group saying it to be made up of social aggregates. An inquiry should not establish a component that can be used as an incontrovertible starting point (ibid: 29). While eliciting this, Latour refers to Harold Garfinkel's (1967) work on ethnomethods that transforms mundane encounters into *controversies*. In this way, the inspiration of the use of 'opening' alludes partly to the ethnomethodological exercise popular as 'breaching experiments'(Garfinkel, 1967). From their foundations in ethnomethodology, such exercises have moved into the design space, engaging with the development of innovative technologies in Human-Computer Interaction (HCI) (Crabtree, 2004) to provoking participation in participatory design (Boer & Donovan, 2012; Boer, Donovan, & Buur, 2013). While I use breaching as an inspiration, what occurs in openings is not 'breaching' in the sense that Garfinkel refers to. There (Garfinkel, 1967:54-75), a breaching procedure is aimed at modifying "the objective structure of the familiar, known-in-common environment by rendering

the background expectancies inoperative". Specifically, the modification according to Garfinkel consists of subjecting a person to "a breach of the background expectancies of everyday life" (ibid). In my design practice, the opening is in conjunction with everyday energy use practices and the information resulting from them. Its aim is to also modify the structure of the familiar, known-in-common electro-environment that is closely related to the practices of the domestic realm by design means. Making a component of everyday energy practices through its information made unusual creates an opening. As I will discuss in later chapters, the everyday home constitutes of constant flows of everyday practices with the electro-network, thereby generating electro-measures. Here, firstly, we deliberately by design introduce a displacement in the flow of everyday practices, thereby rendering the context unusual through mild provocation, resulting in an opening. Secondly, an opening makes unusual or provokes by displacing, exposing and making public the scalar measures of the energy use of a private place or the activities of a dwelling. Thus, an opening can involve a break in the flow of an everyday electro practice, and on the other side, it can involve exposing the scalar measures i.e. the energy use measures, of everyday practices. So, both of these aspects that I consider for opening as a design procedure are different from Garfinkel's ideas on breaching background expectancies. However, here the aim is also to modify the structure of the familiar, transforming mundane encounters by design means.

More recently, from a Practice theory perspective, the idea of using disruption as a research agenda has been discussed by Elizabeth Shove and others (Shove, Trentmann, & Wilk, 2009). Discussing routine and rupture, they say that "ordering only makes sense in relation to processes or threats of disruption and fracture" (ibid: 8-9). They mention that disruptions are unique moments that allow us to see moments of stress and the forming and un-forming of rhythmic achievements within everyday practices. So, for them, deliberate disruption becomes justifiable as research. Heeding Shove et al.'s call, energy studies that are closer to design have undertaken such approaches (Higginson, Thomson, & Bhamra, 2014). In this sense, I consider making open private energy use measures through opening as an event place a deliberate disruption. With this as a background, I have briefly traced the roots of 'opening' as a conceptual design practice strategy.

In the following section, I will discuss four prior design approaches that have not only influenced this design practice, but from which it also interpretively borrows for inquiry, for prototyping and as a form of activism. Within the discussion, I will also present selective aspects from these approaches that I reinterpret and relate to the term 'opening'. Thus, I attempt to not only refine the term as a conceptual design tool but also to contribute to the prior theoretical design approaches through this design practice.

OPENING AS EMPATHIC DESIGN

People like Patrick interacting with a design prototype or an event place such as 'Light is History' interpret, give meaning and respond to it as they feel about it at that moment. When the design prototype or a process provokes a response that is of an intimate private nature, it provides scope for interpreting what matters to people. This approach can be seen as building on prior works of design inquiry where a response is provoked through design artefacts and prototypes for further design inspiration, for interpretation or for both (Gaver & Martin, 2000; Blauvelt, 2003; Gaver et al., 2007; Routarinne & Redström, 2007; Kurvinen et al., 2008).

Within this design practice approach, it has been useful to interpret empathically from such interactions with design prototypes and processes, providing scope for reaching the "inner state and worlds" of people (Suri, 2003:53). With varied approaches, design's emergence as an academic discipline can be attributed to many factors. A crucial aspect that has made the discipline industrially relevant and significant in terms of research has been the systematic inclusion of peoples' views and concerns into its processes and procedures through user-centred' methods and approaches over the past forty years. One such procedural program of research has been to bring in empathy as a basis for design. Empathic design (Koskinen, Battarbee, & Mattelmäki, 2003; Suri, 2003; Kurvinen, Koskinen, & Battarbee, 2008; Mattelmäki, Vaajakallio & Koskinen, 2013) as a research program has made inroads into making sense of people to gain insights and inspiration, and to further create openings for design. Being based on design practice, empathic design has been interpretive, focusing on daily life experiences, individual desires, moods and emotions. Such a program has set avenues to systematically explore matters of bodily existence and the sensorial aspects of daily living. At the core of this design program (Koskinen et al., 2003: 47), is the understanding that people give meaning to things through interaction and that these meanings are also modified as people act on them. Then it proposes that since design gets its meaning from the real world, research must be carried out in this context. The next understanding is that the meanings and means of its methods should be design-based, being visual, tactile, sensorial and tested in reality, through making and constructing towards an end to further design. In this sense, empathic design is empirical, providing designers' access to feel how people experience their material surroundings and the people in them, including themselves as key characters of their everyday lives. With this framework, decisive where necessary and flexible as essential, empathic design provides both scope and inclusivity to address and interrogate matters of material concern that relate to daily living.

With regard to the conception of the term 'opening' for this design practice, while it ushers in a mild controversy as a provocation, its aim is also to bring together people and form a place of discussion as

a socializing place. Traces of controversy need conviviality to provide a balanced social interaction. The key challenge for this design practice has been to capture the emotion that arises out of this mixed tension generated by the opening of private energy use data. It is within such a complex place of emotions that people provide the meaning during openings. Thus, as a transient momentary event, it holds discussions, views and opinions which are aired, shared and recorded, making the opening a place and time of interpretation. All this occurs in the real wild world, away from any controlled lab set-up or well-behaved white cube gallery space. Snowed out public squares, leaky apartment building community halls and inside peoples' messy homes have been the venues of openings. An approach and method built by design means the components of the openings are at a prototypical stage and are not at the level of ready-for-market design artefacts or made to be gallery exhibits. They are deliberately cheap, mid- to low-tech, quickly assembled and resemble alpha stage design prototypes (Koskinen, 2011: 125-140). They carry the ad hoc spirit (Jencks, 2013) but made bespoke to the context and workable and robust enough to stage an opening. These design characteristics that form the opening are built upon and follow many of the traits from the core (Mattelmäki, 2013) of the Empathic design traditions evolved at the Helsinki school.

While the empathic design program has generated approaches that have tackled such diverse issues as service design, design methods and co-design, it has made no forays into design practice-based energy use studies. This design practice presented as a thesis hopes to address this gap in the empathic design program by putting a topical focus on energy practices and more specifically on data concerns in the domestic environment.

OPENING AS AN INTERROGATION OF THE PRIVATE REALM

As discussed earlier, Patrick expressed a concern initially about data security: he was cautious about how his home's information would be represented in a public art project. Later, he did provide his consent to participate when told that the representation would be made anonymous. This indicates not only his personal concerns about the project but also a common larger societal concern about private data that is faced today in the networked society. Then Patrick's other concerns around measuring moral superiority by lower consumption, the idea of serving strangers in a public space and his idea of how to make energy use comparison within a selected community provide a glimpse of his personal views and opinions with regards to others. The emergence of these issues from the project is close to what Krzysztof Wodiczko discusses in his call for Interrogative Design (Deutsche, 2011: 245). Amongst other characteristics, for Wodiczko, design as a research proposal can be interrogative if it "functions as a critical mirror questioning the user's preconceptions and assumptions

about others and the self". This aspect is what connects the approach of being Empathic to that of being Interrogative. In the call for Interrogative design, Wodiczko further recommends design "to deconstruct life, to unmask and uncover our singular and plural lives, our lived experience and a history of this experience from the panopticon of our subjectivity and our ideological theater of our culture". By utilizing energy use information from the domestic realm that is considered as private and then opening it through design prototypes and processes and as place-making I have sought to 'interrogate' through design means what comes to be 'private' to people today as framed through people's energy use data. This is where as a design practice it interrogates the boundaries of the private realm for its material relation to domestic energy practices and their measures as information. As an interrogative design practice that is field-based, involving the active participation of people, the practice "takes place in the world rather than upon it". Through the openings, people encounter provocations and mild disturbances when their private information is made public through their consenting participation, allowing a questioning of their views, perceptions and relations to their daily energy practices.

In this manner, the practice is as an interpretive field process of interrogative design. When an opening is undertaken like making a home's private energy use information public, it seeks to not only generate a discussion about what people make of their and others' energy use but also to question the construct of the private realm and its relation to energy use. To this end, making open a private entity, through an opening, aims to be controversial, to provoke responses. This again alludes to Wodiczko's idea that "the appearance of interrogative design may attract while scandalizing, - it must attract attention in order to scandalize the conditions of which it is born. Implicit in this design's temporary character is a demand and hope that its function will become obsolete". As I will discuss later in this chapter, domestic energy use and its information can be seen as both an ecological concern and an informational concern. If these concerns did not exist, then 'opening' as a function would also be redundant and obsolete. It is in such a manner that the opening as a design approach has been interpreted through Wodiczko's ideas of Interrogative design.

FROM RELATIONAL AESTHETICS TO RELATIONAL DESIGN

The 'Light is History' project can also be seen as proposing a new set of relations through the designed artefact that engaged in opening the energy use information of private homes as a place-event. Firstly, a relation emerges between people, such as Patrick and his wife, Jane, their domestic energy practices and its information. Secondly, a new set of relations is delineated between the participating households. Thirdly, a relation can also be seen forming between the design object emitting light

whose brightness is based on a household's energy use and passers-by in the public square, who Patrick described as strangers. The gathering of participating families for the project's opening as a convivial event discussing their participation in the project over glasses of glögi, speaking to strangers who passed by during the event explaining their interpretation of the project, all these and even more new relations can be seen as being formed by the project. This making open of domestic energy information as a design process thereby generated a unique set of relations that did not exist before. To imagine, deliberate and trace such a social forming by design is also integral to this design research practice. When using the term 'relation', here I refer to what Niclous Bourriaud (2002) calls 'relational' in his work on Relational Aesthetics. Bourriaud, recognizing a turn in the art scene of the 1990s, describes artists engaging in "an art taking as its theoretical horizon the realm of human interactions and its social context, rather than the assertion of an independent and private symbolic space" (ibid: 15). These artists' works, according to Bourriaud, were producing "relational space time elements, inter-human experiences trying to rid themselves of the straitjacket of the ideology of mass communications, in a way, of the places where alternative forms of sociability, critical models and moments of constructed conviviality are worked out" (ibid: 44). According to Bourriaud, 'form' in a relational aesthetic sense can be seen as the "invention of social relations through encounters" (ibid: 23). Through such a proposition, a new set of social interactions between participants gets placed, revealing domestic energy use information, generating responses from it and suggesting transformations of everyday energy practices. Through the practice's proposals of revealing and generating responses and plausible transformations, these aspects become the intention of both the design practice and also of the 'social formation' from within the context.

Borrriaud's strain of Relational Aesthetics has received its criticism (Bishop, 2004) for not examining the broader context within which it operates, and also for its structure being detached from its context. Opening as a relational inquiry examines the relationships within its broader context and attaches itself within the lives of the people by being a result of their domestic energy practices. It heeds Bishop's argument of inter-subjectivity, since it is grounded within people's everyday contexts rather than being part of only a selective artistic social group.

The opening thus becomes relational because of putting together the energy use information of the everyday practices of different people, families or households in a public place, making a 'place' that would not happen otherwise. By making these relations, the opening places energy use and its household information as a public concern. It intends to raise alertness in some, disquiet in others, a mild provocation intended for the participating residents that was not there before. What

results from all this, if it creates a provocation or not, how it is received and by whom, what is observed, what is heard and what can be captured to have been felt, then becomes a lead to trace, follow and infer from.

The term 'relational' is also used by Andrew Blauvelt (2008) in his proposal titled *Towards a Relational Design*. He considers Relational Design to be part of the third wave of design, which according to him was preceded by the semiotic phase of design that started in the 1960s when design was about meaning-making. The first phase was the modern movement, which was preoccupied with plastic form. Similar to Bourriaud's proposal of Relational Aesthetics, the third relational phase of design according to Blauvelt also featured in the 1990s, but rode on the wave of emerging digital technologies. One aspect of Blauvelt's Relational Design is of interest to this discussion. According to Blauvelt, Relational Design offers open-ended platforms as 'connected ecologies'. This is when design and innovation are placed in the hands of people as users. While many aspects of the 'Light is History' project do not fit into Blauvelt's conception of Relational Design, I see the above aspect of design as an open-ended platform as sharing a trait with it. If the project were seen as providing a platform for the participants, allowing them to decide on turning a lamp up and down, controlled by their home, to be therapeutic or not through its brightness, based on their energy use, then 'Light is History' could be considered as Relational Design in Blauvelt's sense. The relation, though, need not be considered entirely 'open-ended', relating everyday private practices within the home to the public well-being of strangers in a square. That aspect of the 'Light is History' project is intentionally deliberated by design.

APPROPRIATING CRITICAL REGIONAL PRACTICES FOR OPENING ENERGY USE

As mentioned earlier, Patrick's opinion about the project, its central design idea and his response from participating was intrinsically woven together with his understanding of the concept of the interactive urban art object. The bright therapy light from the artefact directed at citizens in the public square was made responsive by the daily domestic energy use and its information from private households. It was this relation that simulated the therapy lamps at the public square. The design object, as a set of bright therapy lamps, held within it elements, practices and practical dispositions of the region that made Patrick interpret it easily. If the use of therapy lamps were to be considered as being a unique and integral practice of the Nordic region or the upper northern hemisphere, then it was this practice that was appropriated within the design of the energy use feedback. This practice of using therapy lamps in the winter can be considered here as having derived "indirectly from the peculiarit[y] of a particular place" (Foster 1983: 21), which has been appropriated by design to open private

domestic energy use information. I borrow my mention of the 'peculiarity of a particular place' from Kenneth Frampton's essay, *Towards a Critical Regionalism: Six points for an architecture of resistance* (ibid). Building on the work of Alexis Tzonis and Liane Lefabrve, Kenneth Frampton presents his ideas as Critical Regionalism. As a conceptual critique, Frampton's idea can be interpreted as a response that emerged to criticize the failure of both modernism and post-modern architecture. Its criticism firstly was towards Modernism's 'placelessness' and its failure to deliver the promised utopia. Its concern about Post-Modernism was its failure to acknowledge the regional identity[5] of its contexts. He mentions that the onslaught of 'universal technologies' are invariably political, and as material production takes a universal form through the technic, it starts to engulf an entire culture and makes it into a world as a historical whole. Frampton identifies the work of a number of architects which he sees as providing an approach that sets out to mediate the impact of universal technologies with elements derived indirectly from the 'peculiarities of a particular place'. This he mentions as the fundamental strategy of Critical Regionalism. As an approach, Critical Regionalism was addressed to be a double mediation that emerged from the site and the context rather than as a technological imposition. Firstly, it deconstructed the overall spectrum of world culture that it invariably inherited, then through a synthetic contradiction also manifested a critique of that universal civilization. Furthermore, as a designed place form, it imposed limits on the optimization of industrial and post-industrial technologies that resisted what Frampton calls the endless processual flux from the megapolis. Such a bounded place form became a space of human appearance, and even if it was a pseudo-public space, it held a latent political and resistant potential. Overall, the Critical Regional approach in architecture avoided mechanical reproduction arising out of the static application of universal technologies to generate a place-conscious poetic.

Thus, as an architectural approach, Critical Regionalism sought a resistance of universal modes of production, and as a place form, it imbibed the contradiction of the use of the universal technologies that produced it and yet was a critique generated by the particular peculiarities of its context. To manifest the contradictions of such an approach through the design of the place form should be seen as evidence of its critical lineage.[6] But the place forms were primarily concerned with the architectonics of the place, and remained comfortable within the contradictions of functionality and practices which they

5 The Critical Regional approach should not be mistaken for the lost romantic vernacular, nostalgic historicism or the glibly decorative, but according to Frampton, if architecture took on an arriére-garde position, it could cultivate a resistive identity-giving culture while still having a discreet recourse to the universal technique.

6 The reference to Herbert Marcuse and then Alex Tzonis and Liliane Lefaivre's work on Critical Regionalism indicates a Kantian notion to the criticality. This presents the work as being closer to critical theory, as proposed by the Frankfurt School.

held within their plastic tectonics. The examples in Frampton's essays, of Jorn Utzon's Bagsvaerd church, Alvar Aalto's Säynatsalo town hall or Luis Barragan's houses, are primarily about the architectonic forms and their relation to the surroundings, and less about the everyday regional practices employed by the people of the region and their relation with the architectonic. The resistance was in the plasticity, and the criticality remained there, but how well it incorporated the regional everyday 'practices' remains an issue less discussed by the theorists[7] and the practitioners of Critical Regionalism. In this practice, the design approach borrows from Critical Regionalism the 'peculiarities of a particular place' aspect and interprets it for regional everyday practices and appropriates them for making energy use information open. Thus, by reinterpreting Frampton's idea of Critical Regionalism regarding plastic architectonic form, it applies it with selective regional sensorial practices to the design of material feedback, presenting the concept of Critical Regional practices for energy use feedback design.

While opening as a design strategy identifies elements indirectly from the peculiarities of a particular place, it does so not from the physicality or plasticity, but by identifying and appropriating the existing everyday practices of a place, and then incorporating these as a tactic for the opening. As seen at the beginning of this chapter, the use of therapy lamps as a winter practice can be interpreted as a peculiarity of the northern hemisphere. When it is incorporated into the design of feedback on domestic energy use, it is experienced and understood by people in the Nordic regions in a particular way. This is aimed at generating an ambivalent emotion. When one's own domestic energy practices and their measures are made to determine the functioning of therapy lamps in a public space, forcing a relation with public well-being, the emotion is still more complex. Certain sensorial practices are specific to a region, and these 'practices' hold meanings that people act on in a particular way, as it matters to them. When these practices are intervened in, by adding and proposing new relations by design, this is a subversive act suggesting intervention at a larger cultural scale. While the response to and inferences from such subversions cannot be generalized at any structured cultural scale, it still provides some insight into what a person 'feels' when they are made to respond to such a scaled-up hypothetical proposal. It also gives enough direction to further reframe the hypothetical assumptions.

Thus, here the design strategy emerges by identifying practices that people have a prior experience of, whose meaning lies afloat at a larger scale in a particular place, to take hold of them, change them and subvert their use through design and make them convey a concern

7 The book by Douglas Powell on connecting politics and culture in the American landscape (Reichert & Powell, 2007), is an exception and takes an alternative approach to Critical Regionalism, to create new kinds of texts and images of place.

for domestic energy use. This is how I reinterpret and repurpose elements derived indirectly from Critical Regionalism's "peculiarities of a particular place" to the approach of 'opening' for my design practice.

Above I have discussed four varied design approaches, Empathic Design, Interrogative Design, Relational Aesthetics and Critical Regionalism, which my academic design practice borrows from and builds on. The approaches have been organized along a scale that indicates their movement from a singular to a more collective regional level of cultural practices. The borrowing is largely interpretive and selective. Within the discussion, I have also presented how the term 'opening' is interpreted by considering particular aspects from within these design approaches. Having clarified the four prior design approaches, next I will discuss about the issue for the design practice. In this discussion I will present how energy use as an issue and topic has been addressed by other academic design practices and how particular aspects of these prior design practices relate to my own practice as a design practice-based energy use study.

ENERGY USE: FOR AN ISSUE-BASED DESIGN PRACTICE

By the 1960s[8] and 1970s, western contemporary art practices raising energy-related issues for political engagement and activism had gathered considerable force. Design practice and discourse on the issues of energy, energy use and especially electricity as energy has been popular within academic programs and projects since the late 1990s. Next I will refer to programs and projects where design practice has a central position, as an output for research and inquiry and also for theorizing about the politics of energy through practice. Being part of university-funded design research programs and projects, such design practice-based energy studies can be seen to have emerged in specific geo-academic caches. When I refer to such energy studies here, I not only include academic practices dealing with electricity as energy use, but also stretch further to projects and practices dealing with the wider spheres of electromagnetic radiation.[9] The list of works dealing in the topic of electricity as energy use are selective. The references are only to well-known approaches in doctoral-level design studies and also those that have inspired and influenced my own academic design practice. I will briefly discuss caches from three different parts of the globe.

8 For instance from Germany the work of Joseph Beuys (et al., 2004) on art, energy related issues and political action is well-known. The work of the Situationists, the Italian Radicals and the Fluxus movement with their relation to anti-art and as critics of capitalistic systems are known to have carried a strain of an environmental agenda. These have come to the attention of academic design practice discussions (Dunne, 1999)(Koskinen et al., 2011). For a detailed listing in chronological order of energy and art-related developments, see the work of Hemauer and Keller (2013).

9 The reference here is to the work of Anthony Dunne and what he has referred to as the 'electrosphere' (Dunne, 1999) which I discuss further in this chapter.

The pockets of academic design practice communities I discuss are geographically based in the United States, at Bloomington, Indiana and Pittsburgh, around London in England and in Sweden at Stockholm. So the references I make to design practice-based energy studies are largely concentrated around academic institutions in the north-west of the globe. The community in North America, based largely on the HCI community has addressed energy-related issues through a sub-category called 'sustainable HCI'. The design community in the United Kingdom with humanist and artistic tangents has been looking into electricity and energy issues through critical and design for debate approaches. The design researchers at the Interactive Institute based in Sweden have addressed energy studies through design research programmes with reference to critical practice and post-critical practice-based approaches. Next I shall briefly discuss these caches.

THE NORTH AMERICAN SCHOOLS: SUSTAINABLE HCI

The topic of Human-Computer Interaction grew widely through the last two decades of the 20th century. With cognitive sciences, computer science engineering and usability as its foundations, it has been fast in borrowing approaches from other fields and disciplines. However, the emergence of sustainability as an issue, through design featuring in its discourse, is rather recent in HCI. While approaches such as 'persuasive computing' to address habits and behaviours emerged in the early 2000s, it was in 2007 that Eli Blevis (2007) presented the view that sustainability should be the core semantic for interaction design, positioning it differently from experimental psychological approaches of persuasive computing. Basing his views on the perspective of design values, he defined design in his paper as "an act of choosing among or informing choices of future ways of being". The paper by Blevis set in motion the emergence of 'Sustainable interaction design', also called the sustainable HCI approach. It particularly led HCI-based design practitioners to deal with energy use through design. In the same year, Zimmermann and others (Zimmerman, Forlizzi, & Evenson, 2007) presented a model for research through design as a method for interaction design research. In it, building on various previous models and particularly on Frayling's (1993) model of research through design, they highlighted design practice and making as a method of inquiry. Then, other established researchers in the HCI field such as Paul Dourish also began to contribute, calling for a wider political basis and scaling for sustainable interaction design (Dourish, 2009, 2010). The work of researchers such as Eric Paulos and James Pierce has dealt with issues of energy use through what they call a 'design-orientated' perspective in HCI. Their approach has tackled a wide range of energy-related issues such as design for awareness, design for feedback and examining energy use as a phenomenon in specific contexts, and they have also

tried to approach the issue through wider philosophical perspectives (Pierce, 2011; Pierce, 2009; Pierce, Odom, & Blevis, 2008; Pierce & Paulos, 2010, 2012, 2013). Within this design-orientated perspective, the sustainable HCI community's contribution has been particularly useful in reviewing energy use visualizations and feedback design, and in furthering the concept of energy as 'material'. More recently, the sustainable HCI community seems to have attempted an 'everyday practice' turn, moving away from the 'individual action' as a unit of analysis. Building on sociologists such as Andreas Reckwitz (2002) and Elizabeth Shove (2003, 2007), sustainable HCI practitioners currently seem to be taking a practices theory turn combined with science and technological studies perspectives (Pierce, Strengers, Sengers, & Bødker, 2013). In the research community there also seems to have emerged a deep reflection on the use of the term 'sustainability' and its challenge to the domain of HCI with business as usual (Silberman et al., 2014). So, attempts are being conveyed that the community aims to specify and refine goals regarding sustainability, and to move beyond simple models to address the full complexity of sustainability problems.

ENGLISH DESIGN: FOR DEBATE

Basing arguments on speculative design artefacts and their ability to mediate aesthetical experience has brought into question, the 'design for debate' through design practice (Kerridge et al., 2009). It was Anthony Dunne's doctoral dissertation, *Hertzian Tales* (Dunne, 2005), which led to the emergence of what today is considered Critical Design. It presented an ideology for product design practice that put social, psychological and cultural experiences as its basis, rather than being technological and commercially based. The portrayal of speculation carried out through prototypes, videos and imagery leading to discussions, reflections and debate spawned a new discourse within academic and artistic design practice. Currently, this pioneering strain of critical design practitioners from London is portraying diegetic exhibits as design fictions, citing future energy use concerns among other issues mixed with larger political narratives (Dunne & Raby, 2013).

Another related team of English design practitioners engaged in energy issues has been utilizing the route of co-designing with communities using fieldwork, workshops and probes at a project level (ECDC, 2012). The project website states that the attempt of such a 'community co-design' process is to incorporate the imaginative, playful, emotional and potential aspects of people using technologies, while looking at ways to reduce the current carbon output by 80%. Building on their previous pioneering approach on cultural probes (Gaver 1999), they have involved communities by engaging with them in their local settings and bringing the participants' imaginative experiences

into the design process. Starting from these processes, the team has programmed bots (Kerridge, Ovale, Plummer-Fernandez, & Wilkie, 2013; Gaver et al. 2015) that mediate energy practices on a social network platform. They have been prototyping networked devices incorporating online social networking platforms and have deployed them into participants' natural settings.

THE SWEDISH SHAPING: TECHNOLOGY AS MATERIAL

The interactive institute at Stockholm is another notable group whose large body of work has approached energy studies through design practice. They mention the formulation of a program/experiment dialectic (Redström 2011) approach that has provided their process with an alternative and design-led perspective on energy consumption. They also mention that the programs are based on "provisional knowledge regimes" (Binder & Redström, 2006), and position design practice centrally through conceptual designing, making artefacts and staging design interventions. Based on a critique of both modernist thinking and usability, the design practice programs have looked at technology beyond functionality and usability and addressed it as 'material', as something to be crafted and formed. Building on a range of critical traditions in design such as post-critical architecture, anti-design and critical design discourse, these programs seem to address two main interrelated concerns: materiality in design and use. Three programs have been specifically aimed at energy use and everyday practices: 'Static!', 'Aware' and 'Switch! All have considered an aesthetic and material-based approach to everyday energy interactions, resulting in the presentation of a number of experimental everyday artefacts as examples of staging design interventions on larger urban scales. These artefacts and interventions have attempted to generate reflection and awareness on and through energy use. The design artefacts and interventions through the programs suggest finding and discussing problems rather than providing solutions, whereby design becomes a mode for critical reflection and for shaping a wider discourse.

FROM HERTZIAN DREAMS AND ENERGY MATERIALISTS TO ENERGY USE INFORMATION AS A COUPLED MEASURE

From the above brief discussion of three academic caches whose programs and projects have looked at design practice and electricity as energy use, next I discuss two works that I have found to be relevant to my own design research practice. Both are relevant as inspiration and also for a conceptual logic relating to design practice-based energy studies. These two works are from the latter two caches respectively, so I do not discuss the works on sustainable HCI from the American academia. Their works on sustainable HCI or sustainable interaction design

can be considered to have evolved with an HCI foundation, so could be considered to be from a large academic network whose output has mostly featured at HCI conferences where discussion on design and its practice has gathered attention only recently, while I find the works from England and Sweden on this topic to be earlier than that emerging from the United States. The design research output in the form or publications via large-scale conferences can be speculated to be due to the nature of the foundation of HCI research or research funding mechanisms, and the work on energy research through design practice from the North American academia can be seen as being rapid, dispersed and with constantly evolving ideas rather than a slowly evolving but consistent ideal. So it seems not to be simple to find a single programmatic idea on design practice and energy research from a design practitioner or group of practitioners from North America. This is unlike what can be seen coming from the English and Swedish schools, as will be evident in the following two works I discuss from these two caches.

Dreamy Hertzian Domestic Electro-Artefacts

In *Hertzian Tales: Electronic Products, Aesthetical experience and Critical Design,* Anthony Dunne (1999) raises a critique of the aesthetic role of electronic products and indicates the invisible 'electrosphere' that electronic products and artefacts generate around themselves. Dunne presents the idea that electronic products also hold a subversive aesthetical potential because of their dissipating invisible electromagnetic waves. He mentions his experimental process of measuring and drawing electromagnetic fields around electronic objects in order to arrive at an alternative vision of electro-artefacts, whereby he refers to them as 'dreamy objects'. Presenting the design potential in the electromagnetic sphere through designed artefacts, he asks for a more meaningful social benefit than designing merely towards a commercial end. The output of Dunne's thesis on design artefacts is referred to in *Hertzian Tales* as 'sublime gadgets' (ibid:123-146). Through these prototypes, categorized as post-optimal objects, Dunne presents five conceptual design proposals. Each of these design outputs is considered as an interface between the electromagnetic environment of the Hertzian space and people. With such one-off designed objects, Dunne's work raises pertinent questions about the technological realm and daily living rather than offering solutions to any conventional problems.

This idea of Dunne's also got carried over to the next work, titled *Design Noir,* with Fiona Raby (Dunne and Raby, 2001). They again raised attention to the issue of invisible and hidden electromagnetic fields, taking forward the idea that electronic objects 'dream' in electromagnetic radiation. In this project, they took the design as inquiry

approach further with the 'Placebo' project. In it, they introduce a set of eight designed artefacts to residents of eight homes to investigate the residents' attitudes to and experience of electromagnetic fields within their homes (ibid: 75). The scale of these designed electrosphere mediating objects is that of pieces of domestic furniture. The questions and discussions with the residents bring forth a set of interactions that can be seen as either revealing or else trying to exclude various invisible electromagnetic fields that are manifested within today's living environs. The attitudes and experiences of the residents with these electro-mediating prototypes are presented through interviews. In these interviews with the residents, the discussion centres on encountering the invisible electrosphere. The design prototypes amplify the experiencing of the electrosphere for the residents, as if the prototypes provide a prescription to the residents to interact with the electrosphere, with their responses resulting accounts that are presented through interview transcripts. However, the accounts raise a need to imagine the potentials of the wider details of the context. For instance, what type of homes were these residents living in, were they apartments, row houses or single plot homes: how would Dunne and Raby's prototypes have played out in the larger density of a block of flats? While instances of family members and the relations between the participants surface meagrely within the accounts, questions arise such as, what did the residents think of encountering their neighbour's electrosphere or one from a neighbouring building, and what would that have been like?[10] The project allows such questions to emerge. Overall, the pioneering work of Dunne and Raby set in an important direction not only a new genre of approach to design practice, but also an archetype of design practice and research for electricity as energy. From these early works from British design academia, what can be considered interesting for this research is the conception of 'dreamscapes' of electronic objects as the Hertzian space. The many questions this raises, such as that of the context or ones that lead to further speculation, have also been some important leads from Dunne and Raby.

Energy as Design Material

If Dunne and Raby's domestic furniture-like prototypes made residents encounter the Hertzian dreamscape, the Swedish school's program began presenting firstly, technology as material (Redström, 2005) and then also energy as material (Backlund et al., 2007). Johan Redström has argued that designing in practice through material and form is different from predicting use, which is how technology is conventionally

10 As a speculative proposal here, what if Dunne and Raby were to set up their inquiry with the council housing residents whose accounts are described by Daniel Miller in his study *Appropriating the State on the Council Estate* (Miller, 1988) rather than with people with an art and design background?

understood. Redström's concern seems to be centred on the fixation of predefined ways of using and interpreting technology, which he critiques as leading to inflexibility (Redström 2005: 14-20). He is also of the view that electronic technologies have a discrepancy between their inner functional complexity and their surface, which fails to communicate the intended use. To overcome this, he presents technology as design material and asks us to think of technology as form and material rather than technology as prescribing functionality. For Redström, as a basis for design, as temporally forming elements, a material needs some kind of spatial presence through a spatial surface for presenting itself (ibid: 25). With this argument, he recommends that computational technologies could also be treated as material that could be worked with in both spatial and temporal forms.

Backlund and others (2007), writing on developing a program for design research and practice, mention the expressive and aesthetic potential of energy as a material in design. They also mention a type of design practice with strategies to involve people and invoke engagement for exploring alternative notions of the role, actions and responsibilities of designers and users. According to them, this results in a 'critique from within' design practice. In the same publication, the authors also present nine prototypes as poetic objects of everyday life and show how energy-related issues could be made more present through form. Eight of the nine prototypes are also interior domestic artefacts. However, these are not furniture pieces like Dunne and Raby's set in *Design Noir*. In *Design Noir*, the furniture pieces could be seen as movable domestic artefacts, able to gain focus on themselves, by being able to move and be taken into any room, by being pieces that centre visual attention within the volume of a room. The domestic artefacts from the Swedish school differ from the furniture pieces from *Design Noir* as they are more peripheral to the structure of the architectural home. I consider them to be closer and tangibly connected to the wires in the wall of a home. Everyday objects such as curtains, wall heaters, power cords, wall tiles, cord connected lamps, the exceptional odd erratic radio and other such domestic objects form the set of prototypes.

The programmatic procedures of the Swedish school are consistently laid through their projects. The artefacts as design output are clear to follow with an aesthetically sensitized practice argument and a strangely familiar (ibid; Blauvelt, 2003) use agenda. In later projects with design interventions into everyday energy ecologies (Ramia Mazé, 2008), the program also scaled up, continuing with a material for design centred argument. Furthermore, Bergström and others (2010) from the Swedish program have suggested bringing in new concepts and methods for doing and studying the design of becoming materials.

From Dreamy and Material to a Coupled Measure

Above I have presented two separate design communities and their practices from what I refer to as two academic caches that have engaged and questioned the issue of electricity as energy. One of the concerns of the former cache, from the English school, can be considered to be around the electrosphere as the 'dreamy' Hertzian space. In the second cache, from the Swedish programme, the argument can be considered to be about technology and energy as 'material' for crafting and forming for design practice. If these two caches are to be taken in a sequence, then first comes the conception of the dream space emanating from electro-products. In the second case there is a consideration of technology and energy as a material in itself to craft and form. If such a sequence were to be considered, what then could be imagined to be next in the sequence? How could energy use be positioned conceptually for a design practice, which like the previous two caches also wishes to address energy use as an issue? Is the next thing to build into such a sequence the measure of energy use? So, then, based on the prior works discussed, the sequence can be considered to move from the electro realm as a dream space, to a material for design, then next I present engaging with energy use with its abstract measures. This is a conceptual movement from the outward dream space to materiality for forming to invariably encountering an abstraction, in terms a measure of energy use. When I mention this sequence it is only for conceptual continuity and to position the approach of my practice with respect to other academic design practices that have also addressed the issue of energy through design practice. Composing such a position with respect to other design practices then also becomes useful in beginning to clarify the central agenda of this academic design practice as a thesis.

ENERGY USE AS A COUPLED MEASURE

Since above there is a mention of a 'measure of energy use', how is this interpreted or framed for this design practice? The response to this will be opened in a variety of ways throughout this dissertation, but here, to begin the clarification, I wish to first present why I consider a measure of energy to be a concern for a design practice. A measure of energy can be considered as a certain quantity or amount that is represented in a standardized unit. For example, a commonly featuring format that recurs in many cases in my design practice is that of the kilowatt-hour (kWh). Such a measure that combines the units of power and time has spread in its application as a unit of energy use with the delivery of electricity as a networked service. Like other techno-scientific measures, this measure of energy use can also be considered to hold a standardized and universal

human-constructed meaning, which has been built, has traversed and has been retained through human-made techno-scientific systems. As such universally constructed material measures and their means spread across the globe, they engage with different and innumerable human encounters. This meeting of a standardized techno-scientific material measure, as a universal entity, with the innumerable differences of human encounter and experiences is a point of conceptual interest for this design thesis. So, firstly, such a conceptual coming together becomes a place for an inquiry by, and also for, design in this thesis. Secondly, another conceptual gathering within a measure of energy use that is considered important within this design practice is that of a coming together of two concerns, within a measure of energy use: an ecological concern and an informational concern.

DOMESTIC ENERGY USE MEASURES: AS A GATHERING OF CONCERNS

Any numerical measure of a particular material phenomenon can be considered to be different from the phenomenon itself. While the measure remains a representation through a numerical abstraction of the phenomenon, the phenomenon, if considered from a human experiential realm, remains distinct from a numerical measurement of it. When such a generalization is framed for energy use measures, close to four decades of environmental psychology research and with it the designing of energy use feedback (Seligman, Darley, & Becker, 1978; Abrahamse et al., 2005; Fischer, 2008; Darby, 2010) provide indications that such an interpretation should also hold good with energy use measures. By making this distinction and separation between energy use and its measure, a relation between the two also becomes evident. A measure of energy use here is considered as a result of energy use, thus following an energy use phenomenon. When considered as such, a measure of energy use can be seen as a by-product, as one of the results following energy use. A consideration of this relationship of a measure following the phenomenon of energy use allows for design to engage with the phenomenon of energy use through its measure. Within this design-based thesis, when accounting for this relationship of the measure that follows energy use, I present two central concerns for consideration, which I discuss next.

As an Ecological Concern

One concern is that an energy use measure indicates numerical and empirical characteristics, such as the amount and quantity of energy use, as a phenomenon. This aspect can be considered on a similar basis to that on which the ecological crisis in the current climate is repre-

sented in its many formats. Many arguments for the evidence of climate change that have their basis in numerical and empirical measures (an increase in temperatures, the rise in atmospheric carbon dioxide that holds radiation, the number of particles in the air indicating certain pollutants, the amount of non-renewable energy that can be extracted over the next century, the argument that energy efficiency programs are a larger source of energy than any single source of energy) eventually reach the realm of political action. In what is perceived and portrayed as a materially finite world, measuring it in various ways ends up being for more than just a scientific and rationalistic purpose. The purpose of a measure, the standards by which it is being measured and its tools of measuring can border on being political when those measures as data become the basis for political decision-making. At a time when energy efficiency to global warming metrics are fighting to be the central discourse, energy measures cannot be ignored. Instead, I argue that it is necessary to examine how energy measures relate to the ecological realm and its plural implications, rather than being set from one single esteemed source. The approach I take in this thesis should be considered one such attempt to relate energy measures to the ecological realm. In this way, the reference to energy use as a measure presents itself as an *"ecological concern"*.

As an Informational Concern

The second concern about the consideration for energy use followed by its measure is what I shall refer to as an *"informational concern"*. This concern is situated in a context where the separation between energy as a material entity and its measure as information becomes increasingly blurred. When seen from a particular perspective, as the flow of energy use intersects with the flow of information in the networked society, the recording and storing of energy use measures gets subsumed as information within related energy use practices. Citing economy, efficiency and convenience, granular energy use data from homes and their appliances is recorded and stored as electronic data. The number of techno-logical reasons for increasing electronic measures has seen a substantial increase, for example billing for the service, managing networked energy markets and automating domestic appliances. In this age of data-centric networked services, as large troves of private data, including domestic energy use data, are stored in remote databases and servers, there is also a proportional increase in concerns about privacy breaches and surveillance relating to all types of electronic data. There is also a growing suggestion that private electronic data itself challenges the idea of privacy. It is in this atmosphere that the energy use measures of the innocent domestic, of the private realm, of our homes, when it is recorded and stored as electronic data, can be considered to be an *"informational concern"*.

With such a conceptual construct of energy use as a measure, as a coupling of ecological concern and informational concern, I build a framework for inquiring, for prototyping and for an activism by design practice that borrows from and builds on four different design, art and architectural approaches. Referring to energy use measures as a coupling indicates that while there is necessarily no separation between the ecological and informational concerns, as a concept, energy use information should be considered from more than one position, gathering at least both the aspects within it. Since the measure is considered to be a representation of energy use, this conception of the energy use measure as a coupling allows us to address energy use and its practices. With this conceptual construct of energy use as a measure, the design practice asks what this means for 'being home', both as an ecological and as an informational concern. Such a construct presents a different and alternative position from prior studies and approaches on energy by design practice.

