

The Familiar Stranger: Anxiety, Comfort, and Play in Public Places

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ABSTRACT

As humans we live and interact across a wildly diverse set of physical spaces. We each formulate our own personal meaning of place using a myriad of observable cues such as public-private, large-small, daytime-nighttime, loud-quiet, and crowded-empty. Not surprisingly, it is the people with which we share such spaces that dominate our perception of place. Sometimes these people are friends, family and colleagues. More often, and particularly in public urban spaces we inhabit, the individuals who affect us are ones that we repeatedly observe and yet do not directly interact with – our *Familiar Strangers*. This paper explores our often ignored yet real relationships with Familiar Strangers. We describe several experiments and studies that led to designs for both a personal, body-worn, wireless device and a mobile phone based application that extend the Familiar Stranger relationship while respecting the delicate, yet important, constraints of our feelings and affinities with strangers in public places.

Author Keywords

Strangers, urban computing, wireless, wearable, public place, digital scent, community, *dérive*, *détournement*

ACM Classification Keywords

H.5.3 Group and Organization Interfaces

INTRODUCTION

The Familiar Stranger is a social phenomenon first addressed by the psychologist Stanley Milgram in his 1972 essay on the subject [1]. Familiar Strangers are individuals that we regularly observe but do not interact with (see Figure 1). By definition a Familiar Stranger (1) must be observed, (2) repeatedly, and (3) without any interaction. The claim is that the relationship we have with these Familiar Strangers is indeed a *real* relationship in which both parties agree to mutually ignore each other, without

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Figure 1: Familiar Strangers in a typical urban setting

any implications of hostility. A good example is a person that one sees on the subway every morning. If that person fails to appear, we notice.

There are exceptions to the non-interaction rule with Familiar Strangers. The further away from our routine encounter with a Familiar Stranger, the more likely we are to establish direct contact because of a shared knowledge and place. Thus, we are likely to treat our subway Familiar Strangers in San Francisco as close friends if we encounter them in Rome. Similarly, extraordinary events such as an injury, earthquake, *etc.* will also provide the impetus to interact with our Familiar Strangers.

There is a special class of Familiar Strangers called the “socio-metric stars.” These are individuals who stand out in a community or group and are readily recognized by an extremely high percentage of people.

Familiar Strangers form a border zone between people we know and the completely unknown strangers we encounter once and never see again. While we are bound to the people we know by a circle of social reciprocity, no such bond exists between us and complete strangers. Familiar Strangers buffer the middle ground between these two relationships. Because we encounter them regularly in familiar settings, they establish our connection to individual places.

It is also not uncommon for people to personalize their Familiar Strangers by giving them names and/or concocting fictitious stories and backgrounds of their personal lives [2]. The epiphany of the Familiar Stranger relationship is when an individual realizes that they are likely someone else’s Familiar Stranger, complete with names and stories.

TWO SCENARIOS

Imagine a device that could display some measure of “familiarity” of people and places. How might such a device be used? We briefly outline two scenarios.

Scenario 1: A woman who has recently graduated from college has moved to a new city and doesn’t feel at home. The display on her familiarity device reinforces her growing sense of integration within her new neighborhood, and reassures her that familiar people are nearby, even if she does not recognize their faces. When she explores unfamiliar neighborhoods in the larger city, she is occasionally surprised to discover how many people around her she has encountered before.

Scenario 2: In the midst of a frustrating day, an urban professional decides that he doesn’t want to eat lunch in his usual spot. After years at the same job, the large city seems more like a small town. He sees the same people every day in the same places. He wants to escape. As he walks quickly away from his work, he occasionally checks his familiarity device to see if there are any Familiar Strangers nearby. When he finds a street that the device tells him is completely unfamiliar, he chooses a restaurant. He feels as if he’s exploring new territory and though he is still surrounded by other people, he feels much less crowded than he did 15 minutes ago.

