The Internet-Of-Things

Freshman Seminar

Robert Cudmore, PhD
Assistant Professor
Department of Physiology and Membrane Biology | School of Medicine
University of California | Davis
rhcudmore@ucdavis.edu
https://cudmorelab.github.io

Overview Of Day 1
Internet-Of-Things (IOT)

- Hello and welcome and a bit about me!
- Online survey: Words you associate with the IOT
- Online survey: How IOT-ness is each of the following
- UC Davis Canvas
- Review Syllabus
- Brief history of the IOT
- IOT examples
- Online survey: What do you want from the course?

A bit about me!

1980's Started programming on a Commodore 64 when I was 12-13 years old

1992 Bachelors in Computer Science (University of Buffalo)

1990's Full time job as a programmer in a Molecular Biology lab. Lots of statistics and some cool GUI

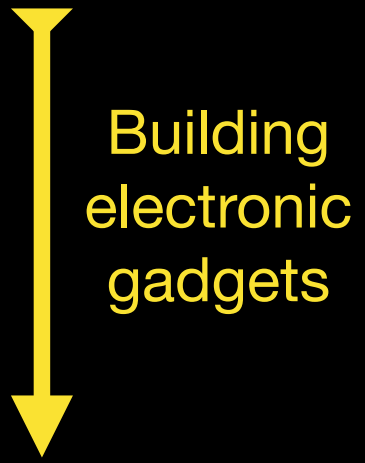
Masters coursework in Computer Science (UPENN, Philadelphia, PA)

2000's PhD in Neuroscience (Brandei University)

Postdoc in Marseille France

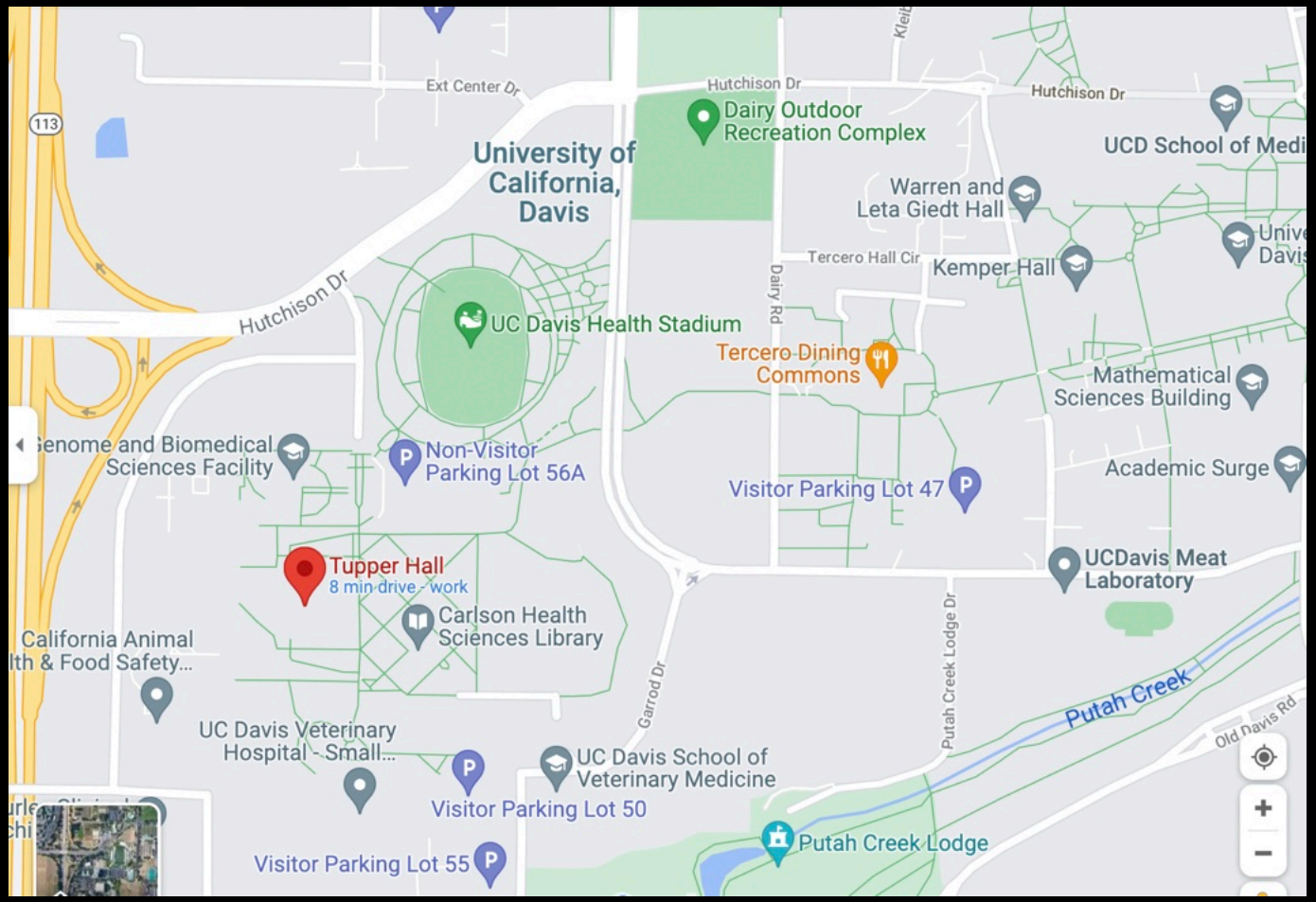
2010 Postdoc at Johns Hopkins University (Baltimore, MD)