CHAPTER 02—ELECTROME AS A SITE FOR A FIELD-BASED DESIGN PRACTICE

BEING HOME: A SITE FOR A FIELD-BASED DESIGN PRACTICE

As described in the previous chapter, I started with the 'Light is History' project as an example, which was carried out in Helsinki. For practical academic reasons, my studies and part of the practice and research have been based out of Aalto ARTS in Helsinki. However, the design practice part of this thesis is largely field-based and makes a commentary on a specific context, that of Indian apartment living and its everyday practices, energy use and its measures. While the thinking and ideation of the design practice with collaborations, courses and trials (Acharya & Mikkonen, 2010; 2011; 2013; Acharya, Mikkonen, & Keinonen, 2010) largely evolved in Helsinki at the Department of Design at Aalto ARTS, the fieldwork in India was undertaken over a period of three and a half years from 2010 to 2013. This provided ample distance that I found supportive to the study.

Settling for home as a topic and within it the Indian apartment as a context for an experimental design practice was deliberate. As a design practitioner, I have had a close agenda with this context. With a background in architecture, for my Bachelor's thesis I designed a recyclable housing project for mine workers(Acharya, 2003). As a junior architect, I was involved with teams designing and supervising the building of apartment homes and residences in India. Then for my Master's thesis in interaction design, I undertook a project titled 'The Habitat of Electronic Media' (Acharya, 2006), proposing design concepts that left digital traces of residents' social network in transition spaces for an Italian apartment complex. Therefore, it seemed like a personal thematic progression to examine energy use through electro-networks within Indian apartment living as Doctoral research through an experimental design practice.

More important than this personal agenda, I present the idea that energy use from everyday practices within a particular Indian residential type from a specific region has not received the attention it deserves, and thus there is a gap in energy studies on the Indian domestic realm. Before I present such concerns around energy research on the domestic realm in India, I will discuss prior literature on the home as a context. This literature review around home is from various disciplines but also limited. It is selective in presenting topics from the various disciplines that have been helpful in positioning this field-based design practice as a study of the contemporary domestic realm.

POSITIONING HOME FOR A FIELD-BASED DESIGN STUDY

What, then, is the larger aim of this study through the contributions I mention above? Where, within what and with whom do these contributions engage? This design practice over the period of the study has evolved as a commentary and description of the contemporary home and its domestic energy practices set within the on-going changes in electrical technologies. This makes the study a field-based design practice about energy use concerns within the everyday home. The relation between the everyday home as a private entity and the energy networks is considered in a reflexive manner, one supporting the other. The study by design practice interprets this relationship and presents an alternative conception of the contemporary home that looks closely at the home's relation to its electrical and energy networks. This focus on the home has led this thesis to refer to and borrow from a number of prior studies about the home.

THE CULTURAL GEOGRAPHY PERSPECTIVE

To begin the review for this study on home, the work of Alison Blunt and Robyn Dowling (Blunt & Dowling, 2006) titled *Home: Key Ideas in Geography*, has presented an expansive landscape on the topic from a cultural geography perspective. Providing a wide array of studies that relate to the topic of home, house and housing, Blunt and Dowling propose both a spatialized and a politicized understanding of home. Their conception of a critical geography of home is presented through three components that are not mutually exclusive but overlap. Firstly, for them, home is simultaneously material and imaginative. Secondly they mention a nexus between home, power and identity, and then thirdly they present the idea of home as multi-scalar. Their work on home and its issues, with its numerous cases and approaches from multiple disciplines and varied cultural and topical perspectives has been useful in positioning and making a place with this thesis as a study of the Indian apartment home through design practice that looks at the nature of the home's energy use as information.

ANTHROPOLOGICAL FRAMINGS

The next reference on home studies is from an anthropological position put together by Irene Cieraad (1999) titled, *At Home: An Anthropology of Domestic Space*. Cieraad's anthology discusses the transition and the relationship between the domestic and the public space. The various topics and issues gathered from what is referred to as the 'Western domestic' realm deliberate on this transition between the domestic and the public space, further highlighting it. Referring to Saunders and Williams (1988), Cieraad says home as a symbol of the emotionalization of domestic space

derives its meaning from both the opposing public space and the practices performed within it. This well-known distinction between the private and public realm, better referred to as the 'split' of the West (Weintraub & Kumar, 1997), is also acknowledged by Cieraad as the 'myth of the two worlds apart'. This distinction, as the split between the private and the public, is well discussed in the political and legal realms, in matters of everyday citizenry, for everyday sociability and also as a distinction between the family and the outer political and economic realms (ibid: 1-40). Following such a distinction of the private and public spheres, this thesis interrogates the boundary of the private domestic realm through design practice. Bringing in domestic energy use measures holding ecological and informational concerns into the public realm interrogates the boundary of the private realm and infers the components of domestic energy practices from within apartment homes in India.[11]

Another work that has been useful for this study on home is an anthology from Daniel Miller titled *Home Possessions* (Miller, 2001). Again with an anthropological basis, but from a material culture perspective, Miller says that studying the private sphere can provide insights into the public sphere. He suggests that focusing on the fine-grained relationship between people and the material culture of their homes allows us to gain insights into the societies in question. On assessing the home in developing and reproducing social relations, Miller contends that it is useful to directly study the relation between the home as materiality and the social relation it develops, not only between the material entity of the home and its residents but also the relation between the residents that the material entity facilitates. He prefers to take the house as a more equal partner, rather than bring in the idea of the 'household', which generates a triadic relation. Miller also cautions against the idea of a semiotic home as an expressive genre that the occupants could use to create meaning. Instead he asks us to look at how occupants come to see their lives as formed through the influence of their house. Through this argument, Miller presents the house and its material components as an agent, whereby the house occupies its occupants as much as the occupants occupy the house, thus attributing agency to the home and its material components.

Following Miller, this study looks into the relationship between the home appliances and electrical artefacts of Indian apartment residents and infers meanings that they provide from these relationships. Then, from the inherent characteristic of these appliances and electrical artefacts of needing an electric flow to be used, the design practice considers their energy use measures from the flow. Then, by taking these energy measures and opening them by design, the practice infers further

11 Discussing energy and equity, Ivan Illich (1974) mentions that technology transfers also transfer values from one culture to another. So in this case, if not geographical position, but instead infrastructure and technological aspects were to be considered, the private-public distinction of the Western context becomes equally applicable to an Eastern domestic context.

meanings, orders and relations from the context of everyday domestic energy practices. With this, the design practice presents an alternative conception of the domestic realm and the relations that emerge between the home, its residents and their energy practices, and of wider issues related within the context.

AN ARCHITECTURAL TERRITORY OF THE POST-HUMAN

When the spatial components of the home are considered as rooms with specific everyday living functions attributed within a set of walls, floors and a roof, then the house can also be seen to emerge as an architectural entity. So, this study in its widest sense also considers the home context as an architectural entity. If Miller attributes agency to the home as a material entity, what can be thought of the increasing influx of electro-networks and their measures within a dwelling as an architectural component of it? Some aspects of such a concern have received attention from academic design practices (Dunne, 2005)(Bergström et al., 2009). However, for these practices, the framing of material agency and its relation to the architectural entity is not an explicit concern, and neither do the electro-measures within technological network matter as they become integrated within the architectural entity. When architectural elements like walls turn into rooms and edifices, when switches, appliances and electrical artefacts are set and placed as elements of the environmental control of everyday living, what remains as the architectural dwelling and what begins to shape everyday domestic practices does not end up being a simple question. It leads to questioning the nature of agency itself. Furthermore, in today's context, the control of the dwelling itself is divested far beyond the walls of the home through electro-networks and their measures. In such a context, the architectural entity of the home can be seen as a stage where agency and its divestment are contested between the residents and their infrastructural networks. This study shows such a contestation by actively engaging with these issues by design practice.

The anthology, *Architectural Theories of the Environment: Post Human Territories* (Harrison, 2013), which discusses issues pertaining to material agency and architecture, presents a framework for a post-human understanding of the design environment. In the introductory essay, Harrison (ibid: 15-45) begins with an acknowledgement of the Anthropocene period (Zalasiewicz et al., 2011). According to Harrison's post-human perspective, machinic to technologically networked bodies have consistently emerged as a discourse for more than two and half centuries. This highlights human embodiment as being in flux. This perspective does not see the human body in its current form to be a sacrosanct vessel of human consciousness. Instead it envisions humans and machine intelligences co-developing in various degrees of interdependency.

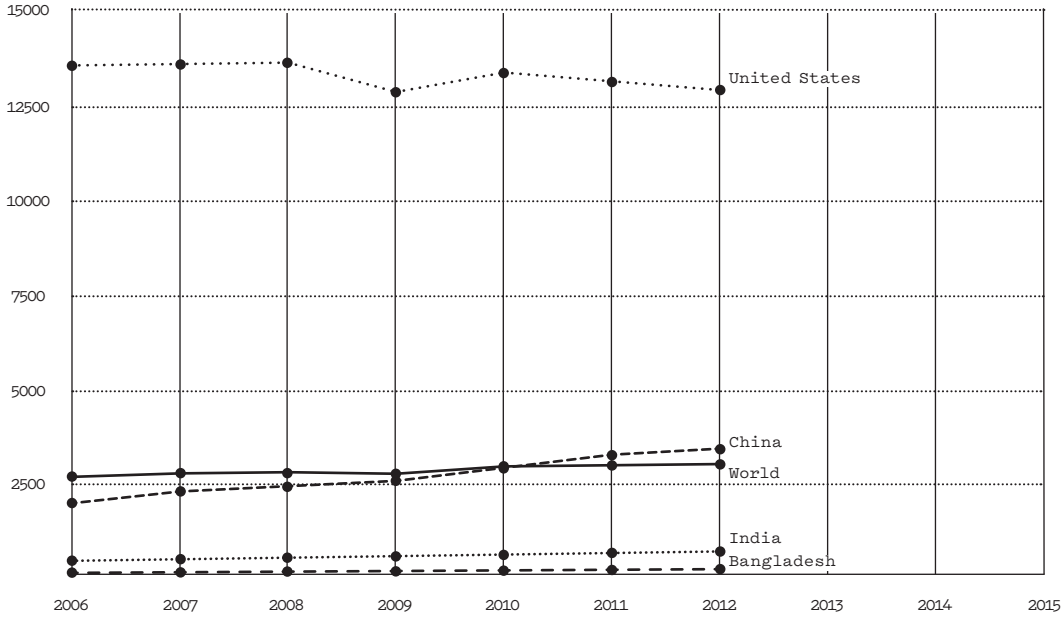
Framing the term post-human with respect to architecture, Harrison mentions that the term challenges both the conception of the building as an object autonomous from its environment and also the discipline of architecture's governance by disciplinary interiority. According to her, post-human theory extends the cyborg metaphor beyond the body and into the built environment. Treating the designed space as a prosthetic produces a new understanding of 'nature', which in itself cannot be conceived as an origin or occupying neutral ground. Referring to the architectural theorist Reinhold Martin, Harrison also mentions "the architectural endgame of post war corporate modernism is a post industrial or even posthuman subject, a subject immersed in and constructed by data flows and patterns".

In this manner taken from Harrison, the post-human discourse with an architectural framing manages to gather the body-dwelling combination and discusses its evolution with respect to the influx of technological networks within such a combination. This design research practice in its broadest sense also positions itself as an inquiry into the post-human issue by engaging with domestic energy use measures. What relations can be described from the home through energy use measures that can inform about and mediate a post-human condition? This entire thesis as a field-based design practice can be seen as a response to such a reflective question.

I have presented a selective review of research about the home, looking at studies about the home that have been useful in positioning my design practice as a field-based study about the home. Through the review and its selective topics I have also highlighted the relevant questions that emerged through my period of research. Next, to further position the context of the field-based design practice, I will discuss matters concerning energy use in the Indian domestic realm. Relating to this context, I will then present plausible consequential contributions from this field-based design practice as an energy study.

ENERGY USE IN THE INDIAN DOMESTIC REALM

Significant research bodies and academic circles exist in and about India whose interest covers a large gamut of energy as a topic. However, the current state of the art in energy research can be seen to reflect an aspect of the existing condition of the Indian populace, that of economic and also energy disparity (Filippini & Pachauri, 2004; Pachauri, 2004; Pachauri et al., 2004). When seen as such, it becomes evident that the weight of the research focus is currently tipping more towards issues of lack of energy than about practices that increase dependency on and consumption of energy in everyday living (Kumar et al., 2010; Ekholm et al., 2010). This is against the background of the trend in India's per-capita energy use from



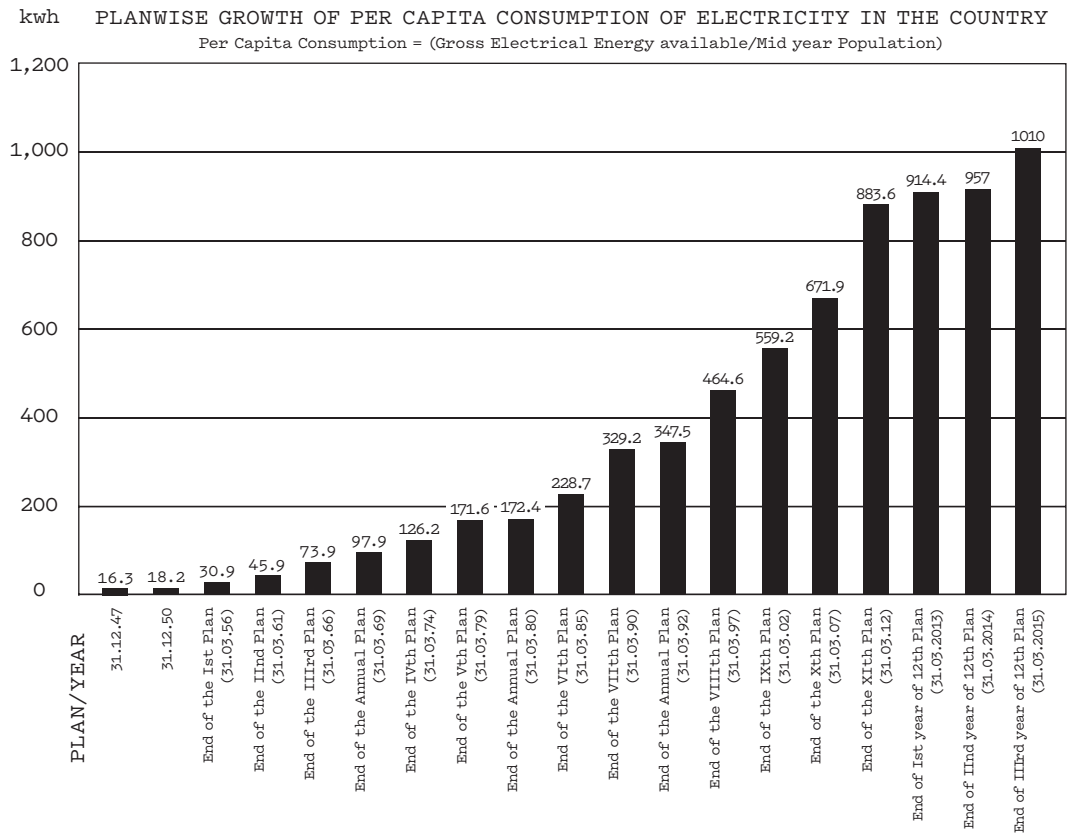
GRAPH 01
Per capita electric power consumption of world and selected countries (kWh per capita)
SOURCE:
From World Development Indicators of World Bank database derived from IEA Statistics 2014.

1970 until 2012 showing that its per-capita consumption increased from 1,204.3 kWh in 1970-71 to 6419.53 kWh in 2011-12. Even though this does not come across as large when compared with other nations of the world (Graph 01), India's large population, its primary electricity production source being coal and its contribution carbon emissions being third only after China and United States are only a few of the many reasons that make energy use an ecological concern.

Of India's total energy consumption in 2011-12, 22% was accounted for by the residential or domestic sector, which was second only to the industrial sector (44.8%). From a sectoral energy demand point of view, energy use from buildings in India constitutes 25% if it is attributed to the residential sector for total electricity consumption (Govt. of India, 2014). It can be taken to be 29% when inclusive of all fuels (Ahn & Graczyk, 2012) and 33% if modelled on end use services using a bottom-up approach (EIA, 2014). The Compound Annual Growth Rate from 1970-2012 for electricity consumption from utilities for the domestic sector has been at 9.44%, the largest rate of growth of a sector when compared to the industrial, agricultural, commercial, railways and other sectors over the near forty-year period. Such research from India indicates that domestic energy consumption has been on the rise and it is seen as only likely to increase in the future.

Studies providing an overview of energy end use by appliance type, their usage and energy consumption within the domestic realm (Murthy & Reddy, 2001; Boegle, Singh, & Sant, 2010; Rathi, Chunekar, & Kadav, 2012) provide a nuanced picture with socio-economic, house type and regional category variations. Such research indicates that while there is a partial saturation of certain domestic appliances, for example lighting and thermal comfort through ceiling fans in urban India, rural India still provides a large potential for energy end use through domestic appliances leading towards the urban trends. An increase in the penetration of appliances would significantly further affect the overall electricity requirement for India's domestic sector.

The concise overview of energy use research from the Indian domestic realm indicates a well-known context of increasing energy demand from the Indian domestic realm at a time of on-going changes occurring to the larger energy systems globally. These were also the premises on which the research initially began, meaning then the concern was towards energy savings. At the stage of submitting this dissertation, I see it as having gone beyond energy savings into engaging with wider issues that include social concerns such as domestic relations and social and economic disparity. Identifying such nuances over the period and through the study can be considered to be both central and consequential contributions of the research. While the discussion on domestic relations and disparity will emerge in the coming chapters of this study, I will now discuss other nuances as context and also highlight their identification as consequential contributions of this research. I will also use this discussion to inform on contributions that emerged because of choosing a field-based design practice path. This discussion on contributions is divided into two sections. One is a disciplinary dialogue that can be considered as



GRAPH 02
Growth of per capita electric power consumption (kWh per capita) in India
SOURCE: Annual Report by Central Electricity Authority for 2015, Ministry of Power, Govt. of India.

a consequence of choosing the design practice as an energy-based study and the second is a field-based design practice that has identified transitions in energy technologies.

BY AND FOR DESIGN PRACTICE

A DISCIPLINARY DIALOGUE

Design Practice Discusses Migration with Anthropology

On a reflective note, a particular field-based approach (Strauss, Rupp, & Love, 2013) and research I have identified with from a region very close to my own fieldwork which also relates to domestic energy use is the work of Harold Wilhite (2008). His work, *Consumption and Transformation of Everyday Life,* undertaken in the southern Indian state of Kerela has been carried out on an anthropological basis. I began referring to this work in 2012 after my second field visit, and from then on I further built on it through this study. Wilhite's study identifies a specific phenomenon of the re-migration of families from the Gulf at the turn of this millennium. The study looks at this phenomenon particular in the region of the south-west coast of India and its relation to everyday energy practices and consumption. I, too, encountered aspects of this phenomenon during my second field work trip, but I was not too sure of how to frame it during the initial analysis. Chancing upon Wilhite's work, I was more convinced of my finding and so built further on his work. I have considered such reference to and building over prior topical research from a particular region as a disciplinary dialogue. While mine is a prototypical field-based design practice, I largely refer to a study from another discipline, of cultural anthropology. This dialogue between an experimental design practice engaging with another piece of research from anthropology can be seen as a contribution of this thesis and also as the potential of this design practice for design anthropology (Clarke, 2011).

Critical Regional Practices for Feedback

I will again bring the attention to Critical Regionalism, discussed earlier. Critical Regionalism is largely presented from a theoretical framing of architecture. From it I reinterpret the fundamental strategy of "peculiarities of a particular place", a plastic architectonic aspect, and direct it towards particular regional sensorial practices that further shape it for domestic energy use feedback. I see this as borrowing from architectural theory and applying it to design research on energy practices. This

borrowing and reinterpretation occurred over the period of this study and can be seen as a contribution to the disciplines of both architectural theory and design practice-based energy studies.

IDENTIFYING TRANSITIONS

From Sparse to High-Density Housing

The increase in demand within domestic energy use in India is also becoming evident with the rise in demand for housing in India. The Indian residential sector, while bequeathed with a shortage of affordable housing, is adding millions of middle-class, upper-middle-class and luxurious homes through private realty investments. The Urban Development Secretary of India (PTI, 2014) has said that while there exists a shortage of 25 million homes, 11 million apartments remain unoccupied. A large Indian populace considered as lower-middle to middle-income are moving up into apartment homes from informal and single plot homes for the first time in their lives. While this phenomenon can be considered to have occurred over the past two decades the lack of attention to the phenomenon from an academic perspective, especially to changes happening in second- and third-tier Indian cities and towns became evident over the course of this research. This significant social and economic phenomenon of home culture and its implications for domestic energy use and everyday energy practices has not received its due attention. Studies that have looked into the design of housing in India have indicated a dearth of apartment-level housing studies in the country (Neelakantan, 2013). Thus, noting such a phenomenon of changing home culture through housing type and its implications for everyday energy practices through a field-based design practice can be considered as another contribution of this design thesis to home culture, housing studies and energy studies on India.

From Electrical to Electronic Control

Changes are on-going in energy systems globally. Because of environmental considerations, condensed non-renewable energy sources from beneath the earth are being replaced with sources from above the surface, resulting in large changes in energy systems. At the same time, energy efficiency is being cited as an energy source, and energy and electricity grids as distribution systems are being subject to increasing efficiency. With the deployment of advanced metering infrastructures since 2010, the electricity grid is increasingly coming under the purview of electronic and software-based controls. The change from the electrical to the electronic and algorithmic for energy control has become definitive over the past half century. This change, citing efficiency, convenience and technology development, has implications for the domestic realm, for the idea of home

	ELECTRICITY USE AS AMENITY			ELECTRICITY USE AS AMBIVALENCE			
YEAR	1880–1930	1930–1970	1970–1980	1980–1990	1990–2000	2000–present	
ACADEMIC DISCIPLINE	Physics, Engineering	Economics	Env. Psychology, Consumer Research, Market Research	Sociology	Anthropoly, HCI	Design, Art	Activism
DEVELOPMENT OF PURPOSE OF DOMESTIC ENERGY USE AS INFORMATION	Accuracy for commercial-ization	Consumer billing	Feedback for behaviour change	For screens and displays, Informative billing	Social comparison, Live monitoring, In home display, Home automation	AMI, Net Metering, Algorithmic regulation, Information visualization, IOT, Art, Open data	
ATTRIBUTE OF INFORMATION	Coarse, Delayed		Fine, Delayed			Granular, Live	
STAKEHOLDER CENTRICITY	Industry		Consumer			Prosumer	
SERVICE USE CASE	Techno scientific measure/service transaction		Techno scientific measure/ Service transaction/ Consumer information			Environmental feedback for consumers, Automation, Base for algorithms	

TABLE 01
Historical tracing of the term 'Domestic Energy Use Information' in various disciplines and characteristics of its use.

itself and how it has been evolving since the deployment of electricity as a domestic service. This wave of technological change has not missed urban India, but is spreading, albeit slowly.

In this context, the few studies which comment on the development of regional power systems, the political implications of the spread of electrical technology and its accompanying issues, made as part of doctoral dissertations (Coleman, 2008; Kale, 2014), note the scant attention that has been paid to the topic of the historical development of electricity as a technology in India. By considering energy use information as data, this study notes the changes in electricity as a technology, not just in India but also globally.[12] It can thus be positioned as making a note within a historicity of technological changes of energy as a networked domestic service. With such an emphasis to the on-going historical transition from the electrical to the electronic and algorithmic for energy control and this study's positioning as a field-based design practice of energy studies, I present the concept of the Electrome.

ELECTROME

Electrome (Acharya, 2015)[13] is a working concept for presenting this design practice, so its aim is not generalization or arriving at an overarching model. Its purpose is descriptive, towards design inquiry

12 As a related exercise, the study traced the use of the term 'Domestic Energy Use Information' by various academic disciplines historically over a period of 135 years (Table 01). With this exercise, it noted a change between late 1960s to early 1970s, when a variety of humanistic academic disciplines begin using domestic energy use information within their research. The study makes a note of this period as a conceptual divide. Along this timeline, the study also positions the rise in the interest of design academics in domestic energy use information in the late 1990s and early 2000s.

13 A paper titled 'The Electrome bound body form', was presented in the proceedings of the IndiaHCI'15 conference in December 2015. Some parts explicating the concept and definition that are presented here also formed part of that paper.

and interrogation, and it is presented in that light. As a working design concept it is hypothetical. At its core, Electrome is a hypothesis about the relationship between 'being home' and everyday domestic practices that constitute and are constituted in electrical and electronic flows that are largely experienced as being normal. With energy flows that induce comfort and notions of control, that mediate everyday meaning and also are subject to techno-scientific measures, Electrome is a maker and mediator of everyday living and relations.

The mention above of the handing over of the charge from the electrical to the electronic was to indicate the relation and the difference between the electrical component and the electronic. While electrical signifies power and energy, electronic pertains to signalling information. The former is confined to current and voltage, while the latter goes beyond, with the control of electrons. While this difference and relation is made, the choice to use the term 'electro' in the prefix of the Electrome is to signify the coming together of the electrical and the electronic in our current everyday domestic living. Therefore, I take the liberty to use 'electro'[14] for both electric and the electronic components within the Electrome as a working design concept. Then, as I mentioned in the introductory chapter, the focus of the thesis on electrical energy use in the domestic realm has dual concerns, one about energy use at home and the other its informational aspect. The former relates it as an ecological concern, and the latter raises the issue of electric energy use and its relation to the privacy of the domestic realm. The 'electro' in the Electrome gathers both issues, the energy aspect and the informational concern, signifying the coming together of the research focus of both the ecological concern and related privacy issues in the domestic realm. Electro as a term then also signifies an ambiguous qualm. Set in an ambivalent environment, it powers progress, it has polluted, it signals development it has displaced, it provides energy as a means and its measures are used for snooping, surveillance and control. If the All-Electric Home is being mediated more than before by the electronic component, then what should we term it? A response to such a question is a working design concept, termed the 'Electrome'.

One of the inspirations for the term Electrome comes from the acronym AEH. Domestic electrical connections in India have two categories, AEH and called non-AEH. AEH stands for All-Electric Home. It falls into the fifteen ampere category and corresponds to a 3.5 kVA load, while non-AEH comes with a five ampere limit and corresponds to a 1.15 kVA load. AEH domestic connections are associated more with urban domestic environments, while non-AEH connections are more prevalent in rural areas. That makes non-AEH homes more numerous within the Indian

14 The prefix 'electro' has been used before in the work of Anthony Dunne in *Hertzian Tales* and also *Design Noir*. However, this distinction between electrical and electronic, where one pertains to energy and the other to information, is not clarified in either work.

context, even though the overall energy use is much higher from AEH homes (Murthy & Reddy, 2001). The apartments that will be discussed from the Indian fieldwork in the coming chapters fall into the former category. The empirical chapters that follow will present electricity as energy use from the apartment residents' perspective.

Electrome: Noun/Verb

Electrome is both a dwelling process and a place. It is where the sensorial experiences of people by the means and measures of the electro as a standardized technology form, normalize and are justified. For and through the Electrome, everyday bodily practices get converted into universal and standardized measures, becoming part of technical, economic and legal processes. It is when and where energy use from everyday domestic practices is transformed into information. The informative measures originating in the personal and private realm move into various electro and non-electro-networks, whereby the authorship, ownership destination and even purpose of the measures remain ambiguous. The destiny of the Electrome is the human body, its normalization and justifying electro-control.

The telephone connection, the electric connection, the Internet router and all such networks that measure with a meter and convert everyday domestic practices into electro-information and transmit it to external bodies like housing maintenance bodies, utility companies, corporations and governments become the formative elements of the Electrome. Their multiple relations combined with the body practices of people, through appliances, switches and swipes forms the Electrome[15]. In this work as a design thesis, I focus only on the energy use measures of the home. In particular, I do not address other equally relevant aspects, like that of the broad range of electronic data from radio waves to social networks and their constituency within the Electrome. As a hypothetical construct of a design practice, the Electrome questions, inquires and interrogates the position of electricity as energy through its measures of use within the everyday home. As a design concept, the Electrome is for questioning the potentials and concerns of transforming everyday practices into universal and standardized measures. By questioning the measures as a means of electrical energy and its dependency, the inquiry presents the inherent coupling within as an ecological concern and an informational concern, as it plays out within the everyday Indian apartment home. Through conceptualizing the Electrome, as a coming together of the ecological and informational concerns, the design practice constructs the questioning and interrogation of the Indian apartment home as a domestic realm.

15 There is a former Canadian television brand by the name Electrohome. It is both spelt and pronounced differently from Electrome.

At the scale of an apartment as a domestic unit, setting up the Electrome can be understood to take place with the positioning of the electricity meter with its relation to the premises of a home. Madeline Akrich (1997) sees the electricity meter as a basic technical tool that codifies and quantifies the relationship between the individual/consumer and the electricity company, generating a symmetrical effect on the producer/consumer relationship. Once this symmetrical relationship, with its codification and quantification ability, is set within a premises, the Electrome is literally and legally in place.

EVERYDAY PRACTICES TO STANDARDIZED MEASURES: REDUCTION

As and when a dwelling needs and allows electricity to manifest within it and a measured electric flow meets that need, the premise for the Electrome is set. The next essential component for the Electrome is the measure of the electric flow in standardized units. Technological standardization in universal measures is imperative for the Electrome, to receive electrical power within electro-artefacts, to deliver it within transmitting networks and for it to spread as a universal value. This is where numerical reduction occurs, making measures an imperative component that is far from the experiential realm but intimate to its composition. In this way, the Electrome houses a temporal process where the measurement of energy use occurs for all practical purposes, facilitating the collection of traces of everyday energy practices through reduced measures. Thus the Electrome is also where and when energy use from domestic practices is transformed into data. These measures, manifested physically as bills, receipts and digital records, have multiple purposes, and move around in various socio-electrical-economic networks, from technical and legal to social, feeding and consistently and reflexively transforming the Electrome.

Within these networks, the Electrome also allows a route for these measures to be traced to its origins, directing towards people's identities and practices, thus transforming them further into information. When they are traceable, these measures pointing to people's practices and identities are in distinguishable standardized and universal units, making them reduced representations and imprints of everyday energy practices. This premise of the Electrome as a reduction of everyday practices into standardized universal measures, is becoming more granular with time, with Advanced Metering Infrastructure growing in swathes. From being used for distributed energy networks, for home automation, for dynamic energy markets and as information for feedback for efficiency and energy reduction, universal techno-scientific measures are pushed and pulled through algorithms. These universal measures forming the premise of the Electrome are in a state of constant evolution. To keep track of its

evolution and how they are purposed and used by various entities is not only a technical matter of academic concern, but it is also a design imperative to trace and track it for its social, cultural and political implications.

ELECTROME AND ITS AMBIVALENT PROSPECTS

The first premise of the Electrome formed with the coming together of the electric network with appliances through the everyday practices of people. In the second premise, it took its place in the realm of numerically reduced measures and got into the receipts, accounts, databases and servers of institutions and companies. If the Electrome forms with and between the two premises, then what are we to make of it? What other than the banality of everyday living that that uses networked energy services can be concluded from the Electrome?

The Electrome firstly gets its position and its characteristics, which make it neither personal nor collective, neither domestic nor corporate, neither private nor public, neither material nor immaterial. It exists in the interstices of the relations between ownership and service provision, straddled in suspension between coffee making and the Cloud. Its formation and density can vary and it is not consistently patterned as it gets drawn between devices, appliances and the home and their connections and the various external bodies that gather the energy use measures as data and distribute it.

The Electrome remains in matters of negotiation, within transactional networks and in speculative economic models and future technological visions. As energy use patterns formed by domestic practices within the home, its measurements in the form of data collected by the utility service providers with their installed meters further move into the records and servers, and these recording platforms do not come under the ownership of the households. If these consumption patterns and measures are treated as data, then it moves into the domain of the entity that invests in collecting the data. Thus, while the authorship is within the household practices, the ownership of these measures as data becomes external, as measures of the market. The Electrome carries the reflexive relation that is present between the home and the market through the electro-networks, making the reflexivity ever more hyperactive and dynamic. Much concern continues to be expressed about the data privacy of homes yet there is a continuing rise in the platforms that afford the gathering of personal electro-data.

Thus, the Electrome's context comes to the fore as and when live energy measures become part of the collective demand response and shape household practices through peak time energy charges or through dynamic energy pricing via market mechanisms. While in some cases affordable energy prices may not affect decision-making on everyday household practices, however it would not be appropriate

to exclude this when shaping routine decisions in any case. In addition, while feedback through smart energy monitors may or may not affect immediate household decisions, routines and practices have been on-going as trials over the past twenty years to nudge practices towards particular times of day or domestic practices are even subject to remote automation to match pricing programs. Will this issue in the context of solar and wind power as energy sources that are not independent but naturalistic cycles actually shape household practices in the long run? Will the dynamic measures begin to affect everyday energy practices? Who and where should we position agency in such an interaction? The Electrome holds such an issue in speculation.

Finally, within the context of the Electrome, it references multiple-member households and their domestic energy use. Measuring of energy use covers the entire household as a collective rather than implicating individual family members. While the domestic energy billing may be addressed to a particular member of the household, it cannot implicate specific individuals of a household within any particular consumption pattern. While there are services that work through specific device connections or smart and advanced metering to indicate the consumption of specific devices and their patterns of consumption, it would be highly problematic to implicate an individual for a particular measure of energy use in such a context. Such an attempt, as will become evident in Chapter 3, is conceptually challenging, as energy use is relationally distributed throughout the home. Thus, energy use measures implicating a single person within a multiple-member household can never be exacting and should not be. Then what of a single-member household? What of a single person using a room within a multiple-member household? What of a single person in a multiple-member household who is alone at home for a period of time? Implicating an individual within energy use measures has its limitations. While measuring consumption in granularity is a characteristic of the efficiency paradigm, mapping it onto people through ownership is invariably limited. This forms a limit of the Electrome.

As a design concept, the Electrome does not intend to be model but concludes in ambivalence, embodying the spirit of its times. Above, I discussed the issues and concerns that emerge when considering the premises of the Electrome. It stands only by being conceptualized for a design inquiry with a hypothetical characteristic, which is its sole purpose. A home is many and much and not just one, which takes the Electrome's logical conclusion to be a hypothetical construct for an experimental design practice. Through such a conceptual construct of the Electrome, I present the potentials and concerns of making open domestic energy use information through a field-based design practice undertaken in India.

CHAPTER 03——SKETCHING ELECTRO-RELATIONS FROM INDIAN APARTMENTS

MEETING INDIAN APARTMENT RESIDENTS FROM THREE CITIES

The realm of home as material culture and its practices has always attracted theoretical interest. This should continue for long as there remains a sense of self, possessions, family, dwelling and such matters that are materially mediated within a shelter felt and understood as home. One of the objectives of this research is to further the idea of home and dwelling both *for* and *by* a field-based design practice. Taking domestic energy use, its practices and the resulting information as its central concern, I position this as a study of the home made through a field-based interrogative design (Deutsche, 2011) practice. The practice's site (Latour, 2005:88-91) of construction, intervention and interpretation is largely presented in this dissertation as apartment living in India, so this can be seen as a field-based design practice conception derived from the Indian apartment home.

In the coming two chapters, I build on my initial fieldwork in India. I undertook my first field study at the end of 2010 and the beginning of 2011. I travelled to India and chose three apartment blocks in three cities of the southern Indian state of Karnataka: Manipal, Mangalore and Bangalore. These three cities are of varying population sizes. I started in Manipal, a small but cosmopolitan campus town. This was where I studied for my undergraduate degree in architecture, and during my field research for this study I requested my former college to take me as a visiting researcher, which they kindly agreed to. The next place was Mangalore, a coastal city 60 km from Manipal. This was where I first worked as a junior commercial architect involved with teams that designed and supervised apartment homes and commercial complexes. The third city was Bangalore, the state capital of Karnataka. After having become disenchanted with very commercial architecture, it was in this city that I first started doing user research in interaction design and usability. When I started my research, my interest in everyday apartment living was broad. Daily 'material' resources like electricity, water and energy resources like liquefied petroleum gas for cooking were all of equal interest. While I began my research with the premise of informing people about their everyday material use, it seems now that it was inclined towards ideas of saving and conservation. As the study progressed, the route of choosing design practice with material measures became directed at issues that went well beyond simple matters of conservation and saving. The research began by looking at ways to measure the use of resources, bundle them as information and put them into people's personal communication devices, such as mobile phones, which I imagined to be worthwhile and useful (Acharya, 2009).

With such an intent, my aim was to study Indian apartment living and first try to gain an understanding of everyday material usage from apartment dwellers. At this stage, considering I mention 'gain an understanding' and 'from apartment dwellers', I wish to clarify some

methodological aspects concerning this field-based design research. Other than Latour's *Reassembling the Social*, mentioned in the first chapter, my preliminary approach to understanding everyday living through fieldwork was also shaped by preparatory readings from cultural anthropology (Eriksen, 2001; Keesing & Strathern, 1998; Geertz, 1973). While I chose three different cities and three different apartment buildings, the preparatory readings laid the ground for choosing a small and manageable number of families to interact with. So through my old acquaintances in the three cities of Manipal, Mangalore and Bangalore, I chose three apartment buildings in which to meet residents in their homes to gather an understanding of their daily living. From each apartment block I chose four families and set up times to meet with them. With such a background and the limited number of families, it was clear that gathering data through fieldwork would not be approached as 'sampling'[16] and the agenda was not to make generalizations or summaries about the attitudes and mind sets of Indian apartment dwellers across a limited number of families. Instead, all through this dissertation I have approached each interaction, interviews or sessions with participants, as its own case. The preparatory readings, especially on 'thick descriptions', introduced the approach of generalizing within such cases instead of across cases. Following from Geertz's (1973: 21-27) discussion, all the cases can be considered as being microscopic and based on clinical inferences where I treat each case separately and do not summarize across cases. Then, since each case is approached separately, this provides the opportunity to compare one case with another. Comparison across cases is undertaken only when two different cases present an opportunity to be compared, leading to specific inferences. When such a comparison is made, it is preceded by a step-by-step logic leading to the inference.

Furthermore to argue with a limited number of cases within this research I would like to direct the attention towards a discussion on the study in the logic of comparative inquiry(Meckstroth, 1975: 132-137). In his article titled "Most Different Systems" and "Most Similar Systems", Meckstroth presents about the comparative method. The article begins by presenting the comparative method to be not only one of the basic methods[17] for establishing empirical propositions but also one of the most basic scientific methods. When comparing similar systems Meckstroth argues that having a large number of cases does not provide sufficient conditions to discover relationships between variables that differentiate comparable systems. Then he says that non-similar or most

16 The interviews and sessions from twelve families from three different cities could be considered as dimensional sampling (Arnold, 1970). All of the persons from the families that were interviewed were apartment dwellers, and upper-middle-class Indians living in an urban context. Their dwellings were in an apartment building consisting of commercial housing services, built and maintained by private enterprises located in a small, medium and large city in southern India.

17 The other three are the experimental, statistical and case study methods. See (Meckstroth, 1975:132).

different systems can also be subject to a comparative inquiry. However when comparing most different systems it is important to disregard and eliminate the differentiating systemic factors. For this the inquiry needs to look for variations at a lower level than at systemic levels. He further clarifies that when comparing most different systems the procedure of disregarding systemic factors requires taking into account the relationship between the independent and dependent variables. Thus when comparing different systems this aspect of the relationship between the dependent and independent variables between different systems plays a determining role than comparing with a large number of cases. The aim of this discussion is to clarify that according to the logic of comparative inquiry, two very different contexts as systems can be compared and also with a very limited number of cases. With the above references, especially from Geertz and Meckstroth as methodical notes, next I shall describe the first field visit in the southern Indian state of Karnataka.

Before meeting any of the residents as participants in their apartments, I met personnel such as the apartment manager through the apartment office and conveyed my interest verbally or by handing over a letter of intent to present to interested residents. When possible I met the participating residents beforehand and personally explained my interest in meeting them, after which we fixed a time for my visit to their home for the main interview session. Alternatively, I fixed an appointment with the residents through a common acquaintance who verbally communicated the intent of my visit. Therefore, most of the residents were broadly aware of the topic of my visit before I met them at their homes. In this way, they were suitably informed of the purpose of my visit, its intent and also the topic of interest for me visiting and meeting them.

The meetings with the families at their homes consisted of a number of field-based exercises. After an introductory session, an exercise of co-constructing one day in the life of the residents including activities, artefacts used and their intentions was undertaken by making day in the life charts with them. In this exercise, the residents were asked to recall their previous day hour by hour and make a list of the activities they carried out within their home. After this exercise, they were asked to sketch their homes in plan, and on the drawing they were asked to locate electrical sockets and switches, appliances and water points within their home. Next, on the drawing they also marked the rooms where they spent most time and which they thought consumed more energy according to each of them. Based on the charts and the drawings, they were asked to choose an activity of their choice and enact (Iacucci, Kuutti, & Ranta, 2000) it within their homes in the area they had mentioned on the drawing. This was video recorded and the rest of the meeting was audio recorded. The residents' description of their home as text in the day in the life charts, drawn and annotated in sketches, and shown, described and enacted in place by the residents in this manner

provided a rich and layered representation from them. This data laid down the initial ground to begin framing home and the everyday practices within it. During the final stage analysis, this data proved useful in viewing the home as a nucleus of continuous temporal practices and interpreting the arrangements (Shove et al., 2012: 8-11) of the home as a complex of artefacts and practices.

