

CS 5422: Physical Computing

Instructor: Rajit Manohar

TA: Ned Bingham

Slides will be available through Blackboard. There is no textbook.
Most of the class will just use the board.

Administrivia

Lectures: MW 4:00-5:15pm

Web resources: announcements, slides, labs, ...

- Blackboard: submissions, assignments, lecture slides
- Piazza: discussion boards

Grading:

- 15%: Quizzes (6, drop the lowest score)
- 70%: Labs—more on this later
- 10%: Peer evaluation
- 5%: Instructor discretion

A Note On Grading

Some salient points regarding grading:

- No single item is heavily weighted
- Quizzes: to see if you are keeping up with the class
- Labs: implementation of concepts covered in class, starting in class
- Peer evaluation: to untangle issues that might occur during labs
- Instructor discretion: because students can do extraordinary things that are not covered by the grading policy

Administrivia

Labs:

- No scheduled lab time: you can do them at home
- Office hours will be used for providing help
- Software for the class is (mostly) open source and should work on
 - Mac
 - Linux
 - Windows

Administrivia

Instructor: Rajit Manohar

- Self-timed design (no clocks ...)
- My group
 - Writes design tools
 - Proves theorems
 - Builds chips
 - Writes low-level system software



5

What is physical computing?

- Computing that transcends the traditional desktop
 - “Computing”: hardware + software
 - “Physical”
 - General notion of “input” and “output”
 - Computing that *interacts* with the world
- Often has
 - *real-time* constraints
 - fixed/limited function
 - resource constraints



6

CS 5422

- Traditional physical computing systems are everywhere ...
 - Electronics: smart phones, eBooks, cameras, ...
 - Cars
 - Heating controls
 - Smart homes, appliances
- Less traditional: digital/interactive art
- This class:
 - How do such systems work?
 - How does the hardware and software interact with the physical world?
 - What are common themes in such systems?



7

Topics

- Components of physical systems
 - Sensors
 - Actuators
 - Computation and Communication
- Mechanisms for composition
 - State-based
 - Concurrency models
 - Synchronization
- Real-time constraints and scheduling



8

Labs

Five labs:

- Basic electronics [Aug 31–Sep 13]
- Using sensors [Sep 14–Sep 27]
- Using actuators [Sep 28–Oct 18]
- Wireless [Oct 19–Nov 1]
- Real-time [Nov 2–Nov 15]

Action Items

- Take the survey by 4pm tomorrow (Thu) if you plan to take the class. Link is available on piazza.
 - <https://www.surveymonkey.com/r/L5G2P9H>
- We will only be sending out teams/handing out hardware for those who have submitted their netid via that survey!
- Make sure you can access Blackboard
- Install the Arduino software on your laptop
 - <http://arduino.cc/en/Main/Software>