# Exploring Digital Encounters in the City

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## Abstract

In this paper we explore the types of encounters that technology enables. We consider the differences between digital and non-digital encounters, and investigate how technology can be appropriated for shared interactions that support conscious (or unconscious) social encounters. Finally, we describe two prototypes that generate different types of digital encounters in a city context, and we discuss our initial results.

## Keywords

Pervasive and ubiquitous computing, digital encounters, urban space.

## ACM Classification Keywords

H.5.2 Information interfaces and presentation: User Interfaces – Theory and methods; H.1.2.

## Introduction

The urban physical environment plays a critical role in the construction of social behaviours through the effect of the structure of space [1]. In this respect it does not only reflect social patterns, but can play a vital part in generating these patterns and providing a platform for rich and diverse social encounters. For instance, public spaces such as the bus stop or the cafe can act as 'encounter stages' on which people negotiate boundaries of a social and cultural nature.

Encounters could be unexpected or casual meetings with people we know or with completely unknown strangers, we encounter once and never see again. The encounter can consist of briefly saying “Hello”, or having coffee and lunch. More importantly, a shared encounter between two participants contributes to the development of common context, both personal and communal [2]. Conversation, as well as other common activities like dancing, shopping or dining cancontribute to common context. This, in turn, frames peoples’ communications with each other, helps identify group memberships, contributes to the understanding of social beliefs, and ultimately provides a process by which society evolves.

The use of technology to enhance, rather than replace, human encounter raises certain issues that need to be addressed. In cases where technology replaces human capabilities, without the technology an encounter is simply impossible. A good example of this is the telephone, without which communications across the Atlantic are not possible. However, in a city context, where an encounter is possible even without the use of technology, what constitutes a digital encounter? If the users’ devices communicate automatically and without any user input, does that constitute a digital encounter? Does the encounter need to be two-way, or can it be one way?

The above issues need to be addressed in a consistent manner before we proceed any further. In the next section we describe the concepts underlying a digital encounter, and provide a discussion of what constitutes a digital encounter. We then proceed to describe two of our prototypes that explore different types of digital encounters in the city.

## What is a digital encounter?

Our definition of a digital encounter is an *ephemeral form of communication and interaction augmented by technology*. Note that the use of technology to augment, rather than replace, human communication and interaction means that now each person has a digital agent that can take part in the encounter (e.g. the mobile device), as shown in Figure 1. Additionally, artefacts in the environment, such as shared displays, can act as agents. Each person or agent can communicate with the other agents or persons (for example a person can use a shared screen, or a device can detect a person).

Which type of communication constitutes a digital encounter? Walking down the street, a mobile device or laptop is likely to communicate with other nearby devices. Is this an encounter? Similarly, visiting a shop I am confronted with a screen that feeds me with personalised adverts. Is this a digital encounter? Or consider the automated ticket machine at the train station. Should its use be considered as a digital encounter? What about mobile devices that advertise their owner’s profiles and identity, much like people’s t-shirts? What if a public screen draws my attention to people around me who are within the Bluetooth range of my device? Have I just encountered those people?

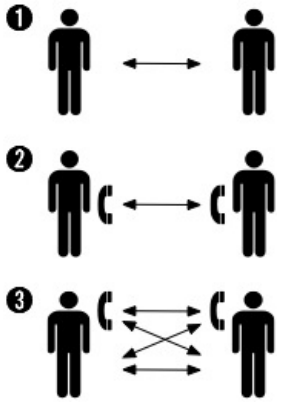

**figure 1.** Human communication (1), communication replaced by technology (2), or augmented by technology (3).

In exploring different scenarios of encounters in the city, it becomes apparent that a large number of humans and agents can interact and communicate at any given instant. Our way of describing these interactions is by focusing on humans. Specifically, our scenarios rely on two key human capacities: *consciousness* of communication and *intention* of interaction. Furthermore, technology allows for digital, in addition to physical 'encounter stages'. For example, a corridor or plaza acts as a physical encounter stage, while Bluetooth devices that can talk through walls provide digital encounter stages.

