ECE 1778 – Creative Applications for Mobile Devices
February 2019
Specialist Assignment S4

Creativity, Sensors and Your Project

A key outcome of this course, for Specialists, is to become comfortable with brainstorming ideas for mobile/software applications in your field *and to evaluate* these ideas.

In this assignment, I'd like you to come up with a series of ideas that you could connect to your project. These ideas will make use of current and future sensors that are in (or may be present in the future) mobile devices.

To begin and provide context, recall that the basic capability of a mobile device is that it is a powerful computer, capable of deep optimization, machine learning, large data storage, and is connected to the Internet and so many other things! You've discussed at least some of these capabilities with your programming partners in assignment S3. Now that you've listened to the various proposals and some plans from all the projects in the course, I hope that you are getting a sense of different capabilities of mobile devices. Also, if you missed it Lecture #2 described many of the input and output methods possible with mobile devices and attached devices. Lecture #4 suggested some of the wirelessly attached devices that are available.

The main outcome of this assignment is that you will spend time coming up with ideas to augment your project. To be clear, the purpose is to get you thinking broadly about what might be possible; you are not making commitments to change the design of your project. (Of course if you really like the idea and it is practical, of course you should try to convince your partners to go there).

Finally, it may be that you cannot see any way to augment or enhance your project with the various capabilities described below; if that is so, please talk to me directly.

1 Reprise Your Field Description

In Assignment S1, you gave a short description of your field for the lay-person to understand. Create a newer version of this description, again 250 words, that includes some reflection of what you've learned so far in this course and how it relates to your field, and how it is best described.

2 Reprise Your Project Description

Give a short, maximum 250-word description of the 'what, why & how' of your project as it currently stands.

3 Enhancements of Your Project using Mobile Devices as they are Now

Give one idea that is an enhancement/extra feature for your project that *makes use of the following sensors, either in combination or separately*:

1. 3D Accelerometer
2. 3D Gyroscope
3. 3D Magnetometer
4. Barometer
5. Front Camera
6. Back Camera
7. Pressure-Sensitive Touch Screen (i.e. can measure force applied with touch)
8. Light Sensor
9. Proximity Detector
10. Humidity Sensor

The work to do here is sometimes called 'brainstorming' which is a method to generate new ideas. While it is most often done in groups, here you should do this mostly on your own. See https://en.m.wikipedia.org/wiki/Brainstorming for a description of brainstorming.

Once you have an idea, you should provide an *evaluation*, from your discipline's perspective, of the strengths and weaknesses of the idea. To do this, I suggest you imagine yourself using the project as it is currently conceived, and 'seeing' how it helps, but also what might be a barrier.

In addition, in your evaluation of your idea, include some sense of the difficulty of the processing the data. You should consult with your programming partners for some insight on this. As example, processing video is fairly compute-intensive, whereas the light sensor provides only a small rate of data to process. One way you can think about the processing difficulty is to count the number of data samples that must be looked at by the computer.

Your enhancement/feature(s) should be described together with the *evaluation* in a maximum of 500 words.

Please review Lecture #2 to see some description of these sensors:
http://www.eecg.utoronto.ca/~jayar/ece1778/ece1778_lecture2.pdf

4 Ideas Possible Mobile Devices in the Future

Now let's consider the sensors that may come in the future, and to do the same thing – suggest an enhancement/feature for your project using one of the capabilities described below. Give a description of the new idea, and its evaluation, as above, in 500 words.

You may use one of the following hypothetical sensors, or *one* additional sensor that you conceive of that has some basis in technical feasibility:

1. A three-dimensional gesture sensor that works in front of the phone, in a similar manner to Microsoft's Kinect, if you are familiar with that. If not, this video: http://www.youtube.com/watch?v=MWlLFEFj7J4 shows you a version of it work.
2. An ultrasound sensor that can look inside a human body and provide images of it.
3. A mind activity sensor, that tells you how active the brain is from 0 (meaning deep sleep) to 10 (wide awake and running for your life.)
4. A Blood Pressure Sensor
5. An eye tracker, that tells you, every tenth of a second, where on a screen a user is looking (called 'point of gaze' estimation) at the screen.
6. A camera with a depth sensor and advanced AI, which can recognize objects in pictures and/or video, and tell you exactly how far away from the device they are. For example, it could tell you that a picture contains a **desk** at distance of **2.3 meters**.

Due: Tuesday February 19th, at 6pm, 0.5 marks off every hour late.

Submit your PDF document on Quercus, under Specialist Assignment S4.

Grading Guidelines/Rubric:

Total Marks: 10
Part 1 & 2: (0 marks)
- Looking for clarity of description of field and project description, to help make parts 3 and 4 understandable.

Part 3: (5 marks)
- Quality of description of idea – 2 marks
- Novelty – 1 mark
- Evaluation – 2 marks

Part 4 (5 marks)
- Quality of description of idea – 2 marks
- Novelty – 1 mark
- Evaluation – 2 marks