Apart from being with the families and interacting with them in their homes, I also met, interviewed, video or audio recorded apartment infrastructure maintenance personnel, apartment office managers and where possible and willing members of the apartment owners' residents' association. I also met and interviewed some of the architects who were involved in designing the apartments and the builders/promoters of the apartment buildings. In total, there were thirty-one respondents, comprising twenty-two residents of which four were the residents' association board members. I also met and discussed the research topic with one association member who was not a resident participant, one apartment promoter/architect, two architects/designers, three building maintenance managers and two building maintenance related personnel during the first field visit. Other than these interviews that focused on the apartment context, I also interviewed a retired state electricity division engineer, a water management expert and an architect who specialized in domestic architecture.

From this initial exploratory study, I will next present the apartment context, as 'outside' and 'inside'. Within this description I will present seven families and selected maintenance personnel who supported their daily living in the background. The 'outside' is the semi-public maintenance area that I describe as having a reflexive relation with the daily living within the apartment homes. I present the 'inside' using seven cases from different families from the three cities. I use a descriptive treatment in this chapter and the next. In both of these chapters, I take inspiration from the anthropological approach of portrait presentation (Miller, 2008). Not just in the presentation of the following cases, but as mentioned earlier, while preparing, approaching and conducting the fieldwork, I have taken inspiration and interpretation from anthropological methods of inquiry (Eriksen, 2001; Keesing & Strathern, 1998). However, the cases and descriptions that are to follow cannot be considered detailed anthropological portraiture from a disciplined ethnographer. Instead these are quick storyboard-like textual sketches (Buxton, 2010: 135-139) of everyday interactions made by an interaction designer in the field. These interactions lasted anywhere from an hour to a little more than two over a single to a maximum of three meetings with both worker personnel and household members. These presentations of the seven cases are from an initial exploratory study, and should be viewed as such, through which I begin to make the grounds for presenting a field-based design research practice. While these are described as initial field sketches, they have

been worked on later with annotated layers and coloured markers for their analysis, all forming part of the presentation. To begin the presentation of the cases, let us now proceed from the outside to the inside.

OUTSIDE: BACK-UP INFORMAL

Madan is one of the four electricians employed by the apartment developer maintenance unit in a Bangalore apartment complex. He wears the official company uniform like the 36 others who are employed to maintain the services of the 120-home apartment block in a Bangalore neighbourhood. This very upmarket apartment block is located close to a software technology park neighbourhood, with many of its residents wealthy professionals. Madan works six-hour shifts, and at least one electrician is present on duty on the premises at all times.

Madan took me to the electricity yard of the apartment block. He recollected only a single resident who once asked him to take him here so that he could check his home's electricity meter reading. Otherwise he said that it was rare for the residents of the apartment block to visit this area. The yard is on the outer edge of the apartment property, separated from the road by a compound wall. From an electric pole on the public road just beside the compound wall, a sheathed thick cable enters the apartment plot area's well-protected transformer set-up, bringing in power from the state utility company. At the transformer, the power is stepped down to 440 volts for three-phase connected homes and 220 volts for single-phase connected homes. In these two categories, the power is distributed to all the 120 homes in the apartment block. Beside the transformer site is a rain-roofed set of five grey metal cupboard-like housings, four of which contain all the electricity meters for the 120 homes. There are also two separate meters that measure the electricity use of the common areas and services, whose cost is distributed to all the homes through their monthly maintenance fees. A closer look at the meters and their readings can reveal and even help in guessing matters related to the apartment block. How many homes does this apartment block have? How many are occupied? How long has a home been occupied? Which homes are occupied at the moment? How many of them are home at the moment? Might any of them have turned on their air conditioners or washing machines? A meter housing at a building allows itself to be read into.

Next to the electricity meter housing cupboards is the fifth similar housing that does not house the electricity meters but instead is marked as the Emergency Panel. It houses the power cut-off switchover panels for the 120 homes and also the common areas. Whenever there is a power cut from the state electric network, these panels aid in switching over the power connection to the building's fully automated diesel

FIG. 04
Madan opening the door of a meter housing in the electric yard.

generator. These are not meters, hence they neither measure individual home consumption nor each home's use of the back-up power through the generator supply.

Paul, Madan's senior and supervisor, mentioned that five- to six-hour power cuts during the late summer had been common while he has worked at this site over the past three years. He also said that the cost per unit of back-up power supply through the diesel generators is double that of the state utility power supply. Paul is in charge of the inspection, upkeep, maintenance and operation of the 250 kVA diesel generator and its automatic mains failure panel in the basement of the apartment building. He looks after the daily oil level checks of the generator motor, its battery maintenance and the periodic cleaning of the entire generator set-up.

Going back to the electricity meter housing, it has a monthly visit from Sridhar, a meter reader from the state utility company on the fifth day of every month. He checks the readings of all the running meters, prints the bills on his handheld printer and delivers them to the security office at the entrance, who hand it over to the apartment maintenance office, from where it gets delivered to all the apartments. Madan and Sridhar know each other and so do the rest of the electricians such as Paul who work at the apartment. Sridhar's telephone number is held at the apartment's maintenance office. Madan says it is important to be able to contact Sridhar whenever possible, day or night, especially during times when there is only single-phase power supply or during day-long power cuts so that the apartment maintenance personnel can plan their diesel supply for the apartment generator or ask him when the power supply will be restored.

In this manner, the apartment maintenance personnel employed by the real estate developers of the apartment maintain an active relation and contact with state power utility personnel through an informal network via which they support and retain the smooth daily living of the apartment residents. The electricity yard, the electricians, the generator space in the basement, the maintenance office, the access to the mobile phone numbers of state utility personnel: the common maintenance unit of the apartment building as a whole can largely be seen as an in between place that goes largely unnoticed. It is where the apartment maintenance personnel are in interaction with the utility state power network, where they discuss breakdowns and their occurrences and plan collaboratively to mitigate failures of electric services, making sure the wealthy residents experience minimal power cuts and low voltage within their homes. This is the place that retains daily living, bridging shortages, by providing it as a paid service to the residents.

Like the electrical power back-up through diesel generators, a number of other services such as water supply, water treatment, garden maintenance, swimming pool maintenance and sewage treatment

fall under the common services of the apartment block. The active running and maintenance of these comes under a contractual cooperative network between the real estate developers of the apartment building, their employees as the maintenance personnel and the homeowners' association, which are negotiated as private housing services. The place between the electric pole on the road and the doors of the private homes is a distinct place, one of cooperation and negotiation maintaining daily living through the private services of home developers and builders. As much as it formalizes normalized technologies like electricity provided by the state, it also works to mitigate their shortages through commercialized services for everyday living. As is shown in the case, this 'place' becomes transitionally distinct, electrically, legally and also physically. It is evident electrically through the power transformation, as it steps down in voltage from the pole to the transformer to the individual meters of the homes, noting their consumption. It also separates distinctly again for electricity as a service, one state-provided and the other provided by the back-up diesel generator. It is evident politically and legally through the ownership and maintenance of the area, as the residents paid for the construction of these areas when they bought their apartment, and also periodically pay for the services it renders. It becomes physically evident as being located between the barriers of the compound wall that separates the apartment property from the public road and doors of the individual apartments.

Within the context of India's economic liberalization since the 1990s (Varma, 1998:170-184), this zone can be seen as an evolving and growing place as the state opens to private investment and business participation to meet the growing everyday material needs of the people. So this common services area within the Indian apartment complex with growing facilities like power back-up, security services, children's play area, swimming pools, parks and jogging tracks can be seen as a physical manifestation of the gradual increase in the privatization of daily living. Physically as a divisional area, between one's ownership of one's home and the state-managed public road, this transitional area of private business is something commonly encountered in apartment home and gated community contexts that is not evident in single plot individual homes.

The reason for introducing these areas of common services in this discussion is to present the diminishing distinction of the public-private divide between the state as an entity that manages public services and the domestic place as a private entity. Instead, here one encounters the commercial establishment outside the home. It should also be mentioned that whatever interventions in or impact on behaviour or practices are to be considered, it would be pertinent to take into account this growing place that is involved in putting together daily living within the apartment context. Acknowledging and taking into account such an in between transitional place with the personnel working

in maintaining it, that which formalizes everyday material necessities and which also mediates the shortages and breakdowns through private commercial means becomes essential when studying apartment living and its energy practices.

From the electricity meter housing in the electricity yard, electricity enters into each apartment home and first passes through a panel board, popularly referred to by the Indian electricians as the MCB (miniature circuit breaker) board. As is popular in Indian apartment design, all the twelve apartment homes visited during the fieldwork had only one main entry and exit door. In this context, the MCB panel boards were located around the main entrance door in the living room area. To a home electrician, this panel can be what the table of contents is to an author or a building plan to an architect. It organizes the entire electric circuit of the home in one place. The MCB essentially safeguards the home circuit against voltage surges and is installed with a number of trippers. Each tripper corresponds to a fixed number of electrical outlet points within each room of an apartment home. From this almost hidden panel on the wall of a home, if checked by measuring its electric flow, there emerges an alternative view of the apartment home. It is an electro-plan of the entire home and then a place of measures spewed out by an energy-consuming home, with a branching out of numerous electrical artefacts that are constituted in various domestic practices within the home. This viewing of an apartment home through its reductive measures of energy consumption is not dissimilar to the approaches emerging today of 'smart' homes with smart meters and grids with domestic energy monitoring services that are electricity measure-centric. The idea here, though, for viewing the home in this manner is because it brings in an issue related to this research, that of being 'open' with one's home's energy use information, its concerns and also its possibilities.

INSIDE: SEVEN SKETCHES

To enter inside the apartment homes of people and look into the topical issues and concerns of residents, we will go through small narratives sketched and gathered from the field. These accounts pertaining to the residents' daily living within their apartment homes are built by interpreting and constructing relationships with their domestic appliances within particular rooms of their homes. Through this interpretive presentation, the attempt is firstly to relate through domestic appliances and artefacts the closer everyday issues and concerns of the people that go beyond the walls and physical addresses of their apartment homes. The presentation also aims to provide a gestalt overview of the Indian apartment home, through different accounts from different homes. For this the presentation of accounts has been arranged thematically in a pattern as common

in describing architectural circulations, where the narrative moves along a circulatory path. I shall cover more on this particular thematic progression in the later analytic discussion.

THE CHANDELIER BRINGS BOMBAY TO MANIPAL: THE SOUZAS' LIVING ROOM

FIG. 05
The circular flush mount type lighting fixture in the living room of the Souzas.

Fifty-two year old Nelvin Souza is a former banker. He and his family moved to Manipal, and have been living in their apartment for about two years. Before that, they lived in Bombay for thirty years. The Souzas' apartment is large and spacious. They have customized it by combining two apartments, so it is nearly double the size of the rest of the apartments in the same block. Theirs is a Konkani-speaking 'local' Manglorean Roman Catholic family. Now Nelvin runs his own venture as a financial analyst and manages the financial portfolios of high net worth individuals and companies. He is also the treasurer at the office of the apartment homeowners' association. His wife Maggie manages their home, and with Nelvin she also takes an active interest in the day-to-day activities of the home owner's association. Their son Matthew is a third year electronics and communications undergraduate at the local university, and their daughter Melissa is studying and living in another city, Pune, closer to Bombay.

During our first long meeting at their home, their prior experience of living in Bombay showed through their constant reference to it, through their comparisons and their weighing of the pros and cons of Manipal and Bombay. Nelvin, when discussing shopping for household goods in Manipal, pointed to a glass bead and golden plated metal-framed light fixture on their living room ceiling (Fig. 05). It is placed in the centre of the living room between two ceiling fans. It holds a central position in the composition of the ceiling. It is a circular flush mount type lighting fixture with the glass beads set within a gold metal frame. The bulbs fit within the spherical dome and are of the halogen type. This fixture he mentioned he had bought from Mumbai, from a street that sold only lighting fixtures and nothing else. Nelvin said that when they were buying fixtures for their new apartment home, he had enquired about light fixtures in the shops in Manipal. Ones like he was pointing out were available, but were quoted by the local sellers for nearly double the price he paid for this one. Parts of the Bombay-bought light fixture like the lamp choke he said were of a 'German make' and of better quality, whereas the ones from this town he said he thought were 'local'. He said that because they lived in Bombay for thirty years, they knew which things to get from where. He then mentioned that people in this town of Manipal bought expensive things and did not worry about the price or of the quality.

Having lived for over thirty years in Bombay, Nelvin's constant reference and comparison to their life there can be read as indicative of their recent move to Manipal. While Nelvin makes a rational argument about cost and quality for buying a decorative light from Bombay for the showiest room of their home, the living room, what is evident is that electrical artefacts, like other artefacts, move with people. Through the purchase, Nelvin not only bought a chandelier from Bombay, but also managed to carry and fix his attributes of Bombay, where he lived for over thirty years, within their new home in Manipal. The cost-consciousness, quality and competitiveness of Bombay are carried within the electrical artefact bought from there. They would not have been there if the chandelier was purchased locally. When people, products and practices move, the energy artefact and its use also gets displaced as it is carried by them. This aspect of moving people emerged as an unlikely recurring theme during the course of this research, and we shall look further into this issue in the coming chapters.

THE LITTLE SON USHERS IN BACK-UP LIGHT AUTOMATION: THE HEBRIS' DINING-LIVING ROOM COMBINATION

Anand Hebri, his wife Shaila and their two small children live in their apartment home in Mangalore. Both of them are engineers, Anand a civil engineer and his wife an electronics engineer. Anand runs a structural design consultancy that is coupled with a CAD/CAM training centre in the city centre. He manages the consultancy and teaches at the training centre, while Shaila co-manages the training centre and also teaches there.

During the interview, while discussing their apartment living and electricity use, I asked them about their experience of power cuts. Anand mentioned that before buying and moving into this apartment, they had lived in rented premises, in an individual plot house. He recalled power cuts and the difficulty living there during summer with the heat and mosquitoes. He said it was literally impossible to sleep, with no electricity and no fan during power cuts. Now he said they were happy. He mentioned the generator power as one major advantage of living in the apartment. He said that in individual houses it might not be possible for people to afford generators but in the apartment, because they shared the costs, it becomes affordable, and this for him was a major advantage of apartment living.

Anand and Shaila's apartment, upon entering from the common lift area corridor, opens directly into the living room, and then the dining area flows from it on the left, in an L-shaped plan with no boundary separating them into two different areas. On the further end of the entry part of the L is the living room sofa suite, and almost in line with the sofa is a four-seat circular dining table in the left part of the L-shaped plan. On the gypsum plaster false ceiling of this L-shaped living dining space, at

FIG. 06
The back-up ceiling lamp at the Hebris apartment.

the inner corner perpendicular area is an extra ceiling lamp positioned such that it lights up both the living room and the dining room (Fig. 06). Since it looked unusual, I asked Anand about it. He said that this was a lamp that worked as their immediate power back-up system. He had it purchased and installed two years back because of the need for immediate light when the power went off. With its in-built charging, it becomes an immediate source of power back-up for lighting, which according to Anand worked very well. The apartment's generator takes two to three minutes, or sometimes even five minutes, so they were looking for a system that would provide them light immediately when the power went off. Anand said he had decided to buy this when their first son was a small baby. He specifically mentioned that it was for him. They found the frequent power cuts in the night to be a problem, and there was a power cut at least once a day, sometimes for two to three hours. Anand said even though the generator started within five minutes, the period of time in between was the reason they went for this lighting back-up system, mentioning that it was excellent.

Here firstly we see how Anand finds the benefits of the generator-based power back-up service up through apartment living when compared to single plot home living. However, we also see his feeling of insufficiency about the apartment's power back-up service for short time periods of three to five minutes. It was this insufficiency that made him bring in his own system of reliance through a permanently installed self-charging light system in his living/dining area. The charging battery based automated lighting system Anand mentions was bought and installed because their son was a baby. Here Anand presents a familial relation and thus his role as a father in rationalizing the installation of the emergency light in their apartment home. Domestic energy appliances, their entering the home, their use and normalizing into components of everyday practices are also implicated within familial relations and roles. In addition, Anand's decision to install the emergency lamp makes him feel a responsible father, whereby an emergency light source and its installation play a part in performing and maintaining a familial relation. When considering domestic energy practices and familial relations within the household, its performance and maintenance are not separate from these. As seen in Anand's case, it has brought in a new appliance, setting an automated normalizing process within his home.

DOMESTIC HELP AND DELEGATING TEMPERATURES: MANJULA'S KITCHEN

Manjula and Pranam live in the same building as Anand Hebri in Mangalore. They are both architects and run their own combined studio-based architectural practice. They too have two young sons, who attend

FIG. 07
Manjula using the fridge in her kitchen.

kindergarten and primary school. Running a busy architectural design practice in a growing city does not leave Manjula with time to cook and manage household chores, so they have a domestic help to cook and also a live-in help for the kids. Their domestic cook has been working with them for seven years and she cooks food for the family every morning. Both Pranam and Manjula visit home from their studio office for lunch, after which they head back to work. In the evening, Manjula gets home earlier than Pranam and gets dinner ready for the family. Their dinner's main course, rice and vegetable gravy cooked in Manglorean style, prepared by the cook, is stored in the fridge (Fig. 07). Manjula prepares dinner for the family by reheating the vegetable gravy on the LPG cooking gas stove, and the rice gets warmed in the microwave. Manjula states that the microwave is a basic necessity of her kitchen. When mentioning power cuts and the provision of the generator as part of their apartment housing services, Manjula said that they only know that there has been a power cut because the fifteen ampere socket points do not work. With the back-up generator, it is only the lighting circuit that works.[18] Then she mentioned that she would be more than happy if the fifteen ampere power sockets were working as well. During a power cut, if their apartment is powered by the back-up generator, then the microwave does not work and neither does the fridge. She said that she was OK with the fridge not working for a while, as the food inside will remain cool for some time, but not having the microwave working becomes a problem at dinnertime. Since her children need to eat in the evening, she has to heat up dinner at the right time, and cannot ask them to wait because of a power cut. So, then it's an effort for her, without the microwave, getting the rice into the pressure cooker and putting it on the gas stove. So that is convenience and a 'basic necessity', said Manjula and during such times, it is secondary to her whether power is being consumed or diesel is being used with the generator.

Here, through Manjula, a practising architect and working mother's account the persistence of the normalization of the microwave oven can be interpreted despite the power cuts. She considers the working of the fifteen ampere socket for the microwave oven as a 'basic' necessity. As in the case of Anand, performing familial roles and providing food at the right time to her children override any concern relating to the type and source of energy. Then, what is also seen is her managing of daily household cooking by hiring a domestic cook who works in her kitchen every day, making the kitchen a materially diverse place and a place of diversity in delegation. The kitchen can be firstly interpreted

18 The Indian standard power output through sockets can divided into three categories: two and half amperes, up to five amperes and above fifteen amperes. The using of the microwave falls into the third category. The generators of this apartment in Mangalore catered only for the lighting circuit and the five ampere category appliances.

as a place of diverse changes because of the constant energy changes within it. With the arrangement of its appliances, the kitchen can be seen as a place of immense temperature differences played out through the combination of the refrigerator, microwave and gas cooking stove, with the processing of food and its undergoing constant cycles of heat and cooling. Through such appliances, the kitchen has evolved to be one of the most diverse places in terms of temperature, also making it one of the most energy-intensive areas of the home.

It can also be interpreted that cooking as a daily domestic practice for Manjula involves delegation, to the domestic cook, the refrigerator and also to the microwave and gas stove. This complex, as a combined arrangement of persons and appliances, constitutes Manjula's everyday living. The rice is cooked and kept in the refrigerator by the cook, and in the evening Manjula warms it in the microwave. The labour-saving appliances of the home and the hired domestic cook co-exist, becoming supportive of each other.

ABSORBING DIFFERING VIEWS: JOSE AND MARIA'S HOME OFFICE

Seventy-year-old Jose Selvaraj is a nuclear plant designer who went to study post-graduation in the US and eventually ran his own large plant design company there. In 2008, he and his wife Maria, five years younger than him, decided to move back to India after being away in the US for forty years. Their two sons, one a doctor and the other an electronics engineer, had both settled with their families in Chicago. Maria and Jose had wanted to retire to a better and warmer climate than the cold snowy environs of North America, and Bangalore was also the city where Maria had lived before she married. Jose now does consultancy work with Swiss and Indian nuclear companies while Maria does medical billing for US doctors and also manages and runs a school in Bangalore. Theirs is a large apartment home set between lush landscaped greens by one of the better builders of the city. They, too, had bought two apartments and had them customized as one home, according to their taste and needs. They seem content with their apartment's customization, as Maria said that they got to see India only when they went out of their apartment, otherwise it was just like living in an American home.

When discussing with Jose and Maria about their using of light, switch and electrical points in their apartment that was customized to an American style, I asked Maria if and how the locations of these mattered to her. She said that they did not matter to her. Then Jose immediately asked her, what she meant by it did not matter to her, as she was the one who had insisted where she wanted the lights. Maria then said yes, when they built the house she did speak about these things to

Jose, and told him what she wanted and where she wanted them. But then, laughing, Maria said that after it was built, it was automatic: now her hand moved to where there was a switch.

Jose and Maria's morning routine begins at around seven in the morning, soon after which they begin spending time in their home office. This home office accommodated in the customized apartment is sandwiched between their guest bedroom and the main entrance. It has a window, and on that wall is a fixed table running the entire length (Fig. 08). On this table are two personal computers, a television, a printer and a scanner. On the left side facing the wall sits Maria with her computer screen. On the right sits Jose, with his computer, and further right a television. The placement of the printer and scanner in the middle separates the table into two distinct areas. At this time of day, Maria checks her email or plays Solitaire on her computer. Jose meanwhile works on his nuclear power plant design consultancy work. By Jose's side, the television with the sound on plays a Tamil language movie channel. He mentioned that the television was always on whenever they spent time in the room. I asked Maria how she would feel if she were to be informed about her home's electricity consumption on her computer screen when she was using it. She replied that she is a spender, and she likes to spend, and it would irritate her if her computer told her how much she spent. She said she knows it has to rotate, there needs to be spending and receiving, and it cannot be only receiving, so feedback would irritate her. When I asked Jose this question, based on the background of the discussion, he assumed it was about reducing their energy use. He said that he would like to reduce power consumption if he could, not because he would save a lot of money, since the power part of the cost for him percentage wise was very low for him, but because there was a shortage of power in India.

In the initial short account from Maria of her use of switches in her home, she notes how her body and the switches as electric controls have evolved a relation with each other. When they were customizing their home, she insisted where she wanted what lights and switches. Now her body responds to where there is a switch. Firstly, we have the issue of material artefacts and body practices being reflexive to each other, and the fact that everyday actions are performed sub-consciously is evident in Maria's account. Next is a conveying of varying attitudes towards their general domestic energy use between Maria and Jose, a couple married for over forty years. While this can be regarded as being similar to differences on many issues amongst members of households, when it is mapped conventionally, energy use

FIG. 08
The work-table at Jose and Maria's home office.

information at a household level implicates the entire household rather than individual members of a family. As a collectivizing entity, domestic energy use information at a household level can be seen as a measure that holds and brings together the family as a unit. Through the case of Jose and Maria, it can be inferred that the interpersonal relations that have evolved between family members easily absorb any difference in attitude towards conserving domestic energy use, which is further reified by the low cost of electricity as a service.

BODY NORMAL WITH THERMAL COMFORT AND DOLLAR RATES: DR PAVAN'S BEDROOM

FIG. 09
The flat screen television in Dr Pavan and Anagha's bedroom.

Although Dr Pavan studied to be a dentist, he moved on to being an industrialist after his graduation. His business deals with the manufacture of Forest Stewardship Council certified plywood, which he described as a 'green' product. During our meeting he said the 'green' concept was clear to them through business. He lives with his wife Anagha and their four-year-old daughter in a three bedroom apartment home in an upmarket residential area of Mangalore. They said they were waiting for their daughter to grow up and then Anagha could help her husband in his plywood manufacturing business.

Dr Pavan wakes up around 07.30 in the morning. The ceiling fan in his room is running, the curtains are drawn on the window, a fluorescent tube lights up the room. There is a window unit air conditioner in the room that they use only in the night. During the Indian south-west coast winters, Dr Pavan and Anagha turn it off at around 01.00 in the night. In the summer, they run the air conditioner throughout the period of their sleep. There is a flat screen television (Fig. 09) on the opposite wall to the bed. Upon waking, Dr Pavan turns on the television and watches the morning news headlines from bed. His interest in watching the television first thing in the morning is not only the news headlines, but also because the financial channels publish the dollar rates against the Indian rupee. This impacts Dr Pavan's business decisions in his plywood manufacturing for the day. After watching the television for about half an hour, he enters the attached bathroom to freshen up for the day.

Here we see Dr Pavan's morning routine in his and his wife's Anagha's bedroom. The place where Dr Pavan wakes up becomes a bedroom because of the tube light, the fan, the air conditioner and the television, without which it would not be a bedroom. Within this place there is no sepa-

ration, between feeling thermally comfortable and knowing the dollar rates for the day: bodily comfort and information that impacts one's business gather together in everyday normal banality when waking up in the morning.

ENTER BEST PRACTICE IN CRISIS: DR SHENOY'S BATHROOM

FIG. 10
The hot water electric geyser in Dr Shenoy's bathroom.

Dr Shenoy's home, although sparsely furnished, has tasteful decor. The orange coloured thick cotton upholstered sofas set against light coloured walls and floors provide a vibrancy that highlights a contrast in the living space of their home. He is a well-known personality in the region, a professor of Pharmacology at the local university, a newspaper columnist for over thirty years who in his past worked as an environmental activist in the region. Like a few senior public personalities in India today, he works bilingually. He writes his columns mostly in Kannada, the regional state language, but otherwise with urban English educated Indians like me, who are constrained in their own regional languages academically, he expresses his thoughts and opinions well in English. He lives with his wife in their seventh floor apartment that provides a vast view of the Indian south-west coast from their balcony. He is also the board member of the 'society'.[19]. Having travelled to different parts of the country for work, Dr Shenoy recently decided to come back and settle in Manipal. It was only three months since they had moved into their apartment.

During the discussion about their apartment living, Dr Shenoy expressed his concern about the apartment builder, saying he was not entirely satisfied with the quality of the construction, especially the way in which the apartment's electrical wiring and plumbing had been done. During our meeting in his apartment's living room, Dr Shenoy asked me to follow him inside into a bedroom's bathroom. There, he pointed at a twenty-five litre hot water electric geyser (Fig. 10) and showed a water leak. A drop of water drips from a plastic pipe of the electric geyser tank every half minute or so. He keeps a bucket below the dripping. The bucket was almost three quarters full. He said the water had been collected over the past twelve hours and could be reused. While

19 Here being a board member of the society means being a board member of the home owners association. Society in a colloquial sense refers to the all the other families who live within the same apartment building or block. Within the context of Indian apartment living, society refers to an association of families in an apartment block. This will be much to the chagrin of Actor Network theorists, who claim that society is comprised of associations. More strictly, within the Indian apartment housing context, a 'society' refers to members of the homeowner's association within an apartment building, and not necessarily tenants.

he waited for a plumber to fix the issue, he justified that by storing water from the leak he also secured water in case there was a shortage at any time. He said there had been problems with water shortages and sometimes there would be no water flowing through the taps. When someone turned on the tap, there would be no water flow and the person would forget and leave the tap in the on position and leave home, then when the water filled the tanks, the water would be wasted through the open taps without anyone knowing. He mentioned that in the entire building's plumbing there was no provision to disconnect one home's water supply if there was such a problem. He expressed that within an apartment block where the infrastructure is shared, such problems can affect a lot of people. If there was a water tank for each home, each home would be accountable, but in the case of the apartment building there was a single pipe for all nine floors. Water was wasted in one part and the entire network below was affected. He said that in the apartment context, people pay collectively for resources like water and to an extent even electricity. When there is wastage of any kind, the individual family or person need not be concerned. When everybody pays and the costs are collective, the issue need not affect one single individual or family. Furthermore, for the entire apartment block, the plumbing was already done and in place, and had no provision for solar panel-heated water. He mentioned that not just the plumbing but the electrical wiring was already in place, and there was no provision for extra solar wiring for lighting even. The building was constructed before the government made solar panels for water heating mandatory for new electrical connections. Any extra retrofitting would incur a huge cost for the 192 homes.

The above description of a small leakage in Dr Shenoy's apartment home's hot water geyser pipe indicates related issues. He conveys that saving the dripping water allows availability during an emergency shortage and otherwise he would still reuse it. Through the episode, he expresses his concerns about the shared infrastructure in the apartments that handles essential needs like water supply and how a breakdown in one part can affect a large number of households. He sees the malfunction of a privately owned household electrical appliance like the hot water geyser or a mistakenly open tap affecting a community of neighbours. Dr Shenoy's further concern with the lack of solar solutions in his apartment block for water heating and lighting is indicative that the choice of moving into an apartment home can direct entire families and community towards particular technological and energy systems that are already in place, making them the norm. Thus, a household, family or individual moves into an already set stage of material and energy choices on offer for the large apartment community. Such a shaping of everyday practices offers limited scope for changes towards newer ideals.

ELECTRO-SCREENS HOMING IN: THE SILVAS

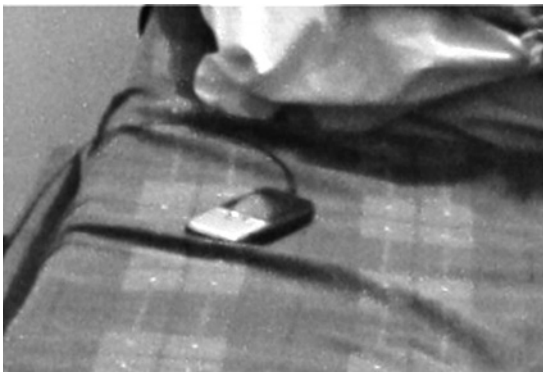


FIG. 11
A mobile phone getting charged on Mr Silva's bed.

Mr Silva has a smart phone and a tablet. His wife Rachel and son Kevin also have their mobile phones and at home use a laptop. The family has a 42 inch flat screen television in their living room. These can be seen as the 'electro-screens' in the Silvas' household. The phone, tablet and laptop use their home's Wi-Fi router to connect with the Internet. The television uses a cable network. The phone, tablet and laptop have in-built chargeable batteries and are charged as necessary and move around the home. The television is fixed on their living room wall. It is plugged into the five ampere wall socket, which remains switched on and the everyday television use is remote controlled. The mobile phone is handheld, kept in a pocket or in a bag, it is closer to the body and moves everywhere with it, into any of the rooms within the home. The tablet, too, is held close to the body and also moves with it. The laptop moves, but Rachel prefers using it on her bed. The amount of time Rachel spends with the laptop watching dances on YouTube is more than she spends watching television these days. The television gathers the family; the other screens gather them individually. When they were teenagers, Mr and Mrs Silva would watch a movie or two at the cinema every month. The cinema, as it still does, gathered a large number of people, family, friends and strangers. The screen was large, the number of people gathering in front of it was large but the amount of time they spent in front of the cinema screen was just a few, hours every month. Their television screen within their home, much smaller in size than the cinema screen gathers the family for a few minutes to a few hours daily, much more than the cinema screen. Rachel spends more hours in front of her laptop than watching television with the family. Her laptop screen is smaller in size than their television screen. Mr Silva's tablet is smaller in size than Rachel's laptop, but larger in screen size than his touch screen mobile phone that he carries on his self throughout the working day.

Historically, as electric-powered screens have evolved as platforms of moving image and sound, so have their relation to time and distance with human bodies. In their larger public gathering form of the cinema, the number of people it brought together was large but the amount of continuous time people spent in front of it was less. As the electric screen entered the home, first through the television, then through the personal computer and later with other personal mobile devices, its physical dimensions have reduced. The number of people it collectively gathers has also reduced, but it has increased the bodily time spent in front of it. As the electronic screen has taken the form of personal devices,

like laptops, tablets and mobile phones, to bodily dwell in front of the screens can be seen as an individualistic experience. With its increasing numbers, the electronic screen has diminished in size; with this there is an increase in the amount of bodily time spent with it and also a decrease in the bodily distance from it.

TRAVERSING THE GRADIENT OF THE INDIAN APARTMENT HOME

In the previous two sections of this chapter, the narrative of the presentation moved from outside to inside the apartment home: outside from the public road into the semi-private environs of the maintenance area of the apartment block, to inside, different rooms within Indian apartment living. The inside, through short accounts from apartment residents, was built with selective appliances within specific rooms within seven different apartment homes from three different cities. These accounts are what I have referred to as interaction 'sketches' from the field. The presentation has been selective, as if it were a sort of curatorial exercise, but they have been chosen and constructed from actual field data.[20] It started with the living room, went into the dining room area, then into the kitchen, the converted home office, the bedroom, the bathroom and with the final screen space, the narrative can be seen as moving anywhere within the entire home (Appendix A:1-7). In Christopher Alexander's terms, we traversed through the *intimacy gradient* (Alexander et al, 1977: 610-613); in Amos Rapoport's (1977) terms, we moved through the *penetration gradient* of a particular type of designed domestic shelter. If the movement presented were to be considered as moving from a more public realm of the living room to the inner private bodily realms of the bathroom, the final screen space breaches this order, managing to traverse all rooms of the home. The various electronic screens of the home, with their extended and distributive content and their interactive capabilities, can not only cross any private-public divide, but 'being home' with electro-screens opens an entirely ambiguous realm.

Of the six rooms that were entered, five of these form essential demarcations of any Indian 'middle-class' apartment home that gets designed, built, sold and bought as a developer-based apartment. The home office is the uncommon sixth room that is presented but not necessarily a demarcated common feature when buying or selling a typical apartment home. In two homes that were visited, both customized apartment homes, that of the Souzas in Manipal and Maria and Jose's home in Bangalore, the office was a separate room, while in six of

20 I have taken some liberty in the narrative of the Silvas, since during the first visit Mr Silva was still living in Kuwait while Rachel Silva and her son lived in their apartment and participated in the research. I met Mr Silva during the second fieldwork when he was moving around his home with a tablet computer.

the twelve other homes visited, there was some sort of a converted area within reading rooms, dining rooms or bedrooms that was dedicated to a computer and its peripherals, kept on a work table with a chair. This presence of the home office or its peripherals like the laptop within the Indian apartment home is as if the workplace of the network society has by now well breached and settled into the post-modern home. That post-modern home has been viewed as a site of consumption, and the only labour tolerated was the gendered technological domestic labour that ushered in modernity (Putnam, 1999). Now, within the past quarter of a century, the networked tools of the home office sit coyly within the home, entirely normalized as if a medieval ghost, 'work', was now naturally at home in the form of a virtual image.

The sketches presented of the rooms do not make a claim to be entirely complete. In the presentation, rooms such as the store, the balcony that also commonly gets converted into the utility area or the washbasin corridor are areas that have not been discussed. However, the set of sketches aims to provide a glimpse of the components and ordering[21] of the apartment homes that were visited in three different cities. This traversing within the interiors of apartment living in the sketches was made with the aid of particular electric artefacts and appliances from each of those rooms. From the residents using those appliances, their inferred relations and ordering of the rooms' aims to provide a gestalt overview of the apartment home as part of the context for this research.

LOCATING RELATIONS WITHIN

The presented sketches revolved around specific appliances and electrical artefacts of the residents from different rooms. Based on the narratives of the residents and their appliances, certain relations were inferred that conveyed knowledge about their everyday energy practices. These inferences went beyond utilitarian functionality and hypothesized alternatively reasoned relationships. In this section, I shall present four relations arriving from the narratives that merit discussion.

FAMILIAL AND INTERPERSONAL RELATIONS

Anand Hebri's decision to install a back-up light when his son was a baby and Manjula's wish for full back-up power so that she could serve food to her children on time are two instances of how residents convey the shaping of their everyday energy practices through close familial interpersonal relations. In the case of Maria and Jose, there was a conveying of a

21 In terms of the circulation space within the visited homes, the order in which it was presented could be traced except for Jose's and Maria's home, which was customized in an American way. It had a small extra hallway with a water closet in the entrance and the kitchen attached to the hallway.

difference in attitude between the couple to their domestic energy use. This can also be seen within the scope of familial interpersonal relations, but one that accommodates difference. Such an inferring indicates that if artefacts and appliances form components of everyday energy practices, then the embedding of familial interpersonal relations within the use of these artefacts and their practices implicates the forming and retaining of the very idea of a home.

COMPETENCE DISTRIBUTION: PERSONNEL/ELECTRO

Manjula manages her kitchen practices through the distribution of them to her everyday domestic cook and her various appliances. Dr Pavan is able to check on dollar rates as soon as he wakes up from his bed on his television. A range of human and appliance networks provisioning a scaffold for being a businessman or a working mother and wife support the shaping of everyday practices. The relationship between the performing of everyday roles and its competence-providing network, comprising electrical artefacts and people, becomes evident. When considering the home and its energy realm, this aspect of a competence-providing network cannot be taken for granted, but instead highlights that the assembly can provision the viewing of an alternative home.

CRISIS CONCERNS COMMUNITY

Dr Shenoy's concern with the water leak in his bathroom made him evoke a community of neighbours who might be affected by the incident. His identification of the issue brought out his concerns with the quality of the construction of the apartment building and also the larger issues of apartment living itself. Here a water leak from the geyser in the bathroom of Dr Shenoy evoked a larger relationship of himself with the apartment block as a community. The material emergence that evokes one to relate to a community, its components and characteristics also become responsible in forming the idea of an apartment home.

PEOPLE CARRY PLACES

Nelvin Souza saw the need to buy a lamp from Bombay, which he carried with him to Manipal. Maria and Jose's home, customized to American ways of living, made Maria see India only when she left her home. People also develop relationships with places through things, artefacts and the wider material realm. As they move, characteristics of the place get carried through artefacts including electrical appliances and with them practices are carried from the old place to the newer place. This relationship that

people develop with a place and its transfer through objects, artefacts and appliances, its implications for everyday energy practices, requires due consideration when looking at energy use within the domestic realm.

Based on the sketches, four different relations have been highlighted (Appendix B). Familial and interpersonal relations, competence distribution, community evocation and people carrying places were inferred from the electrical artefacts and appliances and their narratives within people's homes. Everyday domestic appliances and their practices hold and contain the meanings of what it is to be at home. The above relations provide a selective set of such conceptions. Such a relation-forming characteristic between the home and its electrical network is seen by the design practice as being an aspect crucial to the idea of home.

EVERYDAY PRACTICES AND ELECTRO-CONTROL IN PRIVATE AND PUBLIC

As seen in the charts (Appendix A:1-7) from the seven selected homes the note by the residents of what they did and what they needed for it can be viewed as people's 'practices' of the daily within their homes. Based on all the interviews with the apartment residents from the first field work their day in the life charts has been condensed and organized in a linear visual representation (Appendix B), where one column corresponds to a twenty-four hour day. Each cell can be roughly equated to an hour of their day. The highlighted cells cover the residents' times away from their homes, their sleeping or resting time and what they mentioned as having done when they were awake within their homes. To view people's day in such a linear manner is to begin to view the home and the practices within it on the broad and a temporal scale of a day. This charting of the apartment residents indicating their time at home and away from shows people interacting with the electric flow through their various practices within and outside their homes.

The practices listed in the chart, with their indication of what appliances and artefacts people use within their homes and away from them at different times of the day, allows us to consider instances of what it is to be at home with one's corporeal body, engaging with the private realm. To turn off a light, switch on a fan, decrease the volume of the music, and take a warm shower and such possible acts and activities one carries out within an all-electric home become evident in the chart. To dwell at home is to sense an ability to make changes through the available controls that the home affords. A plethora of courses of action for the electric flow that one's body practises within remain present in the things within one's dwelling today. Viewing everyday practices in this manner as possibilities of energy-regulating acts in a place allows us to view the making of the private and personal space differently. This aspect of the private

realm and its affordance of dense electro-controls cannot be separated from the numerous relations that the electro-artefacts can hold within them. This was evident through the various possible relations that were inferred earlier. A parent, husband, wife, child, sibling, friend, stranger or any other being present in the same place changes the consideration of the notion of control that is available. The home is a place of relations, of negotiation, compromise, of empathy and many such everyday human feelings and emotions. Watching a television channel during dinner that everyone agrees upon can be a compromise; cranking up the thermostat by two degrees in a room can be a negotiation; not blasting loud music when a sibling is studying for exams can be a mutual understanding and empathy. Control of and in the electro-home is not beyond matters relating to home and family involving gendering, rivalry or care. It grows with it, thrives in it and also forms it.

