E11: Autonomous Vehicles
Fall 2011
Harris & Harris

Syllabus

Teaching Staff

Faculty:	David Money Harris	Parsons 2374	x73623	David_Harris@hmc.edu
	Sarah Harris	Parsons 2359	x77048	Sarah_Harris@hmc.edu
Section Instructors:	Eric Zhang			Eric_Zhang@hmc.edu
	Greg Fong			Gregory_Fong@hmc.edu
	Brad Perfect			Bradley_Perfect@hmc.ed
Lab Assistants:	Stephen Pinto			Stephen_Pinto@hmc.edu
	Vijay Ramakrishnan			Vijay_Ramakrishnan@HMC.Edu
	Tyler Robinson			Tyler_Robinson@hmc.edu
	Alistair Dobke			Alistair_Dobke@hmc.edu
	Rebecca Thomas			Rebecca_Thomas@hmc.edu
	Katie Vinnedge			Katie_Vinnedge@hmc.edu
Tutors	Jeremy Usatine			Jeremy_Usatine@hmc.edu
	Josh Vasquez			Joshua_Vasquez@hmc.edu

Schedule

Lecture:	TuTh 8:30-9:20			Beckman B126
Labs:	S. Harris, Thomas, & Ramakrishnan	Tuesday	1:1 – 4:10 pm	Parsons B171
	Zhang & Robinson	Tuesday	6 – 9 pm	Parsons B171
	Fong & Dobke	Wednesday	6 – 9 pm	Parsons B171
	D. Harris & Pinto	Thursday	1:10 – 4:10 pm	Parsons B171
	Perfect & Vinnedge	Thursday	6 – 9 pm	Parsons B171
Office Hours:			TBD	
Tutoring Hours		Saturday	1 – 5 pm	Linde Computer Lab

Feel free to stop by even if we do not have official office hours. One of the main reasons that we teach at Harvey Mudd is that we value working with students one-on-one and in small groups.

Text and Supplies

There is no textbook for this course, but lecture slides will be distributed. **You will need to purchase a lab kit before your lab on the week of September 5**. The kit contains components for your Mudduino embedded processor board and for your autonomous vehicle. The college has partially subsidized the kits, so your cost is $100. To purchase a kit, bring your ID card with Claremont Cash to Sydney Torrey in the Engineering Department Office (Parsons 2373) and get a receipt. You can add Claremont Cash to your card online or at Honnold Library. Take your receipt down to the stockroom (Parsons B714) to pick up your kit.

Electronic Communication

Class web page: http://www3.hmc.edu/~harris/class/e11
Class email list: eng-11-l

Be sure to check that you are on the class email list. You should have received email before the beginning of classes. If you did not receive mail, add yourself to the list or risk missing important late-breaking announcements. To subscribe, send email to listkeeper@hmc.edu with one line in the body:

subscribe eng-11-l

You also will need a Harvey Mudd College computer account to complete your labs. If you are not a HMC student, email one of the faculty your full name and school affiliation and we will request an account for you.

Course Objectives

Autonomous Vehicles is a hands-on interdisciplinary introduction to mechanical, electrical, and computer engineering, computer science, design, systems, and controls. The course has a variety of objectives including

- Give students a taste of what engineers and computer scientist do to help make informed decisions about majors
- Provide practical technical skills relevant to subsequent projects including
    o Machine shop
    o 3D CAD and printing
    o Soldering
    o C programming
    o Sensors and actuators
    o Analog and digital interfacing
    o Modeling
    o Embedded control systems
- Whet students' appetite to learn more advanced topics
- Develop design – build – test – debug skills
- Develop teamwork, presentation, and technical writing skills
- Just plain fun!

By the end of this course, you and your teammate will have built your own autonomous vehicle and programmed it to play Capture the Flag.

Grading

E11 is offered on a pass/fail basis. To pass the class, you are expected to:

- regularly attend class and lab
- complete all but one of the weekly labs
- complete all but one of the homework assignments
- deploy an operational autonomous vehicle to play Capture the Flag
- make a presentation about your vehicle
- complete a final report documenting your vehicle

If you have an emergency, please notify your instructor when you will be missing class.

You will complete the labs before Fall Break on your own but are welcome to consult your classmates and your instructor. You and a teammate will jointly design your autonomous vehicle to play Capture the Flag in the weeks after Fall Break, and then will jointly prepare your presentation and final report.

Your problem sets may be done on your own or with a partner. Both of you should be involved in and understand all aspects of the work; it misses the point to simply split the assignment and do two halves independently. You are welcome to discuss the assignments with other students or with the instructor or lab assistants after you have made an effort by yourself. Be sure to credit at the top of your assignment anyone classmates with whom you discussed ideas. **It is an honor code violation to simply copy someone else's work.**

Schedule

Week	Tue	Thurs	Lab	Problem Set (Due Tuesdays in class)
0: 8/29	Big Picture, Digital Systems	C Programming I	0: Shop safety briefing	
1: 9/5	Arduino Board	C Programming II	1: Arduino Board	
2: 9/12	Design Representation	C Programming III	2: 3D CAD & Printing	1: Welcome to Arduino
3: 9/19	Gold Codes	C Programming IV	3: Machine Shop	2: Music & Memory Game
4: 9/26	Analog Circuits	Analog Circuit Analysis	4: Robot Assembly	3: Gold Code Generation
5: 10/3	Diodes & Transistors	DEs, Capacitors & Inductors	5: Motors & Sensors	4: Volts & Amps & Ohms, Oh My!
6: 10/10	Feedback Control	Motors	6: Line-Following Robot	5: Reaction Timer & Light Tag
7: 10/17	Fall Break	Line Following Race	Break week: no lab	
8: 10/24	Game Kickoff ; Team Dynamics	Mechanical Performance	Robot Design I	6: Gold Code Detection
9: 10/31	Robot Navigation	Debugging	Robot Design II	7: 1st Order Circuits & Transistors
10: 11/7	Scrimmage	Batteries	Robot Design III	8: Motors
11: 11/14	Guest Lecture	Robotics Show & Tell	Robot Design IV	
12: 11/21	Capture the Flag Game (5:30 pm in Galileo)	Thanksgiving: no class	No lab	
13: 11/28	Technical Writing	Presentation Skills	Technical Writing	
14: 12/5	Peer Editing	Engineering Outlook	Presentations	Project Report (due Thursday 12/8)