Ambient Storytelling: The Million Story Building

Abstract

This paper describes current research towards new approaches for storytelling and context-and location-specific character development. The result of this research is the *Million Story Building*(MSB) project, which has been designed and implemented by the Mobile and Environmental Media Lab in USC's Interactive Media Division. The new School of Cinematic Arts building provides the setting for *ambient storytelling* in which conversations between the building and its inhabitants introduce new ways of interacting with architectural spaces for storytelling.

Keywords

Mobile, Ubiquitous Computing, Ambient Storytelling, Interactive Architecture, Sensors

ACM Classification Keywords

H5.m. Information interfaces and presentation: Miscellaneous

General Terms

Design Document, Work-in-Progress

Introduction

The growing number of ubiquitous and embedded computing technologies introduces a new paradigm for how we interact with the spaces of everyday life.

Mobile devices, specifically smart phones, offer new possibilities for sensing and communicating with the physical world around us. As these technologies pervade our everyday interactions, the context and location in which they occur becomes more relevant. These technologies can be used not only for collecting and providing data about the world, but also for engaging people in context- and location-specific ambient stories that encompass everyday life.

The Mobile and Environmental Media Lab explores context- and location-specific mobile and storytelling. Our current research projects focus on interactive architecture within the context of environmental media. Through the use of media technologies, it is our goal to enhance environmental awareness, augment presence in the physical environment, and enable participation in place making. This research investigates the idea of *ambient storytelling* and how the built environment can act as a storytelling entity that engages and interacts with people in specific spaces. Development of personalized responsive/interactive environments arise as people spend time in and build a relationship with the spaces they inhabit habitually. By integrating context-aware interactions and access to backstory about an environment, ambient stories emerge and can be accessed through mobile and pervasive computing technologies and applications.

Approach
Our approach focuses on the social and participatory elements of both ambient storytelling and interactive architecture. The research project described below uses a campus building as both a character and the setting for collaborative, context-specific storytelling in which the building inhabitants become an integral part of the story world. By inviting inhabitants to engage with both the building and other inhabitants, we have introduced a new paradigm for place making within a playful, interactive environment.

Earlier research into lifelogging

and backstory further provides a groundwork for thinking about new forms of storytelling. This has progressed into an interest in how these stories could be customized and delivered in specific contexts and locations throughout the day, which we have termed *Ambient Storytelling*. By thinking more deeply about context and location specificity, we have experimented with what a lifelog for an architectural space might be and what backstories the objects within might contain, i.e. what a building would lifelog about, how it would communicate this lifelog to its inhabitants or to other buildings, what kinds of backstories the objects tell, and the stories that might emerge from this buildings' lifelog and backstories.

Ambient Storytelling
The term *ambient storytelling* is used to describe the context-specific and location-specific stories that emerge over time and immerse inhabitants in a story world through daily interactions with a building or architectural space. This form of storytelling within the built environment is enhanced through mutual participation and collaboration between inhabitants and the building as they begin to learn from and interact with one another over time. The development of a personalized responsive environment therefore evolves within the context of one's surroundings, creating a deeper connection and sense of presence within a specific location. For the purpose of our research, ambient storytelling takes place through the use of lifelogs, backstory, sensor networks and mobile devices within the built environment.

The practice of lifelogging, or documenting and broadcasting one's daily activities with wearable computing devices, has been a recurrent topic of our research. However, instead of people documenting their activities, we are focusing on designing lifelogs for the built environment. Lifelogs for physical spaces combine various building, environmental and human sensor data, as well as collaboratively-authored character development, to create an ongoing presence of a story. Through the integration of these various

sensors and collaborative character development, the building itself offers a daily snapshot of both infrastructural behaviors (power and water usage, internal temperature, HVAC usage), but also the behavior of the inhabitants of a building(movement through space, interests in context-specific information, time spent in the building). These elements, when combined, create the groundwork for ambient, mobile storytelling based on contextually relevant information collected and authored throughout the day.

