

# **MSE 450/750 - REAL-TIME AND EMBEDDED CONTROL SYSTEMS**

## **COURSE PROJECT**

Students enrolled in this course will need to design and build an embedded system for a real-time control application on one of the following platforms:

- Pick and place robotic arm
- Control of a brushed dc motor
- Traffic signal control system
- Washing machine control system
- Others (you may propose your own project but should discuss it with the instructor for approval)

The students will utilize an embedded microcontroller development system such as TI's TM4C123 MCU/LaunchPad and IDE tools such as the Code Composer Studio to develop their embedded system project. Other embedded targets and development environments may be utilized in consultation with the instructor.

## **1. Objectives**

- a) Design and implement embedded software/hardware and integrate it with one of the platforms listed above.
- b) Practice test procedures in designing embedded systems
- c) Practice design procedures from requirements analysis to system integration in embedded control systems

## **2. Requirements**

Each group is required to come up with a set of requirements based on a study of the project topic they choose. Students are encouraged to come up with their own ideas in terms of what they want to incorporate into the design (e.g., using certain features of the development test bed, microcontroller board, I/O devices, etc). The topics should be discussed with instructor during class/tutorial hours.

## **3. Deliverables**

- a) Project design report (Due Mar 9, 2020). The report should include the description of the project, design goals and objectives, requirements and methodology, platform chosen and tools, and implementation plans.
- b) Working prototype based on the requirements as described in the preliminary design report. A demonstration is required for each group by the end of semester to introduce their design and implementation (Mar 31 and Apr 2, group demonstration to be scheduled).

- c) Final project report (Due Apr 6, 2018). The report should contain the following main topics:
- Introduction
  - Detailed analysis and design implementation of the system as per design goals and objectives described in the preliminary design report. Material discussed in the course is encouraged to be used and incorporated in the design.
  - Test procedure and simulation results (if you use any simulation software)
  - Experimental results specifying the performance of the system designed and validating the design goals and objectives
  - Conclusions