Electrical Engineering and Computer Sciences

EECS 16A

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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

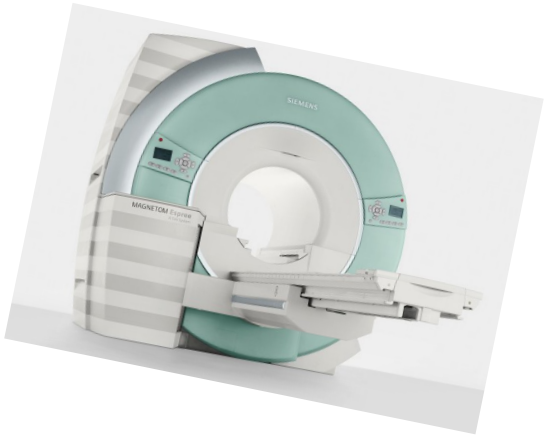
- You can find more info about 47D on the 16A piazza
  - Contact Elad if you are interested in this option

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

Content Introduction



- **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

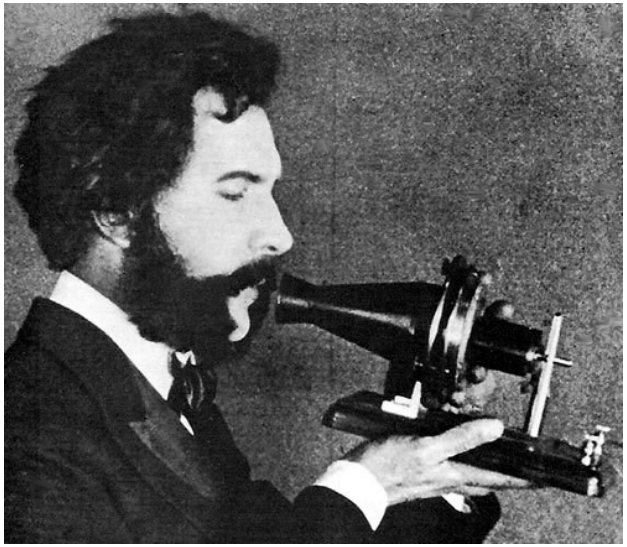
16AB **70** **61B** **61A** **61C** **16AB**	**Modeling and Algorithms**	170, 126, 188, 127	189, 120, *121*, 123, 174, 144, 172	**Specific Domains**	
				121, 122, *168* Comm+Net	176, 145B CompBio, Imaging
				191 Quantum	128, 106, 192 Control + Robotics
	General Software	162, 161, 169	160, *168*, 149	184 Graphics	186 Databases
				164 Compilers	152 Computers
	General Hardware	105, 140, 151	130, 143, 145L	145MO Bio	147 MEMS
				117 Antennas	142 Comm ICs
				118 Optics	113, 137AB, 134 Power+SolarEnergy