Moving away from the domestic realm of one's home into the public, the access to control one's dwelling can be seen to lessen. The further one moves away from one's dwelling, the more the access reduces to the switches, sockets, keys and buttons that mediate one's dwelling in an environment. One can dwell and be in one's personal space, staring at and swiping on a mobile phone screen or listening to music with headphones. Controlling the public lighting on the road, the air conditioning on public transport or the announcements in a loop on a public escalator is far from what one can afford inside within one's dwelling. To sense this visually, one only needs to imagine the number of electric and electronic controls one is able to access and control in one's dwelling versus a public urbanscape. The place where one 'dwells' begins to offer more access to the making of the personal environment than do public spaces, and one's home begins to show the wide variety of energy controls that pertain to such categories as thermal comfort, lighting, eating and cooking, hygiene and health and entertainment. Thus one's dwelling can also be viewed as a place that provisions a variety of energy controls.

This interactional aspect of the affordance of electro-control of one's dwelling, when combined with the numerous plausible social relations they also hold, is a constituent characteristic for an alternative conception of the contemporary home. Because the current home holds such a characteristics, it is also the Electrome. To be home and dwell, then, is to experience a place as dense possibilities that afford a notion of electric and electronic controls of one's normalized and normalizing everyday energy practices, at the same time cultivating meaningful relations by interactions through electro-controls through everyday practice. This attribute, then, through the ingrained electric network and its access to the notion of control can be considered as making dwelling a personal and private place to inhabit. A more public place with less energy control access takes away these possibilities of both control and forming a relation with it. A place becomes a private dwelling when it has predefined

electric controls closer and more accessible to the body and the controls relate to one's personal and private personal relation-making environment. Viewing the personal private realm in such a way provides an alternative relation to energy practices and the making of the private realm replete with interpersonal relations where the provisions of energy control relate to personal dwelling. Presenting the issue in this way begins to unravel the private place through electric and energy constructs holding meaningful relations within one's dwelling.

This chapter has introduced the context of the Indian apartment home for a field-based design practice. Building on data gathered from home visits from three different southern Indian cities, it presented the context of the apartment home through descriptive sketches from the field. The elements of these sketches, made from people's everyday practices, comprised electrical artefacts, their locations and narratives of use from within their homes, presenting a glimpse of the everyday within Indian apartments. From this descriptive amalgamation of everyday electro-living as sketches, the chapter inferred specific relationships and presented an alternative conception of the contemporary home, sharing characteristics with the Electrome. These characteristics can be understood as a combination of two aspects. The first is that domestic electrical artefacts can hold and contain meaningful relationships such as familial, interpersonal, competence-based, community-based and place-based relations. The second aspect presents the idea that the private domestic realm, distinguishing itself from its public counterpart, affords a dense nucleus of electro-controls for its dwellers which becomes crucial to the idea of 'being home'. Such a viewing of the home has not been presented either from a cultural geographical position (Blunt & Dowling, 2006), from an anthropological perspective (Cieraad, 1999; Miller, 2001; Miller, 2008) or from the post-human architectural position (Harrison, 2013). The combination of these two aspects of meaningful relations and a high density of personal environmental control within the private realm through the electro-network provisions an alternative conception of the everyday home presented from a design practice position.

CHAPTER 04——ON BEING OPEN IN MULTI-STORIES

AN OPEN QUESTION

In his essay on Interrogative design, Krzysztof Wodiczko (Deutsche, 2011:245) says that design as a research proposal can be interrogative when it takes "risk[s], explores, articulates" and responds to the questionable conditions of life in today's world, and does so in a questioning manner. In view of Wodiczko's comment, in this chapter I shall again present seven different accounts that are built on one question that was asked of the apartment dwellers who participated in the first field research. Simply questioning people cannot be seen as a design act: if it is not, then it just remains an interrogation or an inquiry. However, a question can help in developing an idea through discussion with the people for whom the design is intended. This question relates to a premise with which this research began: if people's daily resource use information, for example their energy use, were delivered to them, then how open might they be with such information? Relating to this, the question posed to all the apartment residents during the first fieldwork was, what if others were to know about their home's resource use information? Such a question had a necessary focus on what they thought of being 'open' with their home's energy information. During the meeting with the apartment home residents, one of the procedures I followed was to ask each of the families to show me their utility bills. I would ask them the question soon after they showed me their bills, mainly their electricity bills and in some cases their cooking gas bills or related apartment maintenance bills. The residents who had such bills with them at their home and showed me them allowed me to photograph them. So the question was also posed around a private household document, seen as an expense receipt. Household energy bills from utility companies, their content as information and their design have been the concern of household energy consumption studies (Wilhite & Ling, 1995; Darby, 2001; Fischer, 2008). The approach of average social comparisons with typical households, which are already in practice in many current utility bill systems (Iyer et al., 2006), have been popular. While such a proposition of being open with private information may come across as preposterous for privacy's sakes, projects and experiments from multiple disciplines have touched upon this topic. Ranging from environmental psychology (Seligman et al., 1978) to human-computer interaction (Foster, Lawson, Blythe, & Cairns, 2010) to situated visualizations in urban design (Moere & Hill, 2012), the topic has generated interest for a few decades. Now, within the context of Indian apartment living, how might this issue play within my research project whose interest was putting measures on personal mobile devices? When such a question began relating to a household's privacy, it provided a lead into the design inquiry, so I continued such questioning.

To elaborate and clarify the question about residents being open to others, I mentioned to them that 'others' could be their immediate family members who did not live with them.[22] Then I proceeded by asking what if the others were their immediate neighbours and residents living in their same apartment, the people in their homeowners' society? In some cases, the others could be people from their street to the city to sometimes people they knew from the Internet, giving examples of popular social networking websites. To make it easy to communicate, in some cases I clarified the word energy use to be mainly their home's electricity use. As already mentioned the question was asked 'around' the electricity bill, so I would hold the bill for their home's monthly electricity use and ask what if the information on it was made open? As appropriate, during some interviews, after posing the question of domestic electricity use, I also asked a similar question relating to general domestic resource use, like their cooking gas use, water use and in some cases their petrol use information. Overall the question related to people's views on being open with their energy use information that related to their domestic practices centring on the measure of a bill that they showed and allowed to be photographed. In this chapter, I use this question that I posed to apartment dwellers in Manipal, Mangalore and Bangalore to arrive at descriptive text from which to begin inferring further relations from the procedure. As in the previous chapter, here, too, the exercise is not towards any overarching understanding of particular phenomena or people. Rather, it is a way to probe about an issue, a question that extends into the central idea of design-based inquiry. Such a mode of questioning, on being 'open' with one's private material use information, has allowed us to infer further relations, like a pinch on a cylindrical pipe, which on one side helps narrow the scope of the topic but on the other also widens the specific components for the design practice.

SEVEN TITLED NOTES

If the previous chapter was about sketches, the text in this chapter can be seen as quick notes, like the scribbled messages on coloured post-it notes ever popular in design. These notes also contain short wordy, descriptive titles with numerical readings as small measures. Unlike in the previous chapter, the presentation of these notes has no thematic order to convey: it is presented in the order of the visits to homes in three different apartment blocks from the three southern Indian cities.

In the later section of this chapter, based on these seven notes I will again present an interpretive discussion. As a backdrop and reminder of the introductory chapter, the issues I interrogate are in

22 Those members that the residents had mentioned as their extended family during their introduction were brought back into the discussion as 'others'.

the current context when there is a growing hum about smart meters, prosumers, net metering, the Internet of things, open knowledge, open government on one side; on the other are rising concerns with algorithmic regulation, electronic data privacy and mass hackings of people's private data. With this backdrop I shall move ahead with seven notes with titles, from seven apartment homes, from three different Indian cities.

HINDRANCE: DR SHENOY

During our discussion about living in an apartment home in Manipal with Dr Shenoy, one issue that came up was that of students from the local university living in his apartment block. He mentioned that there were very few apartment-owning families compared to students who rented the apartments in the block. These students were mostly Americans and Canadians of Indian origin, locally referred to as Non-Residential-Indian (NRI) students. They rented these apartments from homeowners, who had bought these apartments not to live in but as an investment. Most apartments in the block were such, where NRI students lived, as they could afford to pay the high rent. This issue of students seemed like a constant backdrop as we discussed domestic energy and water use in apartment living with Dr Shenoy. During the discussion I asked Dr Shenoy about his monthly electricity bill, which he showed to me, saying:

I think Rs. 600 is the least bill in this particular building, if you can check. But I have all the comforts here, TV or fridge, or this that, everything I have here, how is that somebody is getting Rs. 2000, 3000, 4000? I have seen people go out when the TV is on, AC (air conditioner) is on, they leave it on and go out, afternoon lunch they come … In this same building I have seen … some students, some American students, TV is also on, AC is on, it's OK … how can you educate them, for whose sake? They say we pay for it, for them it is bucks, for us it is Rupees … but how to educate them … they are utilizing my country's resources …

Much later in the discussion, I asked Dr Shenoy what he thought of the idea of people living within the apartment block knowing how much electricity and water each apartment used: was he open to such an idea? What did he think of it? He answered:

That can be done … definitely that is possible, just to write consumption of each…

I don't mind, but some other people may mind, you know… they may say it is a hindrance …

It depends on you, you know how they take you …for e.g., children [the NRI students] here on Friday, Saturday and Sunday, simply they were relaxing, you can use the word relaxing or enjoying … during those days, I mean, last two or three days of the week, maximum consumption of energy and … late night parties and all, then noise, pollution then all these things. So we had to restrict them with some rules, after 22.30 we said you can't do this… after all this they may not to listen to you … Then a lot of people used to spit in the lift, somebody pissed also… angry young man, you know (laughs). Then for the last month it is not there, you know why? Why do you think? We have put cameras in the lift, somebody is watching, already we have noted the point, when somebody is watching, yes, they then they don't … they know that … people think they are being watched ….

But consumption of resources may not be an offence … I keep my TV on, AC on for 24 hours on I am paying for it, who the hell are you? It may not be an offence …in the strict sense.

The constant references to NRI students living in the apartment block by Dr Shenoy, a board member of the society, shows the external context within which the apartment is set. In this case the apartment being located in a university town interacts with the internal orders of the apartment building. Even when it came to Dr Shenoy's issue of his home's energy use, he compared his home's bill costa to students' homes. He indicated certain knowledge of not only the students' monthly bill, but also their habits and practices, their television and air conditioning usage, comparing them to his own practices and appliances in his home. This comparison was indicative of his reference to the NRI students' practices. His mentioning of comparative currencies while mentioning the electricity bills and the sentence *'utilizing my country's resources'* is indicative of implicating a framing through a larger political identity. A controversy and issue between a group of residents, of a local society in authority and the outsider students, both living within the apartment building, emerged, even though the question was relating to one's own home's electricity use.

The description also brought up Dr Shenoy's opinion on being open with his home's energy use information. He mentioned that he was open to such an idea, but indicated that others might see it as a hindrance. While he mentioned how certain unruly practices of the students were curtailed when people knew they were being watched through the CCTV cameras, he also said that consumption from keeping the air conditioner and television on throughout may not be considered an offence if one is paying for it. There is an indication in his reference that if one pays, or to take it further if one can monetarily afford it, then one need not be questioned about how much one uses.

AMBIENCE: HABIB AND FAMILY

Habib ran a business trading in aluminium extrusions for building interiors. His apartment home was on the ground floor, but in the B-Wing, while Dr Shenoy lived in the A Wing. He lived with his wife Saadia, and three children, the eldest a daughter and two younger sons. During the discussion, the family spoke mostly in a Urdu/Hindi dialect, but Naaz the daughter and Habib both, during their house drawing activity, annotated the rooms of their home well with English words, also it was Naaz who drew and annotated the drawing for her mother.

Saadia, who described herself as someone who preferred being at home and managing her household chores than going out to malls and shopping, mentioned an anecdote from the time when she was growing up in an independent plot home. She mentioned how her father had the habit of checking their home's electricity meter reading daily to keep a check, and continued to do so even now. Although she mentioned this as a side story, over the period of the discussion there were mentions of an 'upbringing with conserving habits' more than once. During our discussions, the family's descriptions of various household practices relating to energy use gave some idea of how they viewed their own habits. Saadia described her kitchen practices: allowing the cold milk just got out of the refrigerator to settle at room temperature before boiling it so it used less gas; half boiling the rice first then covering it with the lid, allowing it to cook without any further use of gas; and using gas to heat their bath water instead of electricity were some of the practices she listed. She also mentioned her preference when washing clothes, to fill a bucket with water first and use it rather than keeping a tap running. The family mentioned using the air conditioner during the summer or times when the heat was unbearable. They said even then it was not used throughout the night: they operated it only until the room got cool, and then switched it off and turned on the fan. These mentions were indicative that the family perceived themselves to be practising frugal and conserving household habits relating to daily energy use.

While discussing about what according to them was essential to daily living and what determined it as being essential, Habib used the word 'maahol'. This word of Urdu origin broadly translates into 'ambience' or 'mood of a place'. When I asked him to elaborate on this issue, he spoke about a 'show-off' culture leading to an 'ambience of difference':

Jo middle class hai who neechey nahin jana chahta, woh uupar aana chahta hai, par uupar jaa nahin sakta, toh upar dikhane ke liye apne aap ko jyada dikhata hai.

Yahaan aisa kyun hai ki sab ek samaan log nahin hai, yahaan har aadmi ka salary alag hai, har aadmi ka payment alag hai, har aadmi key khaney peeney ka kharcha alag hai. Middle class jo hai

middle class key hisaab se khata hai, high class jo hai who waste kar key khata hai, joh low class hai who sab se tangi mein rehta hai. Toh iss wajah se yeh difference aa chukka hai…yeh thoda gareeb hai toh low class log hai aisa, cheap karte hain, thoda high class dikha toh izzat dete hain high class log hai karke. Toh izzat paaney key kiye middle class bhi waha pahunchna chahta hai, show off karte hai, ki chotha gaadi hai toh loan kar bhi bada gaadi leyte hain, apne haisiyat se jyada kar ke dikhatey hain…

Humara lifestyle doosro ko dikhaney key liye hain.

[English translation]

Those in the middle class they don't want to go lower, they want to climb up higher, but when they can't climb higher then they show off.

Here it is such because people are not equal, every person's salary varies and every person gets paid differently. People in the middle class eat like people of the middle class, high class people can afford to waste and low class people have the least. Thus a difference emerges. So if a person is poor, then he gets shown as low class and they show him he is cheap, but if a person is high class, then they respect him because of his high class. So to gain dignity and respect, people show off, like if a person can only afford a small car, he will take a loan to buy a bigger car, people want to show off more than what they have.

The showing off lifestyle here is for others.

Furthermore, in relation to Habib's mention of ' showing off for others', when I asked what he thought of showing his home's energy use information to others, he said he was fine with it:

Theek hai. Koi eitraaz ki baat nahin hai; agar kisiko madat ho toh theek hai, ki current ko kaise bachatey hain.

[English translation]

OK, that is not a problem; if someone benefits from it, then it is OK, if it shows how current [electricity] can be saved.

But Naaz, the daughter, when posed with the question if she was OK with sharing her home's electricity information, including with her cousins and others, said:

Sab ko bataney ki zaroorat nahin hai, sirf humko pata chaley toh theek hai, sab ko bolna matlab publicity hoga, society ke logon ko theek hai.

[English translation]

There is no need to tell everyone, it's OK if only we know about it, to tell everyone would mean that it would be publicity, it's OK if it's only for the people of the society.

From meeting the family of Saadia and Habib, firstly the family not only portrayed but also perceived itself as practising habits of conservation in their daily living. In this context, Habib mentioned a culture of difference that can be interpreted as his reading of economic disparity leading to a show-off culture with which he implicates not only others around him but to an extent also himself. This can be read as such because he mentioned, *'Yahan par aisa kyun hai ki'*, which translates to *'here it is such because'*. Regarding the question of being open about their home's energy use information, Habib saw it as leading to showing others how to save electricity. His daughter Naaz said she felt that such a showing should be restricted to their own society members, indicating a location-based opening of her home's domestic energy use information. Naaz's mention of, *'only we know about it'* and *'it's OK if it's only for the people of the society',* can be seen as being indicative that within the context of the apartment home and its society, she sees a sense of community that gets built and created by the apartment building, with whom she does not mind sharing her home's information.

DEFENCE: THE SOUZAS

The discussion at the Souzas' residence similarly brought up issues regarding 'others' within the apartment complex at Manipal. As another board member of the society, Nelvin in the interview mentioned dealing with first-time local apartment homeowners and brought up an issue of an awareness of living in an apartment block like this:

We have seen those places where water is short … [referring to Bombay], that is reason we know, we know what is the life of staying in the flat [apartment home], here most of the people are not aware of what is the flat, this thing … they say once we have bought the building, you have bought everything. When we started the society we asked for the maintenance [fee], they [the locals who had bought the apartment homes as investment] said,

[Translation of what the local apartment owners said in Tulu, the local language]

'This maintenance [fee] what is that? We have bought the house, why do you need the maintenance [fee]? We don't stay here, why do we need to pay the maintenance [fee]? The flat is ours we have paid money to the builder.'

But students are staying in their flat, they have put it on rent. So these are things here, people are not aware, even the builders here, even water, electricity the way they are misusing it, its bore well [which allows ground water to be pumped locally] here, they think it is free …

Nelvin, having lived in Bombay, a highly populated and apartment-dense city, for thirty years referred to living in a flat as a particular way of life. He recollected his interactions with the Manipal locals as first-time apartment homeowners and was of the view that they were not yet aware of the details of such a way of life. His view while pointing at an on-going transition of people moving into apartment homes in a smaller Indian city like Manipal, also directs at implications for the electricity use, water use and overall collective infrastructure maintenance taking place during a transition to apartment living.

In this context, what was the family's view on being open about their apartment homes energy consumption? When I put a question asking if they were open to showing their monthly electricity consumption to others, including the people in their apartment block, Nelvin was first to say he was fine with it, and it further led the family to open up into a discussion:

Maggie:
But one thing I can guarantee to you, according to the area what I am living here, mine will be the least (Laughs).

Matthew:
My own friends, they have like houses, which are one fourth of this size, and they got an electricity bill of Rs 4600[per month], and our bill is how much (glances towards his parents)? Rs 800 to Rs 900?

Maggie:
That is the students, they are not bothered.
If you open their doors …

Nelvin and Maggie:
Light is open, AC is open, fan is on, computer is on …

Maggie:
And they are not in the house. And the maids come, and they keep the full ACs on and do the work.

Matthew:
But people are like, they have different mentalities. We might say that we will show our electricity bill to others, people will laugh

at us. But other students I know are proud to say that I got a Rs 4600 bill, I mean they are proud to say that they have utilized so much. I don't know what kind of mentality is that.

Maggie:
You must have seen my bill, Rs 900 and something. Mine is the biggest fridge, I have got two microwaves, two washing machines, one is for bed sheets, we have got two of everything here, we use geyser water [hot water] throughout, I have got 25 litre boilers, in all bathrooms, ours and his (pointing towards Matthew) are used every day. But still we see that it gets switched off immediately, even lights, fans and all those things.

The question of being open with their domestic energy use led the family to indicate and point out other related matters. Maggie assumed that her home's energy use would be less than others around her, and she mentioned basing the comparison according to the areas of the home; then Matthew mentioned his friends boasting of their homes' large energy bills; both Nelvin and Maggie indicated seeing how inside student's homes they leave 'everything on' and Maggie mentioned how the domestic help cleans the students homes with the air conditioner on. Firstly, this provides an indication of the family's attitude to the issue of domestic energy practices and their information, but more importantly we can read how they view others around them and their energy use practices.

Like Dr Shenoy, being homeowners' association board members, both Nelvin and Maggie, active in the society's day-to-day functioning, saw the life style and attitude of students living in their apartment block to be different from their own. Being privy to and conveying opinions on other apartment residents' domestic energy practices, both the resident board members of the society, Dr Shenoy and the Souzas, indicate the presence of a 'society' in this apartment building that could 'view and inspect' the day-to-day happenings and had even developed strong opinions about them. So in this case, the society, the homeowners' association, as an administrative and executive body within the apartment building, which is both a part of and formed by the residents, is different from the other residents exerting abilities that allow inspection and opinion-forming. It is also the body that makes rules which it wants the other residents to follow. Such proximity, visibility and ability to affect other residents' daily lives were afforded by apartment living and through the formation of a society board in an apartment building.

Secondly, even though the study is about domestic energy use in Indian apartment living, through this case and the previous one, there emerges what can be seen as a larger issue in the context of Manipal as a university town. A divide and of a difference is shown

between the society, comprising the homeowners, and the other tenant residents, the students. This became uniquely evident within the context of this apartment building in Manipal.

The third issue specifically relating to this family was Maggie's mention and description of the range of electrical appliances at her home and her monthly electricity bill. This can be read as not frugality in the family's owning of electrical appliances but as conveying a type of responsibility in using them. Thus the dependence on the range of domestic electrical appliances for daily living can be seen as being different from how people perceive using them in a responsible way. In Maggie's case, she presents in her defence for having double the number of appliances her being responsible. The other aspect which can also hold characteristics of a defence is her and Dr Shenoy's comparison of their domestic energy use and practices through the electricity bill with the others (NRI students). I read this comparison as a type of defence of their own practices.

DISCREPANCY: DR PAVAN AND ANAGHA

It was Anagha, said Dr Pavan, who managed the affairs of their home, including filing the home expense bills. So it was Anagha who brought out a large file holding a variety of their domestic bills, including their electricity bills. Dr Pavan mentioned that within their apartment block the residents had an arrangement with the apartment manager for receiving and paying the electricity bills. The manager of their apartment building got the monthly bills for the 35 occupied homes from the state utility bill reader and would deliver them to the households. The residents on an agreed date would pay him the cost of each of their bills with a small extra amount as his service fee. The apartment manager would then take the responsibility on behalf of the residents and pay their bills at the utility company's payment counter in the city before the due date. In this context, I asked Dr Pavan to discuss matters relating to his home's monthly electricity consumption and he made the following points:

Dr Pavan:

Since ours is a very small nuclear family I always feel it is on a higher side, sometimes like Rs 2488 [showing an old bill] … I think Rs 2400 is more for just two people and a kid. We use a lot of gadgets, like microwave and ACs.

Anagha:

If there is a guest around then the bill goes up. It is the use of the geysers and ACs.

Dr Pavan:

That thing in the mind is there to save, but …

Further into the discussion, when I asked Dr Pavan about his views on knowing the consumption of other residents in his apartment building, he said:

I always wanted to know the consumption of others [in the building], but there is no common board to know the others' consumption.

Sometimes when we give the manager to pay our bills he would be having the others' bills, so I might sometimes ask him to show them.

Some of the bills when I see of others are much less than ours.

Every time I felt ours is much higher than the others.

Later in the discussion, when I asked if he was OK with showing his home's electricity bill to others in the apartment block, he said,

I would not want others to know about my consumption. Since it is higher, I would not prefer that. Ours is a small family, then they would think why is his consumption so high?

We are trying our maximum to keep it on a lower side but this is the maximum we can do.

Here we see in the case of Dr Pavan, with a three-member family, he thinks his home's electricity consumption is high. During the apartment manager's visit, he asks him to show him the electricity bills of others to compare his home's consumption with others. This confirms his bill is much higher than the others, but he does not wish to share his consumption information with others. His decision not to share, he says, is because he thinks that others might question the fact that even with a small family, his home's consumption is high.

Dr Pavan expressing his wish to not share his energy use information presents the issue of domestic electricity consumption and the matter of its 'conspicuousness' to others. Unlike in the previous stories, here we encounter a type of discrepancy from an apartment resident who wants to know the consumption of others but is unwilling to share his consumption information because he thinks it is high when compared to others.

ABSOLVE: JOSE AND MARIA SELVARAJ

For Maria and Jose, whatever shortages were to be experienced outside their home were buffered by their apartment living and its maintenance fee. There was a water shortage in their locality but the apartment building maintenance fee that they had to pay upfront when buying their apartment[23]

23 They mentioned that when they were purchasing the apartment this amount that they had to pay upright was valid for fifteen years but now had gotten reduced to eight years.

took care of this shortage by buying water through tankers and filling the basement tanks every day. The incessant power cuts that Indian cities are notorious for was also not an issue, and as in most large Indian apartments, even in their apartment it was well taken care of. Jose mentioned that during a power cut the generator kicked in and the cost of that was taken from their maintenance fee. When discussing their home's electricity use, Jose said:

Electricity I do watch because I know there is a shortage of electricity in this country. So anytime anybody leaves a light on, I put it off. But I don't watch how many units, but I don't want to waste it, because there is a shortage in this country.

When discussing their views on being open with their domestic energy use information, I asked them what they thought of such openness with their family members, for example sons and daughters in law who lived in America. Maria said:

As long as we are paying you know, they can know whatever … as long as they are not paying, you know, for us (Maria laughs), so they know it's OK (Jose laughs).

Then I asked them what they thought of other apartment residents in their building knowing the amount they paid for their home's electricity if this was made open through a central place within the apartment. They said:

Jose:
If they want to know …

Maria:
Yeah.

Jose:
Yea we are OK …

Jose:
Whatever our need we use …

Maria:
I know we are not misusing or abusing anything that is the most important thing. I am not abusing anything, so then it's OK, you know …

Here Maria's comment of *'As long as we are paying'* can be read as her firstly conveying a certain financial independence from her children. Then the comment provides a clear indication that she relates energy informa-

tion to its cost and thus correlates domestic energy use, its information and its cost. Her comment suggests that she is fine if others are informed about her energy use since she is absolved by paying for it.

In the second part, her comment suggests that since she feels that she is not abusive with her energy consumption, that, too, is a form of absolution, and thus she is fine with her neighbours knowing how much she spends for her home's monthly energy use. Thus for Maria, then, monetary affording and a self-assessed responsibility for use absolves her and makes her open to sharing her home's energy use information.

ACHIEVEMENT: KISHEN SINGH

Forty-year-old Kishen's home is on the top floor of a four-floor terrace gardened apartment building. One of the considerations for him to buy a home on the top floor was that the home would get ample light throughout the day and would also be breezier than the floors below. Kishen has a doctorate in human resources management, is differently abled, with a polio limp in his gait and lives alone in his apartment, driving his own car to work. His parents, brother and sister, both married with families, live in what he mentioned as his home state, the northern Indian state of Jammu and Kashmir. He works for a global information technology consulting company in the city. In a month, he said on an average work takes him away from home, either to another city or even abroad, for about ten days. When in Bangalore, though, he mostly works from home, writing white papers and attending to official communications from his workstation adjoining his living room. This living room workplace for him is where he spends most of his waking time when at home. Kishen referred to such appliances as the washing machine, TV, microwave, hot water geyser and refrigerator as the 'basic minimum', but the air conditioner that he used he said did not fall into his basic set. Kishen mentioned that his cooking habits were sparse. Living single meant he hardly uses his cooking gas stove, but said that he uses the microwave often. Since he largely works from home, he has a regular tea-making practice for which he uses the microwave oven. This kept his use of cooking gas to a minimum and he said that 15-20 kilograms of cooking gas in a cylinder would last him eight to nine months and sometimes even up to year. When I asked him what he thought of others in the apartment knowing of his energy consumption, he said:

Definitely, to others in the apartment, particularly my cooking gas consumption, they should check it … then they will not believe (hearty laugh),

To my question of how would he react if his family were to know of his monthly electricity consumption, he said:

I won't have any kind of reaction, unless they feel that it is much more than I should be doing, and if they can point out that if, they are staying as four members in a family, and their consumption is equal to or lesser than mine then it will be a shock. If it is already less than what they are consuming, then I think as an individual single person, I will treat it as standard consumption.

Because there are no standard marks where a single person with this particular size of house, these kind of gadgets and all that, one should consume this much power …

Firstly, Kishen's particular willingness to share his cooking gas consumption information with others in his building can be read as being due to his understanding of his minimal usage of it. A normal cooking gas cylinder that may last for a month to two for a family size of four, in the case of Kishen lasted for close to a year. Sharing information on minimal use does not seem problematic for Kishen; on the contrary, he is particularly willing to share information on what he thinks he is using less than others. If framed as such, then Kishen manages to communicate his minimal usage of one type of energy source and convert its usage information into an offering of disbelief to others, through this garnering and communicating his sense of achievement.

In the second instance, with the case of him sharing his electricity use information with his family he is more cautious. Being unaware of what the electricity usage of his siblings' four-member families might be, he expressed that he would not have a reaction unless they think what he is consuming might be more than them. If it was less than them, he said he would consider himself to be consuming as a 'standard' single individual person. However, later, for the 'standard', he brings in ownership of comparable measures as a metric, through it assigning a relation, particular size of house and kinds of gadgets. He mentions that such a standard is not available to him to compare with.

SHIFT: SAVITA SHARMA

When I met Savita at her home, I was asked if it was OK if we could meet in another apartment that was on the same floor as hers but an apartment away and on the perpendicular corridor from her apartment door. She said her parents-in-law were visiting her from the southern Indian city of Chennai, and on that particular day they were preparing for a special *puja* (prayer session) at her home. So the interview was carried out not in her home but at her sister's apartment which Savita's family also took care of. Her sister lived in the US and had bought the apartment next to Savita's so that it could serve as her home when they visited India. This extra apartment also serves as their mother's 'own place' whenever she visited Savita in Bangalore from her home in northern India.

Savita and her husband do not wish to have a television in their home, but there is one in her sister's apartment. So her family call her sister's apartment the 'TV home' and use the apartment once or twice a week when they want to watch television. Also, when Savita has to wash a large set of clothes and needs to use an extra washing machine, she uses the 'TV home' apartment. So Savita's family has two apartments at their disposal, and her sister's apartment has become an extension of her own. The use of these two homes by the family is reflected in the electricity bills, where Savita's home had a bill of Rs 620 and her sister's a bill for Rs 246. Savita, too, maintains a neat file in which she keeps all her domestic bills. It is she and not her husband who takes care of paying their household bills. With a Master's degree in development studies from a British university, she works as an independent management consultant, mostly for the social sector but also doing projects with the corporate sector. Since she works as an independent consultant, she has to file her own taxes, and this maintaining of bills of her home's electricity, cooking gas and car petrol are used to show her expenditure when filing her returns with her chartered accountant. When I asked Savita her views if she were to make her usage of her domestic electricity and water use open to her family, others in the apartment, her social network on the Internet or generally to outsiders, she said:

My sister knowing it is OK, others in the apartment knowing it is OK, as long as it is not … you are not going to be putting this big hoarding saying this apartment consumes so much … If it's some research paper… as long as it is not drawing any attention and saying, why are you doing this?

[When asked if it was shown on her social networking website]:
If it's to be compared with everybody around I don't think I would like it too much … I mean I don't want to kind of answer why this and that, because these are things I don't really think so much about … I don't want to be questioned on that, why 600 [Rupees], why not 700 or 500 … and stuff like that … I know I can share it with my sister, because she will also be oblivious to it as I am. As long as you can take the information and don't bother me with it, I am fine.

If it's going to be of certain interest academically and it's going to make something useful, for example in terms of water again, if all of us know that, all of us sharing information is really going to make a difference in terms of consumption, saving water etc … I wouldn't mind it, and it's not an issue really. The same with electricity, if there is a certain purpose to it and we are all trying to achieve a certain goal and all that, I have no problem.

So yeah, a certain purpose, saving electricity … so suppose the apartment says this month we are all going to track our own individual house consumption and all that and see where the wastages are and where what's happening and all that and we all get together and see how we can reduce it, I have no issue.

Here, within Savita's response as she thought and spoke out about being open with her home's energy use information, we can interpret a pattern. At first she seemed to agree and was 'OK', but with certain conditionality. Then as the discussion moved to the idea of her consumption being made open through a social networking website, she presented a firm reluctance initially. Soon after she brought in sharing the information with her sister and started being more open as she assumes her sister would be oblivious to such an issue, too. Then she said she would be fine to part with her information as long as it would not bother her. After that, she mentioned a 'purpose' with her own reasoning and recommended of a collective process involving other apartment residents, ending by saying she has no issue with the idea. In this way, her response kept shifting with conditionality and her own recommendations for a process.

Savita's reluctance about the idea can be read as stemming from her statement, *'I mean I don't want to kinda answer why this and that, because these are things I don't really think so much about…'* What can be interpreted from this response from her is an assumption that if she shares her information with others, there might be questions that she has to answer from others with whom she shares her information, while conceding that these relate to matters she does not think about much.

The above seven notes on apartment dwellers with their respective titles revolve around responses to the question of what the apartment residents thought of being open with their home's energy use information. In the discussion in the previous of the seven sketches, we traversed the interior of apartment living. Through the electrical artefacts used within the home we inferred various alternative relations. There was a showing of the practices as noted by the residents, and finally we discussed an alternative framing of being in private and public through affordances of electro-controls. In the discussions of that chapter, through the seven sketches, barring one interpersonal relation, that of Dr Shenoy, we largely dealt with issues within the home. In this chapter, the nature of the 'open' question manages to take the discussion to a different scale, and moves to issues outside the home, where the discussion of 'others', of community and culture become more pronounced than matters pertaining to one's family and household alone. Based on the accounts of people's energy practices and their information, the following discussion will delve into a wider scale of apartment living as commercial living, as community and as a culture in itself.

THE APARTMENT COMPLEX: HOUSING AS COMMERCIAL, COMMUNITY AND CULTURE

Multi-storey domestic sheltering environments are not new to human settlements. The insulas of Roman times or the tall mud brick buildings in Yemen provide evidence of the relation between human density and the rise of urban domestic structures that emerged at different times in different regions of the world. However, the types of multi-storeyed domestic structures that begun to evolve after 1880s, for example in New York, began to include specific characteristics and services. Built on the rapidly developing universal technologies of the second wave of the industrial revolution, we see their variations even today. With motorized lifts, electrical networks for lighting, heating and cooling and mechanized plumbing, these apartment buildings at the turn of the 19th century began to decisively set the characteristics of the modern apartment home. Being different from other types of homes like single plot homes, townhouses, bungalows or row houses, apartment buildings as domestic sheltering environments can be seen as a technological response that accommodates a larger number of homes in a small amount of land area, thereby reducing the land use footprint and increasing human density in one place.

COMMERCIAL LIVING

While the rise of apartment housing in India can be related to urbanization,[24] rising land costs and multiple stacking of homes as a solution to affording a home, the growing acceptance and popularity of apartment living can be seen as having resulted in a further push of the commoditization of the domestic environment as a place of living. This aspect was touched upon in the previous chapter when we discussed the support infrastructure outside the apartment home. Commercial housing, being part of real estate, is an active component of the free market entity from the buyer's and seller's perspective. As mentioned in the case of Dr Shenoy, apartment homes are not only homes for living but also make up a significant corpus of the commercial housing sector as real estate, whereby property that is shaped as a domestic environment gets treated as "investment" by property owners. Another crucial ingredient that makes apartment living attractive and highly accepted can be seen in what was mentioned by Jose in this chapter and by Anand Hebri and Manjula in the previous chapter: their homes, as part of a commercial housing complex like many of the large apartment buildings, buffer them from experiencing the breakdowns and shortages that are outside the realm of the apartment housing. Thus, shortages of water, electricity,

24 According to the Indian Census, between 2001 and 2011, the rural to urban migration in India has been the largest in its history (Govt. of India, 2011).

greenery and landscape and even security get mediated collectively through the commercial service envelope. The private water services bought through tankers, diesel generators as back-up power, parks and leisure areas like children's play areas, swimming pools and gymnasiums and round the clock security personnel around the apartment, all provided through a collectively shared residents maintenance fee, become an attractive feature provided by private commercial entities that fill in for the lack in the state's provision of infrastructure amenities for its citizenry. Furthermore, as the costs for common necessary facilities like water, lifts, common lighting and a range of facilities afforded by the apartment building are collectively shared by the apartment dwellers, it works well with the efficiency argument. The wrestling match between the technologically efficient mode and the ecologically ideal mode of everyday material practice is manifested in the apartment block context. With the multiple commoditization processes of the domestic place through apartment living, the referee in the ring here seems to be a neo-liberal market professional.

With its ability to shelter an affording community and buffer it against external inadequacies and with its inherent commercializing processes, the apartment model has not escaped criticism. Mark-Anthony Falzon (2004) refers to the gated communities of Bombay as "Paragons of Lifestyle". He mentions that they hold characteristics of a global urban phenomenon, where residential spaces are more inward-looking, seeking to create private, self-sufficient and leisurely spaces. Presenting the case of the Hirnandani complex in Powai, Bombay, he offers how residential complex formations play along with the local dynamics of the city, especially those of a perceived rise in crime and increasing communalism that generate a politics of exclusion.

Closer to the field data from this study, as seen in the two cases from the apartment in the university town of Manipal which indicated particular issues between society board members as local residents and other residents as NRI students, this type of emergence shows how the apartment as a building can house issues that go beyond its boundaries. Daniel Miller (2001:1-5), mentions that looking at what takes place behind closed doors in the private sphere provides useful insights into the larger social ordering of its outside culture. In a similar way, at a different granular scale, studying a complex of domestic places and their interactions with each other can provide insights into other parts of the urban fabric it is connected with. So, studying what happens within an apartment block as a complex of domestic places can indicate the larger issues of the place within which the apartment is situated. Encountering these larger issues while interrogating any particular topic through a situated place like an apartment building allows us to glimpse the interactions between the complex of domestic places and the larger social fabric of its situation.

COMMUNITY LIVING

If one were to view the apartment as a socio-material complex, interacting with its material and infrastructure component, there exists a large set of human actors. Within the context of my field-based design practice, I have found it useful to recognize the following set of actors: apartment residents who could be home owners or tenants, "society"/association board members, infrastructure maintenance personnel, builders and architects and state utility service providers. Thus, during the course of this research the presence of these set of actors became definitive in what I refer to as an apartment complex in India. There were of course others who emerged depending on how the frame of reference was posited, but within the context of my field-based research, I interviewed members from this community of actors who were directly or peripherally involved with the apartments that I visited as sites of inquiry.

Despite the walls and differences between residents, families and administrating bodies and all the differentiating issues, the apartment can be seen as a building of a community. With a gathering of a large number people in one place, the apartment building with consideration of its spatial and geographical characteristics, the sharing of a common address and infrastructure that brings together a complex of domestic spaces, governed by its own set of rules aided by a self-organized body, all this can be viewed as a community. The collective body that looks into the administering of the day-to-day functioning of the apartment is made up of homeowners as an association. This group, while formed through a set of rules provided by state law, also makes its own rules for the material and infrastructure management and its upkeep. As seen in the Manipal apartments, through the cases of Dr Shenoy and the Souzas, the society also makes itself able to facilitate types of social "ordering" through the deployment of rules and regulations within the apartment building. Within the apartment as a building that makes and holds a community through such ordering and self-organizing, small services are also facilitated to meet the needs of its residents. Since these rules, arrangements and services formed within the community are locally set and evolving, they are also flexible and fluid. An apartment as a community of family homes, with its self-organized association as a society, its interaction with the builders and promoters and its ability to make its own rules provides it with the potential of its own purpose as a community.

APARTMENT LIVING AS CULTURE

Apartment living can be understood to go beyond the community and commercial aspect of a domestic place, to be considered as a culture in itself; one that evolves from living in a specific type of a domestic shelter in terms of the apartment home. The comment by Nelvin Souza about the

'life of staying in a flat' can be interpreted as a way of living that evolves and develops as one stays in an apartment. During the interview, Nelvin also mentioned how in Bombay people from his society would celebrate the festivals of different communities together. Then he also mentioned, as presented in the description, that *'here most people are not aware of what is the flat'*. It is already well-known that there has been a rise in the apartment housing type in the Indian context. Alongside this, there is currently a transition from a non-apartment-living culture to an apartment-living culture, and this is occurring in mid-size Indian cities like Manipal and Mangalore. To say that this transition taking place has implications for people's ways of living should be obvious, but how mediating shortages and breakdowns through the commercial market-based envelope, its impact on ground water, electricity and diesel for back-up power and overall how the culture and community of apartment living will evolve to mediate the ecological challenges remains to be seen.

IS THE INDIAN APARTMENT HOME ENERGY CONSERVATIVE?

