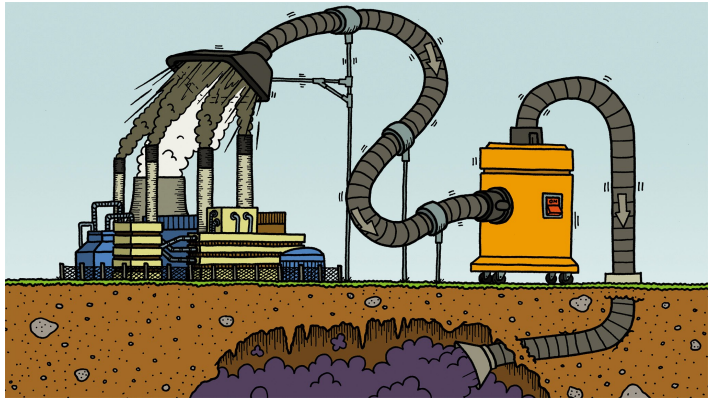
Technology for Conservation and Sustainability

Renewables, Electrification & Storage

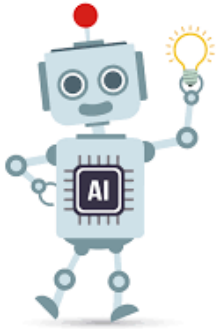
Food & Agriculture

Plastics (Materials)

Carbon Capture and Storage



Big Data & AI



Human Behavior

Enabling Technology

Intro to Terminal

What is “the terminal”?

A *command line system* that can help you quickly take control of your *operating system* and make changes.
BASH Programming Language

*Where is this image from?

Intro to Terminal

What can you do with “the terminal”?

Tell your computer what do to

Explore your computer

Install Programs

Write Bash scripts

Build a Scheduler (CRON)

Send e-mails

Scrape a Website

Schedule Machine Leaning Scripts

Explore Data

Build an ETL Data Pipeline

Take Control of Multiple Programming Languages

Intro to Terminal

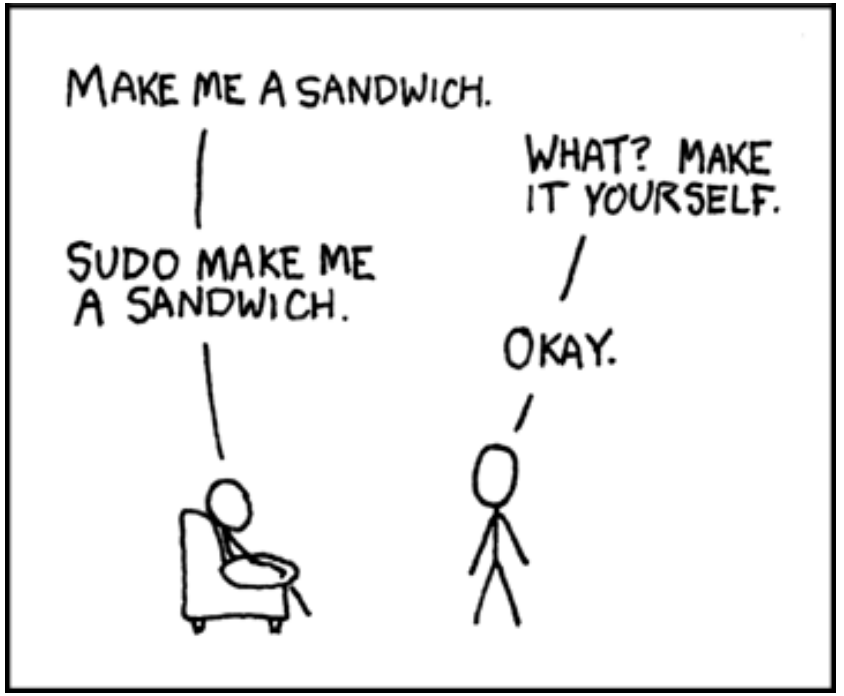
Start with the Basics

Navigation

<Where am I?> **pwd**
< Get Into> **cd <DIRECTORY>**
<Get Out> **cd ..**
<Get all the way out> **cd**
<What's inside> **ls**
<What's inside and give me info> **ls -l**

Creating Directories and Files

<Make directory> **mkdir exampledidr**
<Create file> **touch filexample.txt**
<Add inf to file> vim filexample.txt
<Delete file> **rm filexample.txt**
<Delete all of it> **rm -r exampledidr**



super user do

Intro to Terminal

Start with the Basics

Moving things Around [TRICK]

mv /Downloads/MyFile.txt /Documents/Work/MyFile.txt

cp /Downloads/MyFile.txt /Documents/Work/MyFile.txt

Exercise 1

Create two directories: 1) ”blue” directory and “red” directory
Make one file in each directory
Move the files from the blue directory to the red directory

Intro to Terminal

ssh (secure socket shell)

A set of rules (a network protocol) that determines how data is transmitted in the same network.

