E11 - Autonomous Vehicles

Introduction

On your mark…

- The Great Robot Race

  http://www.youtube.com/watch?v=uoiJeIbowBA

Outline

- Introduction to Autonomous Vehicles
  - History
  - System Components
  - Feedback control
- Teaching Team
- Course Overview
- Lab 0

Autonomous Vehicles - History

- The "Tortoise", Gray Walter 1950

Courtesy of Hans Moravec

Autonomous Vehicles - History

- Google Autonomous Cars

From Robot Shop Blog

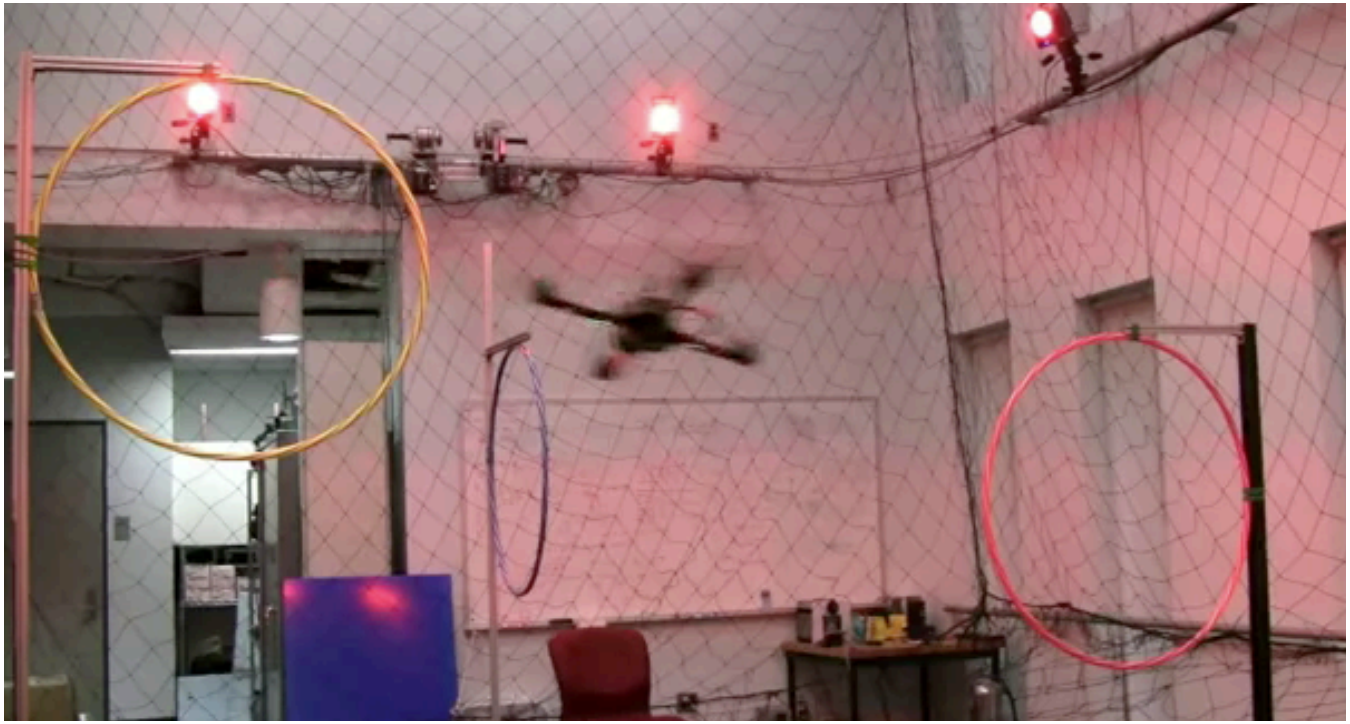
Autonomous Vehicles - History

- Land, Air, Sea, …

Autonomous Vehicles - History

- Land, Air, Sea, …

  http://www.youtube.com/watch?v=geqip_oVjec

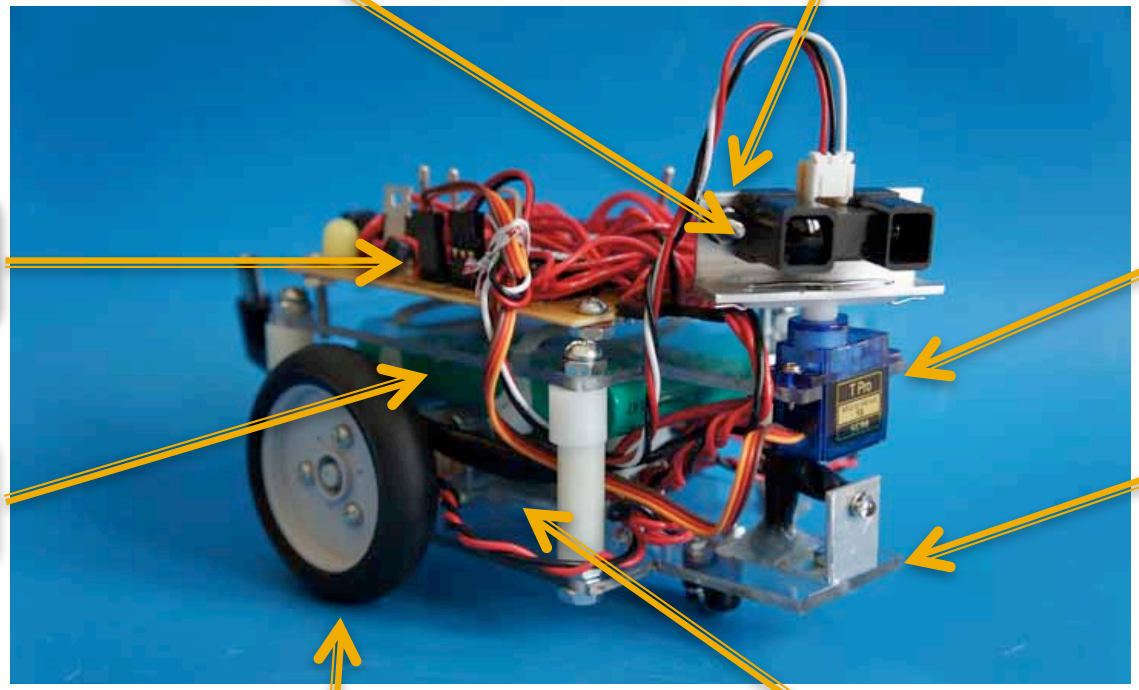


Autonomous Vehicles - History

- Land, Air, Sea, …

