EECS 1021 Minor Project : Final Submission. (STUDENT) Due: April 13, 2021 @ 11:55pm.

By the last day of class (April 13, 2021) of the semester you will need to submit a a minor project report. Part of it will be written and part of it will be a video. In both the video and the written report you need to convince me and the TAs that you completed the work. So, a working demonstration of the project is needed and must be reported on in both the video and the written report.

What do you need to be able to show? You need to show that

a. The Arduino board can water the plant if the soil is too dry. You can do this in one of either two ways, or both:
    a. First, have the Arduino board detect dry soil and water the plant without a connection to a Java program.
    b. Second, have a Java program detect the soil condition and send a command to the Arduino to water the plant.
b. Furthermore, you need to be able to show, via a Java program:
    a. That you can press a button or send a command line command via Java to the Arduino board to turn the water pump on and off manually. Either a JavaFX or a command line approach is acceptable.
    b. That you can have a JavaFX slider send a command to the Arduino board to turn something (buzzer, LED, etc.) on and off. You can also modify an element of the OLED to be proportional to the JavaFX slider value. You have many possible options here.
    c. You can graph the current moisture value from the Arduino on a JavaFX graph.

If your moisture sensor is broken you may use a potentiometer instead to “simulate” the soil moisture sensor (for partial marks).

Your program should be able to run on the Arduino autonomously and water the plant if the soil is dry.

When connected to a computer, you should be able to (1) manually turn the pump on and off and through a command prompt command or a GUI command, (2) graph the analogue value of the moisture sensor and (3)

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The Report

The report should be between two and three pages long. Make sure to use the following headings in your report.

INTRODUCTION

• A short description (three to five sentences) CONTEXT:

• Describe "what" and "why"

TECHNICAL REQUIREMENTS / SPECIFICATIONS

- List of things that the system should do. A drawing (schematic) can be included here.
- You can be more general and less formal ("requirements") or more specific and formal ("specifications")

COMPONENTS LIST: [*as you built the device*]

- What was in your system? Write a bulleted list. Provide descriptions to clarify details.
- A photo of the system is appropriate here.

PROCEDURE:

- Describe the process that you used in creating your project.

TEST:

- how did you test that the system worked? What evidence can you provide (graphs, data points from measurements, etc.) that show it worked?

CONTINGENCY

• Did you have one idea in mind but have to execute a different one because things didn't work out as planned? Reflect on this. What would you do differently next time? Looking ahead to ENG 4000 are there any lessons you learned that you would like to apply?

CONCLUSION

• Wrap up in a few sentences.

The video

In less than a minute show, in video form, that your system works. Can you send Java commands and have the Arduino respond? Does the Arduino water the plant on command? Does it do it automatically? It needs to be convincing. If it appears that things are not working, then the grade will reflect that.

Evaluation

Your minor project will be graded using the following two learning outcomes for this course. Each is equally weighted. Furthermore, you will be evaluated on each of these in both your written report and the video.

1. Given a problem specification and a suitable API, build an application that meets the given requirement. (GAI 4b: Conceive design solutions to solve the defined problem)
    1. Failing to meet expectations: Does not design solutions to solve defined problem.
    2. Marginally meeting expectations: Designs incomplete solutions.
    3. Meeting expectations: Solutions complete, but lacking in elegance/innovation/creativity/professionalism.
    4. Exceeding expectations: Conceives elegant/innovative/creative/professional standard solutions to solve the defined problem
2. Build an event-driven application that controls sensors and actuators in order to connect events to physical actions. (GAI 4b: Conceive design solutions to solve the defined problem)
    1. Failing to meet expectations: Does not design solutions to solve defined problem.
    2. Marginally meeting expectations: Designs incomplete solutions.
    3. Meeting expectations: Solutions complete, but lacking in elegance/innovation/creativity/professionalism.
    4. Exceeding expectations: Conceives elegant/innovative/creative/professional standard solutions to solve the defined problem

So, if this is graded out of 1, then your written report counts for 0.5 points and your video counts for 0.5 points:

- 0.25 points for “given a problem specification and a suitable API” as per your written report.
- 0.25 points for “given a problem specification and a suitable API” as per your video.
- 0.25 points for “build an event-driven application” as per your written report.
- 0.25 points for “build an event-driven application” as per your video.

For “failing to meet expectations”, on an element that is worth 0.25 points, it works out to 0.25/4 points. Marginally meeting: 3*0.25/4. Meeting expectations and exceeding expectations on either the video or the report will be assigned the same grade 0.25 out of 0.25.[1]

When addressing these, make sure to focus on

- a discussion about the specifications (i.e. what were the tasks for watering the plant), and the API (jSerialComm and JavaFX) for the first learning outcome.
- A discussion about how your watering system is “event-driven” for the second learning outcome (“events” mean signals like serial commands or button pushes and how your programs respond to them by turning on LEDs and running pumps)

[1] Exceeding and meeting expectations in the minor project result in the same grade as they fall under the “do the work and get a B+” framework that we use as part of specifications grading. This will not be the case with the major project. In the major project, students who achieve “exceeding expectations” will receive a higher grade than those who “meet expectations”.