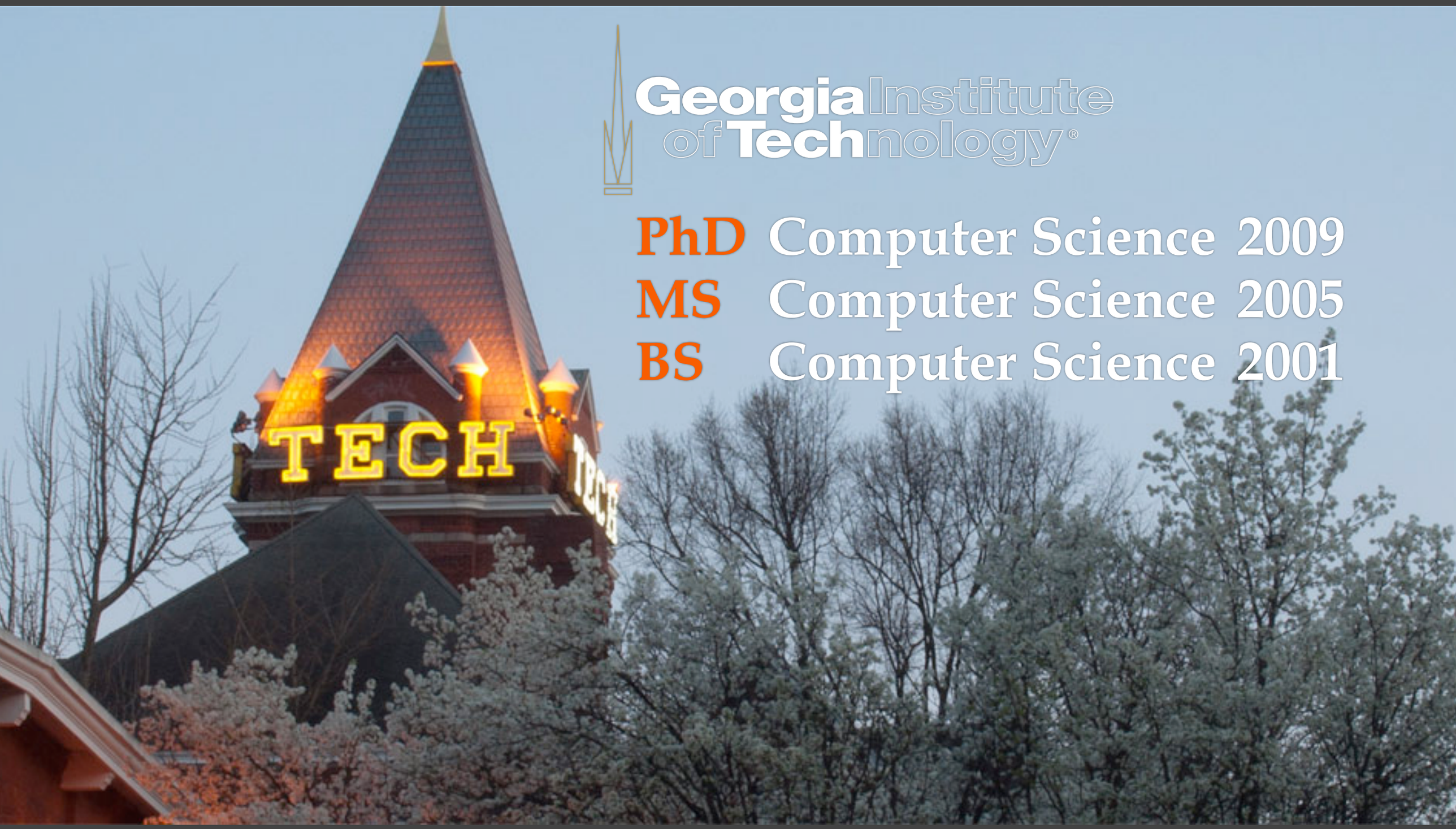
HCIN720
Designing User Experiences for Internet-Connected Devices

Dr. Daniel Ashbrook

Today

- Who are you?
- Overview of the course (what are we going to learn?)
- Course logistics
- Why are we going to learn these things?

