Omega Exploration Presentation Guidelines, Contents and Grading Standards

In order to report the results of your Omega Exploration, you will create a short presentation, record it, and upload it to Gradescope, where the course staff will grade it and give feedback. For your presentation, you should assemble a short set of slides that addresses the topics ***in order*** under "Presentation Standards" below.

Presentation Standards

1. **I can explain the goal of the project.**
2. **I can present a high-level block diagram that represents the functional blocks, inputs & outputs of for each part of my circuit.**
3. **I can show mathematical calculations and, if needed, reasonable assumptions that helped me predict the correct function of my circuit.**
4. **I can show my simulated circuit and show important probe points (simulation results) to compare to my mathematical predictions.**
5. **I can experimentally demonstrate that important functional blocks fulfill their intended general functions.**
6. **I can experimentally demonstrate that important functional blocks *work as designed* (backed by mathematical analysis + simulation) OR I can attempt to explain why they failed through troubleshooting.**
7. **I can discuss design choices directly related to concepts I'm learning in Intro to ECSE.**
8. **I can briefly mention or discuss new knowledge obtained, design ideas OR design choices or ideas that are beyond the content of Intro to ECSE.**
9. **I can discuss other possible real-world applications of my circuit.**
10. **I can articulate at least ONE question based on my experience doing the Omega Exploration.**

The standards above are also how you will be graded. You will earn a point for each, if you've completed them satisfactorily.

Your Omega Exploration Presentation should have the following contents. Please do these in the following order for full credit (don't start by showing us the breadboard and wires!):

1. **Title of Your Project**
2. **Goal of project** – what is the point of the circuit you designed?
3. **High level block diagram** of each function (see example below...don't forget input and output labels for each block! You need these to fully define your system!). No hand-drawn diagrams.

4. **Mathematical Analysis** (important numerical calculations and assumptions)
    a. Did you figure out a sensor's detection range (data sheet) or assume it to be something (potentiometer)?
    b. Did you calculate the current or voltage you expect to set a reference or predict the correct function of a component?
    c. Did you calculate any other parameters that relate to the course to try to predict how your circuit works, such as currents or node voltages?
5. **Functional Circuit Simulation** (simulation of your circuit to show that it aligns with your mathematical analysis and experimental measurements)
    a. Probe important points that you'll compare with mathematical analysis and your experiment – they should agree or at least be close!
    b. Label the circuit schematic and simulation outputs so that they can be associated with each other
6. **Functional experimental measurements** (using Personal Instrumentation board…probe and show SCOPY or WAVEFORM screen… Note: it is possible in future labs to do an experiment using equivalent MATLAB/Simulink outcomes for Lab03)
    a. If your overall circuit isn't working, be prepared to show ***<u>how your individual functional blocks are working</u>***. ***These relate to the concepts we want you to learn in class!*** I.e. the output of the sensor, then output of voltage divider, the LED turning on…if each one works on their own that's great! If integration of each block is an issue try to troubleshoot and explore why! This is excellent to discuss! ***Showing a beautiful, perfectly working circuit with no simulation, no calculation, and no measurements, with NO connection to course concepts will earn you a VERY low score. We don't care if your circuit works, we care that you UNDERSTAND how your circuit works, connects to course concepts, and how it inspires you to explore beyond the course to future ECSE based concepts!***

b. If you have an individual functional block that doesn't work, show how you attempted to troubleshoot it and speculate why it failed. (This thought process will help you iterate later!)
c. There are two points associated with experimental measurements:
   i. ***Working functional outcome***: does the concept/building block fulfil it's general function? For example, if the concept is a voltage divider, does it take in an input voltage and output a lower voltage, regardless of what that lower voltage is?
   ii. ***Working as designed***: does the concept/building block function *as you designed it to*? For example, if you designed (via mathematical analysis and simulation) your voltage divider to take in 5V and output 3V, do your measurements show that when you input 5V, the voltage divider outputs 3V?