As broadly seen in the descriptions, many apartment residents perceive a sense of conservation within their daily living, or convey that they value conserving energy and resources that pertain to their domestic use in general. While in some cases like that of Saadia, conservative practices were explicitly communicated, in the case of Dr Pavan, a need was felt, but mention was also made that their current practices are the best they can do. There has recently been discussion in the HCI and design literature about Indian middle-class households practising conserving habits (Shrinivasan et al., 2013; Vyas, 2012; Kuijer & Jong, 2011). Shrinivasan et al., in their study of eleven urban Indian households, highlight a culture of 'deep conservation', attributing it to an extension of people's culture, context, beliefs and goals. Vyas's ethnographic work with middle-class Indian women presents the concept of domestic artefacts, highlighting creative reuse within domestic households, and attributing it to religious beliefs, traditions, family intimacy, personal interests and health issues. Kuijer and Jong, taking a practice theory approach, made an inquiry into the bathing habits of three different cultures, Japanese, Indian and Dutch. They mention that the Indian approach to bathing practices was the least resource-intensive. While these recent discussions have been useful in conveying some of the better practices of conservation in Indian households, their findings mostly present the Indian household context in a favourable light compared with more energy-intensive northern and western household counterparts. Now, if the apartment home were to be considered from the energy use as information perspective, and since one of the ways in which I looked at the home was through its monthly electric-

ity consumption, how did these homes compare with their counterparts in other parts of the world? According to the World Energy Council (Moisan 2013: 41) the consumption of electricity per household, excluding electricity used for space-heating is 750 kWh/household/year in India, 1,300 in China, 3,500 in Europe, 5,000 in Japan and 10,000 in North America.

In the following table (Table.02) I present the monthly consumption of the twelve households I visited during my first field visit. For these households, in the winter months during the period I collected the data, the electricity consumption is much higher than the average Chinese household, some are closer to the average household of Europe, and a few show their consumption to just under that of average Japanese households. While average electric consumption measures through statistics do not give a nuanced or accurate picture of household attitudes to conservation, they can provide an idea of the type of apartment home I refer to as "middle" or "upper income class" households. That there is such complex disparity between households that are considered as average Indian households and the apartments that were visited during the field research is what the design practice presents and contends with.

INFERRING JUSTIFICATION WITH THE OPEN QUESTION: RELATION OF ONE'S DOMESTIC ENERGY USE TO POSSESSIONS AND BELIEF

Next, to provide an example of what could be inferred about how the apartment dwellers addressed their and others' domestic energy use through the question of being open with their home's energy use information, I would like to present the interpretation of two accounts, that of Maggie and of Maria.

In Maggie's case, it can be said that she used a quantifiable and comparative means to talk about her domestic energy use, through which she expresses her responsible ways and practices. The mention of her home area, the mention of her number of appliances, the size of an appliance (fridge) and also the mention of '*look at my bill*' versus look at the cost of the others' bills, are what I mean by her using a quantitative comparison. She also describes observing others' practices that are different from her own, and compares others' actions with her own and to a degree qualifies hers as responsible. A similar approach of quantitative comparison is also seen in other cases such as that of Dr Shenoy with his bill.

Maria's case, though, is different. First there was a conveying of monetary affordance, which is read as, if one can afford something monetarily, then it absolves one to use as much as one wants. Then she conveyed that she is not misusing or abusing, expressing this without the use of any comparative or quantifiable measures. Maria said that she just knows that she is not misusing or abusing. It is not based on her knowing how much others use or the quantities she and Jose use, but

CITY AND FAMILY	APARTMENT HOUSEHOLD MEMBERS	HOUSE-HOLD SIZE	INTERVIEW PARTICIPA-TION BY	UNITS CONSUMED AS SEEN IN THE BILL/ RECEIPT/VERBAL MENTION FOR THE MONTHS OF SEPT/OCT/ NOV/DEC 2010	12MONTH APPROXIMATION IN KWH OF CONSUMPTION FOR THE HOUSEHOLD BASED ON THE PRESENTED MONTHLY BILL	APPROX AREA OF THE APART-MENT HOME
MANIPAL				(28 day month billing period)		
Family 01	Husband who is a professor of pharmacology, environmental activist and columnist living with his housewife.	2	1 (Husband)	159 kWh (SeptOct)	1908	120 sq mtrs
Family 02	Husband who is a construction material trader living with his housewife and three children	5	3 (Husband wife and daughter)	179 kWh (SeptOct) (Based on paid receipt amount)	2148	156.5 sq mtrs
Family 03	Husband a retired banker, financial analyst living with his housewife and son who is an engineering college student.	3	3 (Husband, wife and son)	248 kWh (SeptOct)	2976	300 sq mtrs
Family 04	Housewife living with her son who is a civil engineering student	2	2 (Wife and son)	242 kWh (SeptOct)	2904	120 sq mtrs
MANGALORE				(28 day month billing period)		
Family 05	Husband a former dentist now a plywood manufacturing industrialist living with his housewife and daughter	3	2 (Husband and wife)	397 kWh (SeptOct)	4764	140 sq mtrs
Family 06	Husband a mobile phone retail businessman and real estate agent living with his housewife and two children	4	2 (Husband and wife)	179 kWh (Based on verbal mention)	2148	122 sq mtrs
Family 07	Husband a structural engineering consultant living with his wife who is a CAD institute manager and two children	4	2 (Husband and wife)	392 kWh (Based on verbal mention)	4704	122 sq mtrs
Family 08	Husband and wife both architects living with two children	4	2 (Husband and wife)	119 kWh (OctNov)	1428	122 sq mtrs
BANGALORE				(30 day month billing period)		
Family 09	Husband a retired nuclear plant designer living with his housewife	2	2 (Husband and wife)	401 kWh (NovDec)	4812	326 sq mtrs
Family 10	A single man working as an HR professional	1	1 (The only household male)	172 kWh (SeptOct)	2064	162 sq mtrs
Family 11	Housewife living with her husband, a software professional and their seven year old son	3	1 (Wife)	235 kWh (Based on verbal mention)	2820	162 sq mtrs
Family 12	Wife, a project management consultant living with her husband, a software professional and their son	3	1 (Wife)	159 kWh (NovDec)	1908	162 sq mtrs

TABLE 02

Description and electricity consumption information for the twelve households that participated in the first field research

however much they use, they know it is not misusing or abusing. This can be interpreted as an expression of a self-belief that is gained with or without any comparative or quantifiable means, which can be seen as a form of believing by Maria.

Through these two instances, evidence of communicating a justification of one's use can be interpreted in two ways: in Maggie's case, through a quantifiable and comparative means, and in Marias's case through self-belief with no comparable means. What, then, can be hypothesized further from their description of what they do in the cases of Maggie and Maria?

Maggie, compared the area of her home, the size of her fridge and the double number of appliances she has at her home. These are what she already owns. Kishen made a similar argument when he talked about the size of his home and the kind of gadgets there. I interpret this as a relationship that one develops through what one already owns and possesses, which is used for the justification. In the cases, a quantitative comparison that gets made with others is created through this relationship with what they already own and possess. Thus, in Maggie's case she conveyed responsible energy use through quantifiable comparative means, and the underlying mechanism can be interpreted to be the relationship she offers with prior possession or ownership of her home and her appliances. The means of comparative quantification is not without its reference to others, through whom the comparison is made possible.

In Maria's case, the argument through monetary affordance is one of self-belief. Monetary affordance justifies and absolves however much energy use. There is a belief that there is no misuse and abuse, with no necessary reference to or mention of others: the belief in Maria's case is her own. So, then, a conveying of a justification for how much one consumes as energy in these two cases took place through the relation with what was already owned and possessed at the moment, comparing it with respect to others as necessary. Alternatively, it does not need consideration and one just believes whatever one does is justified as long as one can afford it. Such an interpretation of the relationship of possession and of belief to making justifications about one's domestic energy use are a way in which to present how people relate to their domestic energy use, not in a quantifiable way as information or data, but through an interpretive relation. Such an interpretation was made by looking into what two persons conveyed when posed the question relating to them being open with their energy use information.

I present the following assumptions about the relationship and inferences made above. First, the developing of these relations should not be seen as being separate from the continuous flow of electricity that both constitutes and becomes constituted within normalized everyday practices through the appliances one owns. Then, it is important to see

the electricity flow as a service that involves a monetary transaction: however minimally felt, this is also implicated in the nurturing of this relationship. In this process, the flow of electricity is measured, and the measurement is treated as valid and as legal information by the entities that provide that service. Then, my use of the broad terms "possession" and "belief" should not be mistaken for set entities. Instead, they should be considered as being as fluid as the flow of electrical energy and experienced as a continual and processual event in time.

This inference about the justification drawn through the open question can be seen as a way of arriving at relationships, and could also be interpreted in a number of other ways. However, inferring about such an issue like justification and relating possession and belief to it provides further avenues for inquiring into people's attitudes to their daily energy practices. If this was through an initial question, then what could be further inferred if the purpose of a design practice was to open energy use and create unique relations? In what other ways can domestic electric energy use be framed towards an interrogation of daily living through design means? How can it be opened? I present my design practice with such a purpose.

ON BEING OPEN WITH PRIVATE INFORMATION

Within the presented seven cases, we saw in all but one that the apartment residents, with conditional reservations, were willing to be open with their domestic energy use information, more so with their neighbours as "others" in the apartment block. Savita was willing to part and be open with her domestic energy use information as long as it did not implicate her. Naaz said she would not mind sharing the information with the other apartment residents but not with her relatives living in another part of the city. As we have seen, Dr Pavan was the only person who firmly objected to the idea. The aspect of people conveying their willingness to be open with their homes energy use information, especially with other apartment dwellers, firstly is further indicative that the apartment residents view the housing complex as a community, even in the aspect of energy use information sharing. Secondly, it raises another central issue of what the residents conveyed about theirs and their home's information which could be considered as being "private". If one's home were to be considered a private realm, then people conveyed that they were willing to be open with such information. While this could be read just as a response to a question in an initial meeting, since no actual design act was undertaken as a demonstration, it was more than that. The single but firm response against the idea, the conditional reservations from some accounts and the reasons provided as to why the residents were willing indicate that the residents considered the idea and were open to it when posed with the

speculation. This attitude from the residents towards information from their domestic practices and its relation to electricity use and their homes begins to provide a scope for interrogating the relation of electricity use information to the domestic realm as a private place.

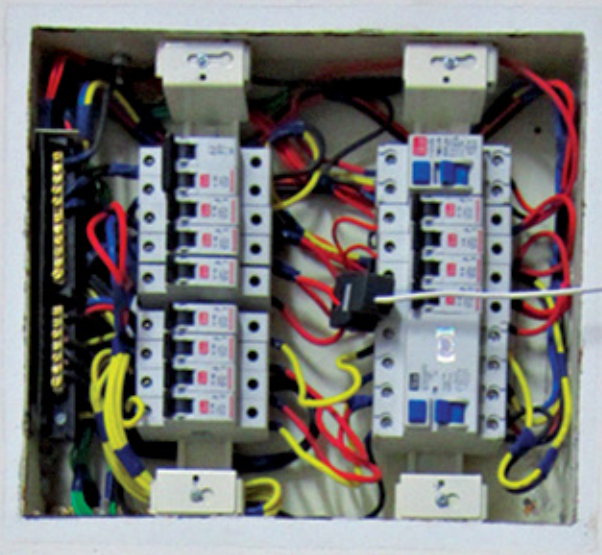
To summarize, this chapter and the previous one have presented two central aspects of this research from a field study on apartment living in India. One aspect was about the home, its relations and how it can be related to the density of electro-controls within the private entity of a home. The second aspect related to being open with domestic energy use information. I began this chapter by introducing a procedure where people were presented with a question of being open with their domestic energy use information. Then, I presented seven titled notes built on this question. The chapter opened a discussion on apartment living as commercial housing, as a community and as culture. I delved into related studies of domestic material practices within the Indian context and provided details of the field study through a chart of the monthly domestic energy use information for all the homes visited during the fieldwork. Then, through the example of two cases presented earlier, I inferred how justification is made for one's energy use and how it relates to prior ownership and possession and self-belief through monetary affordance. This was presented as an analytical inference and arrived at a vision of how unique relations can be inferred and how this could be utilized for design practice. In the final part, I opened the issue of the constitution of the home as a private place through the electricity network and its information use for further interrogation. With such a background of apartment living, an alternative conception of home and inferences made from people's views on being open with their energy use information, I have laid out the context of this research from a field study carried out in three different cities in southern India. In the following three chapters, I will elaborate on the two subsequent field visits carried out in Manipal as a further elaboration of a field-based design practice.

The announcement of the award of the Nobel Prize in 2014 to Isamu Akasaki, Hiroshi Amano and Shuji Nakamura, for the high brightness blue light emitting diode, conveyed the ceremonial retirement of the Electrodynamic Electrical. It handed over the charge to its own subset the Informational Electronic. The handing over process that had gradually begun to take place as an amenity now was complete as ambivalence. Informational Electronic would now take care of matters for Electrodynamic Electrical. From the All-Electric Home we moved into THE ELECTROME


POWERICA
DG CONTROL PANEL
250 KVA AMF


SONY
WORLD BOOK
The HUTCHINSON ENCYCLOPEDIA


UR HOME




DANGER


1024 Ltr
Rs.42834


2016
2015
2014
2013
2012

CHAPTER 05——THE EVERYDAY APARTMENT HOME, DESIGN PRACTICE AND SEEDING A GAME

EVERYDAY DOMESTIC PRACTICES MEETING WITH DESIGN PRACTICE

What follows in the next three chapters is a composition of narrative, analysis and discussion as a result of a field-based design practice. It can be seen as a composition based on what happened when the everyday practices of apartment residents met an experimental field-based design practice through numerous interactions, as a series of 'Openings of the Electrome'. These three interconnected chapters are based on the second and third field visits in Manipal India in 2012 and 2013. If the prior two chapters based on the initial fieldwork were to be considered as field "studies", then the following three chapters present the fieldwork procedures as design "practice". In hindsight, such a separation between what is a study and what is a practice is superficial and not necessary, but yet I have retained this distinction for the purpose of analytical presentation within the dissertation. During these second and third field visits in two consecutive years, a number of design exercises and interventions were undertaken at the particular apartment block in Manipal with its residents. A total of seven exercises were carried out and documented. I present only five of them, and have consciously left out two. It is these five design-based exercises that are presented as a field-based design practice in the form of a prototype, as an *integrated domestic energy information service*. This has been conceptualized as a performative service by design for apartment living residents, presented as a demonstration of 'Opening the Electrome'. In the following three chapters, I discuss such a demonstration as a personnel-based domestic energy information service through a field-based design practice for inquiry, for prototyping and for a discrete activism.

This and the next chapter present the second field visit in 2012 with four sub-cases. The first sub-case is about an initial design procedure, playing out as a 'Collective Garden' board game. This is presented in the later part of this chapter. This sub-case should be considered as being a preparatory and supportive exercise and not an Opening per se. The other three sub-cases, which can be considered as Openings proper, are presented in the next chapter. Then in Chapter 07, I present a prototype from the third fieldwork in 2013. This, too, should be considered as an Opening proper and also as an extension to the conception of a personnel-based energy use information service within the apartment context. All of the sub-cases with their procedures that are presented in the following three chapters are comprised of formative processual prototypes that are concerned with apartment living, its energy use practices and its information. As a practice resulting from an academic design context, as already mentioned, this should be considered as being a prototype in itself. Thus as a developing practice, as a doing and working, "prototype" as a verb can be seen as embodying the same spirit and characteristics as the prototypes it makes and uses as nouns, as things and as places. The

positioning of this as a design service prototype can be envisioned to go beyond its academic intent. Such procedures could work as a proof of concept for a domestic energy management service focusing on apartment living, or as a trial for a community-based energy-centric design service. If further reformulated and refined, these can be imagined as being useful for energy policy-based transitional programs for urban housing. Thus it can be considered as a demo of the wider design programmatic possibilities.

Before delving into field descriptions, I wish to clarify a related concern. A crucial aspect that emerges in the making "open" or public of private energy use information as a design and research agenda is the inherent concern it presents to the participants and me as a researcher. More than a few deep and central issues emerge, such as that of personal privacy, competitiveness, the ethics and morality of material usage and, when stretched, even up to economic justice. These are not simple issues, and they and have presented themselves as central challenges and issues along the journey. Much of this hopefully becomes evident as I discuss the cases with the participants of this research. While it is obvious that the research does not make any attempt to resolve these issues, I try to bring these challenges to the fore, presenting and making them evident through design practice.

FAMILIES, HOMES AND MOVES

I gathered the central themes of apartment living and peoples' everyday practices as domestic living from the first fieldwork. I retained the theme of everyday resource measures from my original research plan that had led me to be accepted onto the doctoral program at the Department of Design in Helsinki. These themes from my original research plan and what was gathered from the first fieldwork came together in my second design practice-based fieldwork. During my first field visit, I had gathered some understanding of apartment living from four families each from the cities of Manipal, Mangalore and Bangalore. For the second field visit, I wished to focus on one place and a community rather than three different sites, so I decided on Manipal. This was a personal and pragmatic choice since I could continue as a visiting researcher at my old university and avail myself of academic and institutional support through the local university during the fieldwork. The apartment building was the one that I visited during my first fieldwork. I got in touch with Nelvin Souza, whose family I had already visited. He was the apartment's society board member and treasurer. He said he did not mind opening the door again for me. This presented an opportunity to continue where I had left off from the first visit. I asked him about the other families I had met previously. To my surprise, he mentioned that the Habib family and Dr Shenoy had both moved out of their apartments.

People move, homes become different, while the shell of the house remains on ground. The shell is not static either: it, too, is in constant change. It has wear and tear, the concrete in some parts may corrode, the walls may get a fresh coat of paint, pipes get removed, rewiring gets done, but it remains on the ground, while people keep moving, changing from one to many more homes in their lifetime. I mention this here because it was encountered in the apartment building that I followed for over three years. In my first visit to the apartment in Manipal in 2010, I met and spoke to five home-owning families, namely, Dr Shenoy, Habib and his family, the Souzas, the Silvas and also Colonel Suveer David.[25] Out of these families, only three had continued to live in the same homes by the second visit. Dr Shenoy and his wife had moved out of the country to go and live with their daughter in England. Having built a large home on an independent plot half a kilometre away from the apartment building, the Habibs had also shifted from the apartment block. The Silvas' residence, however, was housing a larger family. Mrs Silva and her son were living by themselves during my first field visit. During my second visit, Mr Silva, after taking voluntary retirement as an accountant in Kuwait, had returned to his family and was entirely based in Manipal. I met him for the first time during my second field visit. By my third visit in 2013, the Souzas had moved to Mangalore, about sixty kilometres south of Manipal. The Silvas had bought a larger apartment in the next building and had shifted there. By this time, Dr Shenoy had returned to Manipal and had moved into another apartment home close by, selling his old apartment to his wife's sister's husband Mr Prabhat. The one family that continued to live in the building and the same home during all three visits was Colonel Suveer David and his wife Nirmala. These were the home-owning families that informed my field research and field-based design practice during my three visits in three years to the apartment building in Manipal.

With that background, during the second period in 2012 I followed and engaged with the everyday living of three families, the Souzas, the Silvas and the family of Colonel Suveer David. While there was a fourth family whom I had not met in the previous visit that had initially agreed to participate, after three days it became clear that it proved difficult for them. This family who had initially agreed was a couple of practising doctors. The husband was an emergency surgeon and our meetings were often cancelled by his professional calls. However, the doctor participated in another way in the research by permitting me to check and gather data on his home's daily energy use information from his electricity meter and obtain other related data from the service personnel of the apartment building.

25 The interview with Colonel David during the first field visit in 2010-11 was as a board member of the housing association. This interview was carried out in the apartment association's office and not at his home, so did not involve the same exercises as carried out with the rest of the twelve families within their homes, and was not presented in the previous chapters.

During this second field visit in 2012, I was fortunate to be able to rent an apartment in the same building as the families for almost six weeks. The apartment building has 192 homes within its three separate blocks, A, B and C. This building could be considered to be part of the housing boom that started from in the early to mid-2000s in the university town of Manipal. This was when the local university became an autonomous private university. The intake of students into the university to study various disciplines such as medicine, engineering, architecture, management studies and hospitality services increased. While there was a rise in the capitation fees for the colleges of the university, there was still a rise in student enrolment and intake. This led to a demand in housing requirements to compensate for the limited student housing facilities provided by the university. This apartment building was one of the earlier housing blocks and part of the story forming the town's housing situation.

I consider that renting an apartment within the same building rather than living elsewhere proved to be useful for the field-based design research practice. The resident families I was involved with seemed more friendly and open with me than on my previous visit. It is these families' everyday practices that can be said to have shaped the field-based design practice and the subsequent concept of what I now call the Electrome. Living in an apartment as a resident in the same building also allowed access to the working realms of the apartment building's various service personnel, and a key person in the ecology of the building maintenance was Rahim.

IN-FORMALITY IN DELIVERY: PERSONNEL-BASED DOMESTIC SERVICES AND THEIR PERFORMING BY DESIGN

I met Rahim, who was in charge of the maintenance of the apartment's services, in the Manipal apartment building's main office. Mr Souza introduced me to him. His contract as the maintenance person in charge of the entire apartment building was with the homeowners' society. He was in charge of all the maintenance personnel and made sure that the apartment building was well attended by an informal workforce of security guards, plumbers, electricians, masons and gardeners. Being in charge of building maintenance and running it like a small company, he had his own office in the basement of the apartment building. The apartment building had a cooking gas network supplied by three separate gas banks maintained on the edges of the apartment building's plot. Each of the apartments had a meter in their kitchens, and every month the meter was read and the residents paid for their cooking use accordingly. Rahim's daughter Fatima studied at the local college. She gave Rahim a helping hand as necessary: when there was a personnel shortage, Fatima took charge of the cooking gas readings for the apartments. Fatima was wearing a hijab, a flowery cotton top and jeans when I first met her in Colonel David's

home. Nirmala, the Colonel's wife, knew Fatima as Rahim's daughter and she greeted and welcomed her into the home and showed her into their kitchen. Fatima had a receipt book, an account book and a pen, noted the readings on the meter, wrote the receipt and cheerfully informed them of the final date for payment, then walked out, preparing to ring the bell of the next apartment to do the same.

Child care, home cleaning, elderly nursing, cooking single meals, door delivery of daily home-cooked meals, specialized home maintenance, domestic pest control services, quick home fixes, payment of domestic bills: a number of such "services" can be seen as existing and emerging catering to middle-class urban India, all remaining very "personnel" centric. Car drivers with mobile GPS, domestic maids wielding vacuum cleaners, security guards staring into closed circuit video streams and various service personnel working with recent technologies, all are in close proximity to their employers, yet at a large psychological, social and cultural distance. The porosity of the Indian domestic space to the deep exterior vagaries of status, class, caste and gender for the delivery and through the acceptance of various informal domestic services is well evident (Gooptu, 2013). The technologization of the domestic space seems not to have reduced this porosity, rather we can mention based on this study of the Indian apartment home that the porosity can be seen as having evolved with the technologies and the growing economy in a reflexive way, one supporting the other, thereby retaining the distance. This is not only evidence of the disparity that exists but also the closeness and employer-employee relation seems to have evolved into some sort of large myopia that does not evidence the large gap of the various forms of disparity. Rama Bijapurkar, India's leading consumer researcher, says that there are now three Indias: India I, which is lucky; India II, which serves India I; and India III, which is unlucky (Sabharwal, 2010). The aspect I consider as being one of the central concerns that emerged from the study was a distance from empathizing with service personnel, the domestic helpers and household service personnel. Here especially, a person, the domestic worker or the household help, works and labours in the same space, which is home to a resident. Such a duality, where for one it is a place of work and for the other a home, is held by the Indian domestic environment, generating room for a bewildering tension that goes without a discussion within homes. Is it not in this same space, within this disparate context, in which the new services tending to the domestic realm are claimed to be are thriving and innovating (Bijapurkar, 2015)? The feel for this issue that was previously almost non-existent became latent during the beginning of this research and simmered throughout, and only increased in density over the period of this research. However, I do not attempt to resolve it through the research, but it has emerged as an essential topic for design to address, studying material use within extreme disparate contexts and the role of design in addressing disparity.

The delivery of informal door-to-door services through personnel in urban India is a well-established phenomenon. From food delivery (Pathak, 2010) to waste management(Gupta et al., 1998) to collecting personal savings (Sriram, 2002), there is a wide variety of personnel/ agents based everyday services. The personnel-based services from the global South can be seen as being sparse in material technologies when compared to the global North. Within the existing economic and social disparity in the context, with the wide gap in labour costs, the evolution, sustenance and delivery of these services seem to have only thrived.

From the previous study, based on the first field visit, there was enough information from the apartment residents to indicate that they were paying their electricity bills according to their cost only and did not pay attention to their consumption in units of kWh. They had also mentioned that they were not aware of how much electricity their home appliances consumed in scalar quantities. Meeting various apartment maintenance service personnel and Fatima as she did the rounds of homes for her father, and then knowing of various door-to-door type of domestic services prevalent in day-to-day living, provided a discernible direction for imagining a "personnel-based energy information service". Writing on design rituals and performative ethnography Halse and Clark (2008) say that design need not take place only in formal events such as collaborative workshops or in formal surroundings such as a design studio, but "in the interstices of everyday life when there is a realization of our practical and imaginative capacity to transform the circumstances of our lives into scenarios partly of our own choosing".

Thus, putting together the ideas that firstly residents could do with being informed about their home's energy measures and then this could be framed within the existing practices of personnel-based door-to-door services that cater to the everyday living of people within the context, the concept of a personnel-based service had begun to form. I imagined "a role to be performed" as service personnel who was responsible for and concerned with the delivery of residents' domestic energy use information. Such a context on site, a decision of my own choosing, with prototypes as tools for meeting sufficient service delivery and the support, permission and willingness of the residents and maintenance personnel shaped a performative role as part of the field-based design practice. This performing of the service as a prototype that I present as the Openings became the design practice during the second field study.

OPENINGS AS PERFORMING: BEING WITH AND WITHIN APARTMENT HOMES

Within such a field-based context, reflecting as a design researcher, I looked at this phase as resulting in the emergence of two distinct roles, one as the service personnel performing an energy information delivery service to the residents and the other resulting from renting and living in a home as a resident of the apartment complex. Both of these roles conceptually merged within my own everyday practice during the second field study. At the time, this was not aiming to resolve the issue of the presence of disparity, the duality of the Indian home space that questioned the lack of empathy that I mention earlier, as it was not clear then. However, reflectively, I see both these roles as supporting and providing resources for each other, both practically and theoretically. In the context of the field, the apartment building was a place where others' and my own everyday practice of apartment living merged with the design practice that was prototyping a personnel-based everyday service for the participating residents.

Having rented a home within the apartment building I asked for a venue and time from Nelvin Souza to present my research engagement with the residents. Therefore, I managed to present my proposal at a board meeting of the homeowners' association. The presentation took place in the association's office in the basement, a bare office with a large flat screen television, and a few chairs and two tables. During the presentation, I stated that my broad aim was to come up with future solutions for high-density vertical residential places like their apartment building for sustaining material resources like energy and water. To this end, I proposed to engage with them to learn how they carried out their everyday practices within their homes and to come up with possibilities with them. As a route to exploring such possibilities, making information on their domestic energy use public amongst them was presented to them as an experimental procedure. Hypothetical questions of what their experiences might be when their energy use was made public and what meanings they may give to it were posed to them during the presentation. With this background in the meeting, I presented design prototyping procedures with their respective designed artefacts that I had made in Helsinki. I asked them to consider these procedures as design exercises that could be used to shape future services for multi-storey residential living such as their apartment building. The procedures and their prototypes presented to the homeowners' association's board members at their meeting were:

1 A game session the 'Collective Garden' board game.

2 A one-day tagging exercise with coloured stickers on items that use electricity that the participating residents used within their home.

3 Allowing the electricity usage within the participating residents' homes to be measured for different rooms and appliances from the distribution box with a prototype called the Livelimiter.

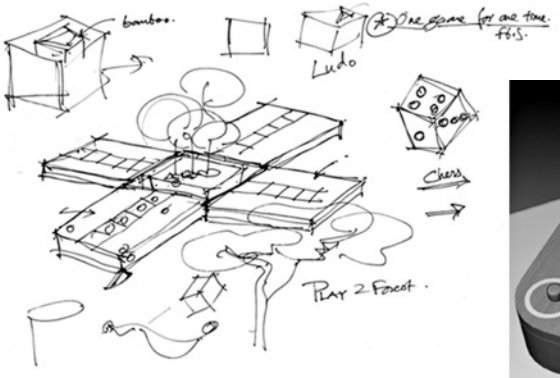
4 As an everyday morning service, first to allow me to read each home's overall electricity readings from their electricity meter in the basement and then allow me to share that as information among all of their homes for a fixed number of days.

Through the presentation of the prototypes, I also presented a rough time schedule for the entire exercise. After questions and discussions, the members said they were open to the idea. Two of the members said they were interested in knowing about their home appliances' electricity consumption and that is how they thought they could also benefit from this exercise. Nelvin Souza, Nirmala David and the surgeon who later could not participate, who were all housing association board members, agreed to participate and collaborate. Later I went to the Silvas, neither of whom were on the board of the housing association, presented the same slides to them and asked them to participate. They, too, kindly agreed to join.

Next I shall discuss the first procedure. The others will be presented in the next chapter with their backgrounds, supportive designed artefacts as props and prototypes, their selective and key interactions with the apartment residents and their analysis within the framework of 'Opening the Electrome'.

SEEDING THE OPENINGS: THE COLLECTIVE GARDEN BOARD GAME

To begin the second fieldwork the aim was to bring the participants, the apartment-owning residents, together for a collaborative discussion to further shape and form the central concerns and the methods and approaches of my field-based design practice. Through such a discussion, while hoping for directions and shaping from the participants for my field-based interrogative practice, I also wished to communicate and clarify further the intent and approaches of my visit to them. With such a mixed purpose, the second fieldwork incorporated an exploratory but simple game for an introductory gathering. While the inspiration for this could be read as design games (Brandt, 2006; Vaajakallio, 2012), it should also be noted that the interaction was intended to take place only with the participating apartment residents and did not involve complex multiple interests from different stakeholders. So I do not consider this preliminary exercise a "design game" in its strict sense. I consider the basis of making a place of play with the participants to learn from them and also clarify intent as being between a design game and exploring the context with a



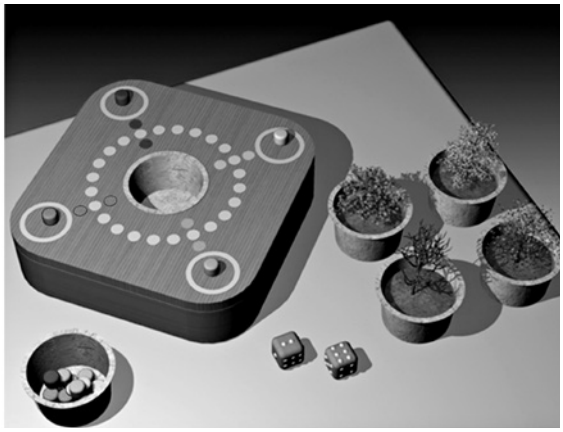


FIG. 12
The Collective Garden board game design concept and the residents at play with the board

prop (Koskinen et al., 2011: 75-76). The purpose of the game was to set the pace and place for learning about the residents' daily living. At the same time, the aim was to open a space for a participative discussion, asking the participants what they thought of being open with their private information. The idea of beginning with play was that if the practice was to provoke by making open and public private energy use information, it was better to clarify from the beginning that the ultimate purpose was towards conviviality, and this had to be experienced and portrayed from the start.

A design for a board game that had been worked on earlier was already in its conceptual stage. This concept was customized and tailored around the intent of this particular field exercise. The idea of the board game was an improvisation of an old well-known and popular dice-based game popularly known as ludo, or pacheesi or the cross and circle game. Dice-based games have been popular throughout India and for all age groups, so it was decided to be purposed for play on account of its familiarity within this context. The four-player game used a typical symmetrical patterned path on which the players' pods moved according to their dice throw results. A box was crafted out of plywood and made cylindrical in shape. The innovation of the game was to make the players' pods out of different plant seeds wrapped in four different-coloured cloth swatches. Local seeds of four kitchen herbs were chosen for the pods. Alongside the board was a basket full of moist mud in a copper vessel for planting the seeds (Fig. 12), whose ownership was attributed to the all the players of the game.

Upon playing and finishing the game with the pods, the players would be asked to plant the seeds together in the single mud basket, allowing the seeds to grow into plants. The growing of the seeds from all of the players' pods into plants in one single basket aimed to convey collective ownership and let it remain as a reminder of the game. Thus the intent was to generate an artefact as a memory of the product of the game that conveyed collective ownership seeded through play. Fruit juice and biscuits were offered as refreshments during and after play.

The game was further conceptualized such that its playing became an event for a discussion and a further opening of the understanding that had emerged from the previous fieldwork and relating to further design possibilities. Matters relating to material practices, their energy use within apartment living of electricity, cooking gas and water and the information concerns from these were merged with future directions and possibilities. Matching the number of pods of the 'Collective Garden' board game, sixteen questions were generated around the central issue of this research broadly along these four sub-topics:

1 Apartment home as individual and collective living.
2 Being open with resource use information amongst apartment home residents.

3 Information exchange on the material use of individual homes and possibilities of a micro-economy within the apartment block.

4 Apartment blocks and self-sustenance of electricity in the age of energy prosuming and net metering.

The area outside the community hall behind the apartment building in Manipal was chosen for playing the board game. The Souzas and Silvas arrived as couples, but Nirmala David came alone as Colonel Suveer David could not attend. A few hours before the session, the surgeon informed us that he could not participate in the session, as he had to attend to a professional call. Instead, he asked Nelvin Souza to represent him. Once all the participants had gathered, the working of the session was discussed. The rule of the game was that each of the four participants would have four pods of the same colour. Each pod would move along a circle with 24 dots, with two dots at the beginning and the end of the circle, according to each dice throw. To finish the game, each player would have to complete a full circle on the board with their pods. Then each person was given four closed cards on which were printed four questions, giving the sixteen questions. Upon getting a pod to the finish, a player had to open a card and ask out loud the question printed on it to the group, thus opening up a discussion with the other participants. Framed broadly on such rules, the residents carried out the play session with questions. The event took place over a period of two hours and was audio recorded and photographs taken.

Next, based on the transcription of the event and its analysis, I present a discussion through the game play. Having transcribed the play session with the families and their response to the sixteen questions, I categorized the resulting content into two parts. The first part is the direct responses from the participants to the questions and the second part the interpretation of how the participants responded to the questions and the format of the game. So if the first part can be seen as ‘what was the response to the questions?’, the second part is categorized as ‘how did the participants respond to the procedure’? This separation was done for the convenience of analysis and has been retained for the presentation. I will present the analysis of this game session in three sections: first, the participants’ direct voicing of their opinions and views about the issues through the questions presented to them; second what was interpreted as having emerged because of the coming together of the issues presented and the tailored method of play with the participants and how they responded to it; and third a reflection about this field-based design procedure, its shortcomings and possible refinements.

The Families' Voice

This first section is built up from the direct responses from the families to the prepared questions they asked each other during the game play session. From the transcription of the session, the content presented as a direct response was separated and organized into four categories, which I discuss below.

OPEN? DEPENDS

As the play progressed and the discussion opened with the questions of being open with one's homes electricity use information, the residents' responses can be seen as presenting three related concerns. Their first concern about being open was with whom and where. The second was, what are the benefits for them, of making their information open, and the third response concerned certain specific characteristics of the domestic material resource use whose information was being proposed to be open.

When the three families were asked if they were willing to be open with their energy use information with each other, all of them said they were OK with the idea. Then one of the family members asked if this was only with the gathered families or if the information would also be made open to all the other residents in their block. I replied that at that stage, it was only with the gathered members. Next, when asked if they were willing to be open with their information on the Internet, there was reluctance towards the idea from all the participants.

Further on, the issue of the benefit of being open with their daily energy use information was raised during the discussion. One member asked if there would be an actual reduction in their consumption and thus cost. He mentioned that this could be seen as a benefit not just for the residents but also for owners who saw the apartment as an investment. If any measure could reduce the overall costs of maintaining the apartment as an investment, people would be more likely to be open to the idea.

Then, in terms of material characteristics it emerged within the discussion that if a daily resource was seen as being "free" or the resource was seen as being "limited", like fresh water within the immediate context, or if a material was "rationed" for any reason, then making that information public would also be more acceptable.

We have alternatives, if that electricity [utility provided] goes we have the generator. This is what the people think. We all don't know how it is produced, no? We have not seen that and all that. But water we know, that every year it goes down and down …

I interpreted from this part of the residents' discussion that for them, something like domestic electricity use for which one paid according to usage, whose production was felt to be unlimited and whose production issues were not visible, being open with its information would need more reasons that clarified the wider benefits.

US AND THEM

While a question on being open to others may seem obviously to lead to an emergence of "us" and "them", during the session there was a recurrence of what was already noted from the previous fieldwork. The issue of the university students as tenants again emerged. The residents agreed that this was a particular concern for that town only, where a large majority of their neighbours were students who were renting and not permanent residents. According to the participating members, who were all homeowners, this aspect led to the students not taking an active interest in matters of the apartment. References to the students as "them" was noted and speculation emerged that "they" might not take up participation in the block as a community in the long term or be willing to invest further in the building for any long-term changes in its infrastructure. Two members also referred to the homeowners who did not reside in the building but had bought the apartment as an investment, as "others".

If everything is transparent yes, trust can increase.

If I hide everything, if you disclose everything there is no trust in that. I will make use of all your weaknesses and be better than you and put all the blame on you. So this is here…

Another aspect of "them" that surfaced during the session related to the domestic helps and "maids" who worked within the homes. Then on another scale, when I suggested or gave examples of trends from other countries where apartment residents converted apartment blocks with solar panels or grew their own vegetables, the residents mentioned that India is "different" and if something works elsewhere it might not work in India because of this. These were other notable instances of the making of an "us/them" boundary that was interpreted from the game session.

BRINGING IN THE NEW AS A COMMUNITY

While the discussion indicated the presence of some differences, as mentioned above, there were enough indications of the directions and intent of making a community. Gathering and celebrating various festivities together as a community of residents within the apartments was indicated

as way of building trust by one member. Inviting homeowners to be more active and join in the board of the association indicated a call for more collective engagement to manage the workings within the apartment.

It is the involvement of the individual units of the society. You have absentee landlords and tenants. Landlords have bought apartments here as investment. So anything that is going to give them extra money as positive results, an increase in revenue, they will cooperate.

When one member laughingly said 'Indians are greedy people,' another said that this was not true, and such a claim could not be made. Furthermore, there was enthusiasm within the group when discussing one of the questions relating to imagining if their apartment building were to produce its own electricity through solar measures and each of the residents were to gain from it. The homeowners mentioned the need for collaborative working by apartment builders and architects to introduce new methods of infrastructure management within the apartment building.

RULES, REGULATIONS AND POLICIES

A distinct category recognizable from the session was the discussion about the existing rules and regulations that the participants as homeowners and also as society board members had made amongst themselves, and also the rules they had to adhere to as a body registered with the state agencies.

The housing society cannot distribute the profit, you have to run with no profit or no loss. More than that you cannot generate. A cooperative credit society is another thing, then you can generate and can declare profits. Here now we can generate how much we want, but not excess. In that case you have to become a cooperative credit society.

Within the session came discussions of what was possible and what was not as a registered housing association body. They also discussed how, if there needed to be changes, the body could change its registration from being a non-profit body to a credit and cooperative body to accommodate newer possibilities.

Playing Relational

This second part discusses what emerged from the play session. As mentioned earlier, it is treated as a different level of interpretation. Unlike direct responses from the playing members, these responses were categorized as how they responded to the gathering, because of its format of being a game and the nature of the questions posed to them. Here, too, I have categorized them into four themes.

SOMEONE ELSE

The two-hour play session was set throughout in an animated environment with discussions. During this period there were a few instances where respondents mentioned or referred to being "someone else". For instance, during the start of play as the dice were being rolled and moves made, one member said, 'We have all become children now'. Then, over the discussion of a question relating to current domestic practices when compared to their childhood experiences and their parents' practices, one member mentioned that they were like "squirrels" before who knew how to store food. To another question that related to what electrical appliance the members were willing to share, when the example of a vacuum cleaner was given, one member mentioned that they would exchange their maid, their domestic help, since they hardly used the vacuum cleaner.

Mixie maybe … or our maid (everybody laughs). Because here we don't use the vacuum cleaner.

These instances recorded[26] and evidenced from the play session indicate that during the event, its questions made some members imagine themselves and others to be someone and also something else.

RECALL

Another theme interpreted from the session was the residents recalling their past experiences and sharing them with each other while answering questions. The questions triggered responses of people's past experiences, and thus became a convivial sharing time. Issues and stories from the past of the apartment building were shared as small anecdotes. Changes that took place in the past to the association's rules were quoted and the reasons for them were also mentioned.

