Extending the Lifelog to Non-human Subjects: Ambient Storytelling for Human-Object Relationships

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ABSTRACT
In this paper, we describe an approach to lifelogging that positions everyday objects, vehicles, and built environments as worthy of their own lifelog systems. We use this approach to anchor what we call ambient storytelling, and we argue that this methodology opens up new opportunities to design for rich and enduring relationships between humans and non-humans. We will explore this research approach through a series of examples, including: (1) a building that learns about its occupants and reveals its lifelog through playful solicitation and reciprocation, (2) story-objects that reveal backstory to their users, and (3) an automotive-sensor system and lifelog platform that facilitates context-specific playful interaction between a driver and their car. In this last example, we were interested in how a vehicle-based lifelog could augment drivers' existing propensities to project character onto their cars. In each of these examples, we reposition the concept of the lifelog to consider the "lives" of objects and the relationship between humans and non-humans as a worthwhile area of research.

Categories and Subject Descriptors
J.5 [**Computer Applications**]: Arts and Humanities—*Fine Arts, Architecture*; H.5.1&2 [**Information Interfaces and Presentation**]: Multimedia Information Systems, User Interfaces—*Theory and Methods, Evaluation/methodology*; D.2.2 [**Software Engineering**]: Design Tools and Techniques; H.3.0 [**Information Storage and Retrieval**]: General

General Terms
Design, Experimentation, Theory, Documentation

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Lifelog, ambient storytelling, environmental lifelogging, vehicular lifelogging, story objects, architecture, interactive architecture, human-object relationship

1. INTRODUCTION

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The notion of the lifelog has traditionally been tied to the idea of memory prosthesis for a single human subject. This coupling of the lifelog concept with a human subject has deep historical roots. In describing the MyLifeBits project, Jim Gemmell & Gordon Bell et al. [1, 3, 4] point consistently to Vannevar Bush's Memex system [2] as inspiration, and in particular they draw attention to the Memex as an indexing and recording system designed to augment a researcher's mental and physical experience. The centrality of a human subject is further embedded in Bush's description of an interconnected web of human knowledge (presaging the internet) that enables humans to share and navigate vast stores of information. But while the imagined protagonist of Bush's tale is a human subject, our current media environment suggests a significant shift towards the recognition of non-human subjects as authors and readers of sensor data in an emerging Internet of Things. How, then, might we conceive of a lifelog for a networked object in the physical world? Our research in this area points to new design opportunities in which objects record and communicate their own lifelogs.

1.1 Human-Centered Lifelogging Versus Object/Environment-Centered Lifelogging

In more recent years, research focus has expanded beyond Bush's original emphasis on knowledge retrieval to subsume more experiential memory augmentation through video capture. However, this work largely retains the original assumption of an individual human subject. In the 1980s, Steve Mann began experimenting with streaming video and started recording his life using the Wearable Wireless Webcam in 1994 [6, 7]. Similarly, Bell integrated the SenseCam video recording system [7,11] into the MyLifeBits software. In both of these projects, the perspective of the video camera is aligned with that of a human subject observing their environment through a camera mounted to the chest or eye (a perspective that Mann has described as sousveillance [6]). This move to ubiquitous video capture casts the lifelog subject as a human vector supplying an always-on audio-visual record of daily life.

However, recent research points to new perspectival orientations for lifelogging by using objects in the environment to capture video. For example, Lee et al. designed a lifelog system that captures images and other data from the perspective of objects (in proximity to humans) [5]. Nevertheless, previous research has yet to address interest in the possibility that objects and

environments might themselves be positioned as the subjects of lifelogging.

Our research instead explores the perspective of objects and built environments as characters with their own stories to tell. Through projects like The Million Story Building and StoryObjects we have explored the lifelog as a narrative platform [9].

1.2 Ambient Storytelling

This model of lifelog research has led us to insights about how to engage occupants in built environments using ambient storytelling [10]. We use the term 'ambient storytelling' to refer to a narrative structure that unfolds asynchronously in the background, as opposed to the foregrounded narration characteristic of durational media artifacts such as video games, movies, or literature [12]. This notion of ambient storytelling is informed by a variety of artistic, narrative, and design traditions including but not limited to: Mail Art, Sticker Art, web-based ambient storytelling (such as The Nethernet), augmented reality games (such as Hidden Park), location-based games (such as Shadow Cities), environmental games (such as Macon Money), as well as historical antecedents in urban interventionist art practice of the Situationist and Fluxus movements. What these interactive experiences share is a kind of intermittence, a lack of explicit foregrounding, and a sense of always-on or potentially available mystery that confounds the expectations of a participant and keeps them guessing about what counts as play or story.

In our more recent work, a project called PUCK (Place-based Ubiquitous, Connected, and Kinetic) positions the lifelog as a platform for supporting relationships between a building and its occupants [11]. We have also developed an automotive lifelogging system that uses in-car sensors to engage drivers in ongoing discoveries about their vehicle, driving environment, and social context throughout the lifecycle of their car [8]. This work departs from the familiar emphasis on video recording as the primary tool of the lifelog.

