Spring 2020 EECS192 Mechatronics Design Laboratory Oral Presentations v. 1.1

Due on BCourses Tues. May 5, 330 pm.
Presentations During Dead Week Tues May 5 (in class) and time TBA Wed May 6

The purpose of the oral presentation is to provide you with an opportunity to inform your peers and instructors about what made your car successful. The style should be of a professional technical presentation. Due to the size of the class, each group's presentation will need to be no more than 10 minutes with one minute left for answering questions. Be sure to practice and time your presentation. Assume that your audience is very familiar with the project. Hence, you do not need to explain how the line camera sensors work or how the program is compiled.

Typically, going through ten slides in ten minutes is about right.

Submit a pdf version of your slides by 330 pm Tues May 5 on BCourses.
If you would like feedback, you may optionally submit a draft version by 5 pm Saturday May 2.

The following items should be addressed during your presentation:

1. Vehicle Hardware (20%)

a) Show a basic electronic block diagram with major hardware subsystems.
b) Motor drive circuit- show schematic and how you implemented emergency stop and protection of shoot thru (if applicable)?
c) PCB- (Checkpoint 9) Show your layout and copper pattern. Estimate PCB wiring resistance (assume 1 oz copper board) from battery through MOSFETs to motor connector and from motor connector through MOSFETs to ground.

2. Line Sensor Algorithm (25%)

Describe in detail your signal processing algorithms for line detection. Show examples of line tracking error using data from either a V-Rep simulated run or stored telemetry data. (For an example, see presentation from Spring 2019 slide 6,7). How are crossings rejected?

3. Controls (15%)

a) What kind of stability problems did you have and how did you overcome them? State how you implemented the controller and how you chose the gain constants. What gains were used (radians per meter, radians/(m/sec))? (For an example, see presentation from Spring 2018 slide 7).
b) Include a plot of lateral error vs time for a step in the track.
c) Complete the following table for the car simulation after tuning:

k_p	k_d	max step err	sensed velocity	command velocity

4. How well did your car work in Round 2? (25%)

a) Plot the lateral error, velocity, steering angle, and line sensor output during your car's best run on the `ee192_Round2.ttt` track. (Be sure units and labels are readable on your figures).
b) Explain from the plots where the control system might allow the car to go faster, or where the car is at some stability or sliding limit.
c) If you used memorization, explain what information was stored, and where and how stored information was used to speed up the car. For a representative track section with significant speedup, show plots of the performance with and without memorization.

5. Lessons learned (10%)

What were your most memorable glitches, failures or debugging issues?
What didn't you know that you needed to know?
Advice for students in next year's class?

6. Roles and Contributions (5%)

Briefly describe the role of each team member.