

EE 10115 – Arduino Project

As a “capstone” assignment, student teams will propose, design, build, and demonstrate an Arduino-based project that incorporates the three fundamental elements of embedded systems – sensing, processing, and actuation.

Project Guidelines

- Students will work in *teams of two*.
 - Email any partner requests to Mir Sahariat (msaharia@nd.edu) by Tuesday, March 8.
 - We will announce teams via email by Thursday, March 10.
- Each project must include at least two sensors or input devices, and at least one must provide an analog input. Possibilities include push buttons, potentiometers, phototransistors, temperature sensors, tilt sensors, piezos, or anything else you can find online that looks interesting.
- Each project must include at least two actuators or output devices. Potential actuators/output devices include DC motors, servo motors, LEDs, the liquid crystal display (LCD), piezos, etc.
- The “C” program that runs your project must include at least one user-defined function in addition to **setup()** and **loop()**.
- Each project must have a clearly defined and (one would hope) a useful and/or entertaining function. On Monday, March 21, you will turn in a short proposal describing its purpose and function – i.e., what it will do, including what sensors it will use and how the data obtained from those sensors will be processed by the microcontroller to make decisions about the actuators.
- There are descriptions of *thousands* of Arduino-based projects available on-line. You may look to on-line resources for inspiration. However, if you decide to base your project on something you found on-line (or in some other publication), you must:
 - Provide a link or some other reference to the project you are emulating.
 - Make some significant change(s) to the project as it was previously published. (Obviously, “significant” is subjective, so be sure to discuss this with a member of the teaching team.)

Timetable and Deliverables

- March 10: All teams will be established by 5:00 PM.
- March 21: Turn in 1-page proposal.
- March 25: Feedback from EE 10115 teaching team about project suitability.
- April 20: Turn in project report.
- April 25 & 26: Demonstrate project for a member of the EE 10115 teaching staff during class or recitation.

Description of Deliverables

- Project Proposal: A one-page summary of the proposed project. It should include at least the following elements:
 - Project Function – i.e., what will it do?
 - Sensors and Actuators – i.e., what sensors/input devices and actuators/output devices will it employ?
 - Processing – i.e., what computational and/or logic tasks will be required of the microcontroller to respond appropriately to changing inputs?
 - Attribution – i.e., if you are basing your project on a project published on-line or elsewhere, identify that project here and explain what “significant” change(s) you are making.
- Project Report:
 - No more than five pages (not including C program listing). Format to be provided.
- Project Demonstration:
 - Each team will be asked to schedule a 15-minute appointment to demonstrate its project and discuss it with a member of the EE 10115 teaching staff at some point in the April 25-26 window.

Grading

- The following elements will play a role in the project grade:
 - Efficacy of the design – i.e., how well did it work?
 - Difficulty and novelty of the challenge.
 - Design rationale – i.e., what choices did you make and why did you make them?
 - Student understanding of the principles employed in the project, as disclosed in the project report and the project demonstration discussion.
 - Clarity of proposal and report.
 - Clarity of C program – including effective use of commenting and white space to enhance readability.
- Any grade differentiation between team members will be based on discussions with the team during the project demonstration.
 - Although team members may have contributed to different aspects of the project, all team members are expected to understand all aspects of the design.