How Did We Get From This…

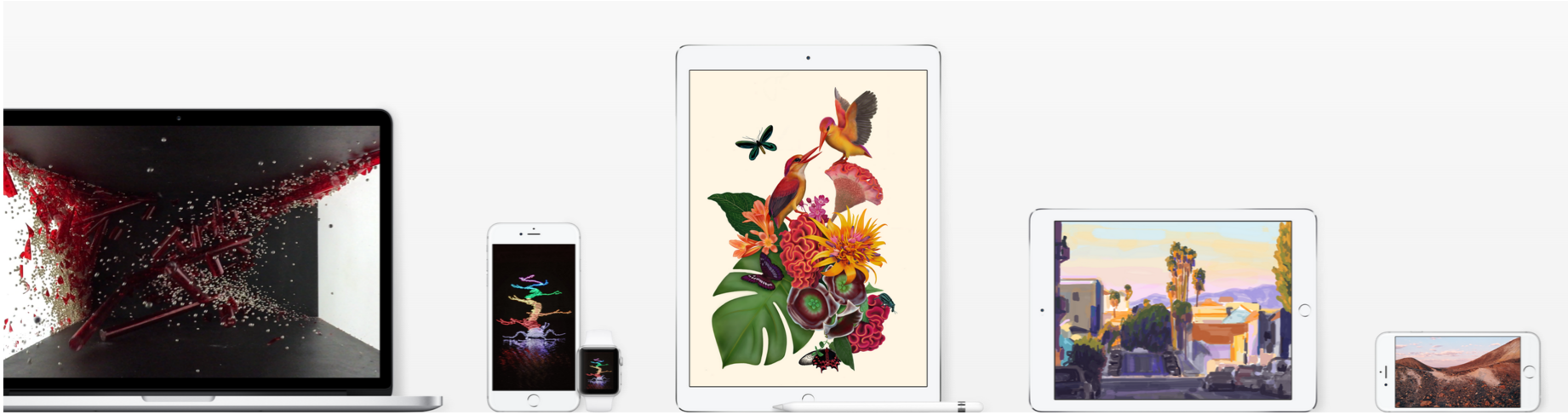
1837

1866

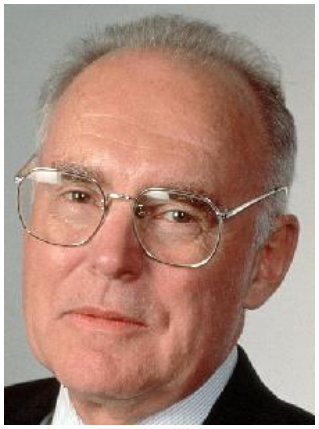
1876



To This?