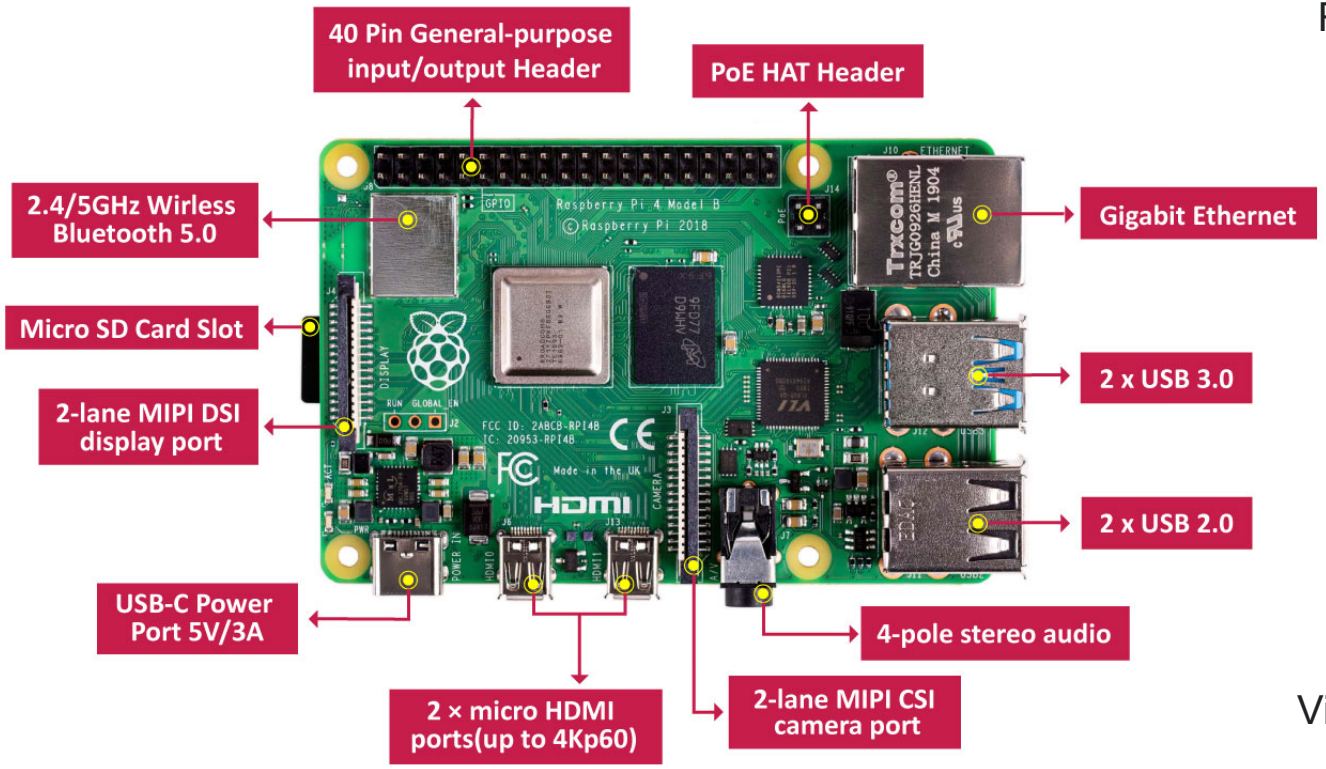
“ssh into”?

“Create a secure and encrypted communication line between two communication devices (Raspberry Pi <> Computer) through the internet so we can keep going”

Intro to Raspberry Pi

Raspberry PI: A microprocessor based mini-computer (SBC). A single board computer.