MOTIVATION

Wireless, personal, digital technologies are rapidly transforming our relationship to people and place in public urban settings. Emerging mobile communication systems are fundamentally reshaping the spatial and temporal constraints of all aspects of human communications in both work and play. A myriad of new interactions and potential interactions between individuals are dramatically increasing the capacity and efficiency of information flow within urban settings. Mobile phones are simply the first wave of an imminent invasion of portable, personal digital communication tools. These future devices will lead to a transformation of individuals’ perceptions of self and the world and consequently the way they collectively construct that world. Mobile communication devices will have a profound effect on our cities as they are woven into the daily routines of urban inhabitants.

While today’s mobile communication tools readily connect us to friends and known acquaintances, we lack mobile devices to explore and play with our subtle, yet important, connections to strangers and the unknown – especially the Familiar Strangers whom we regularly see. Will these systems provide a new lens to visualize and navigate our urban spaces? How will these systems provide an interface to strangers and unknown urban settings? What will such devices look like? How will we interact with them? What will they reveal about ourselves and strangers? Will they alter our perception of place? Of the strange and unknown?

As computer and social scientists we have the responsibility to look critically at such underlying forces and trends. In

this paper we take the urbanist’s perspective on the application of these new technologies within cities by their inhabitants. We think of the city not simply in spatial terms, but temporally. We are interested in the movement and activities of people as well as the familiar patterns [3] that comfort individuals within a seemingly chaotic, crowded landscape of *urban strangers*.¹

Urban Life and Public Places

The spectacular image of the modern urban city is that of a facilitator of commercial exchange, a place where people go to shop: the city as mall. The city is also a workplace – a center for government and business functions. While work, commerce, and business are the focus of cities, it is also a place for individuals and communities – a place where people can play. People come there to eat, drink, dance, meet friends, and just hang out. The potential for sociable exchange and the pursuit of happiness is vast. For its workers, the city also provides leisure zones – what Foucault calls “sites of temporary relaxation” [4].

However, the nature and locations of these social encounters are not always predictable. Whyte’s “Street Life Project” [5] observed that usage of New York’s downtown plazas varied wildly and bore little relation to extant theories of constructed space. Similarly, Lynch and Milgram exposed the difference between peoples’ mental maps of the city and the physical city plan [1, 6]. Jacobs discusses the creation of small neighborhoods in cities [7].

Public urban spaces also manifest a degree of anxiety and fear. The 1964 murder of Kitty Genovese exposed the tenuous and conditional links urban dwellers have to their neighbors and community of Familiar Strangers. Genovese was murdered on the streets of New York City while her neighbors listened to her die. Not one called the police or came to her aid [8]. Afraid for their own safety, they were psychologically handicapped and emotionally bankrupt, unable to even telephone the police for help.

While massive physical changes are still rare in urban settings, a new social landscape is emerging. The extensive use of personal, wireless communication technologies enables behavior in urban spaces to transgress the lines and protocols between public and private space. Boundaries between home, office, automobile, and street are increasingly blurred [9]. Jain exposed how individuals used mobile phones within a city to influence the nature, negotiation, and navigation of urban space [10].

Recent research focuses on the use of new personal wireless devices, such as mobile phones, that allow us to communicate with those that we know at a distance. However, we are interested in exploring the implication of personal wireless devices that provide a loose connection (but not explicit communication) to those nearby whom we do *not* know – our Familiar Strangers.

¹ We explore only the social phenomenon of the Familiar Stranger in urban settings. Familiar Strangers in rural settings are radically different.

At the same time, current trends in mobile phone usage increasingly divide people from co-located strangers within their community. Uncomfortable in strange situations or public places, people reach for their mobile phones, dramatically decreasing the chance of interacting with individuals outside of their social groups. We hope that our exploration of Familiar Strangers will promote discussion around tools that strive to improve community solidarity and a sense of belonging in urban spaces. Encouragingly, emerging mobile phone uses draw us into acceptable social contact with strangers. Flash and Smart Mobs repurpose our existing personal wireless mobile technology to create impromptu social gathering between strangers [11].