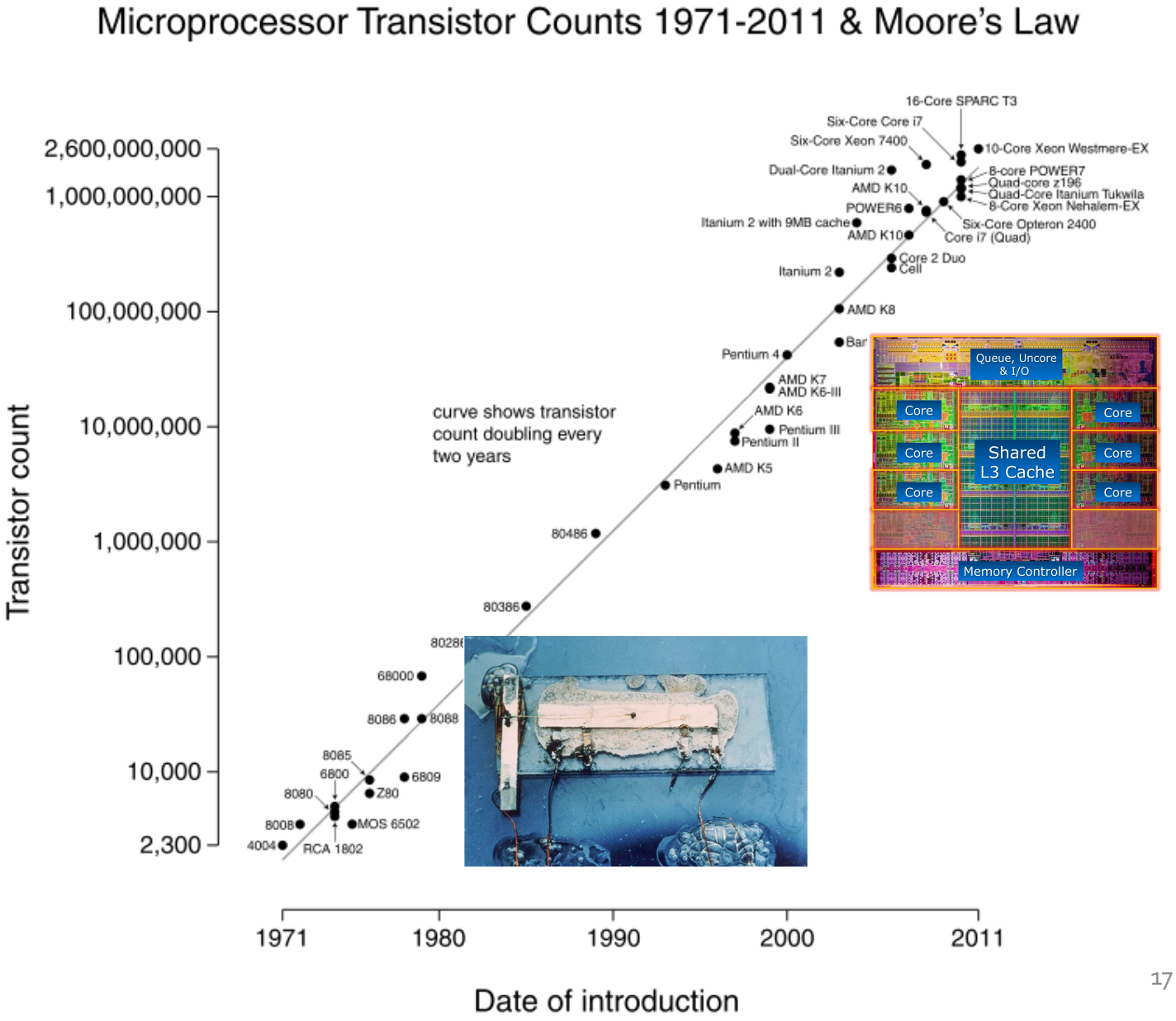
Moore's Law



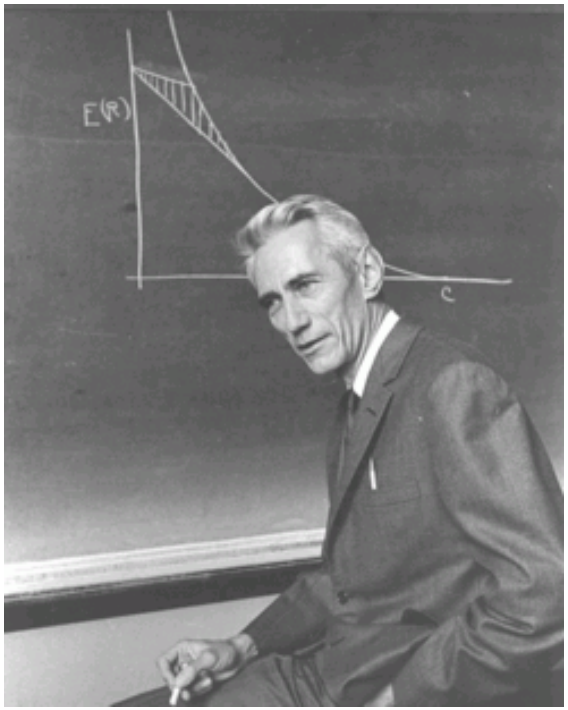
Gordon Moore

Intel Cofounder

B.S. Cal 1950!

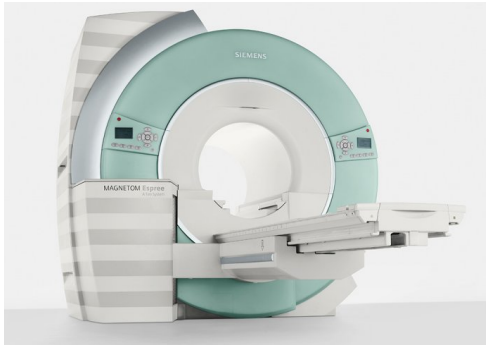


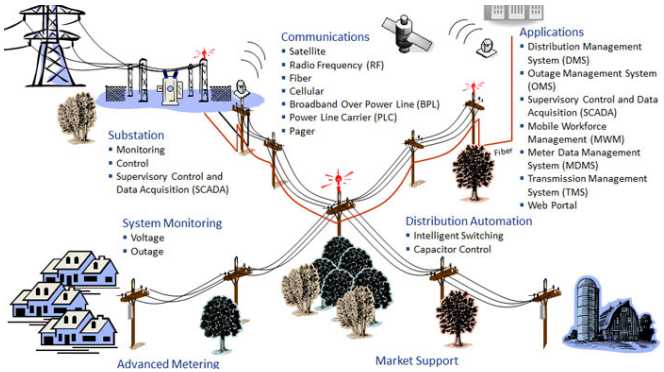
That's Just One Piece of the Puzzle…



1940's

Where This is Used:





Whom We're Training You to Be

2017

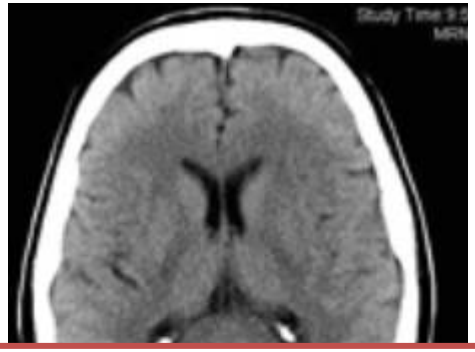
What Modern Systems Look Like (Intro to Module 1)

Medical Imaging ca. 1895

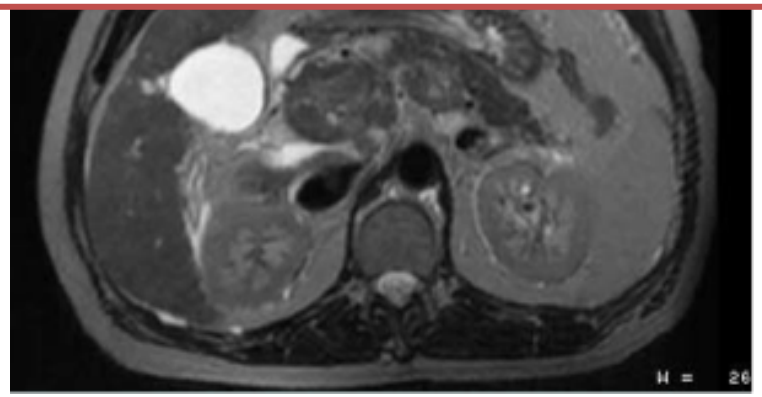
Medical Imaging Today

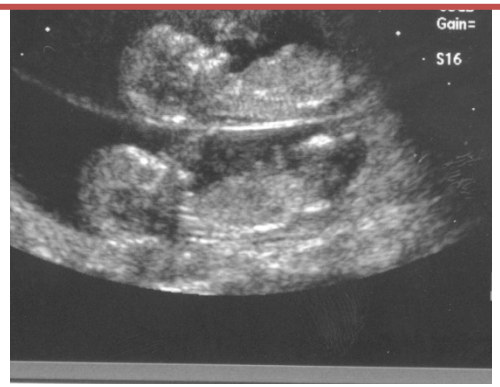
X-Ray

CT

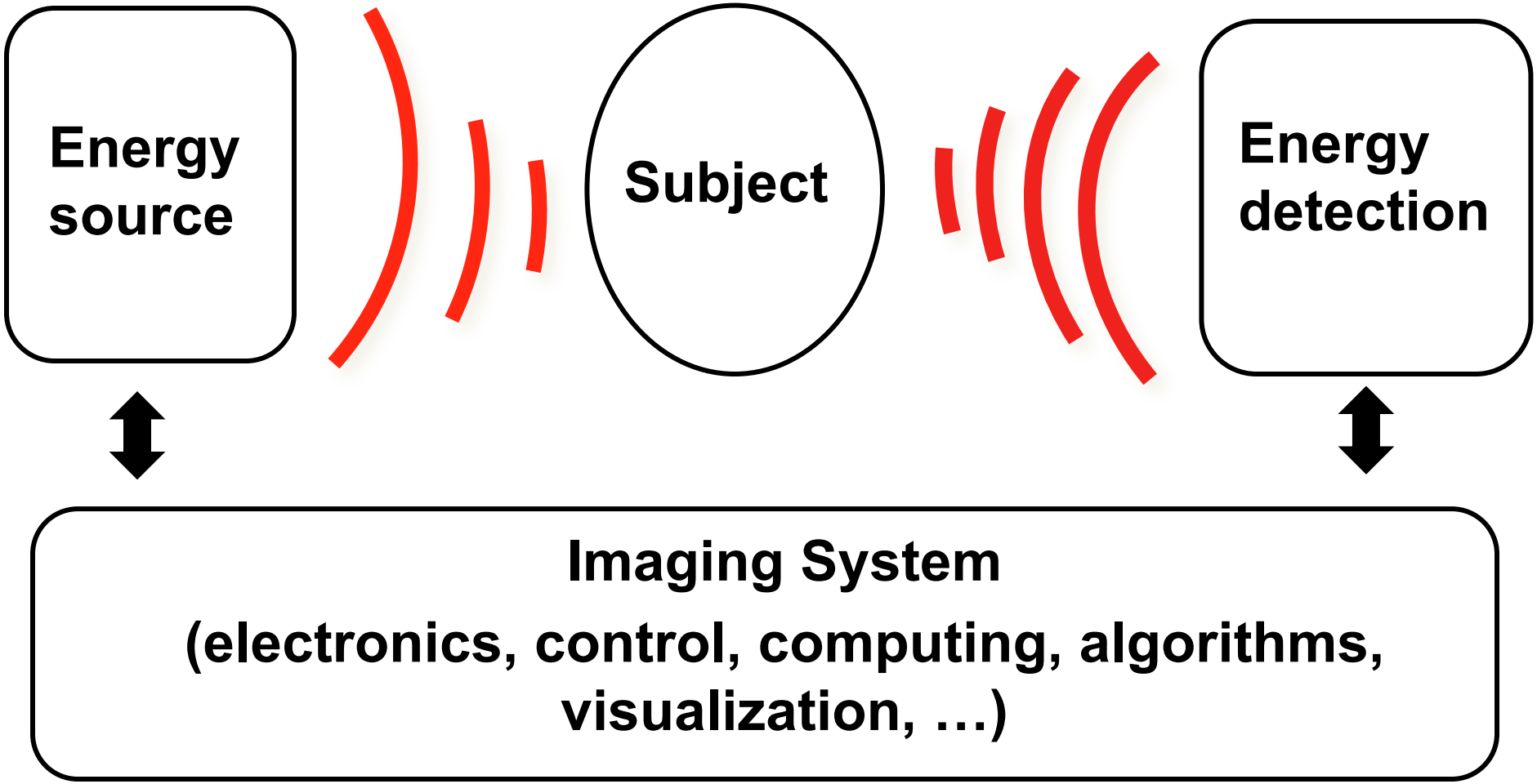