26 While such a response comparing their domestic help to a vacuum cleaner can be understood as being offensive, I did not openly counter this matter in the immediate context. This particular issue was at least partially addressed when during the game role reversal questions were posed to the residents. This will soon be shortly discussed in the upcoming sub-section, 'Facing Empathy'. On reflection, based on feedback, design research could address such issues by creating suitable situations for empathy.

See here all this community living, it is not at our will and wish that we came together. Like in Bombay earlier housing society formation was often like-minded people coming together, and they applied to the government, and constructed a building. But now it not like that. Here it is not community living, it is commercial living.

Then members' prior experiences of everyday living from living abroad, daily practices from other cities, jovial with some tales of caution, all became part of their responses to the questions in the play session.

FACING EMPATHY

The session included a set of four questions that targeted an empathic response from the participants. These questions asked the residents to imagine themselves exchanging tasks and appliances with their neighbours or other apartment residents through a points system based on their resource usage. Two questions specifically revolved around being gainers or dependents with the neighbours through the points system. The questions posed were also posed in this order.

This is like a punishment that has come back to me. Why should I take up a punishment? The first question when it was on the other side we gave them a tough punishment. So when it comes to us, we are not … (everybody laughs)

This approach specifically brought out a reflective empathic response. In the former context, the residents gave out menial domestic labour tasks to their neighbours when they were in the gainer position, but when they became dependent, they gave themselves more respectable tasks to do for their neighbours. This led to a big laugh amongst the players and reflection on their prior choices.

ISSUES AT PLAY: LOCAL/UNIVERSAL

This final section holds a number of large and small contextual issues that emerged from the discussion. From opinions about local conspiracies relating to energy business lobbying, political leadership trends impacting the supply of power within the district to the country, the construction mafia and its relation to apartment building quality to bringing up lift maintenance woes, all such issues freely expressed by the participants found a place in this final section.

The power generation problem in India, we have the source we have everything, but the political will is not there. Particular in this district and state, there is a nexus between the generator producers and the ministers. They want the [power back-up] generators to be sold, so they are releasing less power. They are selling the power to some other states.

Many, if not all, of these concerns were treated not as digressions but rather as providing a mix of views from the context. Such matters as those expressed above can be seen as a surrounding volume of concerns that were expressed by the residents through the free-flowing format of the event.

Reflection on the Format

As a reflection, having conducted and organized the play session as a gathering with a repurposed board game, it seemed useful in approaching the gathering of people for a participation as a "relational social form". I find it useful to point out some of the issues that I found challenging during the session which need to be refined further. For instance, the questions posed by the playing members through the format of the game could have begun after every dice throw rather than waiting for the pods to finish a circle. This could have made the game move faster. The format of the game could have been more integrated with the design interventions rather than just being treated as a primer for the later intervention exercises. Then it could have been made possible for the residents themselves to have repurposed local and regional games instead of introducing the rules of an existing game to them. Furthermore, such sessions could borrow and build more from Design Games and integrate within them collaborations and participations, especially in contexts of differences like in this apartment in Manipal.

Overall, the session with the residents proved a useful beginning to the second fieldwork, and I felt that the residents also enjoyed the session. After the game, when all of the participants had planted the seeds from their game pods into the mud basket, watered it and were drinking juice, one of them said,

See what you did was nice, at last after three years after this inauguration [of the apartment building and the association] I think we have come together… as one family, and without fights (laughs).

After the session, the schedules and appropriate time of visits for the following sessions were also discussed and planned with the residents. In this manner, the game playing session initiated the closer and deeper engagement that was to follow. I will present this engagement next as a set of three sub-cases from the field visit in 2012.

CHAPTER 06——OPENING AS A PERSONNEL-BASED SERVICE: BETWEEN THINGS, PEOPLE AND HOMES

THE APARTMENT AS ELECTROME AND THE OPENINGS

In this chapter I present a set of three procedures that were carried out within the apartment homes of three participating families. These can be considered as openings of three different types, holding within them the various design approaches I discussed in the first chapter in varying measures that come together as a prototyping of a personnel-based energy information service. These were carried out over a time period totalling two weeks spread over a month according to the convenience and time given by the families. While these procedures are presented as a conceptual prototyping of a service, I saw their being performed as a design practice as being more than just another field design exercise. It was carried out with a warm, friendly and even neighbourly relation, since the families allowed it. As mentioned earlier, living within the same apartment building provided a unique relation with the families. The family members chatted with me as we met within the apartment's premises, they let me into their inner rooms, invited me for meals, allowed me to spend time with them as they prepared for festivals and gatherings, shared about the preparations on their children's marriage and introduced me to their would-be family members. So it was more than just a prototyping of a service. This is not to say that there were no moments of doubt and awkwardness. Any procedure that is deliberate, which opens the private information of others, even with their permission, can result in situations that not only can allude to a comparative and competitive environment but where the purpose of making private information public can be treated with scepticism. There were such moments that evoked questions about the intent and the procedures of the research. It was only the open-mindedness and explorative spirit of the participating residents in the end that allowed us to overcome this situation for the exploratory design practice. Thus overall it generated a relationally rich but sensitive environment in which to engage with the families.

Next, I present the three different procedures as openings with the three families. The first one is called 'Sticking Through a Day'. This opening relates to the everyday bodily practices and its movement around sockets, switches and appliances within the apartment home. The second one, 'Opening as Reading', is about the scalar measures of the appliances within various rooms within the participants' homes. The third, 'Opening as a Delivery', involves the entire home's electricity consumption in scalar quantities set within a time span of a day each with it being made open to all participating apartment households. First I present the outlines, precedence and related matters of the three procedures separately. Then I present the three families, their accounts as a result of their participation in the openings and its interpretations. These have been composed and built from field notes, sketches, photographs, domestic energy meter readings and taped and transcribed interviews and interactions.

OPENING 1: STICKING THROUGH THE DAY

As seen in Chapter 3, Maria said that after their home had been built, her hand now moved to where there was a switch, in an "automatic" way. In the same chapter, an alternative idea of the home was discussed. The domestic living place as a private realm could be considered as affording a perception of control to a body's over its immediate environment with numerous switches and buttons, providing an alternative characteristic of "being at home" which differs widely from the public realm. To question such an aspect further on the gathering of the body around specific points of electro-control around the home, I sought to utilize simple design procedures that I see as being inspired by empathic design procedures. I handed out a set of coloured stickers to the three families. I choose three pairs of colours, constituting six coloured stickers between each couple of every household. I asked them to tag switches, sockets and appliances that they thought need electricity to function with a pair of colours. Another pair of colours was chosen and the residents were asked to stick these on appliances that used cooking gas. A third pair of colours was given to stick on water sources such as taps, flushes and washing appliances within the three apartment homes. The couples from the three homes were asked to do this for a full day.

The procedure afforded the hypothesizing about two issues that relate to the matter discussed above. The exercise was firstly conceptualized to identify and locate points of control of the energy and water use within the people's apartment homes that constitute the elements of everyday practice. Secondly, as already discussed as the premise of the Electrome, the body of domestic practices gathers around places of electro-control in a routine and tacit way, or these spots of electro-control gather and bring the body towards them. This exercise also hypothesized that deliberating on a disturbance around these control points could provide more insight into the constituents of routine electro-practices. So during its conception it had been hypothesized that 'Sticking Through the Day' would result in a mild disturbances that broke the flow of everyday routines as small but deliberate disruptions, thus opening to garner further information about the constituents and elements of everyday domestic practices.

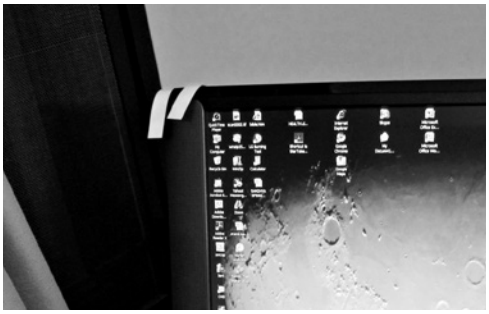
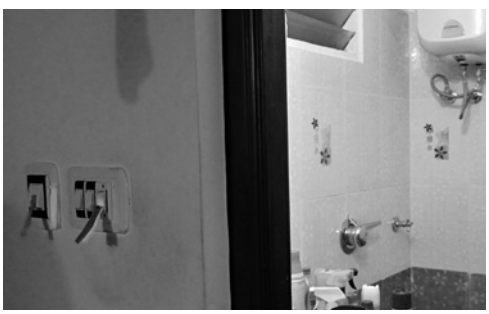


FIG. 13
Sticking Through the Day exercise within three apartment homes in Manipal.



OPENING 2: OPENING AS READING

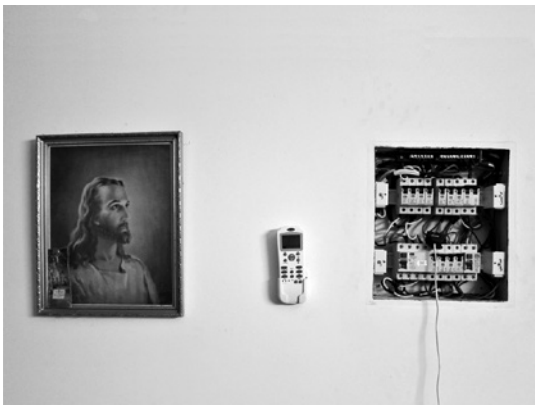
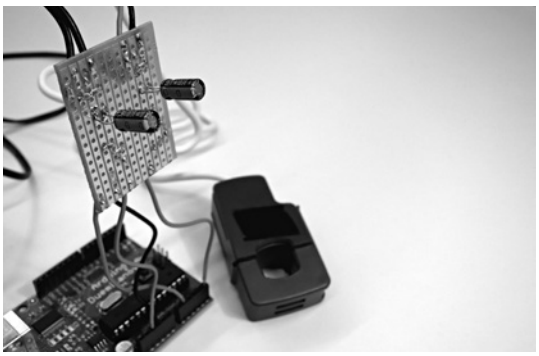


FIG. 14
The Livelimiter in place within a home and below as the circuit form.

The second procedure of the service prototype was based on the understanding that there was a need to provide the residents with scalar measures of the energy consumption of some of their home appliances. The central question at the beginning of this research was what may emerge if people were to interpret their domestic practices through scalar measures and if they were willing to share these measures with others? As the research progressed, by the second fieldwork, other than presenting its complexities, doubts arose as to whether this was even the "correct" question. So to drive further the inquiry about scalar measures of the domestic realm and its relation to everyday domestic living, this question as a starting component had to be tested and tried. From being a central question, it was slowly morphing into a concern of the research. This central concern of domestic energy scalar measures morphed, gathering related issues that surrounded the domestic realm and energy use within it, giving it a volume, removing it from its central position. Instead, it acted as a driver that made place for related issues through the volume. Part of this volume guided the procedure that I have called "Reading".

Then as already discussed in Chapter 2 with the concept of the Electrome, domestic energy use information brings forth issues and concerns because of its reduction into a scalar measure. I have discussed earlier how the measures can be considered to be moving deeper and closer into the domestic realm and how in the efficiency paradigm technological proposals are being laid to implicate everyday practices of the home. Thus, as already discussed, this reduction of energy use information into a scalar entity forms a central premise of the conception of the Electrome.

With such a background, 'Reading' pertained to measuring the consumption of electric energy use of the apartment residents' household domestic appliances in various rooms of their homes. The measuring was carried out using a specially designed device that was built based on the open source platform, the Open Energy Monitor (OEM, 2012). The design of the circuit of the Open Energy Monitor was customized and made to look like a small life-like creature and named Livelimiter. Photos of this "life-like creature circuit" were used to present to the residents the device to be used within



their homes when elaborating the procedures that were to be carried out as part of the research. The previous procedure of 'Sticking Through the Day' with coloured tags was used as the basis for measuring specific appliances in the residents' homes. These measures for specific appliances were then read out to the residents. This procedure of measuring and reading thus became a central part of this opening procedure. Discussions about the appliances, the stories of their procurement, and their various use cases within the various rooms took place around these readings. The readings for the appliances and devices and the discussions were duly noted and documented. Such relating to an appliance of everyday use through its scalar measures, the location of the electrical device and its related narrative from the residents all became part of the opening themed as 'Reading'.

OPENING 3: OPENING AS DELIVERY OF MEASURES

The third procedure that was carried out as part of an experimental energy information delivery service as an opening was titled 'Delivery of Measures'. The inspiration for this can be traced back to a specific service that has its roots to the town of Manipal. While being a university town, Manipal is also known as a banking town, containing the headquarters of an Indian national bank. The founder of this bank is known to have started a personnel-based service for small personal savings.

In the service, a person authorized by the bank would visit small businesses and homes every day or once a week and collect small amounts of money and help people deposit it into their accounts. Knowing this background and story from this town became an inspiration to this procedure as a service. Here, there was no intention to collect any savings, but to carry out a procedure as service personnel and deliver to the residents' homes their daily energy use information as a daily service, and then note what transpired. The service also made clear to the participants that the personnel would also make the energy use information of residents' homes open to other participating households. In this way, the idea was to gather the implications through the delivery and opening of such information as a prototypical service to the apartment households.

FIG. 15
The 'Delivery of Measures' was carried out through manual recording of energy consumption measures from domestic electricity meters in the basement of the apartment block.

The prototyping of the opening as information delivery was undertaken by noting everyday readings from the electricity meters of the four apartment homes. This was

TABLE 03
Electricity consumption data from the four households that participated in the 'Opening as a Delivery of Measures' exercise.

		Col David	Silvas	Souzas
	APARTMENT 01	APARTMENT 02	APARTMENT 03	APARTMENT 04
Household size	4	4	4	4
Approx area sq.m	130	145	130	275
Monday (1st reading in units)	1701.8	8246.55	8247.75	10116.87
Tuesday	1710.7	8255.5	8262.7	10126.8
Units consumed	8.9	8.95	14.95	9.93
Wednesday	1718.6	8264.7	8276.7	10137.45
Units consumed	7.9	9,2	14	10.65
Thursday	1725.5	8275.65	8291.25	10148.95
Units consumed	6.9	10.95	14.55	11.5

carried out over four days,[27] and the energy use data from the homes was communicated as information, door-to-door to the residents of the three households every morning. The readings were taken between 07.00-09.00 and informed to the residents thereafter. The surgeon's home data was gathered and informed to the other three homes, but his home was not visited, as he could not commit to my visits since he was not sure if his professional commitments would allow him to ensure that he would be available at home in the mornings. I did not entirely anticipate how this experimental procedure would be received by the residents. However, they all were open to it and I decided to carry it on. This is the background to the experimental procedure of 'Opening as a Delivery of Measures'.

The above descriptions of the procedures relate to the various design approaches that I mentioned in the introductory chapter. The entire conception of the field study as an experimental design practice I consider to hold an Interrogative design (Deutsche, 2011) spirit that questions what is private as information when it pertains to a home's energy use. As a design practice prototype, it has its inspiration in Empathic design methods of prototyping social action (Kurvinen et al., 2008). Specifically regarding the procedures, 'Sticking Through the Day' also took inspiration for its methodology from Empathic design procedures. Engaging with families through a service as a "social forming" alludes to Relational Aesthetics through the ideas of Bourriaud (2002). Then, I interpret deliberating the opening of private information within the service, evoking the relationship between the self and, others to be closer to both, Antagonism and Relational Aesthetics as referred to by Claire Bishop (2004) and Krzysztof Wodiczko's concept of Interrogative Design. If personnel-based practices that go unseen as everyday domestic services were to be interpreted as a peculiarity of their times within a place, then I consider that incorporating this as a design practice feature is an interpretive borrowing from Critical Regionalism (Frampton, 1992).

Next, based on the design-based procedures, I will discuss accounts from the three homes. The accounts are selective in highlighting specific themes generated from the responses of the residents to the three

27 The period when the procedure was carried out was during Easter 2012, from 26 March, a Monday, to 30 March, Good Friday. As mentioned all the interviewed participants were Christian. One participant even mentioned that he considered Easter to be more important than Christmas. I noticed that all the families were busy and serious preparing for Good Friday and then Easter. I decided not to disturb the families for that entire weekend. I also felt there was enough data to look into from the four days. I continued interacting with them with interviews and other design prototypes the week after.

different openings. The inferences from the themes were gathered from both the interview transcripts and co-constructive discussions had with the residents during the procedures on site through the field-based practice.

INFERRING FROM THE OPENINGS

Broadly reflecting on the process, the accounts and inferences that follow can be seen as what emerged when an experimental design practice interested in everyday energy practices and their information engaged with Indian apartment homes at Manipal. So, then, they should be considered as being accounts of Indian apartment homes that are described through an experimental design practice. More importantly, this should be considered as a following-up on the implications of the field-based design procedures. The accounts are not to be treated as definitive causal relations but more as a gathering of opinions, notions, views and imprints from people because of their participation with the experimental design practice. I consider this to be closer to what Koskinen et al. (2011:79) describe within field-based approaches of constructive design research, where "designers introduce their imaginations into the lives of people to be able to follow how these imaginations shape the activities, thoughts, and their beliefs of these people". I find the procedures as openings to be more than just imaginations; they seem closer to design interventions. However, what I discuss is a result of following the three families in Manipal during and after the openings as design interventions. What did the residents comment on during the various openings? What was evoked by them during a particular procedure? What was their response to specific questions during and after the procedures? These evocations, opinions, comments and responses were recorded and converted into transcriptions. So the following-up is basically the accounts gathered and documented from the residents' participation during and after the various openings.

The discussion I present has been deliberately organized by family rather than theme. From the beginning, as seen in Chapters 3 and 4, the accounts were themed as sketches and notes respectively and every family's account was treated on its own terms rather than generalizing overarching themes from many cases. This phase of the analysis also follows the same procedure. The design practice as performative research has tried to be consistent in the reportage of its context and setting rather than generalizing it by putting everything together and coming up with themes. This is the reason why even in this section the reporting is family-orientated, as it occurred within the apartment homes of the participants.

I present the following accounts as textual descriptions from the three families and their inferences from the openings in a particular pattern. Each family's account has sub-themes. The first two families have

two sub-themes each. The third family's account has only one detailed sub-theme, so in total, I discuss five themes from three families from the second fieldwork. The third account is more elaborate than the first two. This account is treated differently because of the nature of what emerged as a finding during the fieldwork. When I was carrying out this phase of my field research, a specific issue surfaced regarding migration. The formative question was around when Indian families re-migrated, that is, returned back to India after having lived abroad for a considerable period of their lives, how did this particular aspect of returning matter to their everyday energy practices? While grappling with this topic, after the fieldwork as already mentioned, I encountered Harold Wilhite's work, through the book *Cultures of Energy* (Strauss et al., 2013). Through this I was referred to his work on *Consumption and Transformation of Everyday Life* (Wilhite, 2008). This work was close to the Indian context I was studying. Wilhite also encountered the issue of migration, with some similarities to the issues that had emerged from my fieldwork. I found the topic of migration and its relation to energy practices to be intriguing, and from then on tried to build on Wilhite's work on this topic. Wilhite's work is anthropological. It partly concerns the relation between migration and energy consumption. What resulted from the field-based design practice approach, specifically framing "openings", can be considered as a type of response to Wilhite's concern. When I mention a "response", this should not be mistaken for a retort or a way to resolve concerns from that study, as it is far from that. A preliminary prototypical design practice cannot be compared to detailed anthropological field research from a seasoned researcher. The term "response" is more of a preliminary field-based design practice's acknowledgement of a detailed piece of anthropological work, wishing for a modest interdisciplinary dialogue. With this acknowledgement I will now discuss the accounts from the three apartment homes.

TABLE 04
Readings from the Davids' domestic electricity meter

	Col David
	APARTMENT 02
Household size	4
Approx area sq.m	145
MONDAY (1st reading in units)	8246.55
TUESDAY	8255.5
Units consumed	8.95
WEDNESDAY	8264.7
Units consumed	9.2
THURSDAY	8275.65
Units consumed	10.95

OPENING AT THE DAVIDS': INTERTWINING AND THE BODY LIMIT

In the living room next to the television on a stool retained specifically for it was an empty bombshell from a battle tank plated in brass, shining and in pride of place. This was a memento of Colonel Suveer David's participation in the 1971 Indo-Pak War. He said he had retrieved it as a live shell from a destroyed Pakistani Patton tank. Now it had been turned into a lamp with a base fronted by a plaque full of soldiers' names and descriptions.

The family of Colonel Suveer David and Nirmala was also one of the first families to move into the apartment building. I met him during the first fieldwork at the apartment's office, when he was still an active mem-

ber of the housing association's board. The Colonel, a decorated officer from the Indian armed forces, has a technical background in engineering. Having retired from the armed forces, he had worked for the local university in infrastructure management and now had retired from there, too. He has finished his term as a member of the housing association, although his wife Nirmala participates in the meetings and represents the family during meetings. Theirs is a three-bedroom apartment. Their younger son, who recently got engaged, lives with them. The Colonel's nephew, a student of mass communications at the local university, also stays with them in the apartment. With this background, I will next discuss an excerpt from the transcript of Colonel Suveer and his wife Nirmala. This excerpt is from an interview that was carried out after all the three procedures, 'Sticking Through the Day', 'Reading' and 'Delivery', a day after the 'Delivery' exercise had ended.

Colonel Suveer

Between 1-2 kWh reduction can be achieved [per day], by strictly cutting down this [pointing at TV] and switching on only when we need.

Colonel Suveer

My nephew keeps his laptop plugged 24x7 so that we can remove it at night tell him strictly otherwise cut off that switch. Because he comes late in the night, plugs it in, and when he feels sleepy he doesn't want to get up and pull out the plug, leaves it like that and dozes …

Colonel Suveer

We have become aware of our consumption pattern, yeah … There is a marginal scope for reduction. Only marginal.

Colonel Suveer

Other things we don't want to give up. That is the whole thing. Like the fan, I am sitting here, I need the fan all the time, like most of the time.

Nirmala

Now in summer we need the fan at high speed; one, two months, that consumption will be there. If three of us in three rooms, three fans. Everyone will have the same kind of …

Colonel Suveer

And both can't sleep together [in the same room, his son and his nephew]; one of them snores. If Anand comes, nobody wants to sleep with him, my younger fellow. He has to be put somewhere separate, so one fan extra. Because he snores heavily, nobody, none of the kith and kin want him. Sleeping pattern, snoring during sleep; that is another factor to be considered.

(Telephone rings, Nirmala leaves the conversation and starts speaking on the phone)

Colonel Suveer

Another factor my nephew is a student [at the local university]. Now he's supposed to be at class at the daytime, he's sleeping that fan is on. He will get up 16-16.30 in the evening then go for the gym, then come back, come back late in the night, about 2 o'clock get inside put on his laptop leave it on whole day. Suppose at this time, whatever time he came in the night, morning gets up and goes to the class in the morning, at least these 6-7 hours we can save, but he doesn't attend class, lack of attendance is there. They give him attendance at the end of the year. So he's just not bothered. And the course is also such, communications, doesn't have a set syllabus that you have to go and attend. You produce your project, go and do something whenever required.

(Nirmala finishes her phone call)

So that way … anyway hopefully in May he's finishing and going, there will be a drastic cut down, I can assure you …

Intertwining

From the account above from Colonel Suveer and his wife Nirmala, I would like to draw attention to two issues, one of familial relations within the home and the other relating to the body. This account from the Davids is indicative that there exists a certain discontent from Colonel Suveer towards his nephew, a university student, and his routines. The discontent was channelled within the discussion of the home's energy use. There was no clear separation and boundary between the matter of his expressing their home's energy use and the discontent towards another family member. Opening the Electrome here shows an intrinsic issue within the household, between two resident family members. The issues of the Electrome have intertwined themselves with a familial issue within the household. This is not the only instance of such an intertwining. As seen earlier, there was a consistent emerging issue between the home-owning residents and the student residents of the building. In this case of the Davids, particular characteristics of a relation between family members in a household become evident. Inherent issues present in a place emerge when Opening the Electrome. What issues to generalize, address or report and what to ignore as being of specific differences within a context is a subjective prerogative of any inquiry for any scientist, researcher, designer or artist. Here, it is necessary to acknowledge the presence of intrinsic issues as part of the home members, their relation and its nature, especially

within the framing of this interrogative practice. This is essential because the design practice interprets a "relational" approach for interrogating domestic energy issues, one which concerns itself with "an aesthetic of the inter human, of the encounter; of proximity" (Bourriaud, 2002). Then, it is *sine qua non* to identify and acknowledge what surfaces intrinsically entwined with domestic energy use and its practices as a relation. Then we must further choose if the intertwined issue or issues becomes part of the design space or not. The design practice must consider further as to if a practice dealing with energy use and its information becomes able to identify such interpersonal issues within a context, then it also holds the potential to further engage with such interpersonal issues, even through domestic energy use and information.

Body Limit

Secondly, in this case three references emerge to the body that relate to comfort and what can be considered as physiological concerns. One is Colonel David's mention of this need for the fan himself, next when his wife mentions the need for the fan for three rooms and then when he mentions that his son snores. The matter of the body here is gathered in three instances by the essential Indian domestic appliance of thermal comfort, the ceiling fan. Here, firstly the body registers comfort and this can be considered to go unchallenged. Nirmala's mention that there is a need for three fans in three rooms during summer and Colonel Suveer's mention of 'not wanting to give up' on the fan are indications of a firmness that bodily comfort through the fan cannot be compromised. This provides an indication of how individual bodies become bounded markers of territory for energy practices. Another instance is the mention by Colonel David of his son's snoring habit and how 'no kith and kin want to sleep with him'. Domestic energy practices encountering the registering body is the limit and final bastion of the Electrome.

OPENING AT THE SOUZAS': COSTING PRIVACY AND THE DIFFERENCE IN THE EVERYDAY HOME

Cases in research, in a field study, that yield no surprise, the ones that go unreported, the uninteresting, the "so what" instances are not uncommon. Nelvin Souza's responses to many of my questions during the interview session could easily have been put in such a folder. However, delving further into the case, the issue turned into a doubt as to whether it seemed mundane because it was or whether I was biased when seeing the responses being treated with caution. Some responses and interactions have to be treated in more ways than one, and Mr Souza's response is one such. When I asked him what he thought of participating in such an exercise, these were some of his views:

Yeah, it is beneficial, but people don't want to part with that information, some people say, you know, their privacy, they are using it and are paying for it.

Comparing areas of others, I can say I am using a little less. It doesn't mean I want to increase, because I am paying for that I should bring down possibly.

Costing Privacy

	Souzas
	APARTMENT 04
Household size	4
Approx area sq.m	275
MONDAY (1st reading in units)	10116.87
TUESDAY	10126.8
Units consumed	9.93
WEDNESDAY	10137.45
Units consumed	10.65
THURSDAY	10148.95
Units consumed	11.5

TABLE 05
Readings from the Souzas' domestic electricity meter

In both these responses by Nelvin the aspect of "paying" recurs. In the first instance it can be seen to absolve, thus generating the need for privacy because of paying. In the second instance, it can be interpreted as a regulating entity. Then, for Nelvin, monetary affordance and being able to pay validates a material practice and the protection of its information, including for daily energy practices and its information. Furthermore, Nelvin Souza's comment connecting paying for privacy indicates a suggestive relation. This aspect was consistent with his argument through this phase of the research. For instance, in an earlier discussion, he was of the view that since water provision through the bore well within the apartment premises was considered to be free, its consumption information for all the apartment residents could be made open as a matter of regulation. Interpreting his line of argument, privacy with regards to information of material use depends whether it is provisioned free or purchased through a monetary transaction. Tangential to this issue, another matter to note within this apartment premises is a procedure followed by the homeowners' association to make public information on defaulters of cooking gas payments. The apartment number and amount owing for apartment residents who did not pay their cooking gas bills on time was made public through printed notices next to the lift entrances on the ground floor. So making public the information on defaulters can be seen as a disciplinary measure taken by the homeowners' association. Such an undertaking by the society of apartment owners of making payment defaulters' information public falls within the regulations of the state bye law (Govt of Karnataka, 1972, Sec.16/2-g and 2-i). So, as the board of this apartment building, as an autonomous and legal body, the group had formulated certain rules, regulations and actions as they deemed fit. This included the making public of material use information, equating it to non-payment of dues. A relation between material use information and its relation to being private through a monetary transaction and payment can be inferred from such a case.

A Difference in the Everyday Home

Nelvin's 'Sticking Through the Day' exercise was unlike the others. While I had told the residents that they had to tag various coloured stickers on the switches, appliances, water and cooking gas sources that they used within their home in a day, Nelvin went a step further. He marked with a pen the number of times he used specific switches, appliances and water sources. The electrical socket in his home office, the television, the wash-basin switch and even the water bottles in their kitchen's water filter had numbers on them. In addition, throughout the field research phase, when read carefully through the previous interactions, Nelvin seemed more sensitive to water issues than electricity use issues. During the post-procedure interview, when going through the pictures of the washbasin area with its water tap and light switches which he had marked, I asked Nelvin what he made of such a numbering exercise. He said,

Conscious you know, whenever I was going and washing hands, it was already 7, and would say not now. But usually when you wanted to, after breakfast you have to wash, because we never use fork and knife. Eating we use hands so naturally washing. But you are aware and yes, I already used 7, then I am writing 8.

Here it becomes easy to imagine through Nelvin's account how he sees his hand-washing habit implicated within the customs of a place that further connect with existing food practices of a place such as India. It also becomes possible to trace further the format of what gets cooked, how it gets cooked and the larger material networks associated with the food practices of the region. Such an opening into the practices within a place need not be considered exceptional, but it is still useful. Such procedures allow the participants to open up and indicate how the procedure makes them view and experience the spaces of their homes, their everyday appliances and daily practices differently, thus allowing a following-up through their accounts.

For instance, in the same home, the 'Reading' exercise lead to an interesting account in Maggie's kitchen. As discussed earlier, Maggie had had two microwaves in her kitchen, a large one, which she said was imported, and a smaller one, which was newer and she had bought locally. When during the 'Reading' procedure, the energy use of both the microwaves were noted and told to her, she expressed a certain surprise. She said that all this time she was using the smaller oven thinking it was more efficient than the larger one energy-wise, because it just "felt" so. But the larger, older, imported oven was consuming less than the newer, smaller microwave, by 100-120 watts over ten continuous readings with the Open Energy Monitor. She mentioned that from then on she would bear that in mind whenever she needed to choose which microwave to use.

OPENING AT THE SILVAS': WILHITE'S CONCERN OF CONSUMPTION IN MIGRATED FAMILIES

	Silvas
	APARTMENT 03
Household size	4
Approx area sq.m	130
MONDAY (1st reading in units)	8247.75
TUESDAY	8262.7
Units consumed	14.95
WEDNESDAY	8276.7
Units consumed	14
THURSDAY	8291.25
Units consumed	14.55

TABLE 06
Readings from the Silvas' domestic electricity meter

Alan Silva had moved back to Manipal from Kuwait in 2011. Having worked in the Gulf state for over thirty years as a finance manager, he had retired as the Chief Finance Officer of a multinational elevator company in Kuwait. He had grown up in Africa, in Tanzania and Kenya. Then he lost his father and their family moved back to the place where they originally were from, Udupi, six kilometres from Manipal. He finished his studies and first joined banking services in India, then moved to Kuwait. His wife Rachel, too, was a Manglorean Catholic originally from Udupi, but grew up in Calcutta, Trivandrum and Bombay. After her marriage to Alan, she moved to Kuwait with him and they started a family and lived there for thirty years before deciding to move back to India for their retirement. Because of their children's education, Rachel and the children moved back to India first, while Alan stayed in Kuwait for two more years. By 2010, their two children, Joyce and Kevin were already well into their studies. The daughter was studying to be a dentist and the son a civil engineer. Joyce was doing her postgraduate studies in a town about seventy kilometres away from Manipal, while Kevin studied at the local university in Manipal and lived with his mother. Joyce would visit her mother and brother during the holidays. Alan visited the family once every three months for five to six days during those two years. Theirs was a two bedroom apartment, since during those initial years after moving back to India it was only Rachel and Kevin living in the apartment and they felt that they did not need a big home. When Alan moved back to live with his family in 2011, they purchased a larger apartment in the adjacent building. When I visited in 2012 they were still in their older two bedroom apartment and were almost ready to pack and move into their larger apartment in the next building.

During the 'Opening as Delivery' procedure, it so happened that the Silvas' energy consumption remained higher than that of the other three families. I said to Alan that this was not about comparison or a competition but just an exercise of making open the energy use of the participating households. However, he noted that his family's consumption was higher than the rest of the families', despite the smaller area of their home and equal number of people. The participating families were well aware of the size of each other's homes and the size of each other's families. On the second day, Mr Silva mentioned that because they were moving to their new home and were using the washing machine, their energy use was higher than that of the rest of the families. The exercise was carried out over the next three days and the energy use in units was

made open, as shown in the meter readings. At the end of the exercise, we discussed what Alan made of the participation, and if this was provided as a type of service then what did he think of it? This was the discussion:

I think it would definitely get us thinking on the consumption. You know the very fact that you started this, made us begin to think about the electricity consumption. We realized that in Kuwait electricity was so cheap and we wouldn't mind a lot of wastage. Here also the same habit has come through.

In my previous field visit to the apartment in 2010, when I had spoken to Rachel, about her experience of paying and managing the electricity use bills of their home in Kuwait she had said,

In Kuwait the electricity and water was paid by the office, by the office company. So it used to get cut by the company, and used to get paid, the bill never used to come. And I guess I was not aware of the bills because there everything is in Arabic, so we can't understand what they write. Since I never got used to writing much of Arabic, so my husband used to handle that. But our electricity and water bills was very nominal, it was not a big sum there. It's cheap over there.

The Silvas, a Manglorean Catholic family, had spent a large time of their working lives in the Gulf. The moving of populace to the Gulf countries in the Middle East is a well-known phenomenon of migration in southern India. The districts of Udupi, in which the town of Manipal is located, Mangalore and North Kanara all in the state of Karnataka in southern India all have large populaces of families who have migrated to the Gulf states. Families and individuals of Christian and Muslim communities especially form the larger portions of this migrating populace. This phenomenon of migration is further known to intensify as one moves geographically southwards from the state of Karnataka into the neighbouring southernmost state of Kerela.

The specific phenomenon of the migration and returning of migrated families from the Gulf states in Kerela has come under the attention of Harold Wilhite in his study of changing consumption in southern India (Wilhite, 2008). Wilhite's study, based on an anthropological approach, uses in-depth and structured interviews, surveys and diary studies around two neighbourhoods in the Kerelan state capital of Trivandrum. A whole chapter deals with the issue of the migration of Kerelan households and its implications for consumption. I will review in brief, interpret and discuss this chapter (ibid.: 89-103) as it relates to the background and context of the Silvas. After looking at Wilhite's concerns from his study, then moving into accounts by Alan Silva and his son Kevin

from their family's participation in the openings, I will present how a design approach such as the Opening of the Electrome could be a useful way in which to address Wilhite's concerns of consumption of migrated families in southern India.

Wilhite's Perspective on Work Migration and Consumption in Gulf Households from Kerela

Work migration has been an important transnational phenomenon in Asian countries (Wilhite, 2008: 90). Harold Wilhite identifies the migration of Kerelan households to the Arabian Gulf states and how consumption patterns get implicated within it (ibid: 89). Beginning the chapter by referring to the works of Arjun Appadurai, Kevin Olwig and Michael Kearny and their conceptions of "ethnoscapes" and "transnational" fields, Wilhite notes that the phenomenon of migration brings in a fluid sense of place and identity with a transnational movement of ideas as well as things. He notes that the forming of the "workscape", the place pertaining to work, and "familyscape", pertaining to home and its extended relations, become important conduits for change in the consumption of Kerelan migrated households. Through accounts from Gulf migrated and returned families, Wilhite shows how the demands of home construction and extended family needs that both occur in India contribute to important changes in household practices such as cleaning and cooking for the Kerelan families working in the Gulf. According to Wilhite, such practices that develop in Gulf countries then eventually transfer back to consumption practices in Kerela as the migrants return. Using survey data, he points out that households whose members either work in Gulf states or have returned are decidedly wealthier than households that have no migration background. He also points out that there is a higher ownership of household appliances among Gulf families (ibid: 98). Using this survey data, he clarifies that the consumption and ownership of appliances is not just an attribute of economic affordability, since Gulf-based households (families who have returned from the Gulf or have a close family member living there) have a different pattern of appliance ownership, larger than that of non-Gulf-based households with a similar income. He attributes this ownership to two factors, the "Pull of the Family" and the work migrants' "Sense of Dual Residence", by which he means having one residence in Kerela and the other outside India.

Wilhite then argues that migration contributes to changing consumption practices of the everyday. Referring to Wilk's idea of the discursive sphere of heterodoxy (Wilk, 1999:10), Wilhite says that "through the exercise of power [needs and wants or luxuries and necessities can] become re-established as orthodoxy and eventually sink back into the accepted daily practice of the habitus". Wilhite concludes the chapter by mentioning that migration provides a conduit for the transfer of con-

sumption practices from one home to another, changing what matters in a place. According to Wilhite, Gulf incomes that are higher than the local Kerela salaries provide people with the means to put new ideas about consumption into action. Appliances that are thought of as luxuries in Kerela get normalized as means of comfort, convenience and entertainment in the other residence abroad. Wilhite refers to this as the "re-configuring of habitual practice through migration", which then turns into not only an impetus for changing consumption but also a means to reconfigure ideas about what is a good life and the role of consumption in it. It is not plausible to directly map such an interpretation of Wilhite's perspective on Kerelan families who have returned from the Gulf onto the Silva's family account with the very limited time period of this procedure. A direct causal relation cannot be made that since the Silva family had been living in the Gulf, their energy use is higher than the rest of the families who participated in the research. Even though Mr Silva mentions *the same habits hav[ing] come through,* it would not be fair or reasonably logical to directly attribute such a causal relation. The aim of the openings is not to make causal relations within such small and short data sets. The procedures hold no such quantitative ambitions. The aim of the openings is to further design opportunities for an inquiry through discussions that ensue through prototyping by design practice. It is to also activate the context of its situated practice through energy use information.

Getting back to the Silva family and Wilhite's perspective on Kerelan Gulf families, there are, however, similarities between the two. The Gulf-returned families in Wilhite's study, like the Silvas, have lived most of their working lives in the Gulf. Another similarity is that the cost of electricity, water and such domestic amenities is borne by the companies they work for (Wilhite, 2008: 92-93). But there are differences too, that are significant. The working profile, the job type and so the socio-economic background of the Silva family seems widely different from the families described by Wilhite. The Kerela families described by Wilhite have a working-class background with jobs such as nursing and work in the oil refinery sector, whereas Mr Silva had a senior corporate employee background. Then not only do the type of homes that the families return back differ widely, but the process of making the home is also different in both cases. The homes mentioned in Wilhite's case are single plot homes constructed over a long period of time. The Silvas moved in to a constructed apartment home. These are some similarities and significant differences between what is presented in Wilhite's study and the case of the Silvas. Rather than mapping Wilhite's theory onto the Silva family, which would be incorrect, what is deemed more useful here is to look further into this case. Thus, going further I will look into an account between Alan Silva and his son Kevin where they raised particular topics during the interview after the openings. In the account, they discussed their appliance use relating to comfort, convenience and entertainment within their home. These

accounts should be seen as their reflection on their everyday practices because of their participation in the openings. Through this, at least a reasonable response, made through a design-based procedure of the openings, could begin to address some of Wilhite's concerns.

To this end, I will present in sections the discussion that occurred during the interview with the Silvas after their participation in the openings. As I mentioned earlier, I interpret their response and reflections on their own domestic energy practices through their participation. This section is selectively organized to look into aspects of energy use within the Silvas' apartment home that relate to their entertainment, convenience and comfort, through devices and appliances that can be seen as being responsible for generating those phenomena within their home.

Entertainment: Screens Near and Far

The interview with the Silva family was mainly participated in by Alan Silva and his son Kevin. During the session reviewing the pictures from the 'Sticking Through the Day' exercise, a discussion began on their television use, and the question turned into who within the family was more involved with the television. Kevin answered the question by saying that it was his dad who spent most time with the television at home. This was the discussion that took place,

Alan Silva

There are two reasons I use it the most. Because I am in the home, and I am quite a TV addict. Number two maybe being the dominant male if I am watching the TV, they think you know [small laugh] … they know that if I am watching the TV and I am watching a programme and then interested, if they wanted to watch then they may not always get their ….they are more onto the Internet. Right or wrong?

Kevin

Hm, yeah right [sarcasm].

Alan Silva

[laughs] Not that I am feared but they know they will not get it maybe? [laughter]

Kevin

And he has a personalized iPad.