2. LIFELOGS FOR OBJECTS AND ENVIRONMENTS

If a building could "talk" what would it say? How would it "feel" about the comings and goings of the people who use it everyday? Would it be affected by their moods and desires? What kind of relationship would it have with its occupants if it could communicate with them somehow? And how would they respond?

2.1 The Million Story Building

Using these questions as a design prompt, we conceived of Million Story Building [Fig. 1. and Fig 2.], an experimental design project exploring how location-specific mobile technology can add playful, imaginative and practical new layers to the relationship between a structure and its inhabitants. As buildings become dynamic generators of data and information, they have the opportunity to use their embedded technological systems to play a more collaborative role in an inhabitants' experience of space and place. These new spaces of possibility are imaginable by connecting people to now-common ubiquitous computing technologies such as sensors, building management systems, mobile devices, and the networks that make up the rapidly emerging connected world.

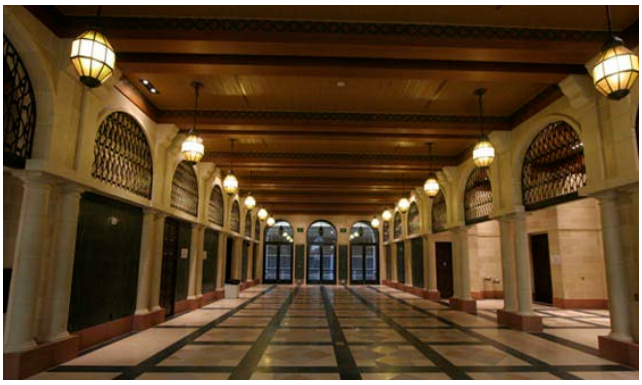

Figure 1. Image of the School of Cinematic Arts (SCA) building, subject of the Million Story Building and PUCK research projects at the University of Southern California

Using a newly-constructed School of Cinematic Arts (SCA) building as a test bed, our team designed a location-sensitive iPhone application that enables students and faculty to engage with their workplace in novel ways: from scanning Quick Response (QR) code glyphs mounted next to posters in the hallways in order to access and tag video clips from a central database, to leaving virtual messages for others to read in an Augmented Reality view of the building's central courtyard.

Figure 2. The Million Story Building application, home screen and twitter feed.

Functions such as these, working together with networks of sensors, interactive plasma screens and web-based social media profiles, made it possible for iPhone-carrying building occupants to learn about SCA history, discover events and activities, share stories and updates of their own, enrich the school's media archive, and participate in an Alternate Reality Game. The end result was a prototype for a personalized and self-renewing "ambient story" experience co-constructed by the collaboration between the occupants of a building and the building itself.

2.2 PUCK (Place-based, Ubiquitous, Connected, and Kinetic experiences for Interactive Architecture)

Building on the work of the Million Story Building, PUCK—a dissertation project of Jen Stein [11]—investigates place-as-character in the context of interactive environments. For users of PUCK, occupants of the SCA building experience real-time data

visualizations, mobile and wall-mounted interfaces, and 3D printed data visualization objects. PUCK introduces inhabitants to a number of data-generating systems and sensors embedded within the walls, floors, and ceilings, allowing buildings to make their hidden data infrastructures more transparent. This lifelog data is displayed throughout the building on networked touch interfaces as well as on a mobile application. By drawing inhabitants into the data, the building begins a conversation with its inhabitants about energy and water consumption, fluctuations in temperature, carbon dioxide levels, and wireless network activity. Inhabitants learn about their collective and individual impact on both the digital and physical landscape of the space. Inhabitants interact with this information through wall-mounted touch interfaces. A personalized "Identicon" follows inhabitants as they move from one interface location to another [Fig. 3]. This Identicon is itself a datavizualization representing the history of the interactions between an inhabitant and the building.

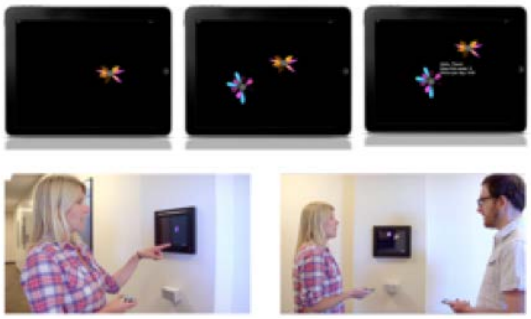

Figure 3. The building personally engages inhabitants through personalized data Identicons

2.3 StoryObjects

The objects of our everyday lives often contain hidden stories about who designed them and what they might have been before they assumed their current form. StoryObjects gives a voice to everyday objects, allowing them to share their embedded stories and histories. This project consists of a custom-designed table [Fig. 4] constructed in part using reclaimed materials the old MGM Studios. This table is embedded with images and information that is accessible when building inhabitants who are using the Million Story Building iPhone application come within bluetooth proximity of the table [Fig. 5]. When a StoryObject detects a nearby mobile phone running the application, these stories are revealed and delivered via images, video, and text. More pieces of the story become available as the user spends more time with the object.