- Microprocessor, any of a type of **miniature electronic device** that contains the arithmetic, logic, and control circuitry necessary to perform the functions of a digital computer's central processing unit.
- Linux



Robotics

Sensor Networks

Retro-Gaming Consoles

Network Monitoring

Prototyping New Ideas

Tinkering

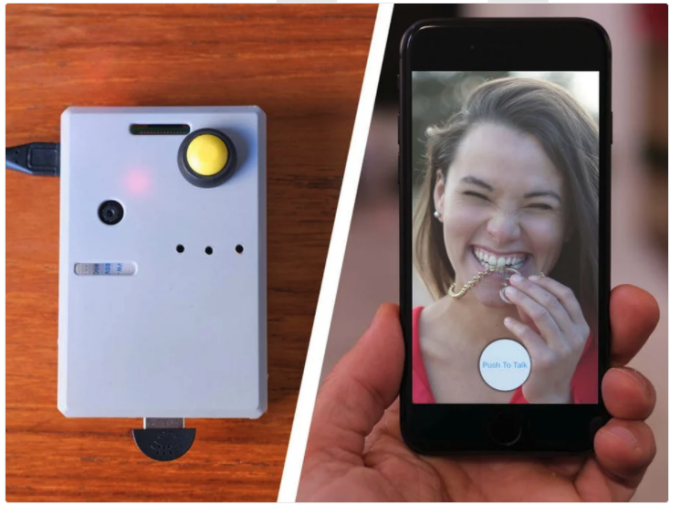
Building a Start Up

Virtually Anything

Intro to Raspberry Pi

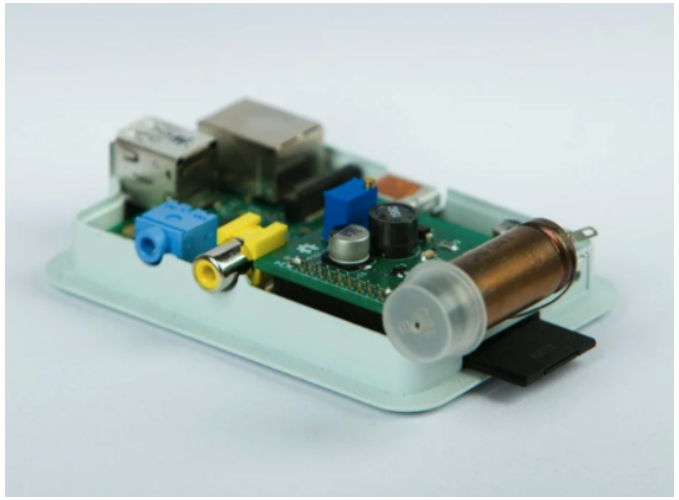
What can you do with a Raspberry Pi? **ANYTHING**

