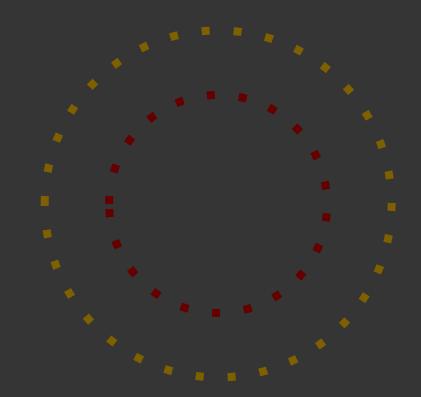
Introductions

Welcome to the Bioengineering Boot Camp

Ground Rules:

- 1. Treat *everyone* with respect
- 2. Don't be afraid to ask questions / work together
- 3. If you think it would make Dr. B mad, it will
- 4. Don't shout out answers, Dr. B will call on you. Give everyone an opportunity to think about the answers.
- 5. No cell phones. If you really want to take pictures for snap-book, ask.
- 6. Take the learning seriously, but have fun!

If I were a...



If I were a...

- A Type of Fruit
- A Historical Figure
- A Household Object
- A Cartoon Character
- A Dog or Cat Breed
- A Tree
- A City

Leave everything here

We don't want you to forget to bring something tomorrow so just leave everything here

How to use your Journal

We are going to be learning a LOT this week so we have supplied you with notebooks to take notes.

Part of what we are going to learn this week is how to take good notes.

Today, work on not writing EVERYTHING down, but just the key things that you think might be important.

<u>Journal Outline - Day 1</u>



Use the resources on github SPARINGLY if at all

You are here to LEARN not copy.

How to use the github page

All of the code, slides, and manuals we will use this week are going to be hosted on Dr. Bechara's github page.

To visit it go to:

https://github.com/sbechara/BioBootCamp

Biomedical Engineering



What is Biomedical Engineering?

What kind of questions do we ask?

Biomedical Engineering

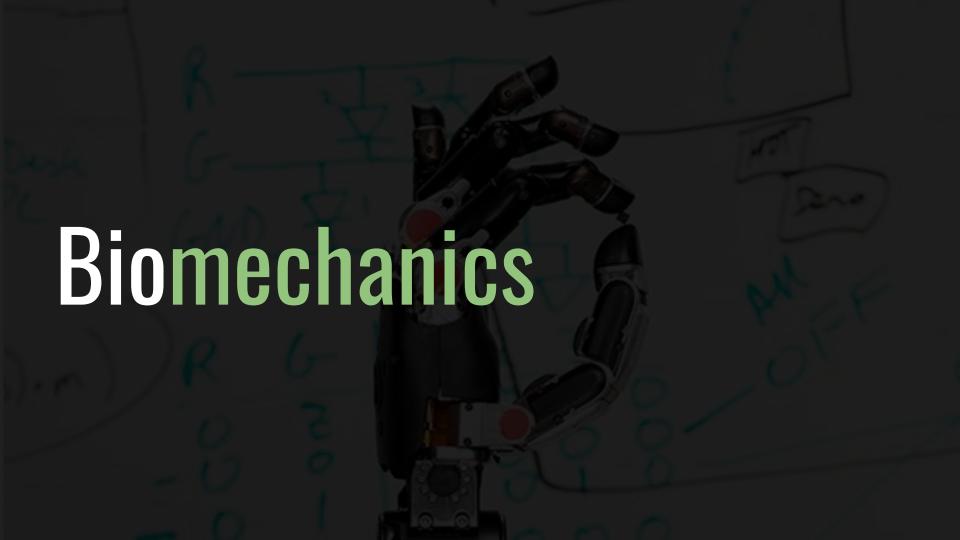
So What?
What can we do
How can we make something?



What kind of stuff do we make?

