

Networked Objects

Patrick Dwyer
Spring 2006
Week 7 - March 2nd

Space Annotation

The growing ubiquity of wireless and location aware devices can enable a shared experience of the world through layering of a virtual context atop the physical world. Using physical, semantic, digital, temporal, and social markers we can change the understanding and meaning of space through annotation.

By annotating a space we attempt to define the meeting point of multiple contexts; physical and social, musical and geographical, imagery and tourism. The types of information we include in a newly defined context is nearly limitless, but we need to provide some method of accessing, sharing, participating and understanding.

Marking Presence

It is important that a contextual layer be understood, and the first step towards understanding is knowing that additional context is available. Even the most revolutionary presentation of information will fail if no one knows where the information is, or how to access it. Annotation requires a means of finding out where shared context exists, and whether or not a given location has an available annotation.

This can be as simple as a web interface, or as complex as specialized devices suited to the context. In an annotation project spanning an entire city or geographical region it would be best to leverage existing devices and mediums; for instance cell phones and WML or SMS. If instead we are working in a known context, we might use specialized devices; for instance museums that use audio tour handsets.

Creating Information

Just about every annotation system needs to let participants create new context and content, and the methods and participation will vary greatly depending upon the medium in which the context exists, but if a project has a goal of shared context the methods of creation must be as easy and open as possible.

Exploring Space / Change

The experience of an annotated environment should be guided by the goal of the shared context; a project meant to add peripheral information to dining in the city will be experienced in a different manner than community created tourist trails. Things to take into consideration:

- How can a participant find their way from one context to the next?
- Should the user affect the context as they experience it?
- Should the user be aware of recent changes or disagreements over the content of a given context?
- Does the context need to reward or challenge the user?

Domestic Applications

The promise of technology has always been an easier life, free from the drudgery of daily chores and meaningless labor. In fewer places has the promise of technology grasped the desire of the general market more than with home automation and domestic application of innovation. From smart toasters to nearly self-aware security systems, the home (and to a certain extent the workplace) is an ideal target for

new and strange technologies; people tend to be much more open about adaptive, innovative, and strange devices in the home, so long as they create some perceived benefit.

X10

One of the most popular home automation technologies has been X10. This technology is typically easy to install in the home, and allows the user to control lighting, electrical connections, and to a certain extent video and audio throughout a home. Usually X10 communicates over home power lines, which can cause certain problems when the house is wired in a strange manner, or when neighbors on the same power grid attempt to use a similarly configured X10 network.

Smart Home

The market that X10 tries to address is commonly known as the Smart Home; living space that is attuned to our needs, desires, tastes, and is able to relieve some of the maintenance burden associated with keeping a home in order. The smart home is more than intelligent appliances; it involves creating a space that is as aware of us as we are of it.

Control / Awareness / Management

The primary functionality of the smart home centers around the control, management and awareness of the contents and immediate surroundings of the home. The home should be aware of usage patterns, common household elements and people, and uncommon situations that may occur. The deeper questions raised by the concept of a smart home are important to address for any technologies that might function as a part of our daily experience:

- What shouldn't technology be aware of?
- Should technology be able to spend our money for us on common items? Uncommon items?
- Should technology ever completely restrict me from an action, or only warn me about it's concerns?
- Can technology ever really be concerned?
- What creates the context of awareness for technology? Should it be aware of things that I want to keep secret from others? Should it aid me in keeping these things secret?
- Should technology call the police for me? Should technology call the police on me?
- In general how involved in our life and routine should technology become?

Introduction to Wireless Technologies

Wireless networking technologies allow us to address similar problems to those we solved with wired technologies, without the physical restrictions of immediate locality and hardware connections. We must sacrifice some quality and stability, but often times this is a great benefit, as it opens large spaces to unencumbered interaction. Wireless technologies are well suited to space annotation and smart homes; the freedom of movement and embeddability can greatly enhance the experience of either.

802.11b with the WiPort

diagram for how we would connect WiPort + PIC

connecting to wifi access points

Bluetooth

The bluetooth specification was designed for the creation of Personal Area Networks using low power wireless communication. It has become enormously popular for connecting localized devices in a quick and mostly efficient manner.

For embedded projects Bluetooth is useful for its small footprint and relatively good serial communication speeds. Bluetooth modules can be as small as necessary because their transmission range is by design limited. This means they are excellent for short range embedded wireless projects.

Simple RF - Serial Radio Communication

While other communication protocols wrapped up the concept of sending and receiving data into a single device, we can work at a lower level with Radio Frequency transmitters and receivers. At their heart any wireless technology must separate the act of sending and receiving data; sometimes we can benefit from the separation at the hardware level by using receivers in only some devices, while other devices are dedicated to transmitting.

The low level RF devices can have a variable range depending on the size and power of the device, usually any where from a few feet to a few hundred feet. Working with one of these devices we need to create our own concept of a communication protocol; much like we would if we connected to a computer with a serial cable.

RF devices can be especially useful if you are designing passive devices that don't need to transmit information, but that can benefit from receiving information, or vice-versa.

Resources

Bluetooth

- BlueRadios - blueradios.com
- Parallax EmbeddedBlue - http://www.parallax.com/detail.asp?product_id=30068
- BT Designer - <http://www.bt designer.com/>

Radio

- LINX Technologies - <http://www.linxtechnologies.com/>
- GLOLab - <http://www.glolab.com/>
- Rentron - <http://www.rentron.com/PicBasic/RemoteControl.htm>

Assignment

- Review Updated Syllabus
 - Midterm has been pushed back until after Spring Break
- WiPORT Extra Session
 - We only have a handful of WiPORTs to work with, but they can be extremely useful devices. Much of the detail of using the WiPORT will be similar to the XPort, so we won't go into detail in class, but we will setup an extra session for an evening or on the weekend to go over setting up a PIC to work with the WiPORT.

- Choose Technical Research Topic
 - Technical research presentations will be near the end of the semester, and should involve a 10-15 minute presentation on a networking or communications technology that we haven't covered in depth or at all in class. If possible it should involve a simple working demo, otherwise a presentation on what the technology is, why we might use it, and why we might not use it.
- Initial Final Project Abstract
 - A one paragraph abstract on a final project idea. This is an overview of what a final project concept would involve, and shouldn't yet contain technical detail.
- Work on midterm project, we'll do an in class update next week
 - Should have a rough work in progress as well as an update on problems and solutions encountered so far.