Applications Performing Calculations Involving Real-Time Sensor Data

Project Ideas for CS 440, Spring 2022

Due: Saturday 22 January, at 11:59 p.m. via Blackboard

This semester CS 440 Software Engineering groups will be developing large complex software systems, from initial project conception through detailed system and object design. (The actual implementation and testing of these project designs will be conducted later, by different groups of software engineers.) Your initial task is to brainstorm potential project ideas, subject to the constraints given below.

The general theme for the Spring 2022 semester is "Software Performing Calculations Involving Real-Time Sensor Data", which is a very broad area with many possibilities. A few more clarifications and specifications:

- There is a wide assortment of potential data sources available, including but not limited to:
  - Sensors built-in to modern mobile phones & devices. (These have mostly been done before.)
  - Independent sensors that communicate through either wired or wireless connections.
  - Data acquisition hardware for modern personal computers.
  - Real-time data available over the Internet, such as NOAA weather buoys.
  - Conceptual hardware that might need to be developed as part of the project.
  - (Combining data from multiple sources may also be called for. See 440 web site for more ideas.)
- Applications may be serious professional products, (e.g. to aid a business or for scientific research), or for entertainment, educational, or promotional purposes, (e.g. a game or educational simulation.)
  - For CS 440, applications with a client and an objective are easier to write up than games.
  - It is extremely helpful to identify a specific client who would want the application to be delivered. Having communication and/or close contact with such a (pseudo) client or user is even better.
- Applications must perform calculations on the data, and not simply display it. For example image analysis of photos to count birds in a flock or of movies to analyze their flight patterns.
- Applications should be original and creative, and not already exist. (This may require a bit of research.) It may also be necessary to develop new hardware ideas, such as mobile odor analyzers.
- The scope of the projects should be large and significant. Something that might take a team of 20 or more professional software developers years to complete. CS 440 will only develop the description, requirements, and design for these projects, so don't be constrained by what students can accomplish in a semester. A web interface is acceptable, but the project should involve more programming than simply developing a web site.

Your task is to brainstorm possible ideas for projects, and to write up your ideas in a one- to two-page written report. (12 pt font, single spaced, ≤ 1" margins, similar to this page.) It is up to you to organize and communicate your ideas effectively, and to decide whether to use your page(s) to develop a lot of ideas briefly or a few ideas more thoroughly. You may want to incorporate sketches, diagrams, or mockups if they help you to more effectively communicate your thoughts and ideas. Your writeup should also give some consideration as to who would use the application and their objectives in doing so.

Note that this is an individual assignment, not group work. Later when you are assigned to a group you will share your ideas with your other group members. You will have more potential ideas to choose from at that point if everyone does their initial work independently. (Your overall goal is to hit the ground running once groups are formed, armed with ideas and ready to start working on a project.)