

**ECE 1778 – Creative Applications for Mobile Devices**  
**February 2021**  
**Specialist Assignment S3**

**Brainstorming and Ranking Ideas for 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 *might* consider in your project. These ideas will make use of capabilities that are present in mobile devices, computers on the internet, and computers in general.

To begin and provide context, recall that a mobile device is a powerful computer, with many capabilities – for example, it can make a good choice among many possible choices (which is called *optimization*), it can classify complex information into categories (*machine learning*), can store large amounts data, and is connected to the Internet and so the planet and many of its people! 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 and described examples of how these were used in different applications.

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. This should help in your (simultaneous) creation of the proposal for the project.

**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 Create a newer version of this description, again 250 words, that includes some reflection of what you've learned so far in this course and how it relates to your field, and how it is best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, similar to what will be in your proposal and what was submitted for the approval-in-principal stage.

**3 Idea Generation for Features of Your Project**

The goal here is to invent/describe a set of separable features/capabilities that your project might have, without any limits due to difficulty/feasibility/cost. To be clear, we want you to brainstorm ideas based on some sense of what might be possible in

the mobile/computer/internet world, but to not be restricted by the timeframe or lack of resources.

To begin, read through Appendix A of this assignment, which describes a set of capabilities that mobile devices have (their sensors) and what computers can do in general.

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.

You should come up with at least 7 separate *features* of your app. In Lecture 4, we described the features of the TeamChooser App as a set of examples in that context. Your app will be similar – there should be all kinds of features you’d like to add if you had the knowledge and ability and time and money.

#### 4 Rank Your Ideas

After you’ve got your set of features, determine which are the most important **by listing them in order of importance**. Describe why each one has the priority that you’re giving it. This is absolutely crucial – it is good to have lots of ideas, but there will be time for only some of them. You have to know which ones you care about!

#### 5 Figure out the Order of Creation

Discuss the set of the features in your app with your programming partners, and try to figure out what order to build them, with their advice and discussion, mixed with your insights into the goal. This decision will require some understanding, provided from your programmers, of how much programming effort is required to build each feature. The features which should be built first are sometimes those that give the most impact while still being attainable with the limited amount of resources available to you (i.e., programmer time).

Here are two good examples of this assignment:

1. <https://www.dropbox.com/s/gh2qaxkygqazhr5/example1.pdf?dl=0>
2. <https://www.dropbox.com/s/eqa5vaw5wr4zgyg/example2.pdf?dl=0>

**Due:** Tuesday February 9<sup>th</sup>, at 6pm, 0.5 marks off every hour late.

**Submit your PDF document on Quercus, under Specialist Assignment S3.**

## **Grading Guidelines/Rubric:**

### **Total Marks: 10**

Part 3: 3 marks.

Features must be clearly explained. Illustrations are not necessary but feel free to include them if they help to communicate the idea(s). It must be made clear how and why each feature has the potential to contribute to solving your particular problem or advancing your desired goal. This will require connecting all features back to your expertise, in a manner such that a layperson (someone with a University education but no expertise in your field) can understand the value of the feature as it pertains to your research.

Part 4: 3 marks

Ranking of features is depended upon some qualitative and/or quantitate metric(s) of the value of the feature with respect to the project goal(s). Metrics employed must be appropriate to the stated goal(s) of your project. Metrics do not need to formal, feel free to devise your own. We are looking for clear application of your expertise in providing some estimate of how much more of an impact one feature would have, relative to others, in meeting your stated goal(s). Intuition can be a valid tool for assessing how valuable a feature may be insofar as you can provide a rational argument (with citations if you can find any) to support that intuition/speculation.

Part 5: 2 marks

Looking for insight into, and communication of, programmers' estimates of the work required to build each feature, Ordering of features should the result of a tradeoff analysis between the importance of each feature (how far it progresses you towards your goals) and cost of each feature (programmer effort required to build it).

## Appendix A – Mobile Device and Computer Abilities

Recall that mobile devices have many sensing abilities, as described in Lectures 1 and 2:

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

Please review Lecture #2 to see some description of these sensors:

[http://www.eecg.utoronto.ca/~jayar/ece1778/ece1778\\_lecture2.pdf](http://www.eecg.utoronto.ca/~jayar/ece1778/ece1778_lecture2.pdf)

In addition, computers have many remarkable capabilities five of which are listed and described here:

1. **Fast Searching.** Computers are very good at organizing data in many clever ways that make it easy to find something that you're looking for very quickly.
2. **Back-End Cloud Servers and Frameworks.** Many of the functions that are presented to regular users of the internet and computers are now done 'elsewhere' in the 'cloud' on computer servers connected through the internet. These systems allow your app to communicate with other people/apps/phones, to store information, to send notifications to you.
3. **Machine Learning.** A field that has come to prominence in the last few years is one where computers have become able to perform classification tasks at a level equal to or better than humans – called Machine Learning, a sub-field of Artificial Intelligence. It is now much easier for a computer to look at a picture and classify the objects in it. We can also give a textual description of a scene in a picture (or a sequence of pictures in a video stream). It is now much easier to understand/classify textual or spoken language.
4. **Optimization.** Given a few choices, a human being is pretty good at selecting among those choices, which of those choices might be the best. Given millions, billions or trillions of possibilities, computers can do a great job of sorting through these and choose the best, whereas a human has little hope of success. There is a very large field that concerns automatic 'optimization' for which many

different methods have been invented in mathematics, computer science, and engineering.

5. **Internet Communication.** The modern world is now predicated on vast communication networks that connect our wired desktops and wireless mobile devices to everyone! The fact that you can connect any number of people through the internet, may well be a capability you can make great use of!
6. **Speech and Writing.** You probably know that computers can “talk” to you by presenting you with text on a screen or by playing computer-generated speech through speakers, but recent advances in machine learning have made computers very capable at understanding speech and writing produced by humans. Automatic Speech Recognition is used by tools like Siri and the Google Assistant apps to provide a natural interface for giving computers commands by voice. Apps like Woebot use technology called Natural Language Processing to power a “chat bot” which users can text with to provide therapy for depression.