

6.883, Spring 2007 Problem Set 2
Due: Thursday March 8, 2007

1 Motivation

The price of attending each lecture at MIT is higher than a front row seat at the opera. It is a rare event when the Soprano will repeat an aria because someone in the audience was not listening. On the other-hand, a lecturer often will dynamically modify the presentation based on the students attention.

Most lectures look at the students to judge their attentiveness and apparent understanding of the material, but not all. Moreover, with students hiding behind laptops, it is hard to read their body language.

A proposed solution is to have the students continually record their attention level using a handheld device. In the future, we can imagine a biomedical feedback device, but that is for another class.

In this assignment, we assume that we are in a large lecture hall. In other words, the system should be scalable.

2 Preliminaries: Install and test Python

If Python is already installed on your phone, then please remove it. There is an "application manager" (sometimes it is in the 'tools' folder) that will remove Python and its shell script.

Install Python (3rd edition phones will need to get a developer certificate and sign the installation packages) as well as the putools package. The wiki should be of some help. Please contribute to it if you figure stuff out that might be of help to others.

The first program is to recognize key-presses. This will require a canvas image and a call back. The callback should indicate the key pressed. Do something to display the key-press. The easiest thing is to pop-up an appuifw.note. More ambitious is to display the text on the canvas window.

3 Bluetooth Communication

Each phone will act as both a generator as well as an intermediate node or gateway. There are three active tasks:

1. Detect key-presses with the following meaning. Zero through nine indicate attention level, with nine being the most attentive and zero meaning nearly asleep.
2. Receive messages from other devices over bluetooth connection. The phone constantly monitors incoming messages from other devices. The message will be very short, consisting of $n + 1$ words. The first word will contain the value of n (to make debugging easier, make sure it is always smaller than 100.) Wait a bit of time (you decide) before forwarding the message towards the Lecturer.
3. Forward single message that aggregates received messages and local activity. Aggregate multiple received messages into a single one by appending values and updating n appropriately. If any keys have been pressed (or pressed several times), append these to the message as well. Find a bluetooth device and send the message to it. I suggest that you choose a device with a smaller bluetooth ID. This will avoid cycles. If there are no smaller ID's, but you do find the Lecturers device, then forward the message to the Lecturer.
4. For the fun of it, you should display on your own device, the average attentiveness.
5. Since service advertisement and discovery is a pain, you should assume a list of all bluetooth devices participating in this exercise. Place your bt-id in the wiki.
6. Since we do not have enough phones, if you can get your laptop to work as a bluetooth device with all the dynamical features, then please use it. Linux laptops will work the best. The use of a laptop is not required. You may just share one phone.

4 Advice and Comments

As usual, the assignment is somewhat under-specified. Please make use of the wiki to clarify and share ideas. You may work in groups according to your phone allocation. You may discuss better ways of doing things and better protocols and specifications, however, I expect everything to work together – so we must agree on standards.

Please hand in the code, documentation, and any suggestions on how to make this project more realistic. We will experiment in class to see if they can all work together!