

Massachusetts Institute of Technology
6.883, Spring 2007 A Pervasive Game
Problem Set 4

Due: Thursday, March 22, 2007 & April 3, 2007

1 Overview

Indoor location based games can be fun as they merge the virtual world with the real physical one. These are sometimes called mixed reality games.

Camera arrays, lasers, or other technology can track peoples movement, but they usually require detailed models of the environment or sophisticated image processing technology. The cricket indoor location technology is easier to use and is available.

2 Details

There are a bunch of cricket listeners and beacons. They are in the area outside my office – the messy area with all the old PCs and junk boxes. There are two iPaqs setup to connect to listeners. You can ssh into them (directions below) or setup some bluetooth connection. Or you can use your own laptops and connect to listeners via the USB to RS-485 connector. You have to install some driver that you can get from the website for the converter. This puts the cricket listeners to be on the serial port. On a mac, this is `/dev/tty.KeySerial1` device. One connects to it on a socket with port 2947 and the ascii string just streams in.

The idea is that one can walk around with a listener (that is unattached) and then discover their position by the environment. Alternatively, listeners/iPaqs could move around, but you have to figure this out by yourselves.

You walk around the room with a listener and a phone. The listener indicates your position. The phone lets you have input and output.

3 Games

The assignment is to implement an indoor location-based game.

3.1 Boogle

The simple version is with just one person, one beacon, two listeners connected to ipaqs, and a laptop with wifi and bluetooth.

Initialize the iPaqs or PCs so they know about each other and are in communication over sockets. This can be done in a variety of ways, but the easiest is to simply open sockets and connect to the right ports.

Initialize the listeners with a beacon by going very close to them and dwelling for a while. The other listener will now know the distance between the two listeners.

The phone should establish connection with the server. As the person with a phone and beacon moves around, the server hears from the two listeners. Using some high school geometry, one can place the person within an imaginary grid.

The letter associated with the grid cell is sent to the phone, which displays the letter and waits for keyboard input. The player either hits a key or moves to a different grid cell.

3.2 Warped Virtual World

Rather than a one-to-one mapping of the physical space in a virtual space, it is much more “interesting” to use some other mapping function. Place some virtual objects or path in the virtual space and have the player walk around the physical space trying to collect the virtual objects. The player must somehow figure out the mapping, which, hopefully, is somewhat contiguous.

3.3 Control a virtual world by moving in the physical world

Walking around the physical world can be represented either as relative changes or absolute locations; either as δx , δy (like a mouse) or as absolute (x, y) (like a touch screen). These values are faked as mouse movements to a virtual world game, such as Doom, Second life, WoW, or even Dasher.

Display results either on the phone and accept additional inputs on the phone keyboard, or project on the wall with a projector.

3.4 Your Choice

Choose your own location based game. Could be in same room or distributed. The idea is to use crickets.

3.5 Converting to outdoors with GPS

The indoor games should all be easily transferred to outdoor versions on a much larger scale using GPS, phones with GPRS and a remote server. Please address this issue.

4 Strategy

This assignment should give some feeling as to what location based games are about. There are many failure modes caused by dealing with the physical world, different systems, and different technologies. Everything is easy in theory; in practise it is harder.

4.1 Collaboration Policy

This assignment should be done in groups or either two or four. Fun, coolness, and general interest is the main feature. This is one of hte cases where thinking saves lots of hard work. Also, many of the projects share lots of infrastructure, and it is perfectly fine to share.

4.2 Timing

A writeup of the team, game idea, components, technology, and initial design are due on Thursday. The working example due on the class after the break.