Strangers

While we initially think of strangers as “removed and disconnected from us”, Simmel reminds us that “strangeness means that he, who also is far, is actually near” [12]. Although both qualities of nearness and farness are found to some extent in all relationships, a special proportion and reciprocal tension between these two factors produce the specific form of the urban relationship to the stranger. In fact, for Bauman, society can only define itself against its strangers [13].

In public urban settings we navigate using familiar landmarks such as signs, trees, fences, *etc.* Milgram’s initial interest in the Familiar Stranger was in understanding how the changing urban landscape of the 1960’s was resulting in a mental remapping of navigational cues and landmarks from objects to people. He was interested in how people were used as markers of space and influenced an individual’s sense of belonging in that place.

We also find artists exploring issues of strangers and public places. In *Following Piece* [14] Vito Acconci randomly selected a public stranger and followed them until they entered at private place. The act of following could last a few minutes, if the person then got into a car, or four or five hours, if the person went to a cinema or restaurant.

Artist, Sophie Calle intentionally followed people around the streets of Paris in order to rediscover her city. Calle became obsessed with the people she was following, especially the physical details of their existence. Eventually this obsession brought her to Venice, where she tracked down and secretly photographed a man she had previously followed in Paris [15].

In contrast to the covert urban performances of Acconci and Calle, Guy Debord and the Situationists sought to reinvent everyday life in urban spaces by constructing situations which disrupted the ordinary and normal in order to jolt people out of their customary ways of thinking and acting. Using *dérive* (the urban flow of acts and encounters) and *détournement* (rerouting of events and images), the Situationist developed a number of experimental techniques that stressed the relationship between events, the environment, and its participants – urban strangers [16].

The Role of Culture and Strangers

The perception, role, and existence of Familiar Strangers are deeply embedded within the culture of communities. In communities of less than 150 people – under the threshold Goffman calls “the nod line” – members are obligated to exchange polite greetings when they meet [17]. In cities, the opposite holds true. Urbanites are expected to maintain “civil inattention” in public places such as the subway platform or the elevator [18]. Both Milgram and Goffman attribute the phenomenon to the sense of urban overload caused by the sheer density of daily social interactions. Familiar Strangers make the city feel smaller while avoiding the impossible task of making small talk with everyone we habitually see.

Mobility is a key factor in the existence of strangers. For Simmel, the observer and the stranger were two poles in a binary opposition between mobility and stability. The stranger, by definition from *elsewhere*, represents mobility. The observer represents a fixed point by which mobility is measured. In an increasingly mobile and densely populated world, we feel ourselves to be strangers more frequently, and feel other people to be strangers to us. In the Kitty Genovese case, Milgram points out that Genovese died not because she was alone in the world, but because she had moved far away from the friends and family who felt responsible for her safety. Strangers also take on different meanings throughout individuals’ lives. Adults warn children against strangers – even familiar ones – while themselves feeling safe in striking up casual conversations with people they do not know on buses.

GOALS

The research goal is to identify the properties and phenomenon of the Familiar Stranger relationships we currently observe in public places. We believe that extensions to this relationship using small personal wireless objects and applications on existing mobile phones can allow individuals to more acutely gauge their social relationship to people, places, and the crowds around them over time. We also believe that such tools are capable of encouraging community solidarity, even transitory solidarity, in places where it is currently difficult to build such ties. Overall, such a system has a great potential to allow individuals to gain an improved sense of belonging within and across their communities, cultivating new views of comfort, safety, and inclusion. To break down these boundaries, the technology must allow individuals to retain an active sense of participation and inclusion across the public social landscape. As a result, we hope that such a tool may expand and improve our own impressions and beliefs of the strangers with which we share our daily lives. Can we develop social tools that interface to groups and crowds rather than individuals? Can we buildup social connections to strangers anonymously and without explicit programming or revelations – perhaps by simply walking around? Ultimately, the design must incorporate ambiguity [19], leaving users to modify, re-appropriate, play, and adapt the system across a myriad of unintended uses.