2019 Faculty at UC Davis



Administrative

Tupper Hall 2135



Online Surveys

We will start with two online surveys

- Survey, 1: Words you associate with IOT.
- Survey 2: Rate a potential IOT from ‘not at all IOT’ to ‘very IOT’.

There are no correct or incorrect answers.
This is not a quiz.
Your responses are anonymous (A big topic for all IOT).

Survey 1: Words you associate with IOT

- https://www.menti.com/k1o7i7ok99
- Voting Code: 2716 9936
- We will review the results a bit later …

Survey 2: Rate the following on the level of IOT-ness

- https://www.menti.com/pucoptg945
- Voting Code: 7437 9446
- We will review the results a bit later …

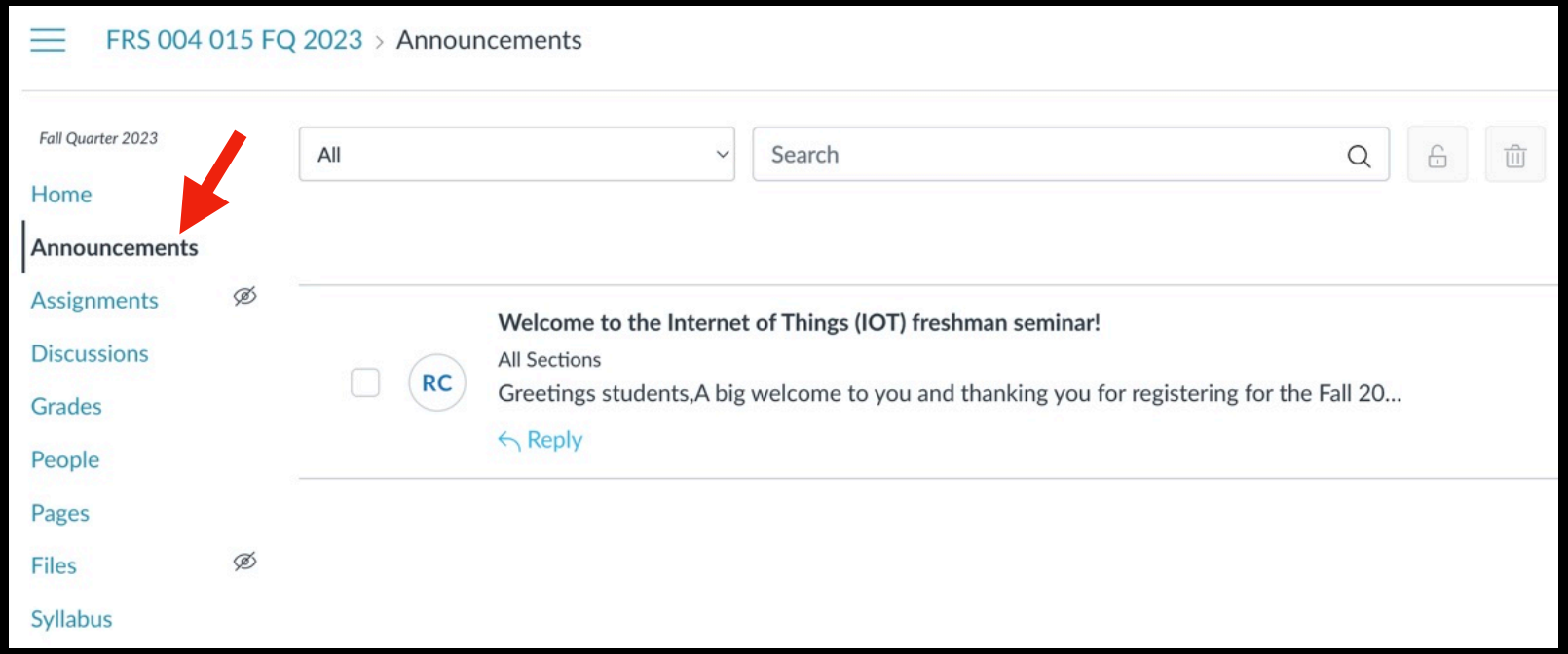
Overview Of Day 1

Internet-Of-Things (IOT)

- Online survey: Words you associate with the IOT
- Online survey: How IOT-ness is each of the following
- **UC Davis Canvas**
- Review Syllabus
- Brief history of the IOT
- IOT examples
- In class feedback: What do you want from the course?

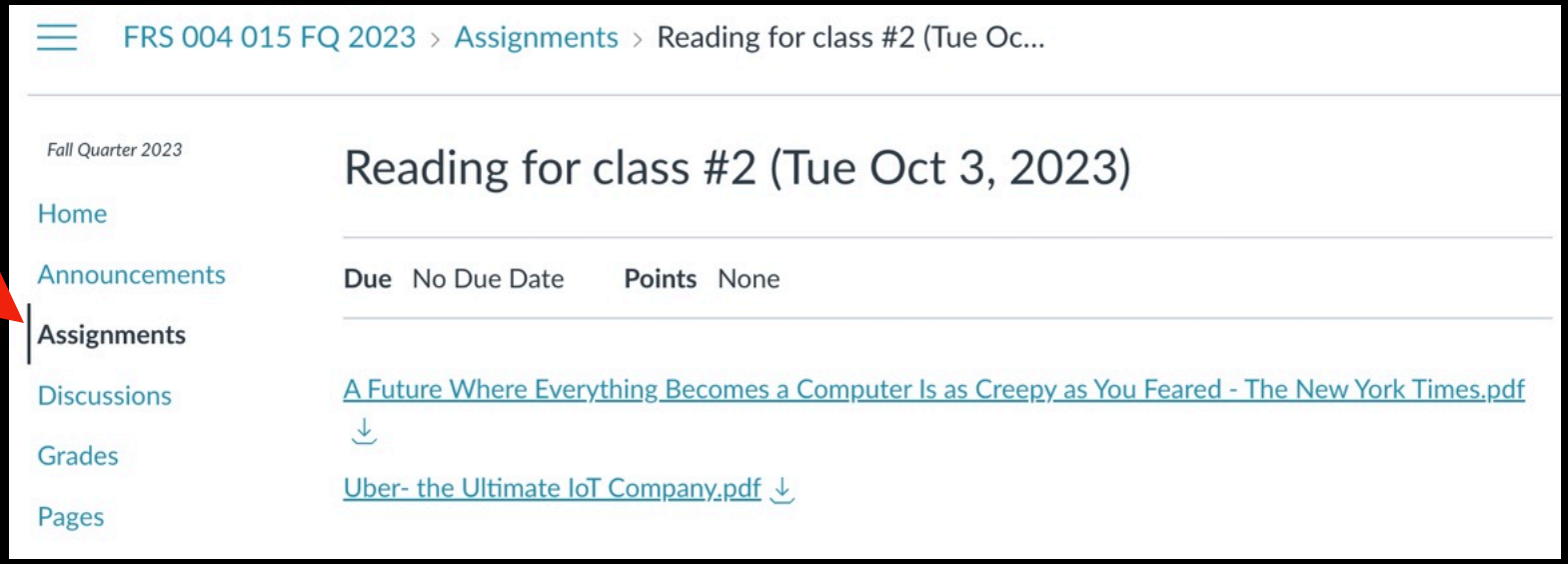
UC Davis Canvas

Announcements



UC Davis Canvas

Assignments



- These reading assignments are not graded.
- They will hopefully get you thinking about the next lecture.
- We want to raise questions and have discussions.

