

Physical Computing Design Project

Introduction

For the final project I would like you to work either individually or in a group of up to 3 to create a proof-of-concept physical computing prototype. This involves building a connected object which promotes digital learning, collects data and/or exerts control a biology, environmental or health situation, broadly interpreted. The ESP32 is suggested as a primary component, since they are cheap, you will be familiar with them from the guided practical labs, and they have SOOOO much capability, particularly: interfacing them with your smartphone.

To build your project you may use any hardware or software from the guided tutorials, and as necessary, your group may spend up to \$65 per person (since there's no textbook for the course) as I mentioned in the syllabus and the approved fee for digital materials. If you do buy equipment it's probably best to visit a store or order by November 18 since shipping takes time. It's also a good idea to review your idea with the instructional staff to ensure the parts work in the way you are thinking, e.g. you decide to order a 5V sensor but the ESP is a 3.3V device so when the sensor arrives but it won't work. It doesn't hurt to have a backup plan you can pivot to, if the hardware falls short. You may use Generative AI tools in the development of the software in the sense this project is about discovery learning from online sources. Your success in mastering a difficult programming language (C) will be a parameter of success, but mainly the challenge is about group problem solving in the twenty-first century. Acknowledge any sources or aids as we have previously discussed in class.

Submitted Work

The final submission will consist of a presentation and a reflective paper.

For groups the presentation will be in common. In the presentation you will explain, discuss and demonstrate the prototype in 10 minutes or less. There's often more to learn from failing than succeeding, however, it would be great if you succeeded to demonstrate aspects of the functionality of your system design as well as discuss design concepts from the course.

For the paper each person will provide their own reflective writing about the design process, and experience with discovery based learning. The report/paper explains how your rapid prototype works/worked and also how the discovery based learning project worked out. It is written from your perspective, but referring to your design experiences and concepts from readings from the course, especially the second half. You may collaborate on illustrations with other members of the group.

Deadline

For the presentation you may either present live to the class on November 29 during regular class hours, or make a recorded video presentation and submit it for review by November 29 at 11pm using Zoom.

I strongly suggest you submit your reflective paper also on the last day of classes, in order to use your study break to prepare for exams, but I have made it actually due by Thursday, November 30 at 5pm, for those last minute people.

Guiding Questions

You may consider revisiting these questions, from the previous assignment where you and how they apply to the prototype you *did* build.

- What direct problems might the proposed system solve? (what will we learn from it)
- What *did* you need to build it?
- What antecedent or similar systems exist and how is this the same or different?
- How might it connect with and change other digital, social or political systems?
- What sources and help did you use to develop the project (friends, relatives, group members, blogs, Youtube, manufacturer forums, Generative AI, etc.)

Weighting

The presentation represents 10% of your grade.

The reflective paper represents 25% of your grade. I'm looking for 6-8 pages, double spaced. If you are in a group you may share illustrations. *Note some additional suggestions at the reflective paper submit-link.*

Some students may wish to browse each other's projects, so if you made a video and would like to share it please indicate this in the comments field.