Figure 4. Depicts images from the backstory of an interactive table

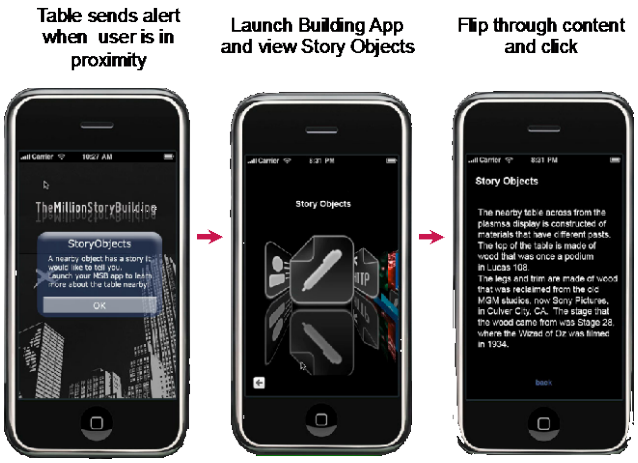

Figure 5. Demonstrates the mobile interface view of the StoryObjects feature within the Million Story Building application.

3. LIFELOGS FOR VEHICLES

Building on the work described above, the MEML team designed a vehicular lifelog prototype for a MINI Countryman. A goal of the design was to extend the typical contexts of automotive user-interface design by (1) looking inward to the imagined "character" of the car and (2) looking outward to the larger social context that surrounds driving. We were interested in understanding how a vehicle-based lifelog might impact the way that drivers project character onto their cars. While the lifelog in this case could have been framed as that of the driver alone, we preferred to explore opportunities in which the lifelog could document or augment the relationship between driver and car.

Using the various in-car sensors within the MINI, we designed a lifelogging system that tracks events, milestones, achievements, and tallies associated with driving. This information triggers contextually relevant notifications on the MINI infotainment system. This kind of interaction takes place intermittently and does not always rise to the level of a driver's experiential foreground, but if in-car notifications are missed when they first occur, a driver (or passenger) can review them later on a lifelog review interface (iPad application).

3.1 System Design

Our vehicular lifelog system consists of an iOS app and a server-based component. This server component not only tracks which events are found but also defines which events we are looking for—which the iOS app loads upon connect. A simple web interface enables us to define and edit events, making the creation of lifelog events less of an engineering task and more of a writing and storytelling task.

3.2 Reciprocation

Our lifelog events often adapted sensors for unexpected purposes. For example, we used the rain sensors (which were originally engineered to trigger the automatic windshield wipers) in order to indicate that the car was being washed [Fig. 6]. In this example we wanted to emphasize a lifelog event that would enable a driver to reciprocate and show gratitude to the car.

Figure 6. Rain sensors, originally intended to trigger the automatic windshield wipers, were used instead to trigger a "Car Wash" event.

3.3 Exploration and Memories

We also used the lifelog as a platform for enabling drivers to see their environments in a new way and use navigational prompts to position the car as co-participant in an evolving relationship. In a demo drive through Los Angeles's history theater district, we used GPS points to trigger exploration achievements tied to notable locations. For example, the driver and car earn an "LA Dystopia" achievement for passing by the Bradbury building (a famous location from the movie *Bladerunner*). Events like these form the backbone of the car's "memories" and subsequent visits (even by a different driver) will trigger notifications about the memory.

3.4 Lifelog Review Interface

An iPad interface was also designed to enable users to review their car's lifelog outside the car (or inside, in the case of passengers) [Fig. 7]. This interface maps lifelog events according to location, time, and event definition.

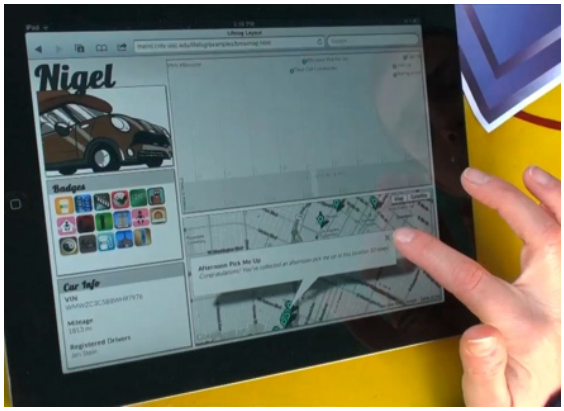

Figure 7. The lifelog tablet interface organizes the events of the lifelog according to time, space, and event definitions.

4. CONCLUSION

The concept of lifelogging can increasingly be extended beyond human subjects to include objects and built environments. Our approach supports an alternative model of human-object interaction that we described as ambient storytelling, in which engagement is intermittent and iterative, non explicitly foregrounded, but potentially always-on. Using a lifelog platform to seed ambient forms of engagement in this way requires a remapping of perspective away from traditional human subjects to consider the "lives" and stories of objects.

5. ACKNOWLEDGMENTS

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