



E11

Autonomous Vehicles Fall 2014

Syllabus

Teaching Team

Faculty:	David Money Harris P2374	909-607-3623	david_harris@hmc.edu
Section Instructors	Sherman Lam	626-383-1787	slam@hmc.edu
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Lab Assistants	Nicholas Gonzalez	215-359 6444	ngonzalez@hmc.edu
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Head Grutor Grutors	Kirklann Lau	805-341-8611	knlau@hmc.edu
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	Alex Alves	914-419-3503	aalves@hmc.edu

Schedule

Lecture		TR 8:35-9:25	Shanahan 2460
Labs	1: Harris & Gonzalez	T 1-4	Parsons B171
	2: Lam & Kahn	T 6-9	Parsons B171
	3: Huang & Hsiung	W 6-9	Parsons B171
	4: Harris & Dunlap	F 1-4	Parsons B171
Office Hours		Tu 9:30, Th 1, Fri 11	Parsons 2374
Tutoring Hours		Sun 3-5	Linde Computer Lab

Please stop by even when 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. You will need to purchase a lab kit before your lab on the week of September 8. The kit contains components for your Mudduino embedded processor board and for your autonomous vehicle. The cost is \$174. 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 B174) to pick up your kit.

Electronic Communication

Web Page: pages.hmc.edu/harris/class/e11/
Email: eng-11-l@hmc.edu
Sakai: sakai.claremont.edu under HM ENGR 11

Be sure that you are on the class email list. If you don't receive mail at the start of the semester, 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 will also need a Harvey Mudd College computer account to complete your labs. If you are not an HMC student, email the instructor with 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 you a taste of what engineers and computer scientist do to help you make informed decisions about majors
- Provide practical technical skills relevant to subsequent projects including
 - Machine shop
 - 3D CAD and printing
 - Soldering
 - C programming
 - Sensors and actuators
 - Analog and digital interfacing
 - Modeling
 - Embedded control systems
- Whet your appetite to learn more advanced topics
- Develop design – build – test – debug skills
- Develop professional skills of teamwork, presentation, and technical writing
- Have fun!

By the end of this course, you and your teammate will have built your own autonomous vehicle and programmed it to compete in a game.

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 in the final competition
- 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 in the final game 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 outside the teaching team with whom you discussed ideas. **It is an honor code violation to simply copy someone else's work.** All problem sets must be turned in to the Resources section of the E11 Sakai site.

Schedule

Week	Tue	Thur	Lab	Problem Set (due Tue in Class)
0: 9/1	Intro & Digital Logic	C Programming I	0: Shop safety briefing	
1: 9/8	Arduino Hardware	C Programming II	1: Mudduno Board	
2: 9/15	Design Representation	C Programming III	2: Solidworks & 3D Printing	1: Welcome to Arduino
3: 9/22	Gold Codes	C Programming IV	3: Machine Shop	2: Music & Memory Game
4: 9/29	Analog Circuits	Debugging	4: Robot Assembly	3: Gold Code Generation
5: 10/6	Sensors & Actuators	Diodes & Transistors	5: Motors & Sensors	4: Gold Code Correlation
6: 10/13	Feedback Control	More Sensors	6: Line-Following Bot	5: Reaction Timer & Light Tag
7: 10/20	Fall Break NO CLASS	Line Following Race	NO LAB	
8: 10/27	Game Kickoff & Team Dynamics	Mechanical Performance	Robot Design I	6: Gold Code Detection
9: 11/3	Robot Navigation	<Slack>	Robot Design II	7: Electronics
10: 11/10	<Slack>	Guest Lecture	Robot Design III	
11: 11/17	Technical Writing	Scrimage	Robot Design IV	
12: 11/24	Competition: 5:30 Big Shanahan	Thanksgiving NO CLASS	NO LAB	
13: 12/1	Peer Editing	Presentation Skills	Peer Editing	Report Draft
14: 12/8	Guest Lecture	Engineering & CS Outlook	Final Presentations	Final Report