Professor Fearing EECS192 Progress Report v 1.01 Spring 2020

Due: Tues. April 7, 2020 in beginning of class on Bcourses.

The purpose of the progress report is to give you a chance to provide final documenation for project hardware, evaluate your interim progress in software, and to set final goals for the project. (In addition, professional technical communication is an important skill to master.) The progress report is a non-trivial amount of work; we would like to see 6 hours of effort per team member. Here is an outline for you to follow (yes, we want you to address all of these points).

1. Current State of Project (1 page) (20%)

What is your current hardware configuration? What types of sensors have you used? How far has your software been developed? Which software modules are currently working? Which still need further debugging? Provide overall block diagrams for the HW systems (ppt is fine for simple block diagrams).

2. Hardware Documentation (n pages as needed) (40%)

This is the most important part of the progress report. Although you will not have your PCB actually built, we want to see your final schematic and PCB design (post Checkpoint 9). Provide complete parts layouts (including component references) and schematics, (schematics should include pin numbers for all chips), of the following hardware modules:

1. motor drive circuitry (20 pts)
2. sensor electronics, e.g. speed and line sensors (5 pts)
3. power supplies (how are things actually connected) (5 pts)
4. labelled IO and other connections to Beagle Bone Blue Freedom board pinout, e.g. `http://inst.eecs.berkeley.edu/~ee192/sp19/files/BBBluePinout.jpg` (10 pts)

Appropriate level of detail is Eagle/KiCAD schematic and parts layout. Example parts layout style (no copper, use white background):
`http://people.eecs.berkeley.edu/~ronf/ImageProc/ImageProc2_v24_dual-1.png`

3. Documentation for Software (2 pages including figures) (30%)

a) What software have you implemented for Checkpoint 7? Please describe your implemented software system, including (20 pts):
i) block diagrams in data flow style.
ii) Make a timing diagram, e.g. as shown in Lee and Seshia Fig. 12.10 (p. 341) for module execution.
`https://ptolemy.berkeley.edu/books/leeseshia/releases/LeeSeshia_DigitalV2_2.pdf`

b) Describe in detail your line finding and control algorithms.(10 pts):
i) line detection strategy, findmax, etc
ii) steering controller, e.g. PID with gains in physical units.
iii) Using data from C7 on your car run, show crossings and track position estimation.
iv) What problems in behavior did you see in C7 (this can be qualitative)?

4. Advanced Control (1 page) (10%)

Describe improvements in detail you plan to simulated car control in V-rep to get higher performance, say 4 m/s? (These can be sensing improvements or control/learning approach).