Figure 2: Stanley Milgram's 1972 Familiar Stranger study

CONSTRAINTS

While there are hints of McLuhan's global village meme within our approach [20], we are more acutely aware of Mitchell's concern for the preservation of the public sphere, entreating that technological enhancements to the urban landscape should improve everyday life while respecting humanity [21].

To that end it is necessary to declare that we are *not* interested in designing a friend finder, matchmaking device, or system that explicitly attempts to convert our strangers into our friends. Strangers are strangers exactly because they are *not* our friends, and any such system should respect that boundary. Having strangers on our urban landscape is *not* a negative thing. On the contrary, the very essence of individual and community health of urban spaces intrinsically depends on the existence of strangers. Their complete removal would almost certainly be detrimental.

RELATED WORK

We have been influenced by a number of projects that emphasize the importance of familiar people and places in systems by allowing mutual strangers to annotate shared locations. Displayed on large [22] or small [23] screens, they allow strangers to collaboratively create and access location-based content. Since interaction with the system can be asynchronous, it does not facilitate face-to-face interaction between strangers. A conceptual project that does encourage synchronous interaction between strangers in groups is the LoveBomb [24]. Physical proximity serves as an initial step to further acquaintance by allowing users to anonymously express private emotions in public places.



Figure 3: One of several questionnaires used in the Berkeley version of the Familiar Stranger study

STUDY #1: MILGRAM REVISITED

Our initial experiment's primarily goals were to:

- Establish a baseline for the current state of our relationship with Familiar Strangers in urban spaces
- Expose changes to the Familiar Stranger relationship based on the 30 year old initial study
- Discover how familiarity affects perception of place

Anecdotally, it was obvious that the Familiar Stranger relationship still existed. However, it was unclear to what degree the phenomenon was operating in typical public urban settings, especially in light of the widespread adoption of wireless mobile phones and other electronic devices that did not exist during the initial 1972 study. We updated Milgram's experiment to see whether his observations were still applicable.

Procedure

In the original experiment, Milgram's students at The City University of New York photographed people waiting on the platform of a suburban light rail station during the morning rush hour. A week later, Milgram's students returned at the same time of day and distributed duplicates of the photographs (see Figure 2). The people waiting on the platform were asked to label individuals in the photograph that they recognized or regularly spoke to.

We focused our research on a similar urban space in downtown Berkeley, California named Constitution Plaza. This public plaza is an exemplar of the type of small urban space that Urbanist such as Whyte described as central to the health of public life in large cities [5].

Constitution Plaza is a high-traffic, block-long rectangle in the center of Berkeley's downtown. Anchored at one end by an imposing entrance to Berkeley's primary underground light-rail station (BART) and at the other by a central bus transfer point, the plaza sees a continual flow of pedestrians. While many cross the plaza without stopping, others pause to make phone calls, eat, or rest on the benches. Observations suggested two potential Familiar Stranger populations: (1) the office workers and students who eat lunch on the benches and (2) the commuters who wait for one of the fifteen bus lines. The bus riders are a contemporary equivalent of Milgram's commuters; as a basis for comparison, we included the lunchtime group.

Following Milgram's study, we photographed clusters of people in each area during their respective busiest hours: noon in the seating area and 5:00pm at the bus stop. We returned a week later at the same times of day to distribute a four page set of photographs (see Figure 3). In order to test for Familiar Strangers common to the two groups, we distributed the same photographs to everyone. We asked participants to label those in the photographs they recognized and those they regularly spoke to as well as encouraging notes for people they recognized. We also distributed a questionnaire on relationships to the plaza and

attitudes toward public place in general – especially familiar places, like their home neighborhoods.

