Electrical Engineering and Computer Sciences

EECS 16A
Your Instructors

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Head GSIs

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Email with:

– Questions not for piazza
– All Conflicts
– Any Emergencies
– Administrative Questions
Introduce TAs

• Many are returning 16A staff members
And we have even more!

• An army of Academic Student Employees...
  – Former 16A students just like you ...

• The path to being on 16A staff
  – Do great in 16A
  – Become an Academic Student Employee
    • Grade homeworks, assist in labs, help out in OH, etc.
Important Web Sites

• EECS 16A
  http://inst.eecs.berkeley.edu/~ee16a/fa17/
  OR
  http://ee16a.com

• Piazza
  http://piazza.com/
Course Policies

• Syllabus is on the course website at ee16a.com
• You are responsible for reading and following all course policies listed
Some Important Notes

• *Freshman* are the target audience for 16A
  – Grading is absolute
  – Assume no prior background in linear algebra or physics
  – Maximize your chances for success by maintaining sustained effort in this class – see syllabus for more about this
  – No technology during lecture
Some Important Notes

• If you are an L&S CS student graduating this semester
  – There is a long list of temporary alternatives you can take to fulfill the requirement

• If you are an L&S CS (intended) student and have taken Math 54 (and understood it)
  – You should probably take 16B, not 16A
  – You can sign up for EECS 47D to learn the circuits content from 16A
Some Important Notes

• You can find more info about 47D on the 16A piazza
  – Contact Elad if you are interested in this option
Final Important Note

• You should all be here to learn
  – We have an extremely dedicated staff who are committed to helping you achieve that goal

• Cheating directly detracts from this goal
  – Any cheating we find will be immediately (with no prior warning/discussion) forwarded to the Office of Student Conduct
  – Do yourselves and us a favor and don’t even think about doing it
    • If you need help, come talk to us – the sooner the better
All of these extract information from the real world and interact with it; we will be learning how to design and understand these devices & systems!
16A: Information Devices and Systems

- **Imaging/Tomography and Google PageRank (~5 wks)**
  - Topics: Linear algebraic thinking and graphs
  - Lab: Single-pixel imager

- **Touchscreens (5 wks)**
  - Topics: Linear circuits and design
  - Lab: Home-made R and C touchscreens

- **Locationing and Least-Squares (4 wks)**
  - Topics: Linear-algebraic optimization
  - Lab: Acoustic localization “GPS”
## EECS Upper Divs: What 16AB feed

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How Did We Get From This...

1837

1866

1876
To This?
Moore’s Law

Gordon Moore
Intel Cofounder
B.S. Cal 1950!
That’s Just One Piece of the Puzzle...
Where This is Used:
Whom We’re Training You to Be

2017
What Modern Systems Look Like (Intro to Module 1)
Medical Imaging ca. 1895

I don’t feel good...

Let’s cut you open...
All of these were enabled/dramatically advanced by the mathematical and hardware design techniques you will learn in this class!
Imaging In General

Energy source

Subject

Energy detection

Imaging System
(electronics, control, computing, algorithms, visualization, ...)

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Simplest Imaging System

• What is the absolute smallest number of components you need to make an imaging system?
Simple Imager Example
Simple Imager Example
Imaging Lab #1
Your Setup
An Imager with Just One Sensor?

• After all, today’s cameras have millions of pixels…

• Great teaching vehicle: you can actually get a lot out of surprisingly simple designs
  – Once you know the right techniques!

• In some systems the sources and/or detectors might actually be expensive
  – Take this opportunity to learn a little more about how detectors usually work
  – And how we get them to “talk” to our electronic systems
More Complex Imaging Scenario

• What if we can’t shine light (i.e., focus energy) either uniformly on all spots or in just one spot?

• The signal we receive on our detector will be a linear combination of several features of the image from different points.

• Can we recover the original image?
  – In many cases, yes!
  – Will start to see how next...