About me



Georgia Institute of Technology®

PhD Computer Science 2009
MS Computer Science 2005
BS Computer Science 2001

2009–2013

2013–2014

R·I·T

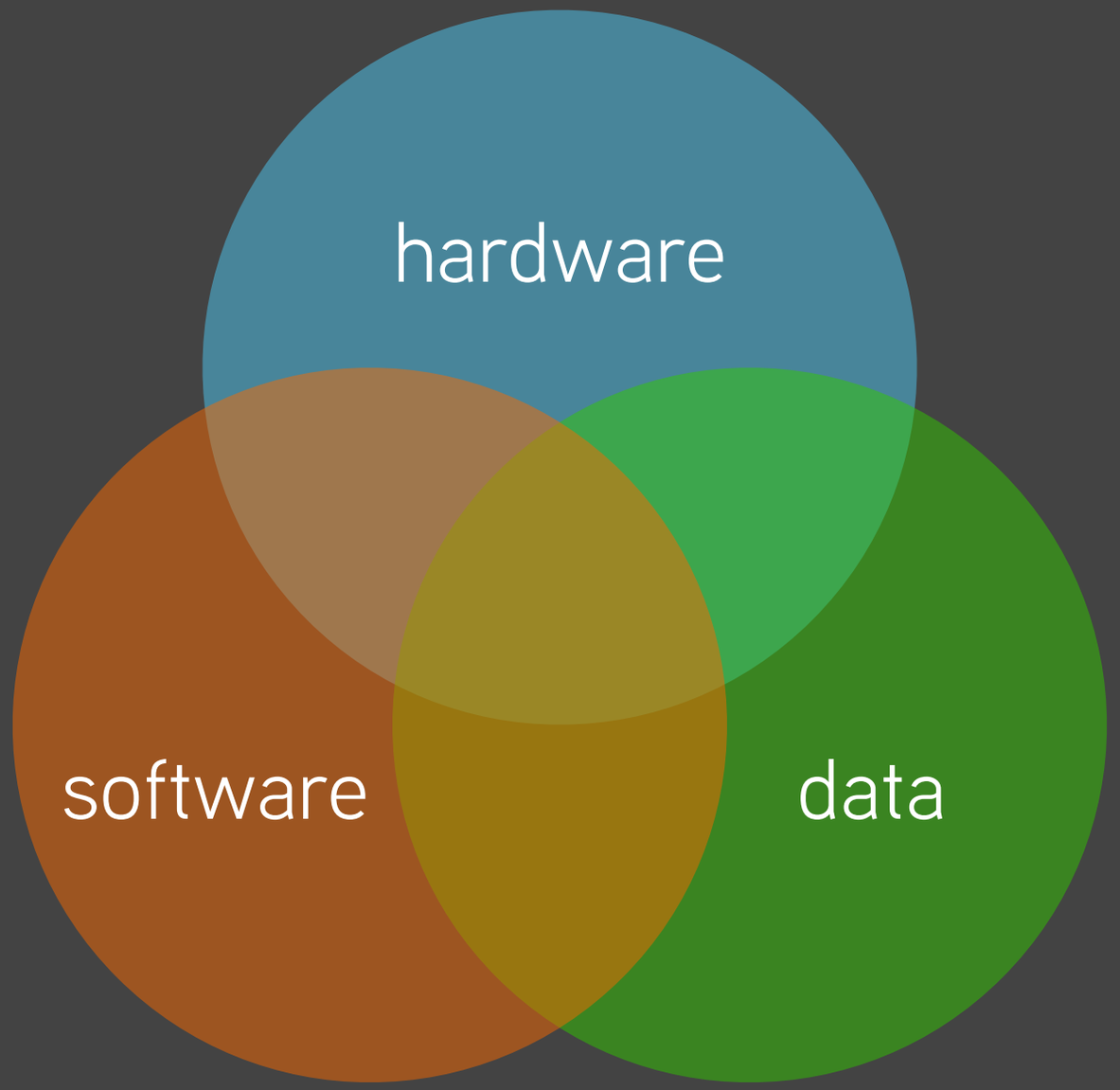
2014–

Course overview

About this course

We can't any longer think only about designing for screen-based devices. There is a whole new world of linked hardware/software/data out there.

These are physical objects that also have digital representations or linkages; alternately, it's digital information that has a physical instantiation.



About this course

The focus of this class is on prototyping user experiences for physical artifacts that are connected to the Internet:

devices that allow things sensed about the physical world to be acted on in the cloud, and that allow things happening on the Internet to be reflected in the physical world.


nest
67
IN 20 MIN
72

Questions for the course

- What's out there?
- Where did it come from?
- How does information flow amongst the Internet and these devices?
- What are the different kinds of user experiences possible with these devices?
- How do we design these experiences?

Logistics

Class structure

Tuesdays 2–3:15
GOL-3560

- Lecture
- Reading discussion
- Student presentations
  - Assignment progress/ results
  - Investigation of product UX

Thursdays 2–3:15
GOL-3560 *or* ORN-1385

- Skill lecture
- Hands-on skill building
- In-class activities
- Assignment work days
- **Bring your laptop!**

If you get confused or stressed or sad, come see me or email me!

Communication

- MyCourses will only be used for posting grades
  - Because it is horrible
- Assignments and everything else will be on the course website: **http://fetlab.rit.edu/720**
  - (this link is on MyCourses)
- We will use Slack for communication, discussions, help, etc; I will send you an invitation.

Slack

FETLab

Daniel Ashbrook

CHANNELS

3d_embedding
augmented_tools
e-nable-study
fetlab_branding
general
kinect_team
laser_cutter
provost_visit
random
teeth

Create a channel...

DIRECT MESSAGES

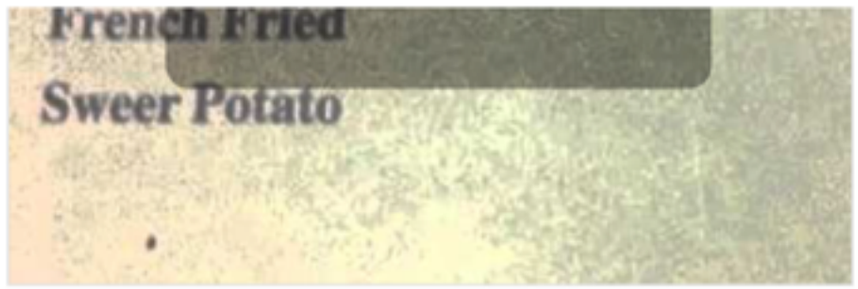
Ameya Lonkar
caitlynorta
Carlos Tejada
chinar
jeremiah
Jeremiah Parry-Hill
Mohsen Zare
osamu
Sourabh Kulhare
Stan Guo

+1 More...

random — Non-work banter and water cooler conversation

11 | Search

Today



Jeremiah Parry-Hill 1:22 PM

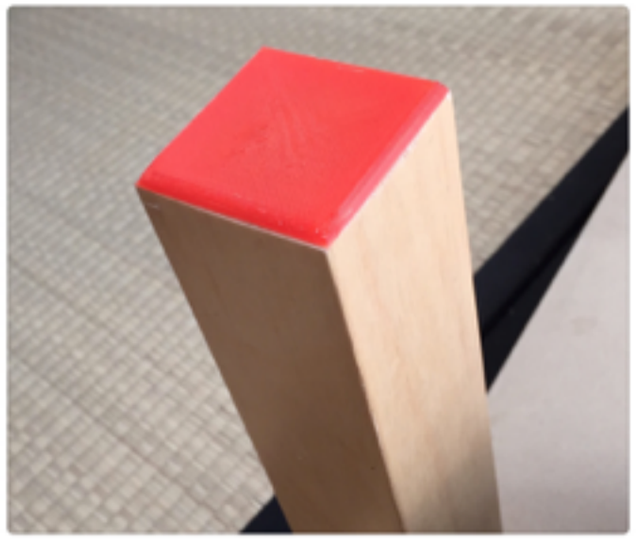
IKEA hackers at it again: http://www.ikeahackers.net/2015/08/print-piy-ikea-lack-end-cap.html

IKEA Hackers

Print It Yourself (PIY): IKEA Lack end-cap - IKEA Hackers

If you want to shorten the table leg of an IKEA Lack table, you might want to put an IKEA LACK end-cap on the leg after you have sawed it off. (97KB)

Today at 4:16 AM



Skills

- 3D printing
- Laser cutting
- Sewing
- 2D modeling for laser cutting
- 3D modeling for 3D printing
- Generative design
- Soft circuits
- Foam core
- Arduino
- Arduinos and interaction
- Bluetooth/BLE
- Wifi
- Processing
- Machine learning
- Signal processing
- Audio generation
- node.js
- Event-driven programming
- Basic electronics theory
- Motors, servos
- Connecting sensors and actuators via IO pins, I2C, SPI
- Capacitive sensing
- Sketching
- Data visualization
- Web APIs (REST)