Participants were recruited by approaching everyone within the target place and time to get a somewhat representative sampling of the population. The participants completed the surveys without our assistance and returned them by mail using an included self-addressed stamped envelope. Participants were asked to complete as little or as much of the questionnaire as they desired. We encouraged participation and disclosure of contact information by offering a chance to win a \$100 USD gift certificate to a local bookstore.

Results

Within the sample size ($n=23$)² of our survey, it seemed clear that the Familiar Stranger relationship is common. While we found less familiarity than Milgram, the numbers are still significant. Eighty-nine percent of those Milgram surveyed recognized at least one person. Our study found lower (77.8%) but still high recognition. In contrast to Milgram's average of 4.0 people recognized, our survey found an average 3.1 people recognized (out of 63 pictured), with a median of 2. The numbers are particularly high given that participants were recruited by approaching everyone within the target areas at the appropriate times. This inevitably included a higher percentage of non-residents and cognitively impaired than the Milgram study.

Clearly, the Familiar Stranger relationship is tied to the daily routines of urban life. When we spend more time in public spaces with others, we are more likely to recognize them (even if we have never talked to them). Lunchtime participants recognized on average far more (3.9) people than their counterparts at the bus stop (2.3). The demographics of the two groups did not differ noticeably, but the lunchtime group spent a median 15 minutes on site, while the rush hour group spent a median 5 minutes.

Some people are also more recognizable than others: Milgram's *socio-metric stars*. Thirty-three of the 63 people in the photographs (52.4%) were recognized by at least one person. But a few people were recognized more consistently: a man in a wheelchair, a flower vendor with a lavish display, and a long-haired homeless man. Milgram's socio-metric star also had a consistent, unusual attribute – she wore a mini-skirt even in winter. The socio-metric stars identified through the Berkeley survey suggest another factor – *prevalence*. Many seemingly forgettable people were recognized because they were seen often in one place³ or occasionally in many places⁴.

² We encountered an unusually high response rate with 23 out of 80 questionnaire's returned, resulting in a nearly 30% participation.

³ "I always see him here." (comment from Berkeley study)

⁴ "I've seen this guy on Shattuck [Street], Telegraph [Avenue], and on campus."

STUDY #2: URBAN WALKING TOUR

Observations from the *Milgram Revisited* study suggested a relationship between recognition of strangers and experience of place. To situate our investigation of a mobile application within the real context of potential users, we interviewed nine Bay Area residents on a walk through Berkeley's business district to address four issues:

- Evaluate ideas about familiarity and place derived from the observations of the plaza
- Elicit input from users into design process

Procedure

Over the course of a week, we arranged nine 45-minute "walking tours". Each tour involved one interviewer and one subject on a walking interview to four nearby, yet functionally distinct, public outdoor locations. Participants were encouraged to interrupt the tour at any time to nominate their own significant places. Starting at the plaza, the interviewer walked with participants to each location:

- Constitution Plaza – described in previous study
- Main Berkeley post office – a government building with narrowly-defined functions and limited hours
- Civic Center Park – a small park with a lawn and paved fountain area, frequented by soccer players, sunbathers, and the homeless who sleep there
- An inexpensive restaurant patronized by locals

In order to determine whether the social aspects of each location significantly affected participants, the interviewer asked them at each stop to rate their perceived sense of comfort on a scale of 1–5, identify any familiar people, then rank the following reasons for their reported sense of comfort in order of importance⁵:

- People around you
- Physical characteristics (architecture and amenities)
- Current environmental attributes (weather and time)

Using results from our initial observations and first survey, we had arrived at four quantifiable factors involving Familiar Strangers that we believed affected social comfort in urban public places:

- **Amount:** How many familiar people are around?
- **History:** How familiar are these people?
- **Turf:** Have familiar people visited this place in the past? Is this "my kind of place?"⁶
- **Tribe:** Do the people currently here visit the same places I do? Are they "my kind of people?"⁷

⁵ Participants were also asked to name any additional factors they believed were important. Over 36 individual stops, this only occurred twice.