In our analysis, rather than draw boundaries that specify what is or is not a digital encounter, we chose to provide a map that explores human consciousness and intention orthogonally. These are considered in instances where one party communicates/interacts with another party. Note that this can involve any combination of human or device as shown at the bottom of Figure 1.3. Our map takes the very simplistic form of Table 1, where at any given instant a human can be conscious or unconscious of the communications taking place, and can carry out interactions intentionally or unintentionally.

| | | Interaction | |
|---|---|---|---|
| | | Intentional | Unintentional |
| Communication | Conscious | Talk to a friend | Friend talks to me |
| | Unconscious | Broadcast | Device to device |

**table 1.** A digital encounter consists of communication and interaction; users may be conscious or unconscious of the communication, while interactions can be intentional or unintentional.

It is useful to keep in mind that during an encounter, the experience and state of each of the two parties may be different. Conscious-intentional encounters are the ones that a person initiates, for example seeing a friend on the street and shouting to get their attention. Similarly, humans using their mobile device, such as calling a friend or sending a photograph to a nearby person using Bluetooth, can initiate such encounters. Conscious-unintentional encounters are situations where a person is aware of the communication taking place but does not intentionally interact. Examples of this are when a person is talked to on the street, or is the recipient of a Bluetooth message in a café.

By using technology, communication can be unconscious (on the part of the human). Examples are

applications running on a mobile phones that broadcast their owners' identity or preferences. This broadcasting is done intentionally by the user, however, the user is unconscious of when it actually happens, how often it happens or who responds to it. Similar examples of unconscious-intentional encounters are applications such as Nokia Sensor and Mobiluck, which broadcast user profiles and negotiate with other devices the similarity of their profiles. Eventually, users are notified of a nearby device with a similar profile.

Finally, in addition to being unconscious about the communication, users can also be unintentional about the interaction. This is typically the case in device-to-device encounters. For example, many Bluetooth devices interact with nearby devices by default and due to the Bluetooth protocol and the manufacturers' setup.

Of course, there are other aspects that one could consider. For example synchronicity and duration are certainly aspects of encounter that one could explore. However, we suggest that the combination of consciousness and intention, which we present here, becomes in particular interesting with the introduction of technology in an attempt to enhance, rather than replace, encounters.

In order to understand these facets of socio-technical behaviours we have deployed various prototypes covering different perspectives related to the physical and social context. In the next sections we describe two prototype systems that explore digital encounters within the urban context.

## Prototype 1: The digital carpet

The LEDs urban carpet, shown in Figure 2, is a digital portable urban installation representing a game with a grid of LEDs that can be embedded as an interactive carpet into the urban environment. When pedestrians walk over it a pattern of lights is generated dynamically following the pedestrians' movement over the carpet. Our aim was to generate a rich urban experience that can be introduced in various locations in the city. In doing so it can be studied under different social situations as an attempt to enrich the social awareness and engagement created by the casual encounter of people interacting with the carpet. The installation was tested in various locations around the city. We selected locations with low, medium and high pedestrian flows. A range of empirical observation methods were implemented including observing and recording the movements in and out of the interaction space, as well as the type of activity taking place in the surrounding space. The form of peoples' interactions with the prototype, and with the other people in the area, was observed and video taped by two researchers. In addition, peoples' movement on the carpet was tracked. Following the session, a selected number of participants (20) were debriefed in both a structured discussion and using a questionnaire.

**figure 2**. Friends using the prototype as a dance stage.


**Figure 3.** Unlike the case with friends, strangers tended to define their territory and stay on one side, not crossing the interaction area of the other user, leaving a kind of mutual acceptance distance between users.

During the evaluation, we observed certain emergent patterns. Different levels of awareness were observed among people walking around the area, from those simply glancing at the interactive prototype, to people stopping around the prototype and asking about it, trying to understand how it works – from peripheral awareness, focal awareness to direct interaction. In some cases this was built up amid anticipation as people used relevant prior experience and expectations of a new experience e.g. often people recognized the prototype as a "dance carpet" before they interacted with it. Furthermore, people behaved differently in different situations and the experiences varied depending on whether the interaction took place among friends or strangers [3].