All of these were enabled/dramatically advanced by the mathematical and hardware design techniques you will learn in this class!





Imaging In General



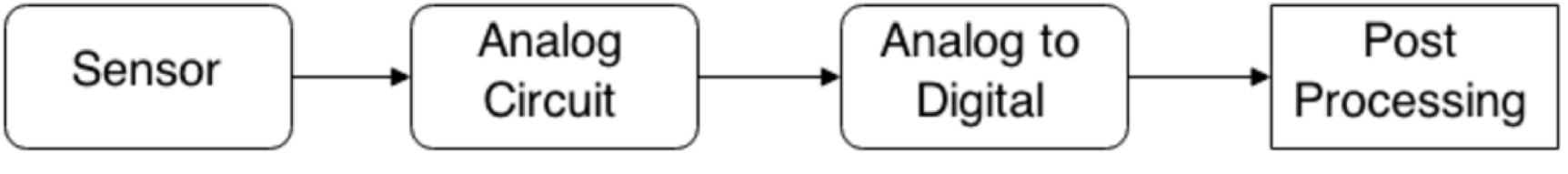
Simplest Imaging System

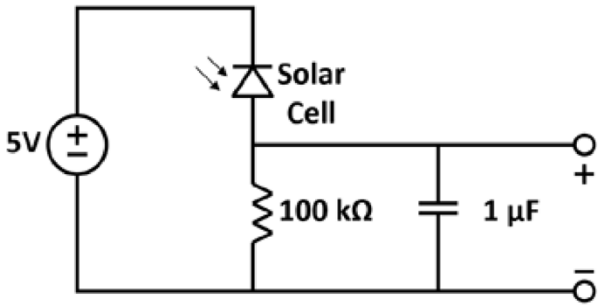
- **What is the absolute smallest number of components you need to make an imaging system?**