UC Davis Canvas

Syllabus

Fall Quarter 2023

- Home
- Announcements
- Assignments
- Discussions
- Grades
- People
- Pages
- Files
- **Syllabus**
- Outcomes
- Rubrics
- Quizzes
- Modules
- BigBlueButton

Tentative Schedule (some changes may apply):

***November 14th and 16th – lectures will be delivered remotely via zoom or with a guest lecturer**

Week	Lecture	Date	Day	Topics
1	1	9/28	Thur	- Overview of course structure, syllabus, goals, and expectations. - Online surveys of students impression on the IOT. - Discuss students expectations and desires for the course. - Origins of the IOT. - Components that make up the IOT and some examples.
2	2	10/3	Tue	- Ride Sharing.
2	3	10/5	Thur	- Scooter/Bike/Car sharing. - Social and economic impact of IOT.
3	4	10/10	Tue	- Review of components that make IOT. - A 6 level framework for thinking about IOT systems.

Syllabus Overview

Lets have a look at the syllabus.

We need to decide (not right now) if we want to

1) Build our own IOT using Arduino
2) Focus on medical biometric IOT
3) Other?

https://canvas.ucdavis.edu/courses/811497/assignments/syllabus

Grading

Class is registered as pass/fail

- Class participation
- Project: Building a personal IOT
- Final presentation.

  Review an IOT or present one you built.

  7-10 minute presentation.
- Final written paper

  The final paper is a maximum of 4 double-spaced pages including figures and legends.

Thoughts or Questions on Course Details?

Brief History of the IOT

- Hello and welcome
- Online survey: Words you associate with the IOT
- Online survey: How IOT-ness is each of the following
- UC Davis Canvas
- Review Syllabus
- **Brief history of the IOT**
- IOT examples
- Online survey: What do you want from the course?

What is the IOT?

Internet of things

From Wikipedia, the free encyclopedia

- 2023

The **Internet of things** (**IoT**) describes devices with sensors, processing ability, software and other technologies that connect and exchange data with other devices and systems over the Internet or other communications networks.[1][2][3][4][5] The Internet of things encompasses electronics, communication and computer science engineering. Internet of things has been considered a misnomer because devices do not need to be connected to the public internet, they only need to be connected to a network,[6] and be individually addressable.[7][8]

- 2022

The **Internet of things** (**IoT**) describes physical objects (or groups of such objects) that are embedded with sensors, processing ability, software, and other technologies that connect and exchange data with other devices and systems over the Internet or other communications networks.[1][2][3][4]

- When “things” communicate with other “things” on the internet (or any network)
- My inclusion of a “thing” as part of an IOT is very broad

What is the IOT?

According to Wikipedia

The field has evolved due to the convergence of multiple technologies, including ubiquitous computing, commodity sensors, increasingly powerful embedded systems, and machine learning.[1] Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), independently and collectively enable the Internet of things. In the consumer market, IoT technology is most synonymous with products pertaining to the concept of the "smart home", including devices and appliances (such as lighting fixtures, thermostats, home security systems and cameras, and other home appliances) that support one or more common ecosystems, and can be controlled via devices associated with that ecosystem, such as smartphones and smart speakers. The IoT can also be used in healthcare systems.[5]

IOT is possible because of the development of a number of technologies

- Ubiquitous computing: When computers/sensors/network are embedded in objects
- Smaller/Faster/Cheaper: computers/sensors/network

https://en.wikipedia.org/wiki/Internet_of_things

What was the first IOT?

A toaster?

- 1990: Considered the first IoT device, John Romkey created a toaster that could be turned on and off over the Internet for the October '89 INTEROP conference
- see: https://www.postscapes.com/iot-history/
- It is interesting to note that this simple proof of concept, the IOT toaster, is now the type of example that make people laugh and think the IOT is silly.

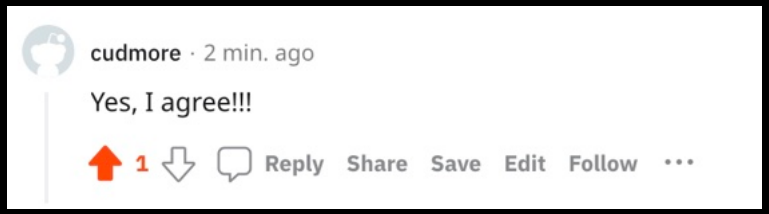
Lets Talk: Is an IOT toaster, microwave, dish washer, washing machine silly? Are these things neccessary?