Autonomous Vehicles - Components

Autonomous Vehicles - Components

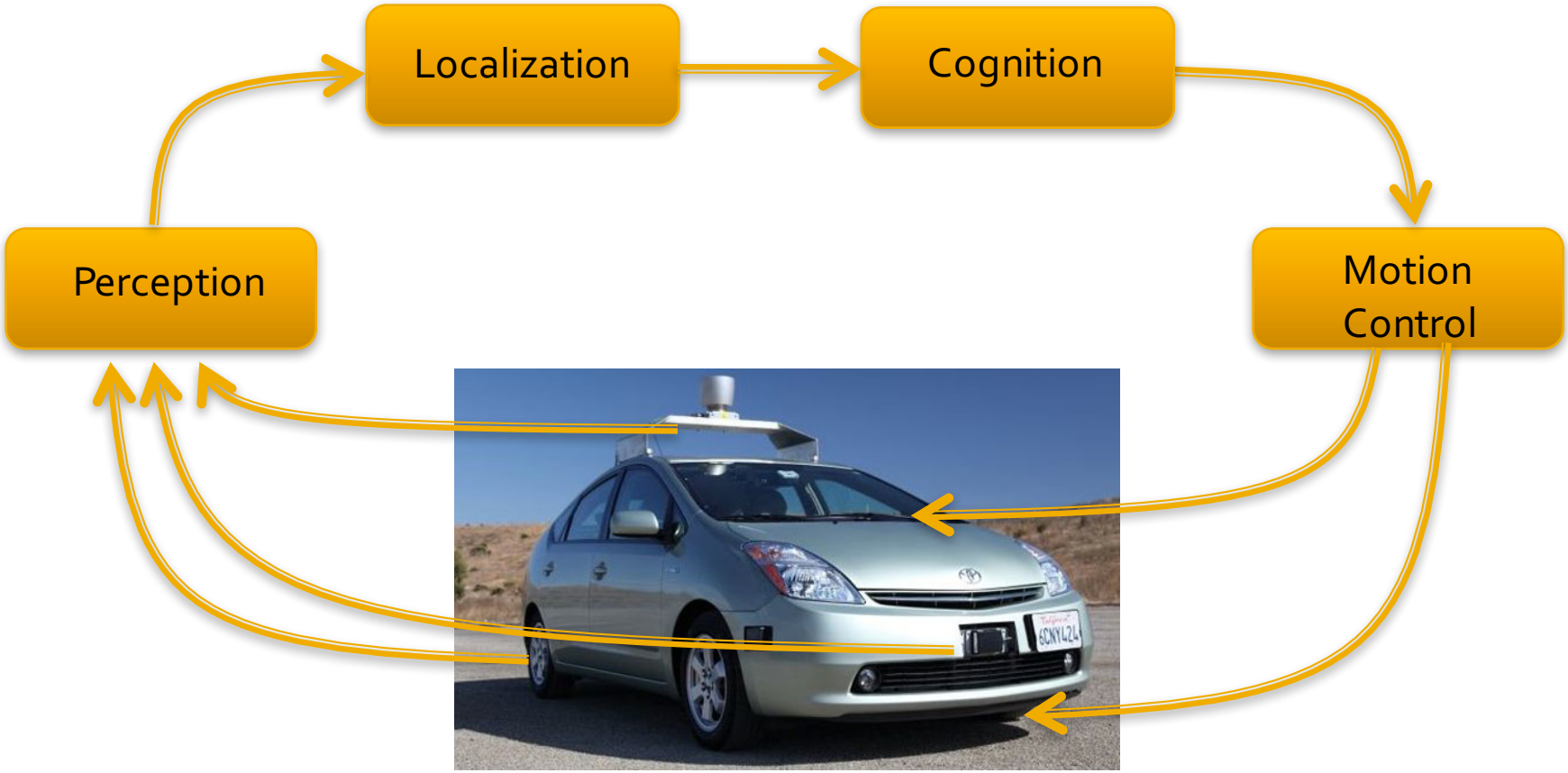


Autonomous Vehicles - Feedback

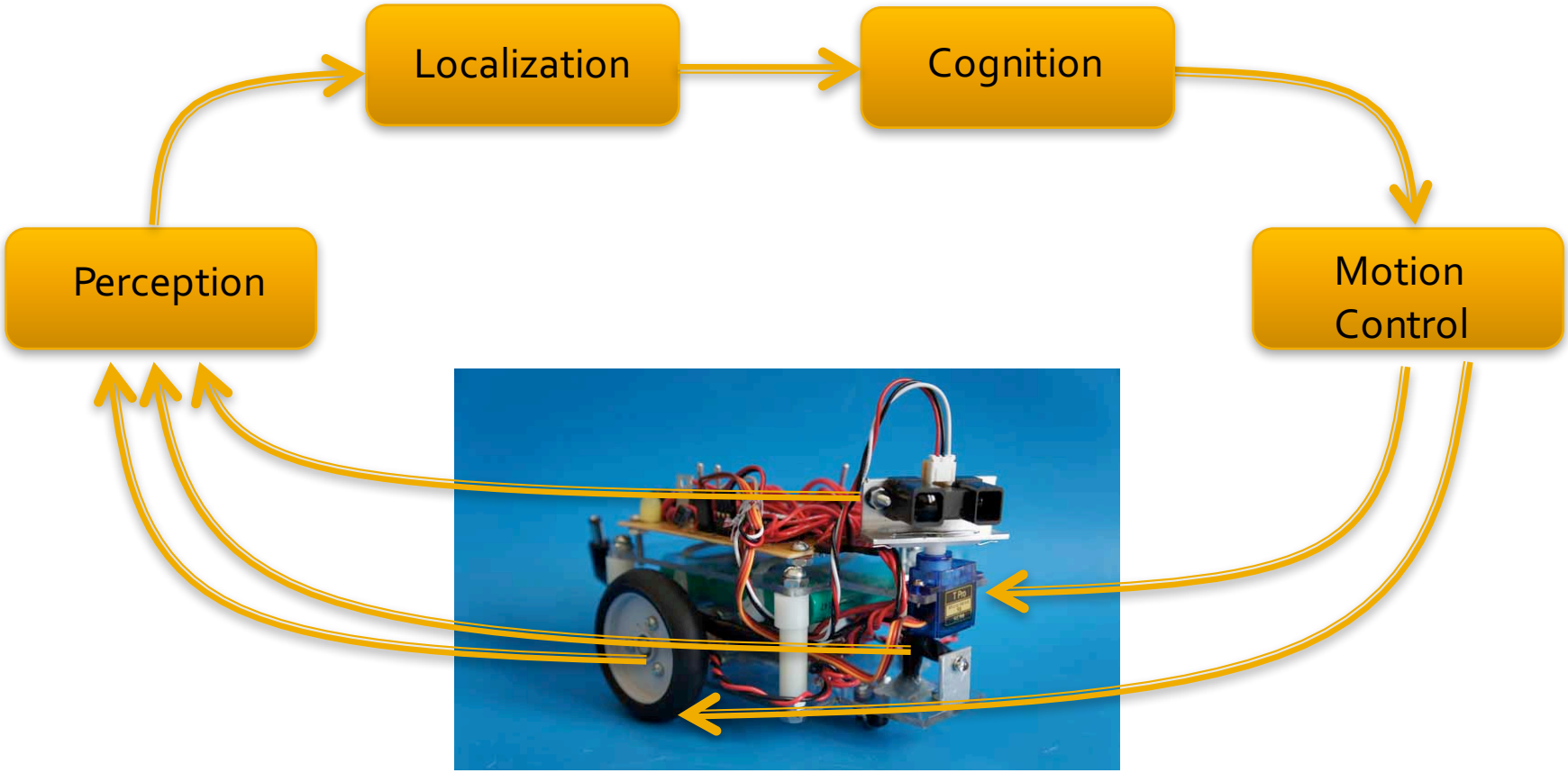
- How do we use Feedback?

http://www.punchingpro.com

Autonomous Vehicles - Feedback



Autonomous Vehicles - Feedback



Outline

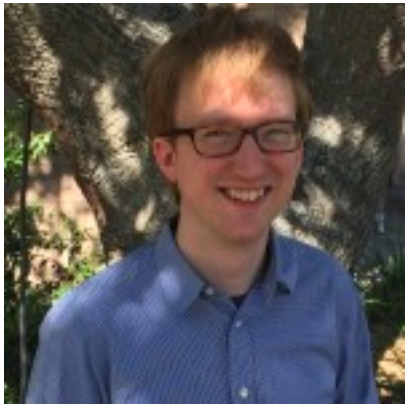
- Introduction to Autonomous Vehicles
- Teaching Team
  - Instructors
  - Proctors
  - Grutors
- Course Overview
- Lab 0

Teaching Team

- Dr. Christopher Clark
  - Robots, kids, and maybe surfing…

Teaching Team

- Dr. Brian Bryce
  - Electronics Wizard
  - Open Device Engineering Lab



Teaching Team

- Dr. Jason Marshall
  - Cal tech Post doctoral scholar
  - Computational Mechanics