7. **Discuss design choices** that are related to your Proof of Concepts
   a. Why did you choose one circuit option over the other? What are the advantages and disadvantages of each approach? These must be substantial, technical justifications.
   b. Did it make your idea more difficult to do?
   c. Did it cause you to rethink your original plan, in what way?
   d. Did you discover something you were expecting to discover by being forced to connect to course concepts? (Design limitations are an engineer's challenge! Always)

8. **Discuss one or two ideas that you need to explore beyond the course** to complete your full design plan?
   a. What are those concepts? Are there any words that you came across that you've never heard of before? (PWM, FFT, PID, state machine, etc.)
   b. What courses are they related to?
   c. Which, if any, of these that are OUTSIDE of the course content, would you attempt to learn on your own (enough to help your plan) during Intro to ECSE?

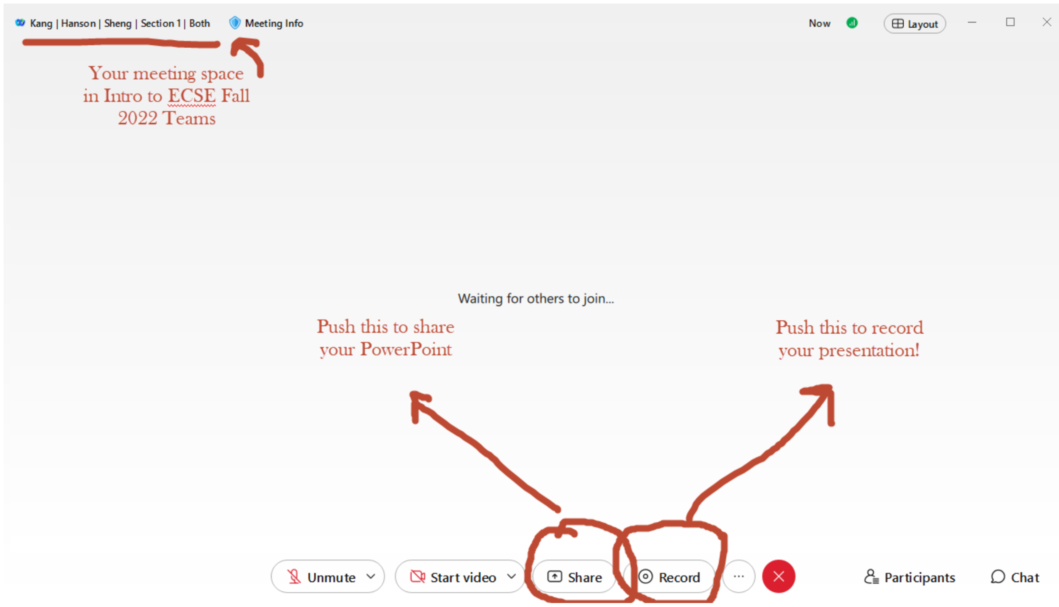
9. **Discuss real-world applications of your circuit**
   a. How else could your circuit (or one like it) be used in the real world?
   b. What problem does your circuit solve?

10. **Come up with at least ONE question for the TA, SA, or Professor** that you found because you did an Omega Exploration.
   a. Is there something that you need to know more about in order to continue your project?
   b. Did something pique your curiosity and you want to know more, but don't know where to find information?
   c. Was there a failure that you didn't entirely figure out after multiple rounds of troubleshooting?

Your presentation video should be ~5 minutes. 10 minutes is the maximum, 1 minute is way too short, 20 minutes is way too long.

How to Create a Video in WebEx

If you want to make a video in Webex, you can click the "Meet" button in your lab group space to start a meeting. To record a meeting click "Record" on the bottom. To share your screen, click "Share" below.



Once you are finished recording your video, you can either save it locally to your computer or have Webex save it to the cloud, then send you a download link later.