⁶ Turf is the degree to which the *now* place has common *past* people

⁷ Tribe is the degree to which the *now* people *have* common past places

The first three of these factors occur without any technological intervention. As shown in the first survey, Berkeley citizens routinely recognize strangers and act on the basis of their past behavior. Moreover, they routinely use physical evidence (such as graffiti) and their memories to determine whether familiar people have visited a specific location in the past. The fourth factor is not part of the current Familiar Stranger relationship because one must verbally query every nearby person to discover the answer. However, it can be captured by the proposed Familiar Stranger device and hence was included in the study.

To evaluate the relevance of these factors to participants' perceptions of urban public places, we created a *Wizard of Oz* scenario with a hypothetical mobile device that monitored each of the four factors: Amount, History, Turf, and Tribe. Without prototypes or props, we asked participants to rate the importance of those four factors in contributing to their social comfort *if they had the actual device at that moment in each place*. The tour concluded with a participatory design exercise where users sketched their own representations of the data from the walking tour.

Results

Comfort levels varied from place to place, with women exhibiting more variation than men. On average, participants were most comfortable at the post office and least comfortable in the park, with women significantly less comfortable there than men. "The people around me" was consistently ranked highest of three factors (people, physical characteristics, and environmental conditions) contributing to a perception of comfort, most notably in the park, where people felt most uncomfortable.

Those interviewed valued information about familiar people most when they felt unsafe and when they had a choice of options. In the *Wizard of Oz* section, they rated information delivered by the imaginary device most important at the park and restaurant, and least at the post office. At the park, anxiety about street people created the need for social data. People most valued the number of familiar people nearby, as they wanted assurances of reliability for those around them. One participant thought knowing "moms and kids" visited the park would be reassuring. Another wanted to differentiate the restaurant from the other "cheap joints" stating, "If lots of people I knew ate here, I'd have more respect for it. It would be interesting to see where other familiar people eat." After walking through a street fair, one woman included a request for a "discreet" interface and a "festival" interface. Since many users organized their Familiar Strangers around social groups, we added user-defined groups (*i.e.* "students," "moms and kids,") to the concept.

The participatory design exercise revealed tensions in users between a desire for social data and concerns about privacy in public places. The "radar" metaphor – a representation of the social and physical space that maps others' positions in relation to the user – was a favored invention of the

participants, occurring six times over nine interviews. However, privacy concerns rendered it unusable. Users liked combining spatial and social data to create a "social landscape," but did not want other people to have that kind of information about them. Concerns about safety arose because visible wearable displays tie digital data to bodies: "What if my device showed that I didn't know anyone? I would feel worried about my safety in a crowd."

Milgram saw Familiar Strangers as a response to social overload. The mixed responses to the idea of wearable displays confirm his insight about the variability of desire for social interaction. As one woman said: "It depends whether I'm looking for people, for connections. When I'm on my own business I'd be more discrete."

JABBERWOCKY: THE FAMILIAR STRANGER DEVICE

Our previous formal studies and anecdotal observations guided a design for a personal, wearable, wireless device and also a mobile phone application that would capture and extend the essence of the Familiar Stranger relationship. The tool is called *Jabberwocky*, named after Lewis Carroll's famous nonsensical poem [25]. These *Jabberwockies* can either be attached to fixed objects, such as a bus stop platform, or carried/worn by individuals.