Alan Silva

I use both together. Now we very consciously switch off. You know there is less consumption usage of TV ah?…I think have I learned now. Because I would by default switch the TV on and even if I am not watching it would be on. While I was let's say on the iPad, the

TV would still be on, it would still be loud, all those things. Now when I am not watching I will switch it off. And for sure, when we are not using it for a long time I make sure I put the main switch off so that the small red light is off. So that again …

Through this account between Kevin and his father we get a glimpse into the television-watching practices at their home. Alan reflected and also joked about his ways with television watching. It provides a sketch of his habits with his personal tablet screen and how he likes to use it while watching television. Upon participation in the 'Openings' exercise he commented that he had changed some of his earlier ways. Although their flat screen 42 inch LCD television is not a big drainer of energy, Alan still said he had begun to switch it off at the main switch. This provides some inkling that Alan had considered the openings in some ways and was receptive to the prototyping of an energy information service.

Comfort: Air Speed and Exchange

To gather an idea of what I have categorized as comfort within the Silva household, I present two accounts, one on their ceiling fan[28] use and the other on the hot water geyser in their bathroom. Both of these happen to be significant domestic appliances, not just for their contribution to the overall energy consumption of the Indian household but also in the shaping and forming of everyday thermal comfort within the home. Within this section, the discussion relating to the ceiling fan is detailed differently than the other cases as it is seen as an overlooked and less researched appliance relating to comfort and energy use within the Indian domestic space.

During this phase of the research with the 'Reading' procedure, the energy use of the ubiquitous ceiling fan was measured using the Open Energy Monitor. The ceiling fans within the participating apartment homes have two levels of control. A switch on the switch board located on a wall in the room of the fan turns the fan on and off, and a rotational knob next to the switch known as the fan regulator controls the speed of the fan. The switch and the regulator are controls that are part of the apartment and are installed by the apartment builder, so when one buys an apartment, the switches and regulators are standard fixtures. The fan though, as is common practice and thus in the case of this apartment was bought by the owners and installed separately. Upon installing the fan, it is connected to the controls through the electric cables that are already present and ducted within the walls. The speed control regulator within the homes of this apartment building has six positions of control. It starts with "off", so even if the switch is on, the fan can still be switched

28 In 2012, it was estimated that 30 million of these were sold in India with an annual growth rate of 10% (Singh, Barve, & Sant, 2010).

ENERGY READING IN WATTS FOR FIVE SPEEDS OF THREE DIFFERENT CEILING FANS

	SPEED 0	SPEED 1	SPEED 2	SPEED 3	SPEED 4	SPEED 5
FAN 01	0	9.92	19.6	32.921	39.741	77.211
FAN 02	0	8.323	17.076	25.42	33.023	63.895
FAN 03	0	15.2	22.237	29.325	37.588	68.07

DIFFERENCE IN WATTS BETWEEN FAN SPEEDS OF THREE DIFFERENT CEILING FANS

	SPEED 0	BETWEEN 0-1	BETWEEN 1-2	BETWEEN 2-3	BETWEEN 3-4	BETWEEN 4-5
FAN 01	0	9.92	9.68	13.321	6.82	37.47
FAN 02	0	8.323	8.753	8.344	7.603	30.872
FAN 03	0	15.2	7.037	7.088	8.263	30.482

TABLE 07
Energy measures from three different ceiling fans from three different homes from the apartment building in Manipal

off through the regulator. The rest of the positions of the regulator vary the rotation of the fan to five different speeds. Three different fans of the standard 1200mm size of different brands were chosen within the different homes of this apartment building. Their energy use for their various speeds was measured. A specific pattern emerged. As seen in Table 07, the electricity consumption of ceiling fans vary with the speeds of rotation of the fans. Consumption increases with increasing speed. With this background, next we go through the following excerpt from the Silvas discussing their ceiling fan use within their apartment:

Alan Silva

In our house, you know, my wife is very fond of the fan. When she puts on the fan, she likes it only when its full on you. Know, mom? (Looking at Kevin)

Kevin

Yeah, she finds it hot.

Alan Silva

Very fond of full on. She feels it's hot. It's not only hot, Kevin, like you know that the habit even in Bombay they had it. [I] remember when she came to Kuwait, know ah? You put the AC but she was used to the fan. So she wanted the fan and the AC at that time. Even now they like it full on. You don't use it so much full ah? [Looking at Kevin]

Kevin

I use it always full.

Alan Silva

He uses it full. For me I generally like it slower. But I want the fan. But mom likes it full speed. That's probably a reason also ah? [That their home's consumption was higher] why we maybe one reason …

Regarding Kevin's comment about needing the fan to be on "full", on speed five, I asked him if he felt that much more comfortable as the increase in the energy consumption between the speeds, and if it was in any way possible to compare the difference between how comfortable he was in between speeds four and five. He replied he sweats a lot and such a feeling was relative to a person. Alan added:

You know again like Kevin said, it is relative to a person. Like for Rachel, this is what she needs. Whereas for me this is for me, full at this speed it is uncomfortable. I am more comfortable at lower

speed. He likes it full because he sweats a lot. So he wants it full. And usually you sometimes you know she feels so hot or he feels so hot that they need both the fans, OK?

I asked Alan, what if he were to talk to Rachel about the issue of using the fan at a lower speed of four instead of five. He replied:

But like you said you know, if I tried to tell Rachel about the fan, that's something related to her comfort. If she had to tell me keeping the TV on for so long, is this thing, I would immediately go on the defensive about my need for the TV, ah? And I would say this is one expense I am must be willing to allow.

This account from the Silvas allowed the discussion to be opened through the ceiling fan. In the beginning, it can be seen that Rachel, Alan's wife, and their son Kevin prefer the fan to be on "full' speed" According to Alan she has always preferred it such and he recollected that even when they moved to Kuwait she preferred the fan alongside the air conditioner. So Rachel has been taking her habit with her, and this is similar to what Alan mentioned earlier, about 'same habit coming through'. He mentioned their family's fan use, saying it was "probably", one of the reasons for their home's energy use being high. Alan then mentioned that he prefers the fan to not be not at full speed. The discussion then moved on, with Alan referring to comfort being relative to a person and mentioning how his son and wife need two fans in the same room. Then he mentioned that since this matter is related to his wife's comfort, if she asked him to change his television habits then it would likely lead to a compromise with each other through the respective appliances they are engaged with, allowing their continued use.

This particular account from the openings with the Silvas began with knowing about the ceiling fan and its energy use at various speeds. Then Alan and Kevin Silva opened up about their family's fan use habits. We encountered a "body limit" aspect again, whereby Alan mentioned that he considered his wife's choice of fan speed and her feeling comfort to be relative to a person and would willingly settle for whatever she wishes as an "exchange" for his television habits. With this case, we can interpret that this is an exchange that occurs between familial relations through domestic appliance use and practices, and this exchange implicates the familial relation within energy consumption.

Timing the Bath:
Hot Water or the Practices of Others?

In this account we encounter another appliance that deals with a different type of thermal comfort issue, one of hot water for showering, the appliance popularly known as the "geyser" within the Indian household. While the use of domestic solar water heating has risen substantially in India since the early 1980s, its use and deployment has been patchy for political, technological, legislative and even educational reasons (Veeraboina & Ratnam, 2012). Its uptake, especially within the apartment context, has proven not as popular as for low rise independent houses with clear ownership of the roof space (ibid: 673). This has been cited as resulting in the use of hot water electric geysers within multi-storey apartment homes. This was the case with all three apartments in the first fieldwork, including this apartment building in Manipal that houses the Silvas. This may change in the future, but the previously installed electric hot water geysers within the individual apartments continue to be in use. Boegle et al.'s (2010) report on the saving potential of total appliance stock in the Indian domestic environment indicates the hot water geyser to be the seventh most power-consuming appliance in the Indian home. This can be found to be reasonable, even though the perception of the geyser is that it is a heavy energy consumer, which it is. However, its use over the day is limited. It can be imagined that the geyser would be switched on for between half an hour and an hour over the entire length of an average day within a household of four, projecting its cost to be less than 10% of the monthly electricity consumption. Alan, when discussing which appliances he thought consumed how much electricity in his home, mentioned the use of the geyser,

Of course maybe everyone knows that with the geyser is heavy consumption. I even thought of one thing you know. I noticed when they [other family members] put the geyser on, ah, maybe when we bought the geyser, we just bought a big geyser alright? Now what happens when you switch the geyser, all that water will get heated. But the person who is utilizing may not use all that. Then that water cools down. So I just thought to myself and I have been doing that over the last few days. After one of them finishes the bath immediately I go have a bath, I still have warm water. Otherwise I would wait you know, after they went and everything was OK then I would again put the geyser on and heat the water.

Here Alan firstly provided an indication, with his mentioning, 'we just bought a big geyser' of what he considered when buying an appliance. This provides some idea of his preferences when buying appliances. This aspect, of buying an appliance by not necessarily considering its energy use in

everyday practice, was also present in Alan's other comments, like during his purchase of the microwave oven and also in an example where he mentioned buying a stereo with loud wattage. I will not discuss these accounts but only mention them here. It can be interpreted that he was making the above comment having reflected on how such an initial decision impacts on the daily use of the geyser and its energy use. So the running costs in terms of energy use for appliances had not necessarily figured in Alan's practice of purchasing domestic appliances for his home before this discussion. Then, Alan mentioned that now he takes his showers soon after someone else from his family has had a shower. If one initially bought a big geyser, then if one decided to reduce power consumption, one needs take a shower immediately after another person has taken a shower. In such a case, with these limited variables, one's practice of showering here is determined by when another person has taken a shower. The control of the geyser through the switch can be seen as a mock: control remains a chimera here. Instead of the switch on the geyser, it could be the person who takes the previous shower who determines when the following person will bathe. The relations within the household and their practices begin to surface as strong forces that determine everyday practices and their energy use. Yet again, as noted in the previous case with the ceiling fan and television, the Electrome also holds negotiations and compromises.

OPENING THE DISCURSIVE SPHERE BY DESIGN AS A RESPONSE TO WILHITE'S CONCERN

Above we saw accounts from Alan Silva and his response to the openings. The accounts provided some instances of how and on what Alan reflected in his everyday practices within his apartment home. No claim can be made that these would continue as practices or it would change the energy practices and consumption patterns within their home. The same can also be said for the Souzas and Davids. However, what the openings as a prototypical service did was to bring out the issues of energy use within the Electrome into a discussion. By design, through a performative experimental design practice, the energy practices of the everyday were given a place and time for reflection by the apartment residents. This discussion from Alan below provides further evidence of how other members of his family became involved in the discussion during the openings at their home:

But since then [since participating in the exercise] I know the first reaction when I began to think was, everyone thought, what's this, you know?

… We have begun to understand some areas. Maybe we understand better which are the key energy consumption units, you know, the accessories. Like Joyce had even gone through Google. She came up with one table, which showed in a typical household which are the

high consumers. You know the AC, the geysers, the washing machine. And you know it showed, you begin to realize which are the ones that you have to be more careful. You know after that we started talking about reducing electricity consumption, when I told them that we are consuming very high compared to other families, we also began to think that we have two bedroom house and others with maybe three bedroom house are able to manage. We discussed reasons also ah …

Maybe we spend more time in the house, some others may be out of the house. All sorts of things.

This can be seen as a way in which the Silvas, a family who have spent most of their working lives in the Gulf state of Kuwait, responded to the openings. The father discusses an issue with his daughter and she checks online and comes up with a list of energy consumption data for household appliances and the family discusses the issues. The consumption that occurs bodily, unconsciously within the Electrome has been brought out, resulting in reflection and discussion. Wilhite, in his chapter on the migration of Gulf families and their consumption, refers to Wilk's work mentioning the cycle between the "conscious and unconscious" being an essential aspect of all consumption systems. According to Wilk, social limits and standards are taken for granted and change only when they are brought out of the doxic realm of the unconscious habitus (Wilk, 1999: 6.2). Wilhite's reference to Wilk can be read as a comment on how consumption is normalized with energy appliances for Gulf families in their second home while working in the Gulf, which is further carried over when they return to India. The openings can also be viewed within such a framework of the process of bringing out the social limits and standards that are carried within (the Electrome) bringing them out of the doxic realm of the unconscious habitus.

It can also be considered to work towards a reversal. With opening measures, such a procedure can be viewed as a reversal of an "advertisement", a sort of an "antithesis of advertising" the existing energy-using appliances that comprise the practices of the home to allow a discussion to take place around and about them. Doing this by design means the aim here is to bring out the existing unconscious of the every-day energy practices of the Electrome into the discursive sphere of the family. That is what marks the opening of the Electrome.

Integrating the performing of a service through the openings within the field-based practice, should be considered as a methodical issue that gathers both design and research. Performing as service personnel as part of a design prototyping practice can be seen from an user-centric design tradition. Firstly by framing the field study process as a "service", the process was distinct from following a traditional anthropological approach. Role-playing and related methods such as body storming and situated enactments have been popular methods in experience prototyp-

ing (Iacucci et al., 2000). Kari Kuutti's (Kuutti & Bannon, 2014) recent note on the "practice turn" as a research agenda mentions that from a practice perspective, the world is a network of performances that are durable, because the ways of doing things are coded in minds, bodies, artefacts, objects and texts, and all are connected together. Thus the result of performing one activity serves as a resource for another.

Within the Relational Aesthetics perspective (Bourriaud, 2002:13-15; Bishop, 2004:55), the rendering of "services" for relation-forming have emerged as a response to the shift from a goods- to a service-based economy. Thus, when seen from such a perspective of contemporary art, role-playing within a service prototype can be looked at as deliberating "relation-forming" through the process. Methodically and approach-wise, the relation-forming aspect has been more significant in this design process, making role-playing as an experimental service closer to the relational approach. However, what holds from both perspectives, from the user-centred design and the contemporary art perspective of relational aesthetics, is that a performative act, which is prototyped with, used and experienced by people, cannot be separated from the design intent as an object of inquiry. Thus, borrowing from both perspectives I have engaged with the everyday practices of the apartment residents.

In this manner, the design practice performed and prototyped an experimental service with the apartment residents. While on one side the performance was conceptualized as a proto-service for the residents, its concern was also to "open" the 'Electrome' of the participating residents as a design-centric interrogation through it. Again there was no separation between the conceptualizing of the service prototype for the residents and it becoming a process of inquiry through the means of the interrogative design. When viewed as such, the procedure holds in it what is conceptualized as being useful to others and as what the designer is looking for to further the design process. The process here was coupled as a service for others that merged with the design researcher's intent of an inquiry. If to be empathic is to acknowledge the other, then to design in empathic terms can be seen as the shaping and forming of material or action that occurs between the others and the designer's self. In this way, the role of the designer as a performative practitioner merges with that as a researcher. In Wodiczko's interrogative design terms, I interpret this as "creating points and spaces of convergence for a multitude of internal and external inquiries as a critical mirror". Thus 'Opening the Electrome' of the participating residents is considered as a design act, in empathic design terms, in relational design terms and also from an interrogative design perspective.

CHAPTER 07 —— OPENING AS A SITUATED AND AESTHETICAL PLACE

OPENING AS A SITUATED VISUALIZATION

The previous chapter dealt with opening of the Electrome with three families within their homes. These families were homeowners and considered as "locals". Two of the families were also part of the homeowners' association board. The openings were presented with multiple design procedures all framed towards prototyping a personnel-based service. A game and three different procedures framed as openings served as a set of experimental services for apartment residents in the southern Indian university town of Manipal. Within the procedures, three families looked at each other's everyday energy use information, engaged in knowing about the scalar consumption units of some of their everyday domestic appliances and were also given opportunities that made them reflect when their energy practices went through deliberate breaks in the flow of everyday actions. This led to interpreting and inferring about people and their everyday energy practices within their apartment homes.

Next, to scale the idea of the opening to encompass the entire apartment building and the energy information for all the homes, a fourth opening procedure was carried out in the same premises. This was carried out during the third field visit to Manipal in May and June 2013. In this section I elaborate on this final and fourth opening. I consider it to be a continuation of the previous procedures, so this also remains part of the prototypical service for the apartment premises. The final opening procedure that I describe in this chapter shares its core concept with the first design case that I presented initially with the 'Light is History' project. So this procedure's central concept also can be framed as being built on an interpretive borrowing of the fundamental strategy of Critical Regionalism.

Before getting into how the framing of the final opening relates to re- interpreting Frampton for the peculiar material practice of a particular place, I would like to discuss another strain of design-based research engagement with which the final opening procedure has much similarity. This is what Andrew Moere and Dan Hill (2012) have referred to as a "situated and public visualization of data, [as] urban visualization. [Where] the visual representation of an urban environment [is placed] through its intrinsic or related data, where its display is also situated within that physical environment" (Moere & Hill, 2012: 25). This consideration of a public visualization of data through place-making (ibid: 26-27) is also close to the idea of the final opening. Such visualizations are directed at a possibility to "make people aware and so that they act" (ibid: 26)with the potential of changing local habits, attitudes and behaviours.

SITUATED AND PUBLIC VISUALIZATION OF DATA

The concept of situated and public visualization of data, framed within the context of urban environments and its data, can be considered to have been popular since the early 2000s. Concerns about bringing data out from information and computer networks, to give it a "place" can be seen as an outcome of the emergent new media discourse (Manovich, 2002: 18-20) from the late 1990s. While its precedents can be considered to be informative boards, maps and signages of various types in public locations, information data visualizations as a means to direct public action emerged after the rise of the networked society. Thus the public visualizations that I refer to here should be considered as those that emerged after information and communication technologies had reached a significant penetration and maturity.

Moere and Hill, taking a variety of examples of varying scales, mention three aspects that characterize an urban visualization (Moere & Hill, 2012). The first characteristic they mention is the visualization's *Situated*-ness. This characteristic takes into account the location, and how that communicates both its explicit and implied meanings. So within this characteristic, the visualization has a direct and immediate relationship with the local context, and also reflects the social and cultural issues of its vicinity. As the second characteristic Moere and Hill mention that the visualization should be *Informative*. For this they mention that the visualization should take the form of feedback, as a factual mirror, generated from the data gathered by the inhabitants' actions. According to them, the visualization should allow onlookers to create meaningful insight from its presence. Being informative, the visualization should be consistent, in that it should not negate the meaning it conveys, but should be compatible with the issues it raises. For example, if it visualizes energy use in a place, it does so in a manner that it in itself does not consume an unreasonable amount of energy for the purpose. The third characteristic of a visualization for Moere and Hill is that it is *Functional*: the visualization has sufficient reach and is easily understood and interpreted by a variety of audiences. It should provide an experience that is shared by a community that encourages participation and collaboration. As its functional characteristic, the visualization should be opportunistic, allowing its viewers free choice to focus on it or receive it as a peripheral experience. Then they mention that it should receive sustained acceptance through the constructive and aesthetic constraints of its surrounding context. As with any public intervention, the visualization should inform in an objective, fair and trustworthy way, accurately reflecting a situation. The final part of the functional characteristic means that a situated visualization should call for some sort of reflection, change or action, making it persuasive.

These are the three broad categories of characteristics that Moere and Hill mention for urban visualizations. They go on to remind us that none of these characteristics necessarily ask for digital display technologies as being necessary for feedback and interactivity, but that dynamic updating can be a consideration only if necessary. Based on this interpretation of the situated and public visualization of data from Moere and Hill, next I briefly review two domestic energy use visualization projects from two different contexts, from Brighton in England and from Sydney in Australia. The final opening that I will discuss in this chapter is closest in characteristics and approach to these two projects. Moere and Hill also discuss these two projects in their paper on situated visualizations. The reference here to these projects and their discussion is to position the final opening in Manipal, specifically using domestic energy use data which can also be framed as a situated visualization.

TIDY STREET BRIGHTON

The Tidy Street project was a domestic energy monitoring project of households set up on a street in Brighton, UK. It aimed to study the effect of publicly displaying the street's households electricity consumption in terms of the energy usage of each household (Bird & Rogers, 2010). The households on the street were of a similar type, built at the same time, terraced and mostly with two floors. The project was carried out over a period of three weeks, whereby seventeen households from a street volunteered to participate by submitting their daily electricity readings via a website. It also aimed to motivate residents of the street to reduce their energy use through the nudging technique of a social norm (Koeman et al., 2014: 131). The project utilized a non-digital visual means to publish the energy use of households at the street level. It collaborated with a local Brighton graffiti artist, Snub, who made a large public visualization of household energy use with line graphs using chalk graffiti on the surface of the street. The visualization allowed residents and passers-by to compare the energy usage of the individual homes on the street with the average usage in Brighton. While the project managed to bring down the energy use of households by 15% during the project period, it also created discussions within the community as well as attracting attention from passers-by and the media.

PUBLIC DISPLAY OF ENERGY USE ON THE FACADES OF SYDNEY TERRACE HOUSES

The next project I discuss was carried out in a Sydney neighbourhood (Moere et al., 2011). If in the previous case the visualization corresponding to homes on a street was on the horizontal plane of the street road, in this project the visualization of energy use was applied vertically onto individual house facades. In this manner, the project investigated the impact

of revealing the changes in the daily residential energy consumption of individual households on their respective facades (ibid: 470). The project chose a neighbourhood in the city of Sydney that was characterized by a distinct building typology of terraced houses that also had high pedestrian traffic. From the neighbourhood they choose two streets, from which eleven such houses participated in the project for around ten weeks. Five chosen households participated in the full experimental treatment and two groups of three houses functioned as control groups. The first group was provided with both public and personal displays, the next group was provided only with personal interior displays and the third group received no feedback over the period of the research project. The choice of the medium of feedback for public display here was a chalkboard that was integrated into the facade by tying a board onto the balcony of the houses. This display had five different parts that were updated manually every day by the researchers who climbed up a ladder. The personal interior feedback was done with a small digital screen that informed about the live consumption of the homes, which fixed onto a portable sized rectangular chalkboard, on which the participants from the household could make notes with chalk. The authors provide results and discussions for their almost ten week procedure by discussing how the project led to increased awareness and conversations amongst participating households. They discuss behaviour change amongst the participants because of the personal displays within the homes and also the competitive comparison that happened through publicly displaying energy use results on the facades. The authors also discuss energy conservation in various conditions and segments of the projects. They note an overall reduction of 2.5% for the group with the public and private display over the test period. The authors also discuss the various visual representation methods used in the project. Finally, based on their generalized findings the authors recommend a set of design considerations for the public representation of energy usage.

REVIEW DISCUSSION

Above I have reviewed two projects whose interests also lay in making public the energy use of households. While the projects have much in common, I would like to highlight two similarities, to allow us to take the discussion forward to the final opening in Manipal and also to frame the opening with a reinterpretation of Critical Regionalism. The first aspect I present is what I refer to as scale. Both the projects work within a similar scale, that of the street. The households are also of a similar type, terraced houses where most of the homes in both cases are two or occasionally three floors high. The treatment of making public the energy use information works in favour of displaying the information within this scale, as the displaying of information gets mapped one-to-one with corresponding houses at the level of the street. In the first project, the information is mapped onto the street

and the corresponding household can be tracked. In the second project, the balconies hold the information on each home's energy use information. This is what I refer to as a favourable scale that works in favour of representing the energy use information of individual homes.

The second similarity is the medium used to represent the energy use information. Both the projects use the non-digital, manual means of coloured chalk to make domestic energy use information public. The first project collaborated with a street graffiti artist who produced the visuals in the line graph format. The second project used a custom-made chalkboard attached to the balconies that conveyed different visualizations of household energy consumption and were updated daily by hand. The second project cites (ibid: 473) that it took its inspiration from the semi-public domain of the streetscape, where the house facade, porch or front garden, including gardening and vegetable patches, garden gnome collections and Christmas decorations become open to a social competitiveness.

With regard to the first aspect of scale, the question then becomes about how feasible it is to use home facades or the street in front of homes, if such a strategy were to be used within the context of apartment blocks that are anywhere from four to twenty stories high, with windows or balconies on all four sides? This practical constraint emerges if a procedure of making public domestic energy use emerges in the context of large apartment homes. Many different solutions can be used to respond to this constraint, and the approach that was taken in Manipal can be seen as one such approach to the matter of scale.

The second aspect, that of using chalk, a hand-drawn and visual means of opening, conveying and communicating private homes' energy use information can be considered useful as a larger tactic within the discussion for opening the post-human Electrome. Such handling of data for a small community of everyday energy users can become a tactic for the *de-electrofication* of the Electrome. This idea of the de-electrofication of data through a small community of visual practices emerged through the final opening at Manipal. This aspect has a similarity with the above two projects in terms of how visual drawing practices are appropriated to make open energy use data on a small community scale.

A PLACE OF COMMUNITY AND ITS ENERGY USE DATA

Large apartment complexes in India, especially those developed by private builders and developers, typically with over 100 homes within a gated compound are provisioned with a roofed communal place for residents to gather. This could be referred to as the community hall, the clubhouse or the party hall. By statute (Govt. of Karnataka, 2004: Clause 29.5.5 and

29.7.1.f), the real estate developer must provide such civic amenities and extra facilities within the apartment premises so that the residents can use it for their gatherings, get together for public functions or celebrate festivals. This space comes under the administrative purview of the home-owners' association. With such characteristics of collective ownership, this space, the community hall, can be considered to have a semi-public to a semi-private nature. This kind of was available within the premises of the apartment block in Manipal. The decision to use the community hall came from the homeowners' association's board members. They recommended the community hall, as the Indian pre-monsoon showers were common in the month of May. Such a space, a sheltered place, a point of gathering, the community hall within the premises of the apartment block, was chosen for the final opening in Manipal.

APPROPRIATING RITUALISTIC PATTERN-MAKING AS A CRITICAL REGIONAL PRACTICE FOR THE OPENING

FIG. 16
Rangoli artist Mahesh Suttar at work in the apartment community hall

"Rangoli" or "Kollam" (Anand & Dhanesha, 2008) is an Indian Hindu traditional geometric pattern-making practice. It is associated with a number of contexts, such as the commemoration of festivities, celebrations and more commonly as a daily practice for the beginning of a new day. As an everyday graphical pattern, it usually finds its place at the entrance to Hindu homes in the transition space between the outside and the inside, acting as a marker of entry into the domestic space. It is largely associated as a feminine activity in the form of a daily practice with certain Hindu communities, but during special rituals it bypasses any gender categorizations. It is commonly made with white stone powder, and in the South rice powder is not uncommon. Coloured rangolis are more popular for festivities and special ritualized occasions.

As a bodily act it involves bending one's body, kneeling or crouching on the floor and then using one's arms and hands to generate a variety of geometric patterns. The pattern-maker collects a small volume of the powder from a container with her hands and then by releasing a consistent amount of the powder that is held between the thumb and the index finger, allows lines and patterns of powder to form on the floor. This makes it a bodily engaging act with an anthropocentric scale. Since the activity is also undertaken in front of the entrance to the home, the door can be seen as providing a sense of architectural scale for the geometric graphic. It is usual for the graphic to be aligned with the middle of the main entrance door. Thus, as a residue of both a bodily and spatial practice, it can be seen as a combination of the personal expression of the person

laying out the graphic and also as a pattern that becomes the collective identity of the domestic space of the house. So, as a ritual it can be considered as an aesthetic activity of the early part of the day, as a personal expression of the maker and also as a collective representation of the daily life of a domestic household.

Common formats of the Rangoli include algorithmic patterns made of lines and dots, radiating concentric patterns and such generative geometric treatments. Designers, mathematicians and computer scientists have explored the generative nature of this pattern-making ritual (Siromoney, Siromoney, & Krithivasan, 1974; Ascher, 2002). Albeit sparsely, it has also made a foray into HCI, as a concept or as a brief description and through field observations in India(Joshi et al., 2008; Nagesh & Kathpal, 2013; Anand & Dhanesha, 2008; Jones et al., 2008). The very geometric visual characteristics of the Rangoli provided a scope to utilize such a pattern-making practice for opening domestic energy use information and treat it as a "situated and public visualization of data". Then, if the Rangoli were to be seen as ritualized and traditional visual practice, it can be considered as a "peculiarity of a particular place" presenting itself to be appropriated for opening domestic energy use information.

With this background, I inquired about Rangoli artists in and around Manipal for collaboration for my third field research. I was lucky to meet Mahesh Suttar,[29] an Indian national award-winning Rangoli artist. He was teaching children visual art in the temple town square of Udupi, close to Manipal. He agreed to collaborate on a project on site at the apartment building, and we set out to explore ways of making a situated and public visualization of data with the Rangoli.

CATEGORIZING PRIVATE AND COLLECTIVE ENERGY USE DATA

Having discussed the plan for a situated visualization of data with the homeowners'; association's board members, they seemed convinced about the idea of prototyping it on site. The chairman of the board, Mr Prabhat, directed the apartment office to hand over the data that was accessible. Two sets of energy consumption data from the 192 homes in the apartment building were used for the final opening with the Rangoli. The first set was of private cooking gas consumption data from each household for the month of April 2013. The second set of data was for diesel usage of the back-up generator for the entire apartment building for two years, 2011 and 2012. So, the former data set can be seen as pertaining to private consumption and the latter to collective consumption. When comparing the two sets of data, the cooking gas usage as information held within it a dense nucleus of issues from the place. On reflection, this does not seem

29 This is the artist's real name: unlike with the apartment residents who participated in the research, this name has not been changed.

surprising, but the "private" nature of everyday material use and its data from the apartment homes began to reveal larger concerns that went well beyond the walls of individual homes. I discuss this aspect next.

COOKING GAS AS DOMESTIC ENERGY USE AND ITS INFORMATION

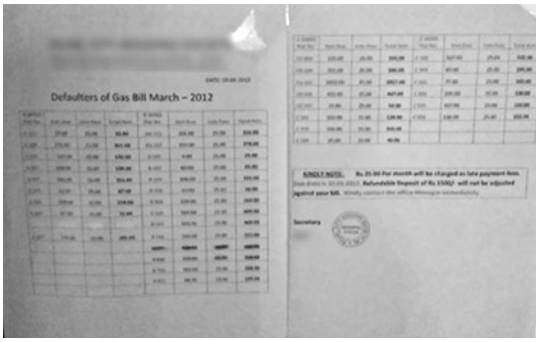


FIG. 17
The cooking gas payment defaulter's list in the lift area of the apartment building

Mentioned in the description of how Fatima would go and collect the cooking gas usage readings from each apartment home, this apartment building had a network of pipes with a gas bank that supplied cooking gas to the apartment residents. Like all other matters concerning the running of the apartment, the homeowners' association's board was in charge of overlooking matters concerning cooking gas distribution. They looked into the purchase of cylinders for the gas bank, its maintenance, consumption data collection from each household and the maintenance of records for the collection of dues from the apartment residents. The homeowners' association office and the maintenance personnel undertook the data collection process, including its entry and storage. This data was digitized and stored in the association's office computer that was managed by the office staff. So the cost of cooking gas usage for the entire apartment was managed through such a system and the gas bill payment was looked after by the homeowners' association office.

As already discussed, payment defaulters' names were being made public within the premises of the apartment. It was noted that the residents who defaulted on their payments of their cooking gas use were first informed of their dues. If any of them defaulted despite the notification, after a stipulated time their name would appear on a defaulter's list. This list was then made public by pasting it above the apartment's lift button on the ground floor. Such a practice and regulation undertaken by the homeowners' association board members was openly noticeable within the premises of the apartment building as a common practice.

If this matter were to be considered as a regulation formed by the homeowners' association as a local self-governing body towards cooking gas payment, there was another matter that went beyond the premises of the apartment building. This was regarding a Karnataka state law on regulating cooking gas and its usage for domestic purposes. At that time, the Indian government provided non-commercial cooking gas for domestic use with a subsidy. According to an Indian government notification (Govt. of India, 2000: Clause 3.3) consumption of liquefied petrol cooking gas would need to be under the Public Distribution System with a valid document to receive this subsidy. Unlike

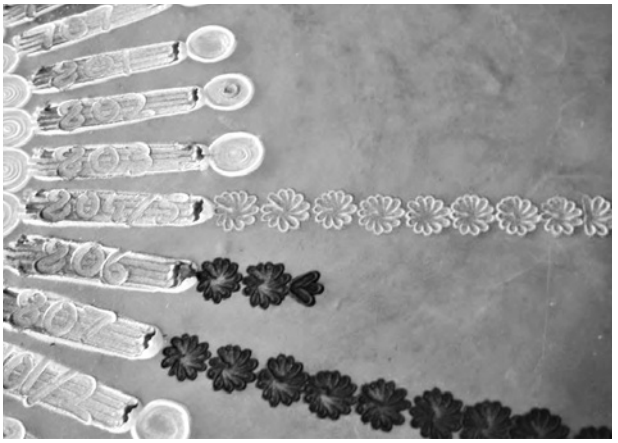


FIG. 18
The four categories of information within the cooking gas rangoli visualization

other Indian states, the state of Karnataka[30] had chosen a particular document called the "ration card" as the valid document to procure cooking gas. The necessity for such a measure of a valid document can be attributed to an attempt at a fair distribution of cooking gas, such that there is no hoarding or black marketing of such an essential commodity. This card as a document enrols consumers into a public distribution system based on the household and family as a unit. Foreign citizens or Non-Residential Indians are not eligible for this card. In addition, if a person from a particular state is enrolled through their family in one Indian state and then travels to another state to study or work, they cannot hold another ration card for the state where they are staying. Based on the ration card system, the state government of Karnataka allots a fixed number of cooking cylinders annually to each household with a subsidized cost. If a person does not hold a ration card then they would be charged three times the cost of a subsidized cooking gas cylinder, forgoing the subsidy. The homeowners' association followed this rule and came up with what they called the "reticulated system". With this, they charged people based on the consumption readings on their respective meters. People with ration cards were charged one third the amount of that charged to people who did not possess a ration card. Information on which homes had subsidized cooking was also noted in the data set provided by the apartment office. This clear categorization of the reticulated system within the data of who had cooking gas at what cost seemed essentially interesting as a topic to interrogate further. Thus it was decided to also incorporate this aspect within the situated and public visualization of domestic energy use information.

Based on the information provided on the cooking gas usage of the 192 homes in April 2013, four categories of homes became evident: apartment houses that were vacant; homes that were eligible for a subsidy but did not use the apartment's reticulated system; homes that did not get the subsidy because they did not have the ration card; and homes that were ration card holders that received the subsidy. These four categories were clearly represented in the situated visualization (Fig. 19) with different colours coinciding with the apartment numbers for all three blocks. The first category was represented as plain white. The second category had a blue dot on the plain white background. The third category was represented with red and the fourth was represented with blue.

30 The only other state that followed a similar choice of document was the southern Indian state of Tamil Nadu. Citizens from other states could apply for a cooking gas connection using their passports or in some cases their electricity connections as valid proof of address.

OPENING AS PLACE-MAKING WITH A COMMUNITY'S ENERGY USE DATA

It took me and Mahesh Suttar almost two and half days to visualize and situate the data on site as Rangoli patterns within the community hall. This was also done with the help of others, including the apartment office personnel, maintenance personnel and homeowners' association board members. The Indian pre-monsoon showers did arrive, and we were thankful for the choice of the venue, despite leaks in the roof of the hall. Upon completion of the visualization, the place was opened for viewing and the apartment residents were invited through word of mouth and personal invitations. The visualization was kept within the community hall for over a period of six days. Residents and personnel from the apartment building viewed the visualizations. Outsiders who were not residents were also invited to view them. Over a period of three days, I closely followed the reactions and opinions of the viewers on site. Selected residents whose energy use information was visualized and made open and who found time to visit the community hall were interviewed. Those residents who agreed were photographed next to their consumption visualization. I present this session as the final opening.

ACCOUNTS

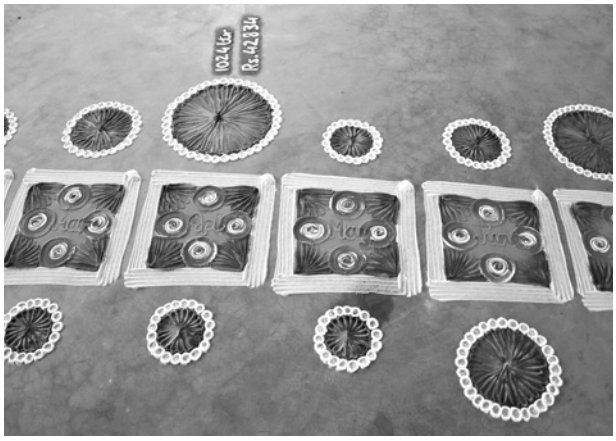


FIG. 19
The two-year diesel consumption visualization for the apartment building

A number of interactions transpired around the visualizations within the community hall of the Manipal apartment building. I interviewed and recorded twelve of the interactions that included apartment residents, personnel working within the premises and also a local art gallery curator. From this set of interviews I present three accounts as part of the final opening at Manipal. I have deliberately chosen these specific accounts so as to present them as non-local people. These were tenants and not homeowners and can be considered not to be involved in the day-to-day workings of the home-owners' association. These accounts are more distant than the previous accounts, as my association with these people has been brief and the interactions were much shorter than with the previous residents. This may well be evident in the accounts. However, they provide a glimpse, an instance, of the concerns and issues encountered by "others", the non-locals, including students.

SHOWING RESPONSE: ANURAG AND SUNIL

Anurag and Sunil are final-year students studying pharmacy at Manipal University. They rent an apartment in the building with another friend, Piyush. I met Anurag and Sunil at their apartment first and then invited them over to the community hall to view the visualization. They visited the hall and first we discussed the diesel generator use visualization. Upon looking at the visualization (Fig. 20), Anurag noted the large diesel consumption of over a thousand litres in April 2011. When talking about this visualization of information and what they thought about the diesel consumption of the building, this discussion transpired:

Anurag

Well that we don't know exactly [how much the consumption is] but we know it's VERY much, that I know.

Karthik

Why, why do you think it's very much?

Anurag

It's very much because the power cuts in Manipal you know na … in summer time the power cuts are very much. So … and the light in this apartment it never goes. So to compensate that they must be using something, some fuel, petrol or diesel. Diesel they are using. That's how I know.

Then we went towards the cooking gas visualization of the A wing, in which their apartment was located, to see their home and its consumption:

Anurag

Is this is the A wing?

Karthik

Yeah, this is the A wing.

[They begin to locate their flat number]

Anurag

This one is the A wing? No … this is not us.

Karthik

So which do you think is you?

… 807 is ours. 807

Karthik

Yeah …

Anurag

Do we consume that much? [long pause]

Karthik

Well that's what the data says …

Anurag

… consume so much? [long pause] … OK, then … I can see that we are using … not the maximum.

Karthik

eah, not the maximum, yes …

Anurag

This is the maximum [pointing at another home]. We are using enough fuel, LPG. And they are like nothing [pointing at another home]. They are not even using LPG [pointing at another home].

Karthik

What do you think of this?

Anurag

What I can say is … our cook is negligent [laughter].

Anurag

That's what I can say [laughs].

Karthik

How much was your bill?

Anurag

Yea, 940, [rupees]

Sunil

900 something we pay.

Sunil

We are paying the most. We are using the most.

Anurag

No we are not using the most … these people are using the most [pointing at the other home]…

Karthik

Yeah … These people, we can count for instance … its about 20 kg. Yours are 16 kg.

Sunil

Means almost same [small laugh].

Karthik

No, but maybe is like you know, you'll cook a lot in the home, and then you'll …

Sunil

Yeah that is true …

Karthik

… don't spend too much outside …

Anurag

That's true.

Through the above account we encounter firstly how Anurag mentioned his understanding of diesel use for the back-up power generator within the building. Even though there are consistent power cuts in Manipal during the summer months, he mentioned how the light never goes in this building. He attributed that to the large diesel use for the back-up power generator. This reintroduces the power back-up systems within private apartment housing. It indicates how an understanding of the lack of power being compensated by back-up power retains evidence but remains elusive as information within a collective housing context.

In the second instance with the cooking gas visualization, surprise and almost shock emerged from the young students Anurag and his housemate Sunil when finding out about their cooking gas consumption information with respect to others in the building. They jokingly blamed their cook for their consumption. There is also evidence of solace that their consumption is not the highest when compared to another home within their same block. This first account broadly demonstrates that this form of a collective visualization of energy use in a place through the Rangoli was more effective in generating a response, rather than trying to demonstrate any causal relation thereafter from such a form of feedback.

REVEALING IMPLICIT RETICULATION: SANAH

Sanah is a student completing her final-year Bachelor's degree in Allied Health Sciences at the local university. She is an East African of Indian origin. She shares a rented flat with a housemate and they also mentioned that they cooked by themselves. After locating her apartment number on the visualization, she recognized that their apartment had consumed 2 kg of cooking gas in April. Then I discussed the reticulated system of cooking gas delivery with her, briefly explaining how there were two different rates of cooking gas for the homes. Those which were shown in the visualization as homes marked in blue, had a ration card and got cooking gas at a subsidized rate and the homes marked in red did not have a ration card and thus did not receive a subsidy. I asked her whether she knew of such a reticulated system within the apartment's gas network system.