Small Arcade Machine

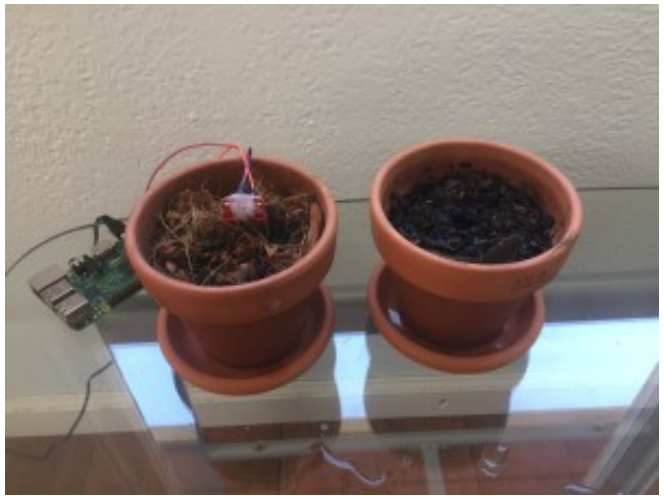


Smart Door Bell

Smart Cereal Dispenser



Geiger-Muller Counter



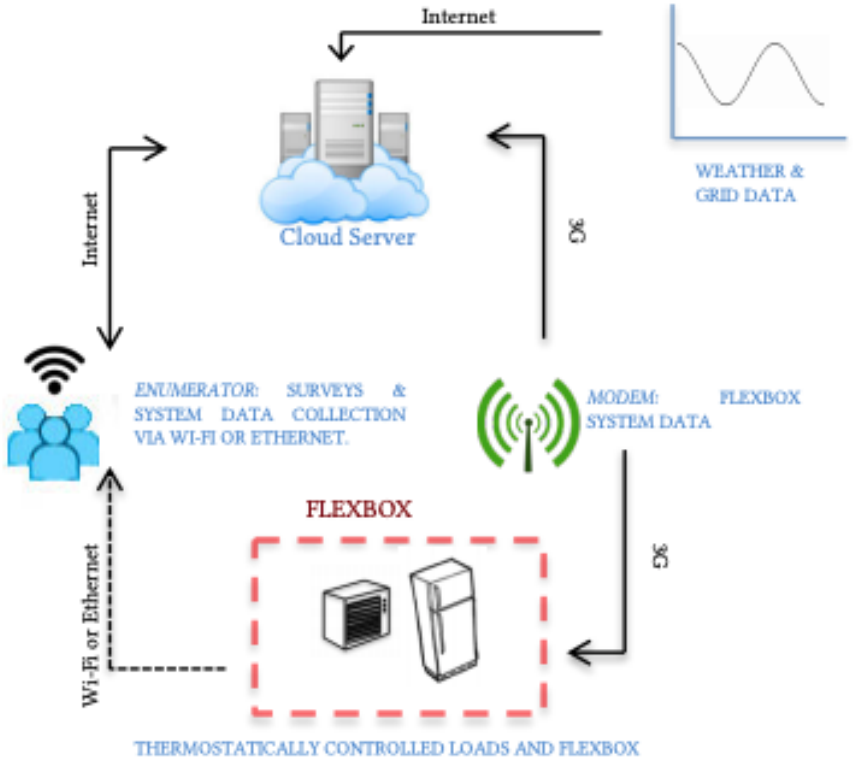
Smart Irrigation System

What are we doing with a Raspberry Pi?

Raspberry Pi + AI Technology for
Sustainability and Conservation

Intro to Raspberry Pi

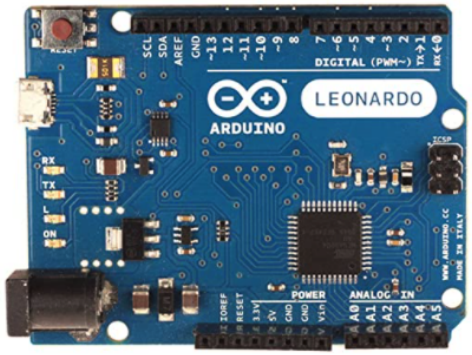
How far can you go with a Raspberry Pi?



Connecting Cloud Infrastructure, to Wind Energy to Thermostatically Controlled Loads (Refrigerators)

Intro to Raspberry Pi

Raspberry Pi Downsides – BUT best for early/learning prototyping



Arduino

- No OS, programmed in C
- Energy efficient, light (USB port)
- Bare bones, flash memory (no SD card)
- Simple + Repetitive Control:
  - Sensors, Electronics, Motors, LEDs
- Useful for scalable projects
- Clock speed 16 MHz
- Good with unstable power
- Hardware and Software are Open Source

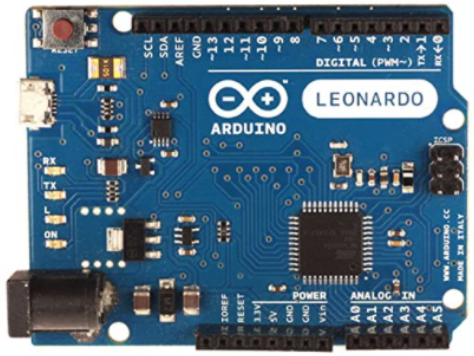
Raspberry PI

- Needs OS
- Energy expensive (need a power adapter)
- Small computer, GPIO
- Complicated Control:
  - Performing multiple tasks, robots, cameras, etc.
- Useful for scalable projects
- Clock speed 1.2 GHz
- Bad with unstable power
- Not open source

*** Look into BeagleBone**

Intro to Raspberry Pi

Raspberry Pi Downsides – BUT best for early/learning prototyping



Arduino

Develop an application where you want to monitor Humidity and Temperature using sensors, display the results on a display.

Raspberry PI

- Monitor the Humidity and Temperature using sensors
- Send an e-mail with the results, check/compare the reading with a weather report, build an ML model for irrigation, control drip.

Arduino is used for beginner projects and quick electronics prototyping while Raspberry Pi is used for more complicated projects.