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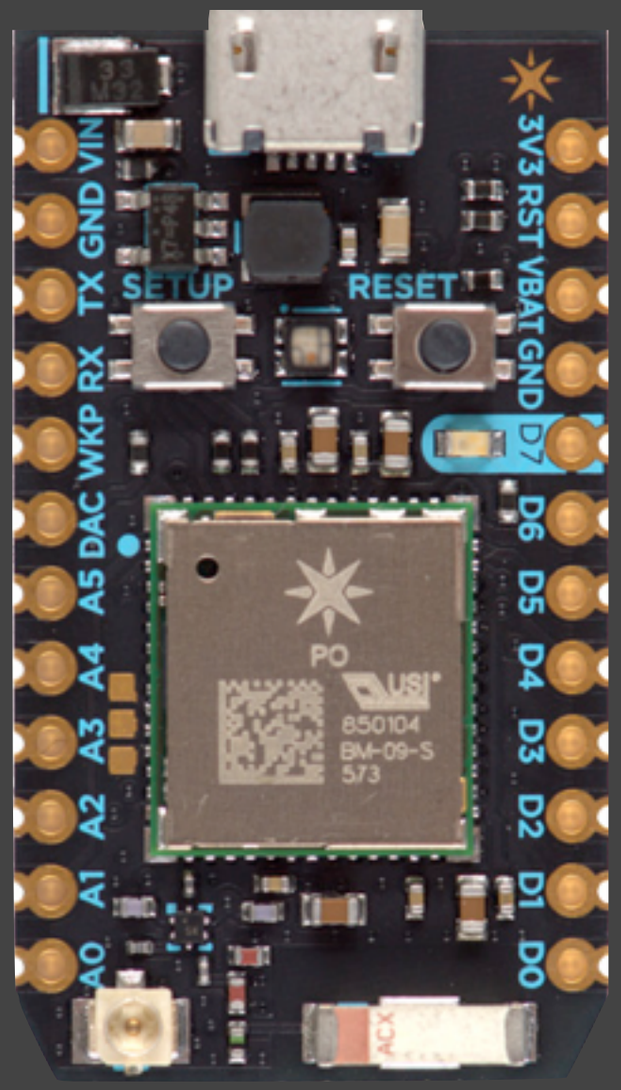
Hardware

Particle.io Photon

- Arduino-like WiFi-based cloud-magic microcontroller
- $19
- Supported path from prototype → product



Hardware

- $50 fee for materials
- You get to keep them!
- Includes Photon and a bunch of stuff

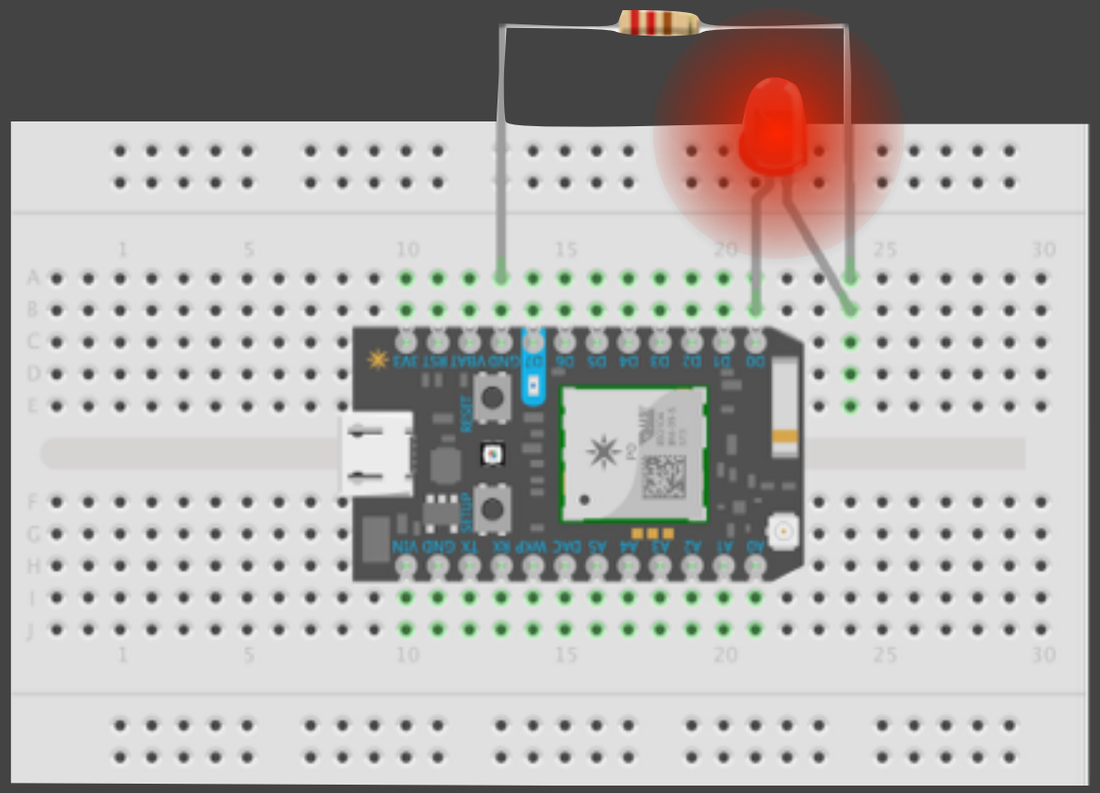
Example: control an LED over the Internet

```
int led1 = D0;
int led2 = D7;

void setup() {
   pinMode(led1, OUTPUT);
   Spark.function("led",
ledToggle);
}

void loop() {}

int ledToggle(String command) {
   if(command == “on”) {
      digitalWrite(led1, HIGH);
      return 1;
   }
   else if(command == “off”) {
      digitalWrite(led1, LOW);
      return 0;
   }
   else
      return -1
}
```



https://api.particle.io/v1/devices/0123456789abcdef/led?access_token=1234123412340&args=off

Grading

Individual assignments (3)	24%
Group assignments (3)	30%
Final project	20%
In-class activities & presentation	16%
Class participation	10%
Extra credit (maybe)	5%
Total	*105%*

Individual assignments

- Relatively straightforward—reflect the skills you've learned in class
- About 1.5 weeks to complete
- Each worth 8% of final grade (24% total)

Group assigments

- Teams of 2–3 students
- Somewhat more complex: requires independent learning and research
- About 2 weeks to complete
- Each worth 10% of the final grade (30% total)

Final project

- Teams of 2–3 students
- Integrate everything you've learned
- About 3 weeks to complete
- 20% of final grade

In-class presentation

- You'll present the results of your project work
- You'll also present UX analysis of existing products
- We may also do peer-teaching days where you teach a skill to the class
- All of these activities (weighted equally) are worth 16% of your final grade

Class participation

- Show up to every class
- Be on time
- Do the reading
- Help your classmates
- Participate in your team
- Engage in class discussion
- Worth 10% of final grade!