Additionally, backstory, or the extant history of an object or situation, plays a significant role in our conceptualization of mobile and ambient storytelling. By embedding objects with contextual information about what materials objects are made of, where those materials came from, who designed and built the objects, and how the objects was transported, we can deepen the emotional connection of a participant to an object and space. It is our objective to provide a novel way to access an object's backstory using mobile and pervasive technologies and applications, while the overarching goal of our research into ambient storytelling is to merge lifelogging and collaborative character development with these backstories and context-aware interactions.

Finally, this model for ambient storytelling provides a platform for making sensor and environmental data more accessible and playful within the actual context of the information. Rather than simply visualizing the data that is produced and captured throughout the day, this information becomes an ongoing part of the story through both lifelogs and backstory.

The Million Story Building Project
The *Million Story Building* (MSB) project introduces the idea of mobile, ambient storytelling within the new School of Cinematic Arts Lucas Building at the University of Southern California. Through the use of the custom MSB mobile phone-based application, inhabitants and visitors become immersed in an emergent, responsive environment of collaborative

storytelling. By designing location-specific interactions in the built environment, we have created an interface to the new George Lucas Building[School of Cinematic Arts Complex] through the use of mobile phones, sensor networks, and software applications.

This application is intended to be used by the students, faculty and staff of the School of Cinematic Arts on a daily basis. As these inhabitants begin to interact with and engage in conversations with the building regularly, an ongoing relationship develops between the building and its inhabitants. If inhabitants chooses to have an active relationship with the building and begin to interact more frequently, the building can create user profiles by learning names, locations and activities of its inhabitants. This user profile can be used by the building to offer context-specific information tailored to the likes and interests of a specific inhabitant. Furthermore, we have designed mission-based experiences and challenges that deliver a daily surprise to individuals as they spend more time in the building and sustain a playful relationship with the building. Experiences such as tagging movie clips, taking photos of specific elements of the building, and collecting videos from film locations are introduced to inhabitants in the form of missions or quests that the building proposes as a way to help it learn about itself, its inhabitants, and the world around it. These requests are made by the building in a pervasive game-like way in which inhabitants are asked to complete more difficult tasks only after becoming actively engaged with the building over time.

Additionally, as inhabitants begin to interact with the building and provide the requested information, a digital archive of all the collected videos, images, tagged movie clips and other data is created. The resulting database for this collected data will be useful to the School of Cinematic Arts not only as a way of developing a living history of the new Lucas building, but will also provide useful tools that can be used in the classroom. For example, as more movie clips are collaboratively tagged, professors and students will be able to access the database and call up movie clips by

keyword in the classroom. Having access to the kinds of information that the building collects and stores will be an invaluable resource to the School of Cinematic Arts.

The Million Story Building project has allowed us to explore new ways of interacting with the built environment, as well as to think about the process of place-making in computationally embedded spaces. By embedding a digital layer of information into an existing building, we have created a new kind of space for storytelling in which a mobile phone application invites users participate in a persistent story world. This current research and development will inform our future design plans for the new Interactive Media building. Our goal for the new building is to embed interactive systems and backstory elements from the ground up at the beginning of the design and construction process.

Million Story Building Mobile Interface
The current mobile phone application provides a voice to the building through its lifelog, as well as a toolset for inhabitants to explore, collaborate/participate, and communicate with the building. Below is a description of the various tools included in the mobile application:

Twitter
Twitter acts as a Lifelog for the building. The building uses its Twitter stream to update its inhabitants of various activity in and around the building. When the mobile application is launched, the Twitter stream is visible and is the first interaction a user has with the building each day. The building might share information about when its plants need watering, who has recently entered the building and launched their mobile application, when someone is interacting with the building or QR codes, and the mood of the building and its inhabitants.

Twitter is also used by the building to emerge as a character, first by providing information about building infrastructure, then slowly developing into more personalized and context specific information as it begins to learn more about the world around it and the people who use it.