Teaching Team

- **Proctors - Lab Section 1**
  Mondays 1:00-4:00pm
  - Prof. Marshall
  - Jesus Solano
- **Proctors - Lab Section 2**
  Mondays 6:00-9:00pm
  - Prof. Marshall
  - Jenny Lee

Teaching Team

- **Proctors - Lab Section 3**
  Tuesdays 1:00-4:00pm
  - Prof. Clark
  - Aomsin Pongpiriyakarn
- **Proctors - Lab Section 4**
  Tuesdays 6:00-9:00pm
  - Prof. Bryce
  - Trevor Fung

Teaching Team

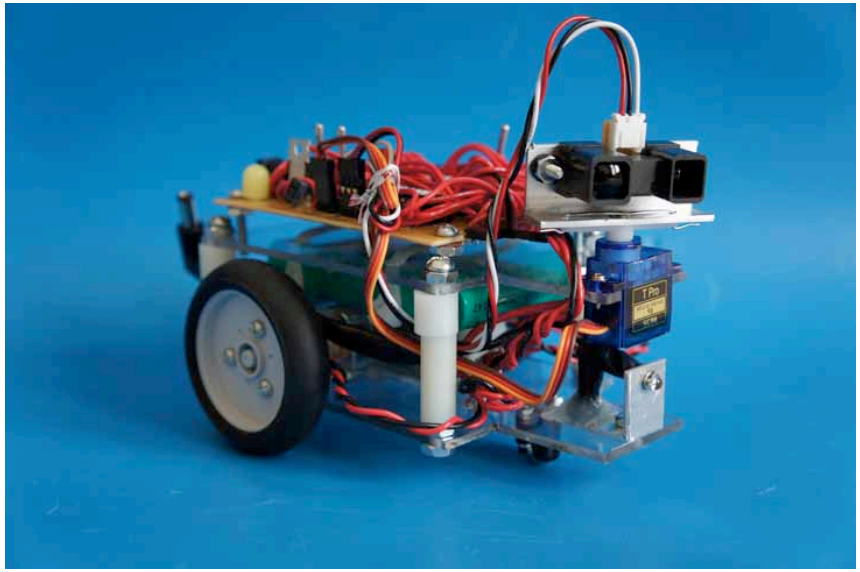
- **Grutors**
  - Kayla Yamada
  - Shiv Seetharaman
- **Tutoring hours**
  - Sun 2-4 PM or TBD

Outline

- Introduction to Autonomous Vehicles
- Teaching Team
- Course Overview
  - Description
  - Objectives
  - Grading
  - Web site
  - Final competition
- Lab 0

Course Overview – Description

- E11 is a hands-on interdisciplinary introduction to mechanical, electrical, and computer engineering, computer science, design, systems, and controls.



Course Overview - Grading

- **E11 is pass/fail, student expectations include:**
  - 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

Course Overview – Objectives

1. **Provide a hands-on interdisciplinary introduction to what engineers and computer scientists do**
   - Mechanical Engineering
   - Electrical Engineering
   - Computer Engineering
   - Computer Science
   - Design
   - Controls

Course Overview – Objectives

2. **Give students a taste of what engineers and computer scientists do to help make informed major decisions**

Course Overview – Objectives

3. **Provide practical skills including:**
   - Machine shop
   - 3D CAD and printing
   - Soldering
   - C programming
   - Sensors & actuators
   - Analog & digital interfacing
   - Modeling
   - Embedded control systems

