

EECS192 Mechatronic Design Laboratory- Spring 2017 (1/11/2017)

Instructor: Prof. R. Fearing, Office 725 Sutardja Dai Hall, x2-9193.

Office Hours: Wed 2-300 pm, Thu 200-300pm

Please email for an appointment at another time (ronf@eecs.berkeley.edu).

TA: Chen-yu Chan chanchenyu@berkeley.edu Office hours (tba) in 204 Cory.

Class meeting: Tue 1230-2 pm 3107 Etcheverry Hall.

Lab lecture/demo Tentative: Wed 9-10 or Th 11-12, 204 Cory Hall. Checkoffs tentatively Fridays, time tbd. At least one team member must be present to demonstrate functionality.

Grading: 15% checkoffs, 20% final exam, 18% oral and written reports, 9% written assignments, 10% first round contest, 20% second round contest, 3% community points (Piazza, peer review, lab helpfulness), 5% in class 10 minute quizzes.

Recommended Texts: (on reserve in Engineering Library) *Mechatronics: mechanical system interfacing* by D.M. Auslander; *Analytical robotics and mechatronics* by W. Stadler; *Robotic engineering: an integrated approach* by R.D. Klafter; *The Art of Electronics* by Horowitz and Hill;

Suggested reference: *Introduction to Mechatronic Design* by J.E. Carryer, R.M. Ohlne, and T.W. Kenny. Please check the class web page: www-inst.eecs.berkeley.edu/~ee192 for class handouts and pointers to data sheets, etc. Also, announcements and discussion will be on **piazza**.

wk	lecture	Lecture and Demo Topics	Project Checkpoint
1	1/17	proj. description, ARM Cortex M0 overview, peripheral interface Demo: soldering, ARM Cortex M0, car	team formation
2	1/24	motors, motor control, CortexM0 IO electronic construction practices -caps Demo: Keil, Eagle, test equipment	Hello World, LED blink
3	1/31	PWM, H Bridge, power MOSFET Demo: RC servo, motor circuit and waveforms	written project proposal Fri. Feb. 3 car clean and checked
4	2/7	RC servo, CortexM0 PWM, Power Supply I Demo: switching power supply waveforms	CPU turns motor on/off (on bench - stalled) CPU turns front wheel left/right
5	2/14	Power Supply II Demo: power filtering, PCB peer review	drive motor from battery power PCB (date tbd)
6	2/21	optical encoder, velocity sensing Demo: velocity control, speed sensor	motor velocity control
7	2/28	line sense intro Demo: optical line sensing	drop and run test, open loop Figure 8 (PCB on car) w/e-stop lab clean
8	3/7	steering control I, line detection Demo: steering control, PID	bench top line following, drop and run
9	3/14	steering II and velocity control Demo: Simulation and embedded programming I	closed loop Figure 8 line following I, drop and run (outside track setup) assignment #1 due Tues 3/14
10	3/21	CT and DT control demo: embedded programming II	velocity control, Figure 8 (> 1 m/sec), sensor mech. response, lab clean Assignment #2 due Fri. 3/24
	3/27	Spring Break	Spring Break
11	4/4	feedforward control and filtering Demo: car tuning	practice course and step response Progress report due Tues. Apr. 4
12	4/11	HW and SW robustness	Round 1: Mon 4/10
13	4/18	Mechatronic system examples I	CAL Day Sat April 22
14	4/25	Mechatronic system examples II	Round 2: Mon 4/24, lab clean
	4/27, 4/28	Student Oral Reports (Th/ Fri)	
	5/2	optional Final Review	
	5/11	final exam Thu. May 11, 3-6 pm	
	5/13	(Sat.) optional NATCAR contest (UC Davis)	