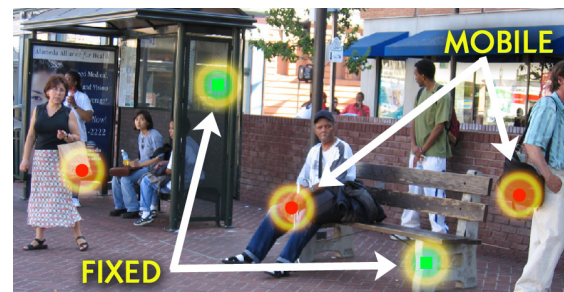


Figure 4: Fixed (square) and mobile (circles) Familiar Stranger devices, called *Jabberwockies*, in context

Digital Scents and Tagging

The principle metaphors of *Jabberwockies* are "digital scents" and "digital tagging".⁸ As individuals traverse an urban landscape, they simply infuse their path with a unique and detectable digital redolence. Similarly, fixed places/objects can also emit unique "scents" once they are "digitally tagged". These scents and tags are localized and map nicely upon many of today's low power radios and personal wireless protocols such as Bluetooth [26]. A moving person or fixed place broadcasting a low power radio signal with a unique identifier is equivalent (at least spatially) to a person or place effusing an individual smell – without the actual odor, of course.⁹ Using these metaphors, we can construct several factors that can be measured, recorded and displayed in regard to Familiar Strangers.

⁸ The term scent is used metaphorically here to simply represent the idea of a unique, invisible, yet detectible trace of a person. Tag is used similarly for places that emit an invisible, unique, detectible identity.

⁹ What about places such as highways and city streets – Can we have automobile Familiar Strangers in urban traffic?

As two people approach one another, each person's individually carried *Jabberwocky* transparently detects and records the other's unique identity. Over time each *Jabberwocky* accumulates a log of unique entries of people that have been previously encountered. Similarly, a person is able to "digitally tag" a place (*i.e.* park, plaza, bus stop) or object (*i.e.* bench, bridge, parking meter) by attaching a fixed *Jabberwocky* to it. The combination of fixed and mobile *Jabberwockies* is the essence of the Familiar Stranger system.

Amount

By intersecting the set of currently nearby detected Familiar Strangers with the stored set of those previously encountered, it is trivial to render a notion of amount of currently present Familiar Strangers.

History

We can measure how long or how many times each Familiar Stranger has been encountered as a notion of history. Using hysteresis to avoid measurement errors in the sampling, each device stores attributes for count and elapsed time with each log entry. Recurring encounters with Familiar Strangers simply increase the count or elapsed time attributes for that log entry. Later, by looking up the currently present Familiar Strangers in each log, a greater sense of established frequency, time, history, and familiarity is calculated.

Turf

The fixed beacons or digital tags allow measurements related to place. Digital tags emit a signal to differentiate them from the mobile, individually worn body devices. The tags are attached to objects in places by people. Typically, a person would tag a location that is perhaps significant or holds special meaning using a fixed *Jabberwocky*. The tagging is driven by the personal desires and interests of individuals.

A digital tag communicates and logs all of the strangers that pass by it. It also broadcasts this list to mobile devices in its vicinity.¹⁰ Nearby mobile devices intersect this broadcast list with their internal log of previously encountered strangers. This intersection is the set of strangers that have been encountered before and that have also been to this current place. The larger the set the more the current place is "your turf".

iMote

As design predecessors to Smart Dust [27], Motes are small (23mm diameter), low power, embedded processors with built-in short range (up to 30 meters) wireless connectivity, a perfect match to the Familiar Stranger design constraints

of detecting nearby people and places. The wireless protocols developed for Motes vary from custom 916 MHz and 2.4 GHz implementations to the iMote's [28] standardized Bluetooth hardware. The wireless hardware also allows for varying the radio power which in turn correlates to modulating the range of sensitivity. Using the digital scent metaphor, each iMote becomes a *Jabberwocky* – a small personal device that wirelessly beacons and records other nearby unique *Jabberwockies*.

Important is the absence of a central server to store, manage, or processes data. This prevents a central entity from "owning" the data. Each *Jabberwocky* maintains its own private unique log of past people and places. Each *Jabberwocky* is programmed transparently as an individual traverses their urban landscape – logging the various digital scents and tags of strangers, places, and objects.