Sanah

Gas I am not sure like, is it that they cut down the rates per kg … for the localites[households possessing a ration card]? So how much do they cut it down to?

Karthik

Like roughly one third.

Sanah

One third of what we pay? That's a considerable amount. OK …

Karthik

So you didn't know about this thing?

Sanah

No, no …

Karthik

So what if you saw this and then there was the reds and blues marked differently?

Sanah

So what about the blues?

Karthik

The blues are the ones that get it at a subsidized rate.

Sanah

But then I thought everything was pipelined so in the end whatever bill comes they just cut it down to … they just take a fraction of it, one third that amount ... Because we have a pipeline system.

Karthik

Yes you have a pipeline system, but through the reticulated system, the rates are different. Would you like to say something about how this kind of visualization is different from just looking at the bill that you get?

Sanah

Yes because here we get a full idea of how much a, what do you say … We can compare with respect to other houses and also the ones who are paying less than us. And I don't know why they do that actually, I don't seem to get the concept of why they are subtracting some amount from there. Because that would only mean we are paying more. We are paying off for their usage of what they are doing. But maybe it's a ... when you divide it … because they are very less it seems … 1, 2, 3… [Starts counting].

Karthik

Yes there are about twenty apartments [with ration cards who get it at a subsidized rate]

Sanah

So then it might not be that much. But it's a nice way of getting a feedback actually. I think it's a good way of representing, because someone will get a very nice idea immediately instead of looking at graphs and bills. It's a nice and easier way. I think it was ah interesting. Thanks.

Here we see Sanah being introduced to the reticulated system of cooking gas distribution within the apartment through the situated visualization made from the Rangoli. Having been introduced to the system, its costing and related details she expressed some concern regarding the cooking gas cost distribution through the system. Even though Sanah's home's consumption is not considerable, her concern seemed directed at the costing and system that was introduced to her through the situated visualization. The in-built network within the apartment building, its working, the larger network and the legalities involved and the costing logic or the lack of it were revealed to Sanah in her apartment's community hall through opening her and her apartment community's cooking gas energy use information.

AN AESTHETIC EXPERIENCE AND JUSTIFICATION: RANJEETA

Ranjeeta had lived in an apartment in the building with her two children for close to two years. Before that, they lived in Abu Dhabi. Her daughter studies at the local pre-university college while her son is enrolled in the engineering program at Manipal University. The visualization showed that Ranjeeta's home had consumed 11.5 kg of cooking gas in April. She was invited to the community hall from her home. Then she was asked firstly what she thought of the visualization and what she specifically thought of the consumption in her home:

Ranjeeta

It looks very beautiful, interesting. You come to know like … we start to compare ourselves to others. How much we are using. And what purpose also we know it. Like we believe in cooking fresh. So you prepare in the morning, don't keep in a fridge and cooking only one meal. We don't believe in that. So maybe that's the reason, we feel quite happy also, by looking at this. We don't think it's a wastage. I think we are utilizing it for some good purpose.

Karthik

Do you cook? Or you have a cook?

Ranjeeta

No, no I don't keep a cook. I cook on my own.

Karthik

So looking at this what is it that you are imagining?

Ranjeeta

I think yeah, when I see the longer cycles, maybe families stay there or the cook comes, these cooks they come and cook … but OK, but I am happy the way my thing is gone. Hahaha ... at least I am cooking, I know it. I cook every day.

FIG. 20 Ranjeeta standing beside her home's cooking gas consumption ray

Ranjeeta firstly admired the way the visualization was presented within the community hall. This aspect of people, including those whose energy use was being made open, commenting that the visualization was "beautiful" was noted as a recurring throughout this opening. Here the revealing of private consumption information can be seen as being intertwined with a visual aesthetic experience from the Rangoli pattern that was on display. The private information display cannot be separated from a gestalt visual aesthetic experience. Both of these aspects merge, as can be read in Ranjeeta's response.

Secondly, when Ranjeeta spoke regarding her gas consumption, she firstly mentioned no concern about her private consumption information being made public. Neither was she concerned with the amount of consumption when compared with others. She justified it, stating that it is evidence of her cooking fresh food every day and her usage is not seen as wastage. Rather she mentioned that it made her happy.

This chapter presented a procedure of the opening as a situated and aesthetic place. It reviewed related work on the situated and public visualization of data to position this opening among related prior works of similar kind. Then I discussed the Rangoli as a regional practice from India as a peculiar practice of a particular place, and how this phenomenon was appropriated as a Critical Regional design procedure for opening energy use information. The opening, its context and issues regarding cooking gas information from the field site were also presented. Furthermore, the chapter presented three selective accounts from the opening within the community hall of the apartment building. These accounts were from people who were not homeowners but residents who were tenants within the apartment building. Through these three accounts, issues of varying details were inferred and discussed. Opening private energy use information on a community scale as a design interrogation allowed the revealing, interpretation and also communication of larger issues from within a place.

Another key aspect that I briefly discussed earlier emerges from this final procedure: that of the de-electrofication of the Electrome for a community-based engagement. If considered as a tactic, private energy use information was converted into a non-electro format and engaged as a pattern on a small community scale by becoming appropriated as Rangolis, transforming into a critical regional practice. Such an event place allows contextual meanings to emerge and situate themselves within a community of practice and place such as an apartment building. In its transformation into a de-electrofied state through community-based practices, the electro-based information can provide a countering agency for the post-human Electrome. Such procedures can be imagined to generate an emergence of a plurality of meaning, rather than universal technocratic measures that invariably hold both ecological and informational concerns. As a tactic it can be imagined as an alternative for small local communities of practices who imagine transitioning towards newer energy futures.

CHAPTER 08——CLOSING THE OPENING

Here I present a closing note on this academic design practice that emerged as an outcome of my doctoral research. The design practice can be considered to address three different outcomes that I introduced in the first chapter, towards an inquiry, for prototyping and for a discrete activism. Through the practice I describe around the apartment home as an architectural type, about everyday living in it through its residents' accounts and their relation with energy networks, and further relating it with energy use information, I have presented such a design practice through the use of a conceptual field-based design tool that I have termed "Opening". This tool in its construction borrows and is built from various prior design approaches: Empathic design (Koskinen et al., 2003; Mattelmäki, Vaajakallio, & Koskinen, 2013), Interrogative design (Deutsche, 2011), Relational Aesthetics (Bourriaud, 2002; Bishop, 2004) and the architectural approach of Critical Regionalism (Frampton, 1992; Foster, 1983). By presenting the design practice as a field-based energy study, the design research contributes to both the borrowed-from approaches and design practice-based energy studies.

THE COUPLING AND THE ELECTROME

Integral to the design practice's approach, this thesis presented domestic energy use information as a coupling that holds both an ecological concern and an informational concern. When seen as a measure of energy use pertaining to the amount of energy use, it can be seen as an ecological concern. Then, when seen as how a measure is constituted and constructed through standardized scientific means, how it is utilized for economic transactions and how in recent times it holds the potential to reduce private practices into information, challenging the notion of privacy itself, it fits into the frame as an informational concern. By opening such a coupled measure by means of design, the practice infers everyday relations within the home and how these relations are invariably intertwined with the ecological and informational concerns through energy use information. Considering such a coupling, the design practice as a study has presented a conceptual construct for contemporary dwellings titled the "Electrome". Such a concept of dwelling becomes relevant as an inquiry in an age when there is an increasing influx of electronic and algorithmic control within everyday living and dwelling. Through this construct, the design practice raises a discussion regarding the application of standardized electro-measures in mediating agency and control in the post-human dwelling. Thus, the conceptual construct is deemed applicable for inquiring into and questioning the contexts from the energy management of large-scale housing, smart home technologies, machine learning, to raising energy awareness through social networks. It is within such a background and context that this field-based design practice positions itself for inquiry, for prototyping and as a form of activism.

INQUIRY

The design practice was presented as a field-based inquiry by interpreting and composing social relations within people's everyday domestic electro-practices, through accounts of appliance use in various rooms of apartment homes. Through this process, the practice inferred inter-familial, competence-based, community-based and place-based relations. When such relations combine with dense possibilities of electro-control, an alternative conception of the private home emerges which the practice has presented as a characteristic of the Electrome. Then, the practice interpreted the views and opinions of apartment home residents by asking them what they thought about their homes' energy use information being made open, which furthered the understanding of Indian apartment living and its energy practices. Next, the study proceeded as an inquiry through a field-based design practice and inferred how energy use concerns that include the ecological and informational are integrated within everyday domestic relations. Furthermore, as part of the inquiry, the thesis presented a disciplinary dialogue with the anthropological work of Harold Wilhite. Such a series of traceable procedures make the design practice a continuous inquiry, one that generates more possibilities of refined openings as an on-going design process.

PROTOTYPING

Through the field-based design practice the thesis described the performance of a personnel-based service that prototyped openings with and within three apartment households. The prototyping made openings within everyday energy networks that could be interpreted into a number of relations with and within the home. The opening as a prototype encountered issues of migration and domestic appliance-based energy use, and also through this made a response to Wilhite's concerns. The prototyping practice also presented the idea that if such a procedure were to be scaled, it could be useful in framing energy regulation service provision for apartment living.

ACTIVISM

I present the third strain of the practice as being activism. As a tactic for the disintegration of the Electrome, the design practice directed attention to the de-electrofication of domestic energy use data. Through such a tactic, the practice hypothesizes the affordance of a plurality of meanings for energy use practices rather than the Electrome growing away as an ever-standardizing technocratic spread. This becomes one aspect of activ-

ism by design practice. Further showing the potential of openings to be integrated within local convivial events, the design practice suggests the subversion of the cultural practices of a place as a discrete form of energy activism. With such a contribution, I present a design practice towards a plurality of meaning and action.

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APPENDIX A1–7

DAY IN THE LIFE CHARTS

LEGEND:

At home sleeping

At home with practices of the everyday

Away from home

Time of Day	PRACTICES OF A DAY: WHAT?	
	Nelvin and Maggie	Matthew
5	Resting	Sleep
6	Resting	Sleep
7	Resting	Woke up
8	Morning prayer, reading the newspaper	College
9	Breakfast & TV News	"
10	Office work	"
11	Building society work	"
12	_do_	"
13	Lunch	"
14	Office work continued	"
15	Office work continued	"
16	Building society - work	"
17	_do_	Reached home after college
18	Household shopping	Had a shower, ate a few snacks
19	Household shopping	Study
20	Bath, prayer (family)	Study
21	Watching TV, dinner	Had dinner, said prayers
22	Watching TV	Watched TV, used internet
23	Watching TV	Watched a movie
24	Sleep	Study
1	_do_	Listened to music, movie
2	_do_	Sleep (said prayers)
3	_do_	"
4	_do_	"
PRACTICES OF A DAY: HOW? (WHAT DID YOU USE FOR THE ACTIVITY?)		
5	Comfortable bed and peaceful environment	
6	_do_	
7	_do_	Mobile (alarm) breakfast
8	Newspaper	Books, stationary, laptop (labwork)
9	Dosa, milk, water, TV	
10	Computer, Phone	
11	Society office	
12	Society office	
13	Bread, rice veg/non-veg, water	
14		
15		
16	Society office	
17	_do_	
18		Water, food
19		Light, fan, stationary, books, laptop
20	Water, soap, bathroom,	"
21	TV, roti, veg/non veg, rice, dal	
22	_do_	(Electricity) TV, internet, laptop
23	_do_	Laptop, mobile, internet
24	Room, bed, fan etc	Light, fan, electricity, water, snacks, books, Laptop
1	_do_	Mobile, music system
2	_do_	Fan, a peaceful mind
3	_do_	"
4	_do_	"

A1.1: The Souzas' practices of a day

A2.1: The Hebris' practices of a day

Time of Day	PRACTICES OF A DAY: WHAT?	
	Shaila	Anand
5	Sleep	Sleep
6	Sleep	Sleep
7	Got up, refreshing yoga	Walking inside the house
8	Preparing breakfast	Freshing up
9	Breakfast, reading news paper	Breakfast
10	Getting ready to go to office	Dropped child to school and went to office
11	In office checking mails	Visiting site to check the reinforcement
12	In office	Visiting site to check foundation soil
13	In office	Working in the office
14	Lunch	Lunch
15	Back home	Back to home
16	Lie down playing with children	Back to office
17	Getting ready to go to office	Working in office
18	Back to office, preparing daily reports	Meeing in the office
19	Back to home playing with children	Taking class
20	Watching TV, playing with children	Taking class
21	Dinner, with son playing	Back to home
22	Making children to sleep, refreshing myself	Dinner watching TV
23	Sleep	Watching TV
24	Sleep	Sleep
1	Sleep	Sleep
2	Sleep	Sleep
3	Sleep	Sleep
4	Sleep	Sleep
	PRACTICES OF A DAY: HOW? (WHAT DID YOU USE FOR THE ACTIVITY?)	
5	Fan, bed	Bed; bedsheet, fan
6	"	"
7	"	
8	Utensils, gas, water, food item	Tooth brush paste, soap, water, shaving cream, hairoil
9		Tea, dosa with chatni, drinking water, wheat flakes, milk
10	Dress, bag, mobile, car	Car
11	Computer	Car
12		Car
13		Computer, table, chair, electricity, telephone A/C
14	Rice, chapatis, dal, sambar	Chapati, rice, sambar, water, curds
15		Car
16		Car
17		Computer, table, chair, electricity, telephone, drinking water, A/C
18		Computer, table, chair, A/C, snacks
19		Class room, computer, A/C, electricity
20	TV	Class room, computer, A/C, electricity
21		Car
22		Rice, curds, sambar, TV
23		TV
24		Cot, bed, bedsheet, fan
1		"
2		"
3		"
4		"

LEGEND:

Away from home

At home with practices of the everyday

At home sleeping

LEGEND:

At home sleeping

At home with practices of the everyday

Away from home

Time of Day	PRACTICES OF A DAY: WHAT?	
	Pranam	Manjula
5	Sleeping	Was sleeping
6	Sleeping	Was sleeping
7	Sleeping	Just got up & washed up
8	Just got up	Made breakfast
9	Started off to drop kids to school	Left home for work
10	Site meeting	Started off with checking mail
11	Site meeting continues	Was checking my office dwgs.
12	back @ office	Met a contractor who came to collect dwgs
13	Pick kids up	Got home for lunch
14	Lunch	Washed up after the meal
15	Back to office	Back to office
16	Appointment @ office	Completing a dwg
17	"	Winding up
18	Site visit	Left for home
19	To home	With kids
20	Dinner	Getting dinner organized
21	Shower / bath	Getting kids to bed
22	Sleeping	Watching TV
23	Sleeping	Watching TV
24	Sleeping	Sleeping
1	Sleeping	Sleeping
2	Sleeping	Sleeping
3	Sleeping	Sleeping
4	Sleeping	Sleeping
PRACTICES OF A DAY: HOW? (WHAT DID YOU USE FOR THE ACTIVITY?)		
5	Bed/fan	Pillow
6	"	Bed
7	"	Toothbrush, facewash, water
8	Brushing/breakfast/hand wash	Dosa batter, milk, coffee, sugar
9	Used life to reach down/drive to school	My handbag, phone, footwear
10	Drive to site	My computer
11	"	Pencil, paper, highlighter
12	Drove to office	The discussion table with printouts of dwgs
13	Drive to school	Plates, spoons, dishes
14	Drive to home	Detergent water dishcloth
15	Drive to office	The car
16	Conference room / lighting / fan	Computer paper, pencil
17	"	Diary, pen, pencil
18	Drive to site	Keys.
19	Drive home	Books, pencils, erasers
20	Hand wash/soap	Chapattis - rice etc.
21	Water/soap/bath towel	Pillows, story books
22	Bed/fan	TV, power
23	"	Pillow
24	"	Mosquito net
1	"	Bedsheets
2	"	Mattress
3	"	Pillow
4	"	Cot

A3.1: Manjula and Pranam's practices of a day

A4.1: Jose and Maria's practices of a day

Time of Day	PRACTICES OF A DAY: WHAT?	
	Maria	Jose
5	Sleeping	Toilet, shave, brush, bath
6	Woke up, Brushed Teeth, Bathroom, Medicine, Water	Coffee, newspaper, my medicines
7	Coffee, Tea, Computer Games	Engineering work
8	Newspaper	"
9	Soduku Game	Breakfast
10	Gym. Warm up, Tread Mill	Played soduku game
11	Yoga	Engg. work continued
12	Shower	"
13	Lunch	Lunch
14	Shopping	Shopping
15	Shopping	"
16	Grocery Shopping	"
17	Home - arranged items	Coffee
18	Watched TV Serial	Watch TV
19	Dinner	"
20	TV	Dinner
21	TV	Sleep
22	TV	
23	Slept	
24		
1		
2		
3		
4		
	PRACTICES OF A DAY: HOW? (WHAT DID YOU USE FOR THE ACTIVITY?)	
5	Bed, fan, bedsheets	Water, electricity, water heater, soap paste, tissues
6	Stretch, (curse) paste, water & soap, water & towel, medicine & water cup & water	Stove, milk/coffee medications
7	Stove, water, milk, tea, coffee powder, computer mouse, chair	Computer, paper pencil/pen, printer, electricity
8	Newspaper, time	"
9	Paper, pen & mind	
10	Tread mill, water to drink, towel to clean	
11	Mat & mind	Same as 7.00 AM
12	Water, towel, dress	"
13	Fish, rice, veg, curd & rasam	Rice/fish/vegetable, stove, water electricity
14	Car, gas or diesel, driver, money & time	Car, driver, diesel
15		"
16	Car, driver, diesel, money patience & mood	"
17	Fridge, light & again patience	Stove, milk, coffee, electricity
18	TV. E.City	electricity
19	Food	
20	TV. E.City	Rice, stove, electricity, water
21	TV. E.City	Fan
22		
23	Fan	
24		
1		
2		
3		
4		

LEGEND:

- At home sleeping
- At home with practices of the everyday
- Away from home

LEGEND:

At home sleeping

At home with practices of the everyday

Away from home

Time of Day	PRACTICES OF A DAY: WHAT?	
	Anagha	Dr. Pavan
5	Sleeping	Sleeping
6	Sleeping	Sleeping
7	Cooking	Woke up at 7:30
8		Fresh and Shower
9	Paper/ TV	Left home for office. Breakfast
10		Rchd factory
11	Cooking	Meeting
12		Meeting
13		Lunch
14		Off to a new site visit
15	Lunch	Site I
16	Reading	Site II
17	"	Site III and IV
18		Come back to the factory
19	Dine-Out	Off for a wedding mehendi function
20		Back home & off with fly for a drive
21		At dominoz pizza
22		Back home
23		Check mails on internet
24		Off to bed
1		
2		
3		
4		
PRACTICES OF A DAY: HOW? (WHAT DID YOU USE FOR THE ACTIVITY?)		
5	Bed Pillow A/C	Fan
6	Bed Pillow A/C	Fan
7	Gas, Vessels, water, lighter, vegetables	TV, Headline
8		Water, Hot water
9		
10		
11	Gas, lighter, rice, cook - well vegetables	
12		
13		Lunch at a restaurant near Bainkampady
14		35 km from Bainkampady to seek a new land for factory
15		
16	Book, paper, magazine	
17	Book, paper, magazine	
18		
19		Traveled abt 10 km
20		Traveled in Car
21		Traveled by car and spent over 500/- at Dominoz
22		Hot water
23		Laptop, wifi with internet connection
24		A/C, Fan
1		
2		
3		
4		

A5.1: Dr Pavan and Anagha's practices of a day

A6.1: Dr Shenoy's practices of a day

Time of Day	PRACTICES OF A DAY: WHAT?
	Dr. Shenoy
5	Woke up
6	Pranayama
7	Yogasana
8	Bath, breakfast
9	To institute library
10	Gave class
11	Visit home
12	Working on computer
13	Lunch 13.00 to 13.30
14	Rest
15	Visit to university
16	Meeting at university
17	Meeting at university
18	Shopping
19	Evening Walk
20	Watching TV
21	Ate dinner
22	Watching TV
23	Went to sleep
24	Sleep
1	Sleep
2	Sleep
3	Sleep
4	Sleep
PRACTICES OF A DAY: HOW? (WHAT DID YOU USE FOR THE ACTIVITY?)	
5	Water
6	Fresh air
7	Fresh air
8	Water, electricity for heating, coffee LPG, electricity
9	Car, petrol
10	Electricity, AC
11	ATM - Money, electricity, bill payment, telephone bill paid, electricity bill paid, petrol
12	Computer, electricity
13	Food, electricity & LPG to cook food
14	Electricity
15	Car, petrol, life, electricity
16	AC, electricity
17	AC, electricity
18	Car - petrol
19	Water no heating
20	TV, electricity
21	Electricity, food, LPG, water
22	TV, electricity
23	Fan, electricity
24	Fan, electricity
1	Fan, electricity
2	Fan, electricity
3	Fan, electricity
4	Fan, electricity

LEGEND:

- Away from home
- At home with practices of the everyday
- At home sleeping

LEGEND:

At home sleeping

At home with practices of the everyday

Away from home

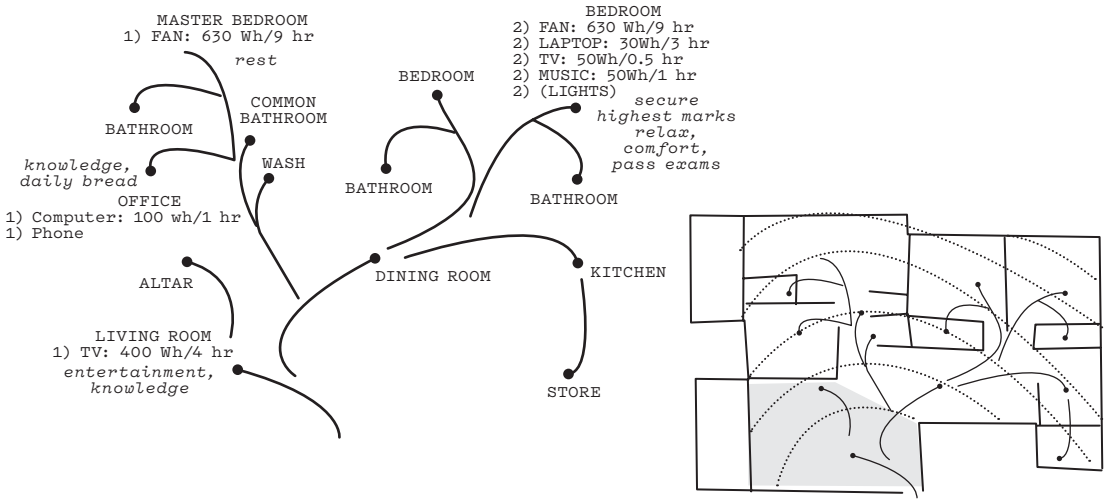
Time of Day	PRACTICES OF A DAY: WHAT?	
	Rachel	Kevin
5	Cooking in the kitchen	Sleep
6	Went to the hospital at 6.30 am	Sleep
7	At the KMC hospital	Bath, breakfast, walk to college
8	Walked from the hospital	College
9	Took my mother to KMC hospital	College
10	Waiting for the medicine doctor	College
11	Met the medicine doctor	College
12	Went to the dental clinic for my mother	College, food-lunch
13	Had our lunch	College
14	Took a nap	College
15	Called some neighbours over	College
16	Had our tea	College
17	Watched some TV	College
18	Went for a walk around the building	Library study session
19	Said our prayers	Library study session
20	Sat on the internet	Watch basket ball game
21	Had dinner	Walk home, dinner
22	Went to sleep	Study
23	Sleep	Study
24	Sleep	Sleep
1	Sleep	Sleep
2	Sleep	Sleep
3	Sleep	Sleep
4	Sleep	Sleep
PRACTICES OF A DAY: HOW? (WHAT DID YOU USE FOR THE ACTIVITY?)		
5	Water, food items, gas	Bed
6	Transport, water to have a bath, clean clothes,toothbrush, comb, towel	"
7	Her hospital card	Shower, water, utensils, food supplier, cutlery, money, good Shoes
8	Nothing since I walked home	Books, focus
9	Good pair of sandals, clothes and a rickshaw as a mode of transport	Books, focus
10	Sitting at the doctors consulting room, met the nurse	Books, focus
11	Nothing in particular, both of us met doctor	Books, focus
12	My mother drank some water and juice before getting her tooth extracted	Books, focus
13	Water, meat and vegetables	Books, focus
14	A clean bedsheet, a pillow and a comfortable bed	Books, focus
15	Needed to interact as needed to talk	Books, focus
16	A teaccup, milk, sugar teabags	Books, focus
17	A TV, a chair, cushion, electric current	Books, focus
18	Some good walking shoes, a good hairbrush powder, clean clothes	"
19	The rosary	"
20	A computer, the internet, clean bedsheet and a bed	"
21	A plate, spoon, food, water, glass	Shoes, utensils, food cutlery
22	A clean bedsheet and comfortable bed	Books, focus
23	"	Books, focus
24	"	Bed
1	"	"
2	"	"
3	"	"
4	"	"

A7.1: The Silvas' practices of a day

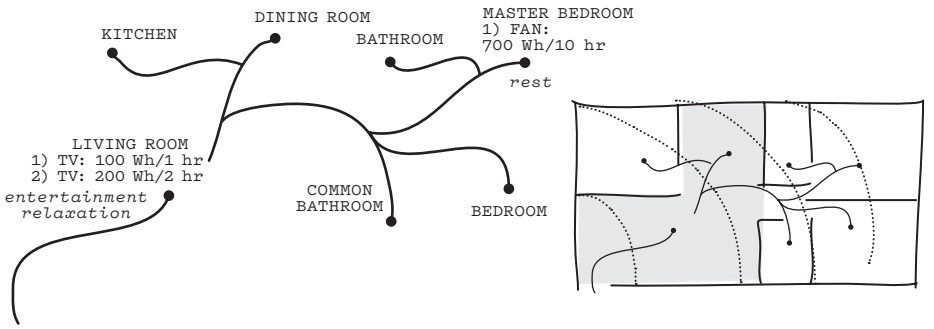
APPENDIX A1–7

PARTICIPANTS HOME SKETCHES WITH SELECTED APPLIANCES MAPPED OVER CIRCULATION

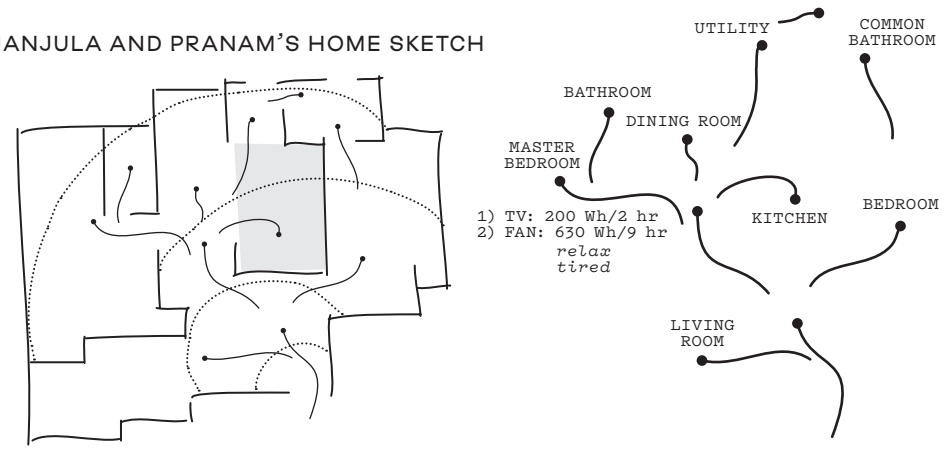
A1.2: THE SOUZAS' HOME SKETCH



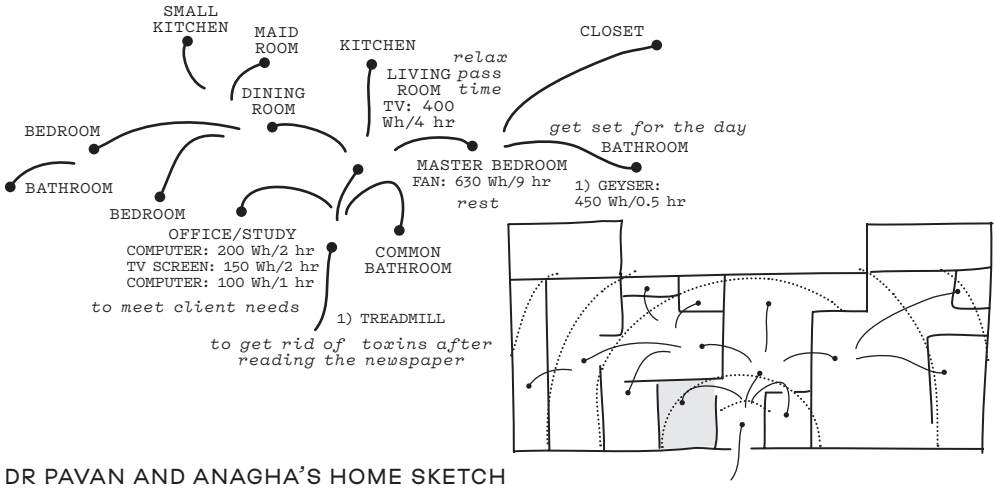
A2.2: THE HEBRIS HOME SKETCH



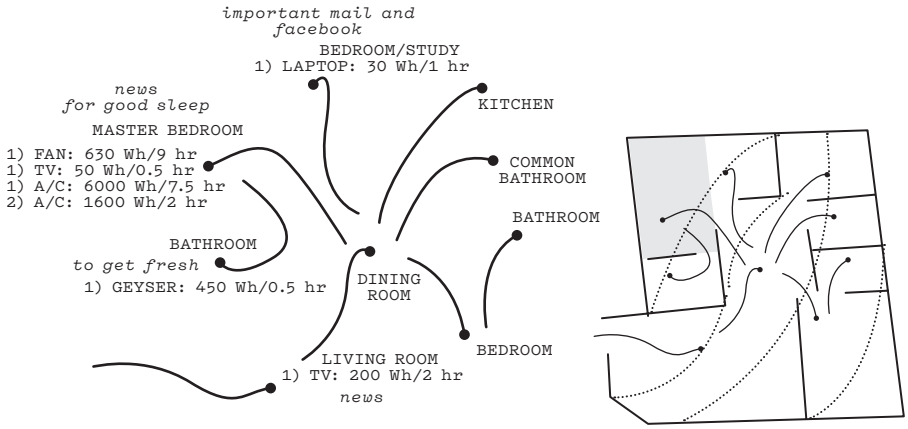
A3.2: MANJULA AND PRANAM'S HOME SKETCH



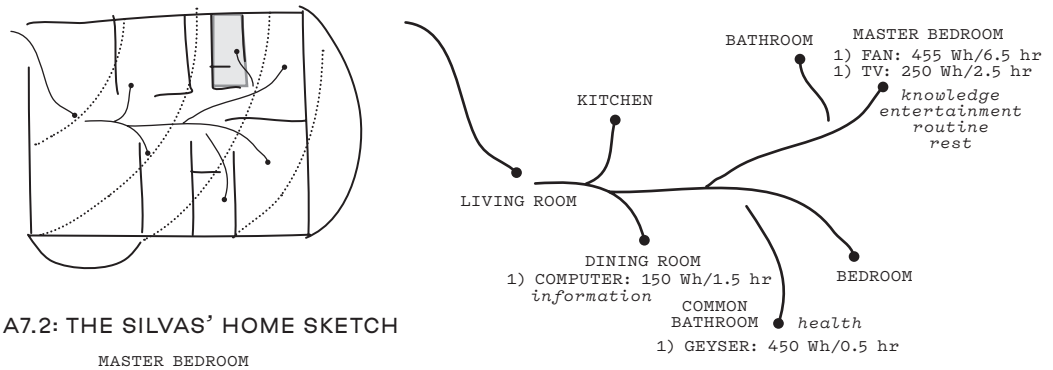
A4.2: JOSE AND MARIA'S HOME SKETCH



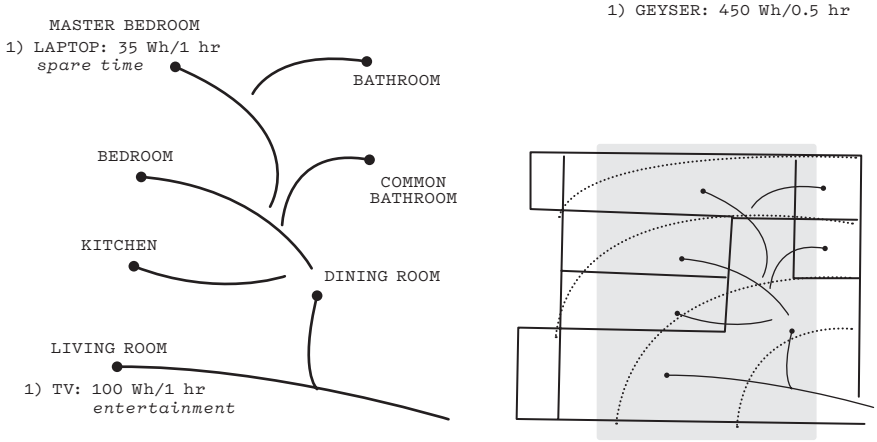
A5.2: DR PAVAN AND ANAGHA'S HOME SKETCH



A6.2: DR SHENOY'S HOME SKETCH



A7.2: THE SILVAS' HOME SKETCH



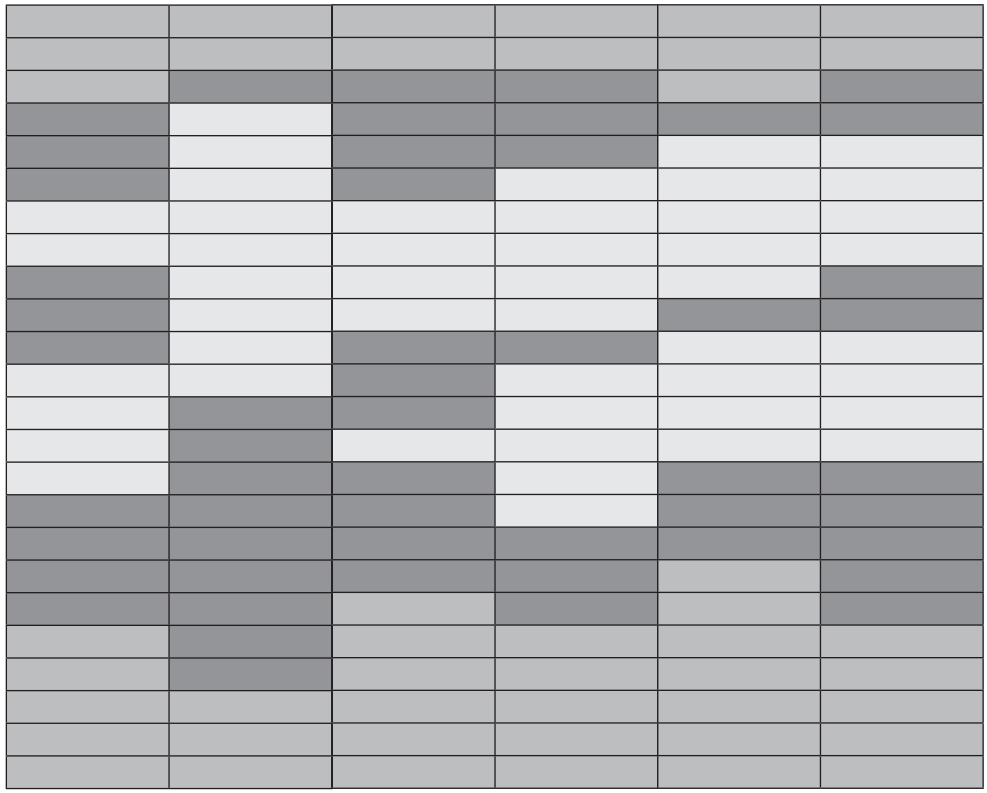
APPENDIX B

Viewing domestic practices of the seven participating apartment residents in temporal linearity of one day

WHAT?

Nelvin and Maggie	Matthew	Shaila	Anand	Pranam	Manjula

HOW?



WHAT?

Maria	Jose	Anagha	Dr. Pavan	Dr. Shenoy	Rachel	Kevin

HOW?

TIIVISTELMÄ

Tämä suunnittelun alaan kuuluva tutkielma esittelee suunnittelumallin, jonka toteutus kentällä koostuu kolmesta osasta: kyselystä, prototyypin tai ideoiden testauskonseptin luomisesta ja eräänlaisesta yksilön aktivismista. Se rakentuu neljälle aiemmalle muotoilussa, taiteessa ja arkkitehtuurissa käytetylle lähestymistavalle, jotka ovat empaattinen suunnittelu, interrogatiivinen suunnittelu, relaatioestetiikka ja kriittinen regionalismi. Tutkielma on luonteeltaan ongelmalähtöinen suunnittelututkimus. Se esitetään energiatutkimustyönä, joka perustuu käytännön toteutukseen. Siinä kotitalouden energiankulutuksen mittauksia käsitellään informaationa ja samalla kiinnitetään huomiota siihen, että näihin mittauksiin liittyy ympäristö- ja informaationäkökohtia. Tapa, jolla nämä näkökulmat yhdistetään kotitalouden energiankulutusmittauksiin, otetaan suunnittelukäytännön pohjaksi. Tutkielmassa nojaudutaan tähän yhteyteen, otetaan huomioon jatkuvat muutokset kotitalouksien energiajärjestelmissä ja tarkastellaan kotitaloutta kolmesta eri teoreettisesta näkökulmasta. Näin tarkasteltuun kotitalouteen viitataan termillä *elektromi* (engl. *Electrome*). Tutkimuksessa toteutetaan ensimmäinen tälle taustalle rakentuva kenttätutkimus intialaisissa kotitalouksissa. Tutkimus hyödyntää intialaisten asuinhuoneistojen asukkaiden haastatteluja ja heidän kanssaan tehtyjä suunnitteluharjoituksia ja osoittaa niiden pohjalta, että kun asukkaat antavat merkityksiä kodinkoneilleen, laitteilleen ja kodilleen sähkövirtojen, -laitteiden ja niiden käytön muodostamana kokonaisuutena (*electro-home*), nämä kodinkoneet ja laitteet ilmentävät useita erilaisia sosiaalisia suhteita. Tässä kontekstissa kodinkoneisiin, laitteisiin ja kotitalouteen virtaava energia mahdollistaa sen, että energian käyttöä voidaan tarkastella informaationa. Kun tämä informaatio yhdistetään kodin laitteista johdettuihin sosiaalisiin suhteisiin, nousee esiin tietoasumisen (*dwelling with data*) käsite. Tämä esitetään elektromin ominaispiirteenä. Työtä jatketaan vielä kahdella muulla kenttätutkimuksella: suunnittelumallilla testataan energiainformaatioon pohjautuvia kotipalveluita, minkä tuloksena ihmisten yksityinen energiankulutus tulee julkiseksi. Mallissa ”avataan” kodinkoneiden, laitteiden ja kodin yksityiset energiamittaukset suunnittelun avulla. Tällöin malli ensinnäkin paljastaa ja tuo näkyväksi kotiin sisältyvät sosiaaliset suhteet ja rakenteet sekä niiden punoutumisen jokapäiväisiin energiankäyttötapoihin. Toiseksi energiankulutusmittaukset avaava suunnittelumalli tuo esiin, kuinka muuten piilossa pysyvät, kotoa yhteiskuntaan laajemmin vaikuttavat sosiaaliset näkökulmat syntyvät. Suunnittelumalli vaatii *elektro*-määrän muutosta universaalilla teknologialla synnyttääkseen uudet voimasuhteet aineellisen todellisuuden hallinnalle ja esittelee suunnittelutaktiikan, jota kutsumme tiedon de-electrofikaatioksi (*de-electrofication*). Kyselystä, prototypoinnista ja aktivismista saatujen tulosten pohjalta tutkielma esittää, että suunnittelu voi luoda useita erilaisia yhtenäisen toiminnan ohjelmia.

Karthikeya Acharya has a bachelor’s degree in architecture from Manipal University in India. He started design practice in commercial architectural studios in the south west coast of India and was engaged in designing apartment homes and individual residences. His interests in peoples’ everyday domestic living and technology use made him focus beyond and work as a field based researcher with ICT design consultancies. Then he obtained a master’s degree in interaction design from Domus Academy+IDII program in Milan, Italy. He gained industry experience working as a corporate consultant where he worked on a number of projects that involved developing field based design methods to making art installations with field data. For his doctoral research from the Department of Design at Aalto ARTS he has undertaken design practice as method for energy studies specifically looking at domestic energy use as data. With this framework he undertakes collaborative research projects that inquire into dwelling in a networked and evolving energy landscape.