**ME 461 Final Project**

**Pick a Project Due Wednesday December 2nd:**

Most on you have talked to me about your project idea, but I want each of you to send me an email with two or three paragraphs explaining what you want to do for your final project. You should pick a project that uses either the three wheeled (one is the caster) robot car or the two wheeled balancing Segbot. Tell me what sensors and actuators you will use and play with. These can be the ones already given to you: microphone, photosensor, MPU-9250, optical encoders, joystick, real-time clock chip (we have some starter code for this chip), RC servo, DC geared motors attached to wheels, buzzer, LEDs. There is also a Relay and spots for higher current transistors on the board that could be used for turning on and off a higher current device like a two position solenoid. You can also purchase other sensors and actuators but make sure I approve the item before you purchase it.

Here is a list of projects I talked about in Lecture 23 and added the last one after working on the simulation of the Segbot. You do not have to pick one of these.

- Play with MPU-9250 registers and Compass. If you want to play with the Compass I suggest you pick the robot car since it lays flat.
- Play with eQEP and unit time capture.
- Play more with microphone. Maybe try ADC priorities.
- Make the Segbot do something. Make gripper with one servo to hold something. Take it somewhere and drop it off.
- Play with a cheap ultrasonic sensor to measure distance. Add it to Segbot or to robot car.
- Make the robot car do something. Figure out where the car is XY on the floor. You can integrate gyro to get theta. Also if wheels don’t slip you should know where you are at.
- Make the segbot do different things if it hears curtain notes. Filter with three sets of filter coefficients to find three notes. Or use the FFT idea (next).
- Implement a FFT algorithm to finds different notes. Would probably need to get this working first in Matlab or something then move the code to the F28379D. I have found some FFT libraries that TI supplies. Not sure how hard they would be to integrate into your CCS project. Should not be too bad?
- Make segbot or robot car dance to beat of a song.
- Add bump switches feelers, to Segbot or robot car so can recognize if it needs to backup and turn.
- Steer segbot/robot car with joystick. This would only be a part of your project.
- Add a sensor you own to Segbot or Robot car.
- Experiment with the Segbot’s estimated parameters and simulation. Compare control gains used in simulation to the same control gains used on your actual Segbot. Can you find a better approximation to the parameters. Is the simulation any good? I have a method of plotting the feedback of the actual Segbot real-time in Simulink.
Project Submission and Due Date:

Project Due Date is Friday December 18th at 5:00pm.

I would like you to submit your project to the http://hackster.io website. When you sign up for an account at hackster.io make sure to use your U of I email account. All the projects that are submitted to hackster.io will be judged by our TI representative Mark Easley. There will be six prizes.

First: $100, Second: $75, Third $75, Fourth $70, Fifth $45, Sixth $45.

Items (minimum) that must be posted at your Hackster.io site:

- Videos of your project working.
- Video of you explaining what sensors and actuators you used for the project and how they are connected to the Launchpad. Make sure to plug TI and the F28379D Launchpad board.
- Entire source code and Code Composer project files. Make a zip of your project directory in your workspace.
- Number of paragraphs explaining your project.
- If any algorithms used, make sure to explain how they were used and have links to websites or papers that explain the algorithm.
- If you added any sensors, maybe a video of how you soldered and interfaced with the sensor.

If you have trouble submitting your project to hackster.io first talk to fellow students to see if they can help. If you keep on having trouble you do not have to submit your project there, but you will not be a part of the judging. Talk to me about other ways to submit your project and videos if this happens.