Integrating Menstrual Cycle Data into The Smart Home

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Abstract

Menstrual cycle data gathered through self-tracking apps are increasingly used to understand, control and monitor bodies that menstruate. This work-in-progress explores the effects of representing menstrual cycle data within the smart home through critical design and planned fieldwork. Themes presented in this paper include the taboo of menstrual cycles, the question of what kinds of data do we represent in the smart home and menstrual cycle tracking technologies as examples of affective computing.

Author Keywords

Menstrual cycle, smart home, critical design, biosensing, self-tracking,

ACM Classification Keywords

J.3 [Computer Applications]: Life and Medical Sciences—Medical information systems

Introduction

Research on the self-tracking of menstrual cycles through the use of apps is burgeoning and follows the founding of feminist and women's HCI [1,2] where the design of digital technologies for women are addressed from a critical perspective.

Fluxes in hormones at different stages of the menstrual cycle result in emotional changes such as increased libido around ovulation and depression and irritability during the weeks before menstruation [11]. Menstrual cycle tracking apps use algorithms based on existing menstrual cycle research and self-reported information from users to predict and report the emotional state of the user at each stage of their menstrual cycle through written notifications or symbols. Self-tracking technologies that show users their own physiological data through digital technologies can create a "data double" [10], influencing the users sense of self relating to their emotions and reactions to stimuli around them and their own felt sense of their body. These dissonances can cause the user to question their true or authentic self [9 pp.49]. This research focuses on the effects on users of being shown the emotional state that they theoretically should currently be experiencing based on where they are in their menstrual cycle. This project expands this aspect of menstrual cycle tracking apps through projecting the

Figure 1: The Hue installed in its harness the home.

emotional information dictated by the phase of the menstrual cycle publicly into the smart home.

The term "smart home" currently refers to a home fitted with a range of internet enabled and connected appliances that autonomously fit around the needs and desires of their inhabitants [7]. This project imagines a not-too-distant future where the smart homes use biosensing to acknowledge emotional changes relating to our bodily transitions, and adapts our environments to them. Related products with this aim in mind are currently being developed. The EQ-Radio developed at MIT uses the data generated by the reflection of RF signals on a user's body to read heartrate and therefore translate this data into a reading of the user's emotional state [9]. Solo, the "emotional radio" reads user's facial expressions to adapt the music played to the user's mood [13].

Related Work
Related research discusses the reasons why people adopt menstrual cycle tracking technologies, which technologies they use and how the form and function of these technologies influence users' experience of their bodies as well as the wider socio-political implications [5,8] . This project builds upon findings from this research and explores the implications of taking menstrual cycle tracking technologies out of the personal device and into the public realm.

The subject of menstrual cycles and menstruation is still a taboo in most cultures [6]. PeriodShare [12] addressed these taboos directly through design fiction. The artifact is in the form of a wireless silicon menstrual cup that tracks when and how much the user is menstruating, automatically reporting this data to the user's social media pages. Periodshare uses the taboo around menstruation to address the conventions of privacy around bio-data such as menstrual cycle data. Similarly, within the critical design presented in this paper menstrual cycle data have lost all connotations of taboo and are just one of many types of data used in the smart home.

Methodology
The vast majority of homes currently could not yet be called smart and do not yet have the faculties to adapt to user's moods based on physiological data. Therefore, the effects of the implementation of technologies that use biosensing to adapt our home environments to our moods are still unknown. This project therefore plans to use critical design to explore the end result of the effect on the user of digital technologies that represent menstrual cycle data within the smart home. The definition of critical design followed is Dunne and Raby's; "critical design uses speculative design proposals to challenge narrow assumptions" [4 pp.34]. The "critique" [4 pp.33] behind this critical design is the question of what types of data we choose to gather and represent within the smart home. When Apple launched their Apple Health app, they tellingly omitted menstrual cycle tracking from the range of tracking tools available [3]. If the taboo of menstrual cycles continues to exist, then it could be predicted that menstrual cycle data would not be integrated into the smart home.

Hacking the Hue
The artifact carrying this research is a Philips Hue LED light strip paired with a designed app. The Philips Hue is a colour-changing, internet-enabled light. Philips encourage users to design their own apps to control the Hue and provide a free SDK for development purposes.

Using the SDK provided by Philips, an app was developed that changes colour relating to where the user is in their menstrual cycle. These colours reflect the moods that the user will experience at each phase of the menstrual cycle. Colours were chosen based on their accepted emotional connotations within the field of colour psychology. Yellow reflects the increase in testosterone allowing improved concentration in the first phase, red represents the increased libido around ovulation during the second phase and blue reflects pre-menstrual syndrome with low moods and tiredness in the last phase. The Hue cycles through the spectrum of colours, changing colour gradually each day. In order to fit the menstrual cycle of the user, the app asks the user to input the length of their menstrual cycle and the number of days since the user's period.

The Philips Hue light strip is to be installed in the home (figure 1.) in a designed harness hanging on fishing wire from the ceiling which hides the LED bulbs but allows the colour to be projected onto the room. This was to avoid the light strip becoming a signifying object and instead create an ambient awareness of the menstrual cycle data within the home, affecting the atmosphere of the room and those in it through colour. There is an awareness within this design that most people co-habit; just as our moods effect those that we live and communicate with, so will the atmosphere created by the colour shown by the light strip affect them too.

Further Work

This project is a work-in-progress and the next stage of research is fieldwork to record the effects of this designed artifact on a research participant's life. The Hue light strip will be installed in a research

participant's home for the duration of two menstrual cycles. This participant will have been using a menstrual cycle tracking app until this point but will be asked to stop for the duration of the experiment. The participant will be asked to keep a daily report of the effects of living with the Hue, both from their own experience and the reactions of others inside the home. Themes that are expected to arise from the findings are the possibility of dissonance between the user's felt experience of their body and emotions and the colour displayed by the Hue. The app designed within this project is based upon a pre-existing notion of a menstrual cycle having three phases of equal length. This is, on average, an accurate representation of a menstrual cycle, though many women have menstrual cycles that do not fit this pattern and it is common that the length of menstrual cycles fluctuate each month. The fact that the colour shown by the hue may be inaccurate is also of interest in this research as this may reveal a placebo effect or a heightened awareness of the felt body generated by the menstrual cycle data being projected into the home. These findings may help to reveal the presence of the "data double" [10] that self-tracking technologies create in the case of menstrual cycle tracking that highlight how biosensing and self-tracking technologies influence our sense of self and how we perceive our own emotions.

Conclusions

This paper presents a work-in-progress that plans to explore the implications of the integration of menstrual cycle data into the smart home. A Philips Hue light strip and a designed app represent an example of a smart home appliance that adapts to a user's menstrual cycle through displaying colours matching the user's predicted moods at each stage of the cycle. This artifact

represents an example of critical design, critiquing what kind of data we use within the smart home in a futuristic scenario where smart homes adapt to our moods based on our physiological changes.

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