Bluetooth Mobile Phones

Jabberwockies require a low power localized radio, limited processing, and small storage. Today's Bluetooth¹¹ enabled mobile phones satisfy these constraints and make an ideal platform to develop a personally carried *Jabberwocky* application. These Bluetooth enabled mobile phones support the same interactions and metaphors as personally carried iMotes. In fact, the combination of a personal Bluetooth mobile phone application to emanate an individual's digital scent and iMotes for digitally tagging individual places creates a remarkably successful synergy for exploring Familiar Strangers.



Figure 5: *Jabberwocky* experience prototypes seen in context

INTERFACE DESIGN

The major interface challenge was representing and interacting with complex social data on very small, low-resolution displays. It was also important to visualize the freshness of the real-time data and the passage of time. Finally, we avoided the look and feel of a tracking device by displaying Familiar Strangers *collectively* as groups and crowds rather than as individuals. While there are two interfaces, one designed for Motes and the other a mobile phone applications; the remainder of this paper concentrates on the design of the Mote platform device.

¹⁰ While clear-text broadcasts of identities violate the privacy of the listed individuals, there are techniques for anonymizing users and establishing stricter privacy guarantees without sacrificing necessary functionality.

¹¹ A part of the application involves discovering nearby Bluetooth devices and is related to Bluejacking – the process of sending anonymous messages to nearby strangers using Bluetooth mobile phones.

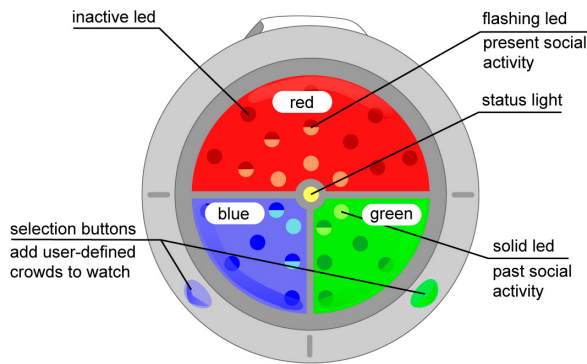


Figure 6: Interface for Jabberwocky device

Unlike the mobile phone application, the Mote hardware can be easily externally displayed as a belt clip, watchband slip-on, bracelet, or book bag clip (see Figure 5). The obvious tradeoff for ease of access is the semi-public display of the device's status as commented on by users in the *Urban Walking Tour* study (see results).

The Mote interface (see Figure 6) is a diffused circular lens divided into three color regions (red, green, and blue) with two corresponding selection buttons at the bottom (blue and green). Using an array of concentric LED rings a user can see the degree of familiarity of a place. The red region renders the general state of familiarity by turning on LEDs corresponding to the amount of Familiar Strangers that you have passed who have also frequented the current location (solid LED) as well as the number currently nearby (pulsing LED). This provides a sense of history and freshness of data within a single display.

As discussed in the *Urban Walking Tour* study, not all Familiar Strangers are equivalent. Typically, a few have meaning attached to a particular place such as a bus stop, street corner, or club. Others may be ones in your own neighborhood. While the red area depicts the general state of familiarity, the blue and green are for specific personal groupings. Users categorize the Familiar Strangers nearby by selecting the green (or blue) button. Later, when members of these groups are re-encountered, their presence will contribute to illuminating both the red (general familiarity) and green (or blue) personalized grouping.

CONCLUSION

The very essence of place and community are being redefined by personal wireless digital tools that transcend traditional physical constraints of time and space. New metaphors for visualizing, interacting, and interpreting the real-time ebb and flow of urban spaces will emerge. Crucial to this discussion will be the often ignored yet vital role of our Familiar Strangers. Without a concerted effort to develop new knowledge and tools for understanding the implications of these new technologies, computer and social scientists, city planners, and others run the risk of losing touch with the reality of our urban streets and their inhabitants. This paper initiates the groundwork towards exploring this space.

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