Policies

Late assignment policy

- Late assignments are not accepted
  - Unless you get my **prior permission**; then 50% penalty

Attribution

- Lots of coding and making in this course
- You will find help on the Internet. This is ok!
- Give proper credit for what helped you
  - Comments in code
  - Mentions in documentation or on slides
  - See syllabus
- Don’t plagiarize!

Plagiarism

Plagiarism is the **representation of others' ideas as one's own without giving proper attribution** to the original author or authors. **Plagiarism occurs when a student copies direct phrases or code from a source** (e.g. books, journals, and internet) and does not provide quotation marks, paraphrases, or attribution; or summarizes those ideas without giving credit to the author or authors.

Plagiarism

In other words:
if you use something
someone else did,
you **must** acknowledge
that other person's work.

RIT gender-based discrimination policy

RIT is committed to providing a safe learning environment, free of harassment and discrimination as articulated in our university policies located on our governance website.
RIT's policies require faculty to share information about incidents of gender based discrimination and harassment with RIT's Title IX coordinator or deputy coordinators, regardless whether the incidents are stated to them in person or shared by students as part of their coursework.

If you have a concern related to gender-based discrimination and/or harassment and prefer to have a confidential discussion, assistance is available from one of RIT's confidential resources on campus (listed in syllabus).

RIT gender-based discrimination policy

In other words:
be kind.

Failure

- Failure is how we learn!
- This is my first time teaching this course. My lectures, projects, etc might fail.
- We'll all fail & learn collaboratively!
- Key: try!

Questions?

What is personal computing?


52Xmax

Is personal computing “over”?

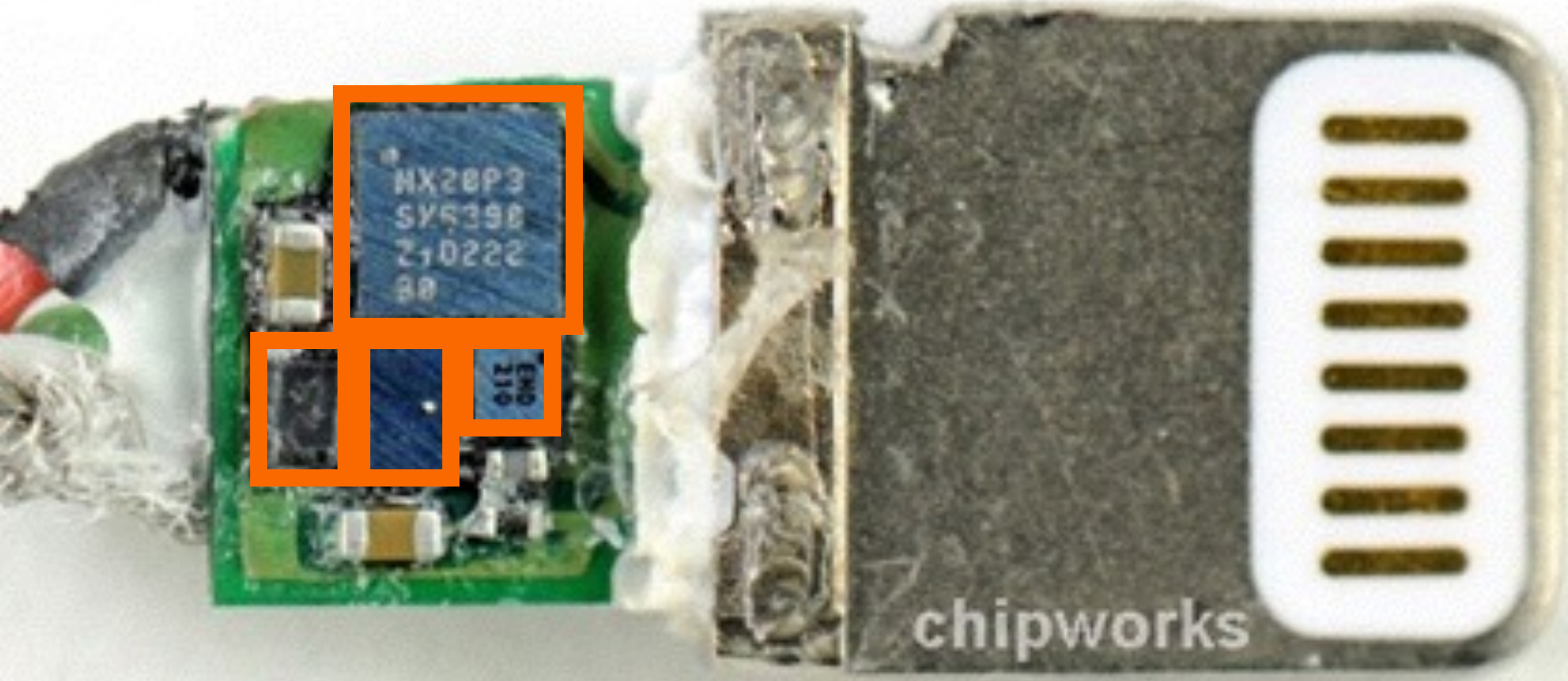
How many computers do you own?

How many computers do you have with you now?