Flickr
The camera can also be used by inhabitants and guests to take photos around the building, which are directly uploaded to Flickr. The building might send requests to users to take photos of certain objects or attributes within the building. A database of photos is created and might show changes to the building over time. The photos are also accessible for viewing on the Flickr page within the application and can give the building and its users a real-timer perspective of what is happening in the building.

QR Code Reader/Scanner
The camera can be used as a Quick Response, or QR reader to discover information embedded within the buildings' walls. When a QR code is discovered in the building, inhabitants can take a picture of that QR code and will receive contextual information related to the location of that QR code, i.e. movie poster, faculty office. Many of the movie and game posters in building will have a QR code that links to information such as alumni interviews, movie trailers, movie stats, and reviews.

MovieTagger
When the building begins to recognize that certain users are actively engaged with the building, it will ask users for help in defining and tagging certain movie clips with keywords. For example, when a user accesses certain movie/game poster QR codes, certain information about that movie/game will be immediately available. Over time, the building might ask its users

to find a plasma screen within the building and help tag a movie clip or series of movie clips. When the user approaches a plasma screen, the plasma display will sense that the user is within range and will ask a question and play a movie clip related to the poster whose QR code was accessed earlier. As the user begins to interact with the building and respond to its requests, the building will develop a stronger relationship with that user and will begin to ask for more help. In addition, this application enables users to collaboratively create a robust annotated clip library for the School of Cinematic Arts, in which students and professors will be able to access for classroom use at any time.

Sensor Information
Sensor data from both sensors in the phone and within the building is visualized and can be viewed within the application. By accessing the sensor tool, users can see information such as personal pedometer steps, human movement through the building, building information modeling data, and environmental data.

Plasma Displays
The plasma displays located throughout the building broadcast RSS feeds from the SCA Community website, the Interactive Media Division website, and other information about what is happening around the building. These displays also provide a platform for interaction between the building and its inhabitants by broadcasting missions that establish new social interactions between inhabitants themselves as well as between inhabitants and the building.

Provenance (Story Objects)
Objects within the building, in addition to the building itself, are embedded with a backstory and contextual information. These objects can tell stories about the materials they are made from, where those materials came from, and who made the objects. These objects contain QR codes, bluetooth proximity sensors or AR applications and will alert the inhabitants to information that is available within them. Furthermore, inhabitants can embed additional information into the objects or the building, creating an ongoing digital archive for the objects and the building.

Digital Story Archive
The statue of Douglas Fairbanks and the courtyard at the entrance to the Lucas Building will act as a story repository, where users can engage with stories that have been left there in addition to leaving their own stories behind. When a user scans the courtyard with their camera tool, a number of story bubbles will be generated from stories that have been left there. Each bubble links to a story which can be opened and read by the user. The user then has the option to leave their own story behind as well.

Navigation
A number of pedestals with AR markers will be located throughout the building. When a user scans the AR marker with their camera, they will see a 3 dimensional model of the floor they are on, as well as information about how to locate specific places on that floor.

Alternatively, there will be a map tool that will allow users to flip to a 3 dimensional representation of the floor they are on and find out where specific classrooms, offices or departments are located.

figure 1. This screen shows how the building communicates with its inhabitants through Twitter, Flickr.

figure 2. This screen shows the tools inhabitants can use to interact with the building, i.e. QR scanner, camera.

Future Directions

It is our goal to extend this ongoing research for new contexts and locations. We are currently considering other ideal application spaces to expand this kind of project to, such as children's hospitals and museums. Additionally, we believe this model for interaction presents new possibilities for making buildings and inhabitants engage in more environmentally sustainable practices by changing harmful behaviors and encouraging helpful solutions. This approach can be adopted and integrated from the onset of new architectural projects by using the sensor networks and information collection and processing within existing Building Information Modeling and Building Management Systems to help change behavior and extend the lifecycle of buildings.

Citations

[1] See Steve Mann's early research on lifelogging http://wearcam.org/steve.html; and Gordon Bell's work at Microsoft with SenseCam/My LifeBits: http://research.microsoft.com/en-us/projects/mylifebits/

Acknowledgements