After trying the installation, some people commented on the experience and explained rules of interaction to people nearby, generating a kind of unintentional conscious shared social encounter. During the test sessions, most people shared the experiences with friends. In this case the carpet generated a conscious-intentional encounter; however, a few of the participants shared the experience with a stranger. The most common pattern observed when strangers were interacting was that they were waiting for their turn. In this case the carpet this provided a platform for an unintentional-conscious encounter.

Finally, our evaluation demonstrated that the physical setting of the built environment had a direct influence on the movement flow of passers-by and the activities taking place near the locations, which in turn had a direct impact on the quality and characteristics of the social encounter and the shared experience. Our observations suggest that public interactive installations, like the one presented here, provide a platform for rich social interactions and awareness among the various people involved. However, by situating it in different locations and social environments, diverse and unpredicted social behaviours may emerge.

## Prototype 2: Bluetooth encounters

Our second prototype was a public display installation. The screen was augmented with software and hardware that carried out constant scanning for Bluetooth devices. When a Bluetooth device was detected nearby, its name was shown on the screen. Our intention was for this system to present what it can sense about people, and to give a representation of people's visiting patterns. For a device to be detected

it must have Bluetooth switched on and set to discoverable. When a device moves out of range of our scanner, the name disappeared.

This prototype was installed for a period of two months on our campus. During this period, the installation was operational 24 hours a day. The screen was installed on our campus, behind an office window (Figure 4). We evaluated this prototype by informally interviewing some of our colleagues who appeared to be intrigued by the system.

**figure 4**. Screenshots of our installation with the Bluetooth encounter prototype. The location was on our campus, and the screen was installed behind an office window.

In terms of encounter, this system typically provides an unconscious-intentional encounter, with users gradually becoming more aware of the encounter as they notice the screen and realise that their name is displayed on the screen. In other words, users consciously enable Bluetooth on their devices, but the interaction with the display is in most cases unintentional. Of course, the interaction can be unconscious-*unintentional*, which was the case with some users who simply did not know that their phone actually had Bluetooth. For instance, one person was baffled by the fact that their phone was picked up by our Bluetooth scanner when her phone "does not have strong signal on campus".

Our findings, albeit quite informal, indicate that the Bluetooth encounter prototype was quite well received, and very few negative comments were made about it. The screen, in addition to showing who is standing here also reflected who was here recently (up to 2 minutes in the past). Our prototype in many cases acted as an object of discussion, and prompted people to talk to each other about it. Most of the user comments focused on the interactivity and responsiveness of the display. A common reaction to the system was for users, especially children, to change the name of their phone in order to observe the change on the displayed names. This is an instantiation of the conscious-intentional encounter, where the users having been made aware of the screen intentionally initiate an interaction (change of name) in order to perceive the effect on the screen. This prototype is an example of a system that can be different things to different people. Users of this system may or may not be aware of the display's existence, of Bluetooth and its properties, and additionally may or may not intentionally interact with this display.

## Conclusions and ongoing work

We have presented two prototypes that investigate the relation between consciousness of communication and intention of interaction in a city context. Both examples explore different roles of technology in supporting social encounters within the surrounding environment. The two prototypes differ in the way they relate to the built environment in which they are embedded, and also in the way they reconstruct the relationship of the users to their surrounding.

More specifically, prototype 1 supported the spatial configuration in which it was embedded, and was similarly affected by it. Prototype 2 overcame limitations in encounter and communication imposed by the surrounding built environment and provided a digital encounter stage. While demonstrating differences in how users' intentions and consciousness can vary, our two prototypes also illustrate two approaches to facilitating and encouraging encounters in the city: providing either a physical or digital stage that encourages encounters.

Our initial evaluations suggest that changing the encounter, illustrated in Table 1, from one type into another provides a richer experience. For instance, in the Bluetooth prototype, presenting people with a visualisation of their unconscious-intentional (or unintentional) encounters with others makes people aware of theses encounters. This can possibly influence their behaviour or provide a motivation to change the way they communicate and engage with others.

In this paper we have illustrated some of the different types of possible encounters. We described two prototypes that were implemented in the urban context of a city. As part of our ongoing work we are trying to address a number of issues that came up through our two prototypes. Specifically, we are exploring how digital encounters can improve the experience of urban space, and how a system can improve the quality of social encounters.

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