7:10PM
12
3
6
6:09PM BARCELONA

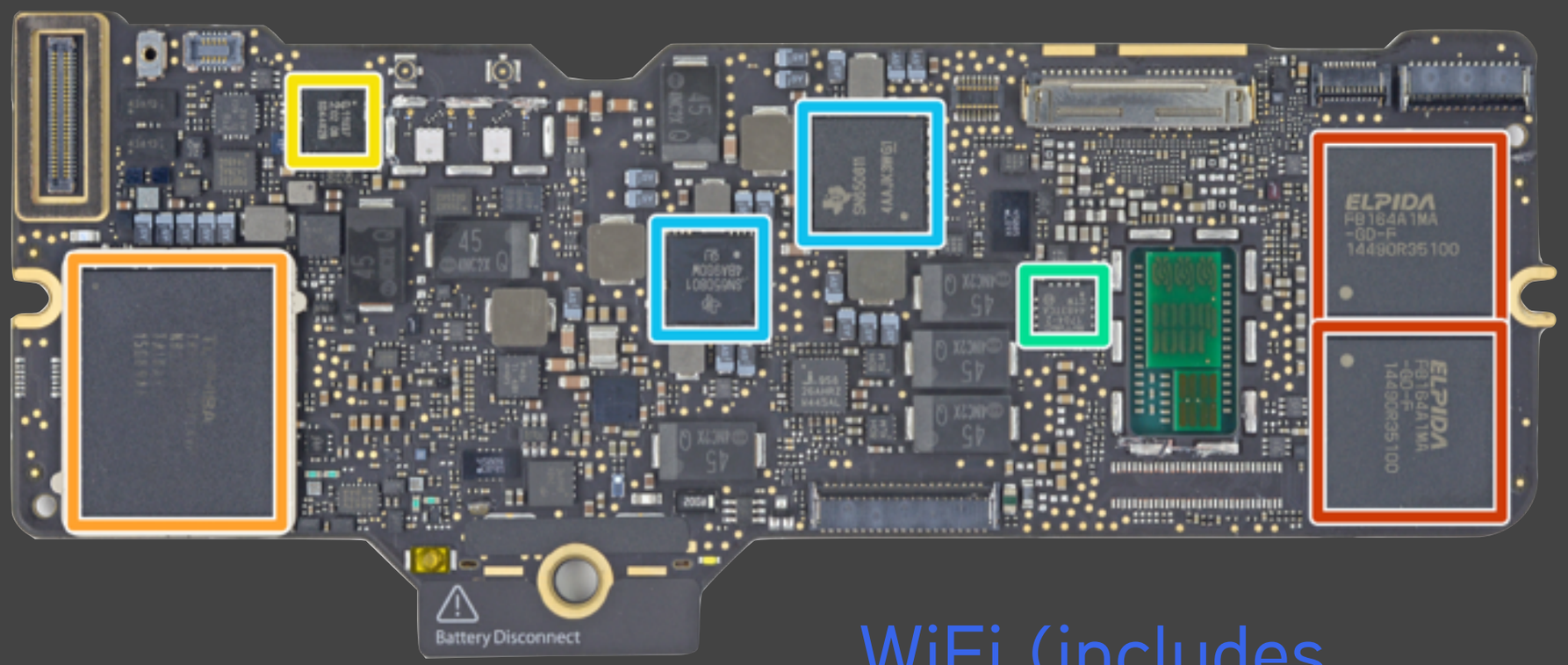

9:41 AM
100%
Messages
Calendar
Photos
Camera
Weather
Clock
Maps
Videos
Notes
Reminders
Stocks
Game Center
Newsstand
iTunes Store
App Store
iBooks
Health
Passbook
Settings
Phone
Mail
Safari
Music

October 2014
Mon 13
Tue 14
Wed 15
Thu 16
Fri 17
Sat 18
Today
Amy Frost
Trail Crew
The Dude
Chance Graham
Steve Lipin
Theo Woods
Hal
MacBook


MX28P3
SY5398
Z10222
88
chipworks

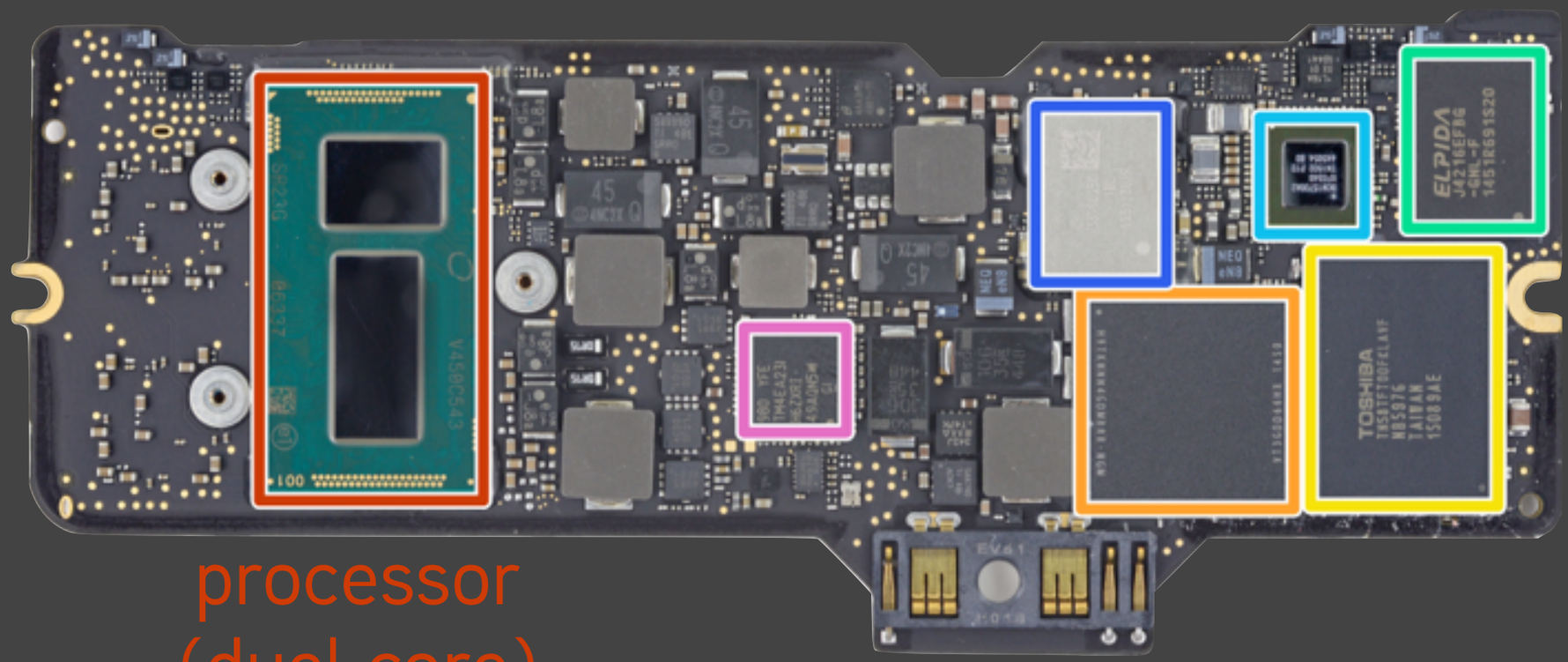
microcontroller

sensor



WiFi (includes microcontroller)