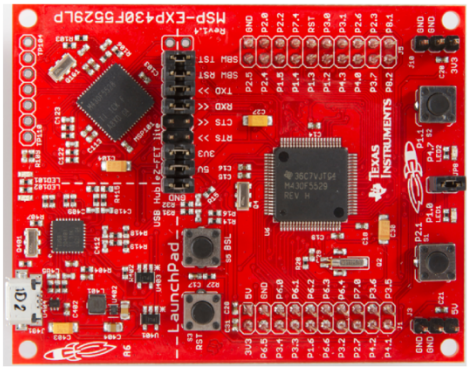
Simple Imager Example

Simple Imager Example

Imaging Lab #1

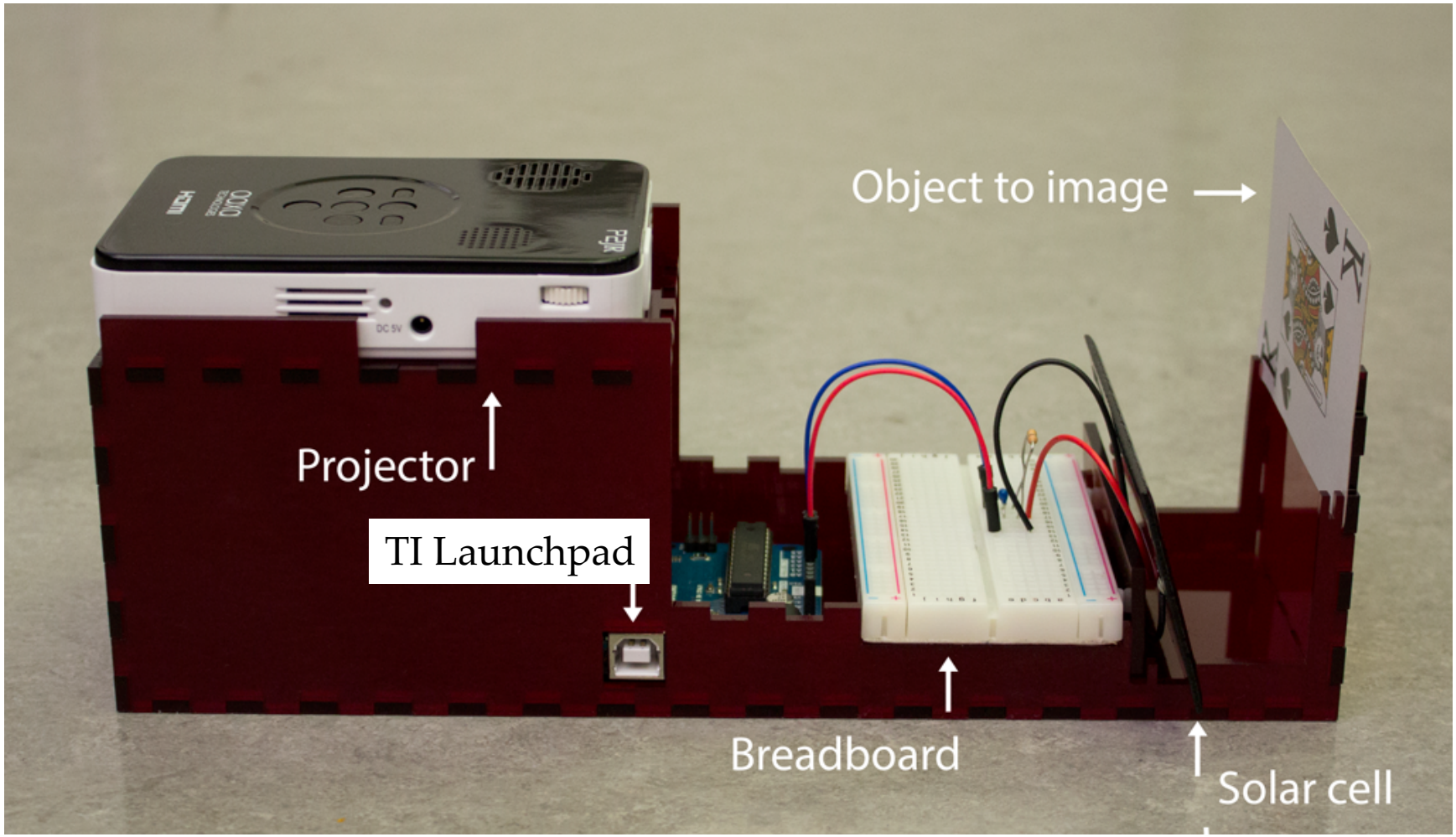






IP[y]: IPython

Your Setup


Object to image
Projector
TI Launchpad
Breadboard
Solar cell

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…