Biomedical Engineering

Prosthetics
Instrumentation
Medical Devices
Artificial Organs
...and more

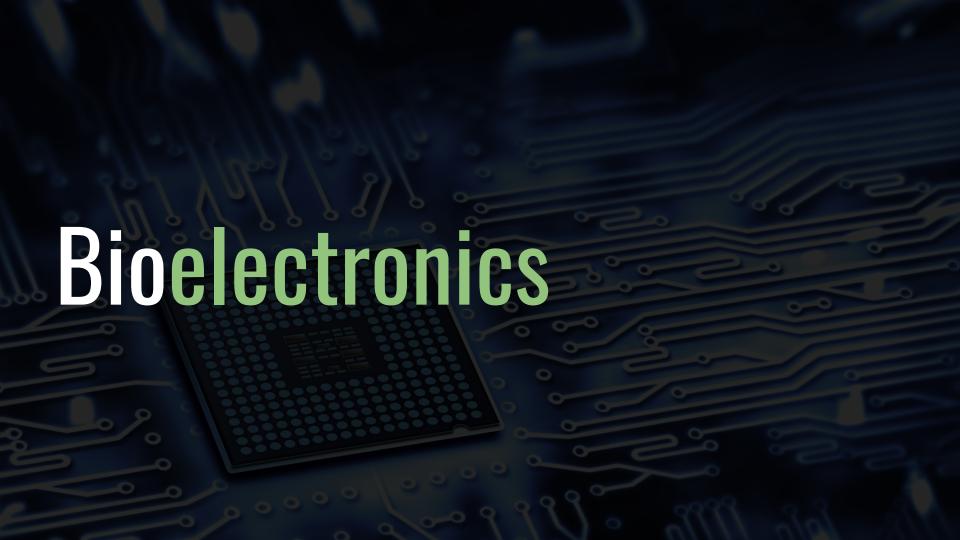


Robotic Exoskeleton









Pressure Sensitive Artificial Skin



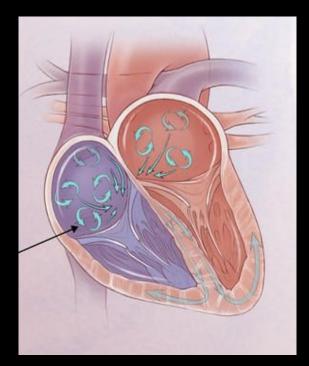
Biocomputing

return c: fcomplex Cinv(fcomplex z)

Problem: Atrial Fibrillation (AFib)