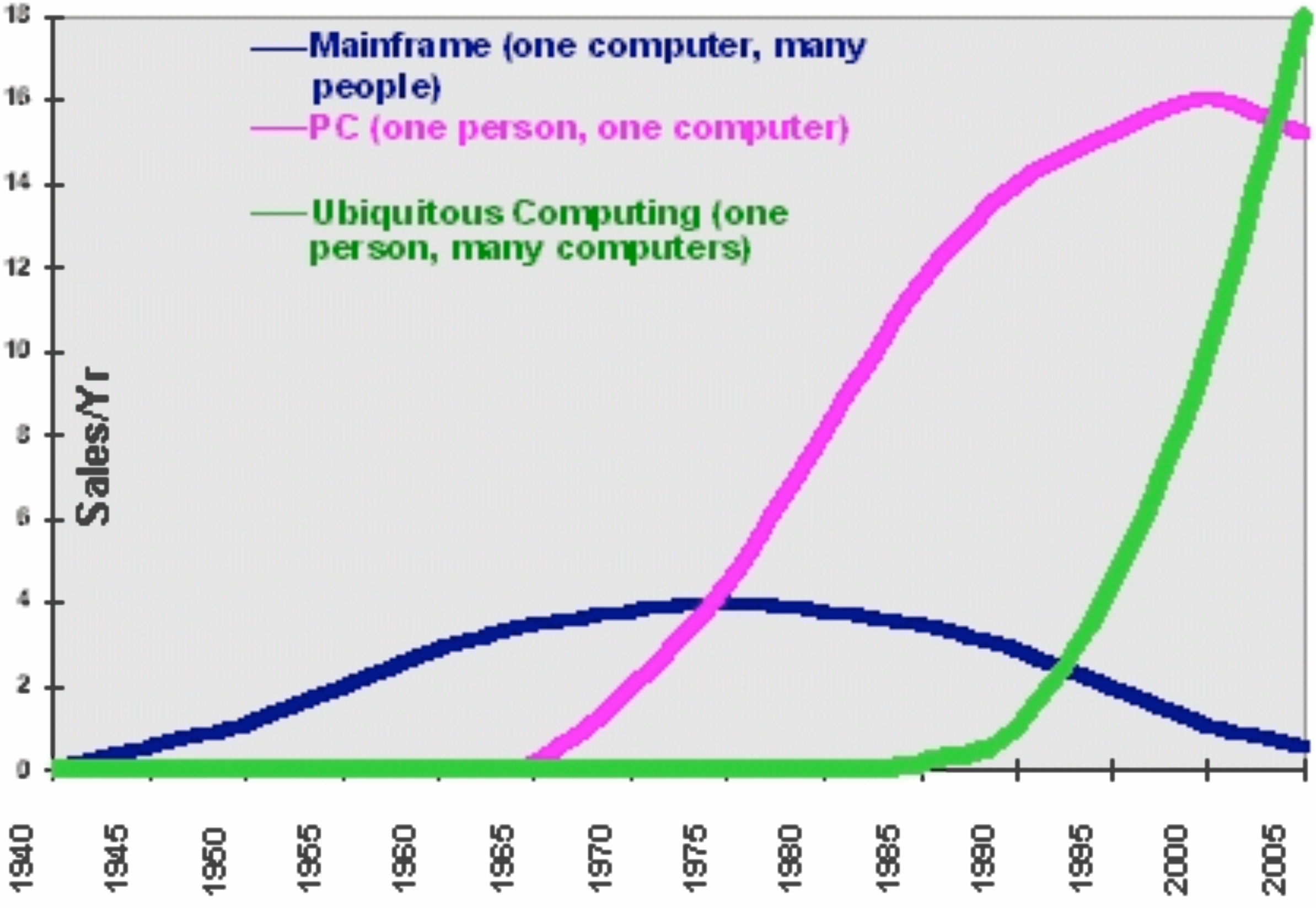
microcontroller



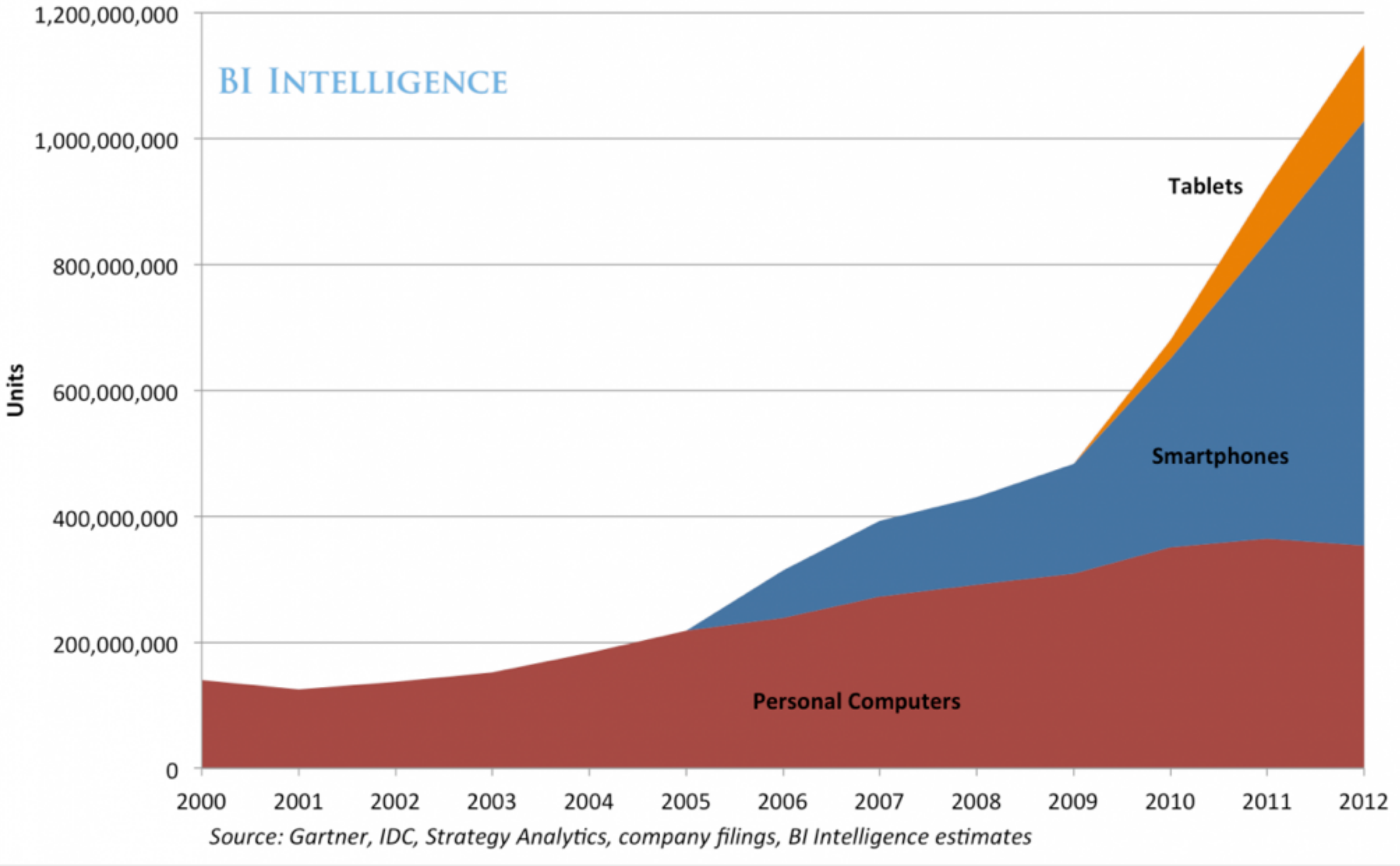
processor (dual core)