Course Overview – Objectives

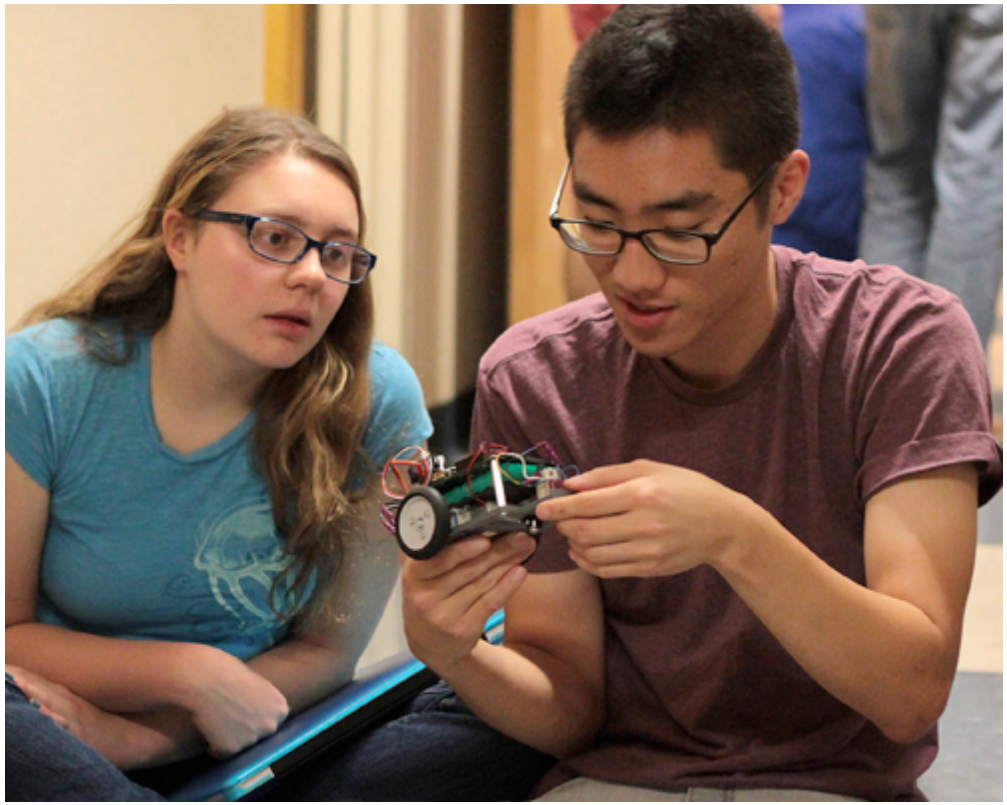
4. **Increase students' appetite to learn more advanced topics**

5. **Develop skills:**
   - Design – build – test – debug
   - Teamwork
   - Presentations
   - Technical writing

Course Overview – Objectives

6. **Have fun!**

http://www.youtube.com/watch?v=hhGPe3XRgCA&feature=youtube_gdata_player



Course Overview – Collaboration

- **Labs 0-5:**
  - Done on your own
  - You are welcome consult your instructors and classmates
- **Lab 6 & Final Project:**
  - Done with a partner
- **Problem Sets:**
  - Done on your own or with a partner
  - Both of you should be engaged in all aspects
  - OK to discuss with other students after making an effort yourself

Course Overview – Final Competition

- Final competition will take place the Monday before Thanksgiving (11/20) at 5:30 PM

- Game rules TBA!

Course Overview – Kits

- **Pay for your kit by Sept. 1st please**
  - Cost is $175.
  - Bring ID card with Claremont Cash to Sydney Torrey in the Engineering Dept. Office (Parsons 2373)
  - Return most tools and a couple parts at the end of the semester to get $75 reimbursement

Course Overview – Web Page

- All course materials can be found at

http://www.hmc.edu/lair/E11/

Outline

- Introduction to Autonomous Vehicles
- Teaching Team
- Course Overview
- Lab 0

Lab 0

- Shop safety training is required for all students
- Four 1 hr sessions, all meeting in Parsons 2358:
  - Tue Sept 8, 6 PM
  - Tue Sept 8, 7 PM
  - Wed Sept 9, 6 PM
  - Wed Sept 9, 7 PM
- Arduino software installation is required by next week