What was the first IOT?

A webcam?

- My answer

  Coffee pot webcam at University of Cambridge



- Put on the internet in 1991
- Transferred to the web in 1993
- Became the worlds first webcam

  See: https://www.cl.cam.ac.uk/coffee/qsf/coffee.html

https://www.reddit.com/r/IOT/duplicates/3js9jp/the_trojan_room_coffee_pot_may_have_been_the/

Overview Of Day 1

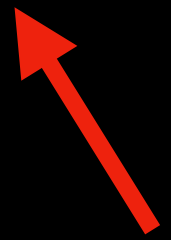
Internet-Of-Things (IOT)

- Online survey: Words you associate with the IOT
- Online survey: How IOT-ness is each of the following
- UC Davis Canvas
- Review Syllabus
- Brief history of the IOT
- **IOT examples**
- In class feedback: What do you want from the course?

Examples of IOT

These are examples we will cover in the class

- Ride Sharing
- Scooter/Bike/Car Sharing
- Agriculture
- Manufacturing and Industry
- Supply chains (delivery of goods)
- Smart Home
- Smart cities
- Biometric data
- etc. etc.



As a biologist and a “futurist”,
I am really interested in this and would
like to expand this section!

Examples of IOT

Ways to think of each example IOT

- Technology behind the sensors and actuators
- What wireless technology is used to get data to and from a “thing”
- What type of cloud computing does it use
- What data is being transmitted and analyzed (is it personalized)
- What are potential societal impacts
- What are potential economic impacts

Survey 1: Words you associate with IOT

Review Results

Survey results:

https://www.mentimeter.com/s/5ebda3853ae0d97c51e904fbfcaf4444/3cef0af71536

Survey 2: How IOT-ness is each of the following

Review Results

- survey results: https://www.mentimeter.com/s/0b89f21597df1d21394da7fa56c3cace/2fb32a8b2107

- GPS satellites communicating with a mobile phone.
- An internet connected camera pointed at an office coffee pot.
- When you use your phone to track the delivery of a package.
- Covid contact tracing with personal cell phone Bluetooth.
- An aircraft engine that logs 20+ sensor values and saves the data to a local flash drive.
- A smart thermostat that turn the heat/ac on and off based on your proximity to local WIFI.
- A door camera that sends you a text message when there is movement in front of the door.
- Ride Sharing With Uber/Lyft

Survey 3: What topics do you want to cover?

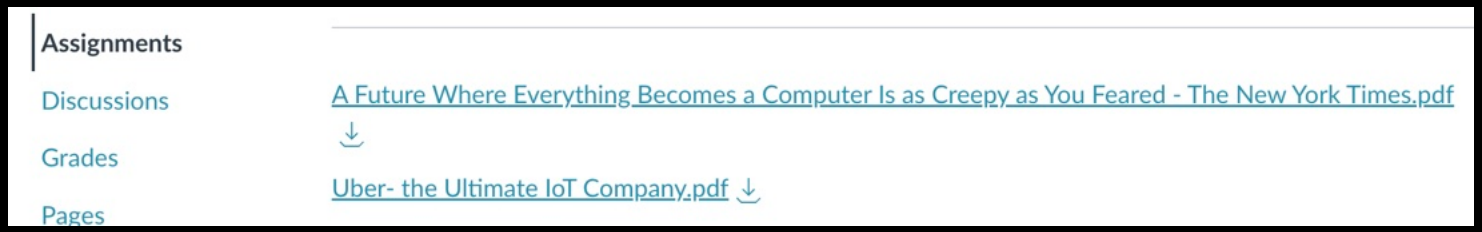
- https://www.menti.com/suz9qkrxvx

Survey 3: What topics do you want to cover?

Survey Results

- https://www.mentimeter.com/s/fca08353fc4fee8d63d56e317183c032/b75bbe7c8983

Next Class



1) Briefly discuss the readings.

- Both are from 2018. Fast forward to 2023
- What did they get right and or wrong about the IOT we have today?

2) Ride Share IOT (Uber, Lyft, Others)

- Technological Overview
- Economic Impacts
- Social Impacts