microcontroller

The Major Trends in Computing

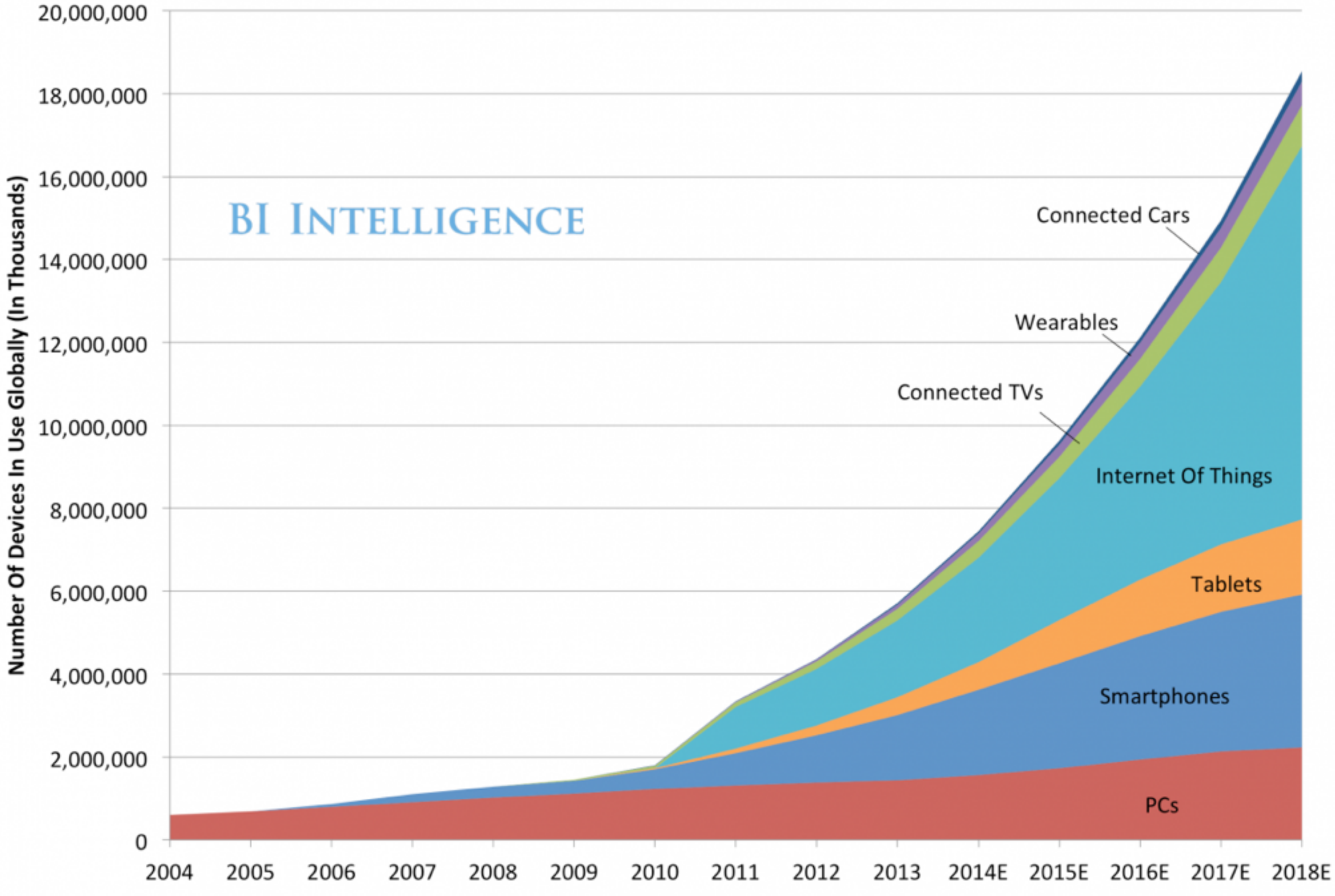


Global Internet Connected Device Shipments



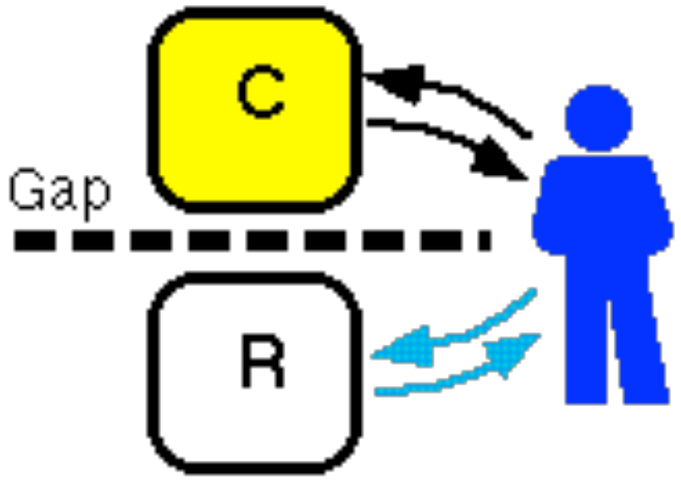
Source: Gartner, IDC, Strategy Analytics, company filings, BI Intelligence estimates

The Internet Of Everything

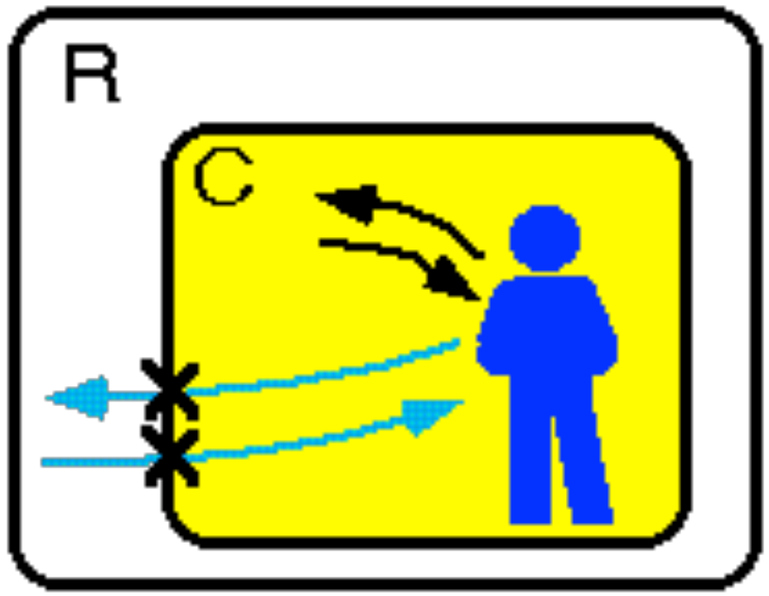


Source: BI Intelligence Estimates

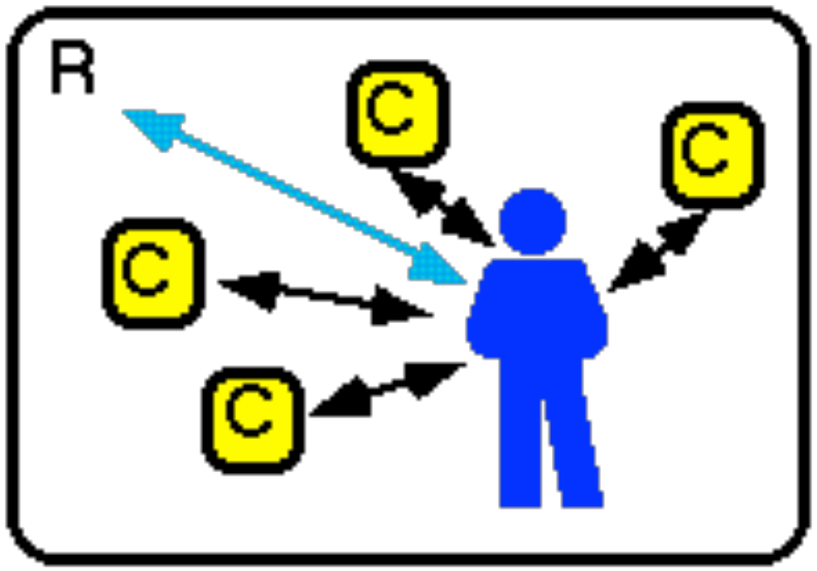
Overview



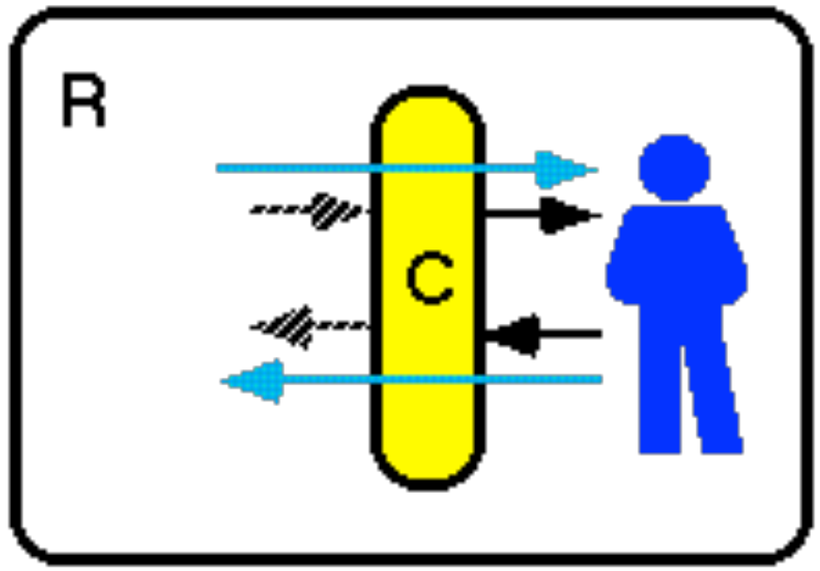
(a) GUI



(b) Virtual Reality



(c) Ubiquitous Computers



(d) Augmented Interaction

C Computer World

R Real World

Human - Computer Interaction

Human - Real World Interaction

Real World - Computer Interaction

Why do we care?

- Old paradigms:
  - one user per computer
  - several users per computer
    - software ↔ software
- New paradigms:
  - many computers per user
  - many computer for many users
  - hardware ↔ software ↔ cloud

Internet of Things

Contact

info@venturescanner.com to see all 781 companies

Venture Scanner

The Parts

- User experience
- input *(e.g. sensors)*
- actuators *(e.g. displays)*
- microcontrollers (abbrev: *μC)*
- Internet *(you know what this is)*

History

Today


nest
67
IN 20 MIN
72

Dual zone temperature

Sleep tracking

Smart alarm

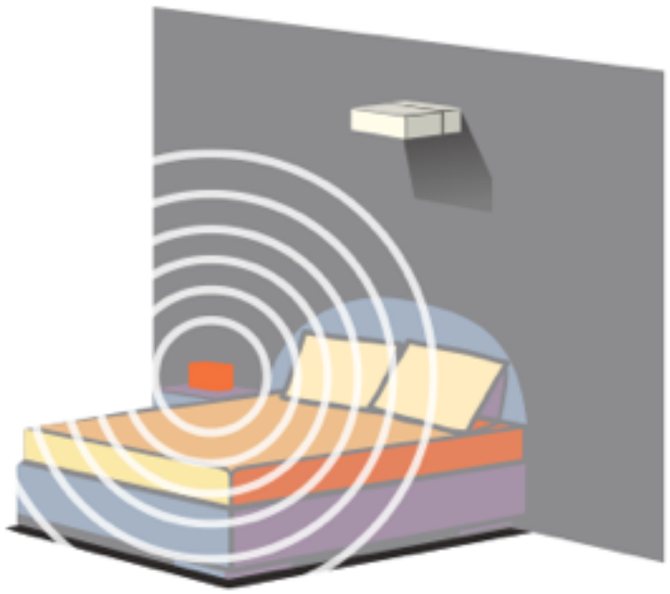
Auto learning

Mobile controlled

Smart home integration

1 **Wakē** mounts to the wall behind your bed and works with your smartphone

2 When its time to get up, **Wakē** uses a body heat sensor to find where you are



3 Instead of using normal speakers that wake up everyone ...

4 **Wakē** uses focused beams of light and sound sent exactly to your location

What's next?

- Tomorrow: course survey (on web page)
  - So I can get an idea of your skills and knowledge
- Thursday: hands-on skills—reading public data sources, visualizing data, jquery, paper.js
  - **Get set up for class Thursday—see web page!**
- Next Tuesday: reading & discussion
  - See web page for paper to read