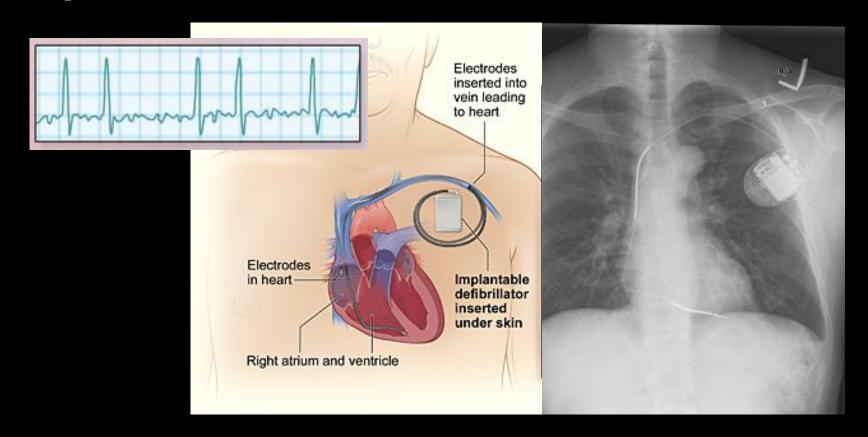




Automated External Defibrillator

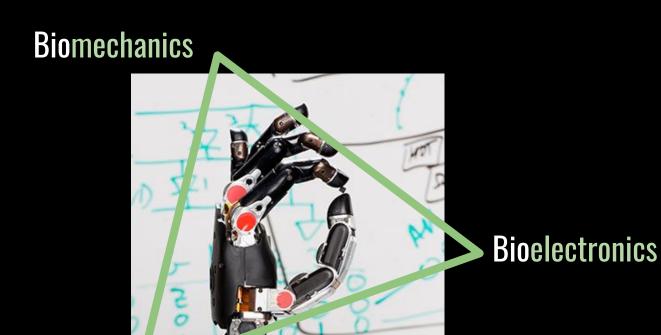


Implantable Cardioverter Defibrillator



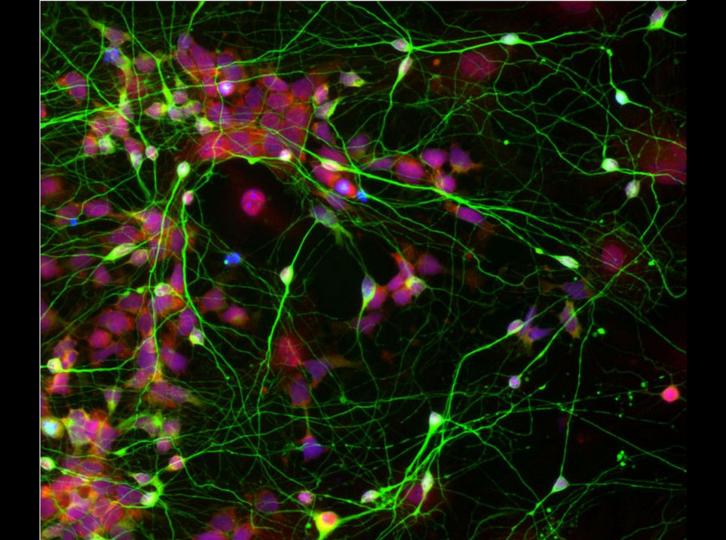
Distinction is not what project you will be working on but what you will be doing...

DARPA Built Prosthetic that can Feel



Biocomputing

Tissue Engineering



Regenerative Medicine





Linux Introduction: What is Linux?

Samuel Bechara, PhD

First off, what is a computer?



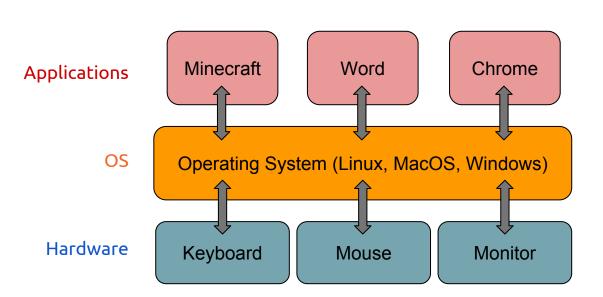




What is Linux?

<u>Linux is an</u> <u>operating system</u>

An operating system acts as the interface between the user and the computer and tells all the computer parts how to work





1. Why Linux?

There are lots of reasons people use Linux. Here are a few.

→ Fast

Linux is designed to be used on older hardware so it's faster than Windows

→ Free and Open Source

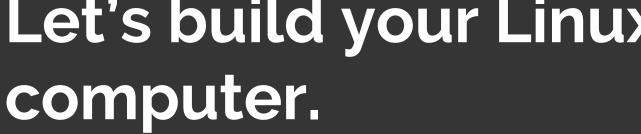
It doesn't cost anything and you are free to see the code and change anything you want

→ Secure

You don't have to worry about hackers getting into Linux









Remember

The computer we are using is called a Raspberry Pi (you can think of it like a Macbook Air). The operating system it runs is called Linux (like MacOS or Windows 10)

Survey

Now that we all have our computers setup, please take the time to fill out a survey.

Please take it seriously.

https://goo.gl/forms/4d1o8NcgwZawgiUv2



In Linux, everything is either a folder or a file

I mean EVERYTHING. That is what makes it so easy to customize and change. If it isn't a file, it is a folder.

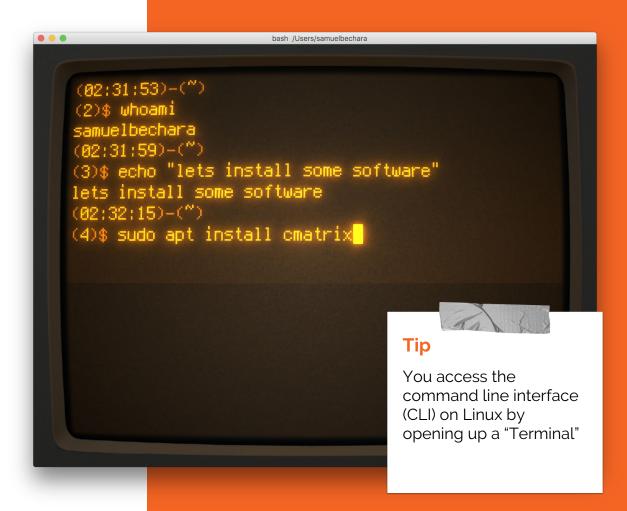
That means all we need to learn is how to navigate the folders and to create and change files!

So...how can we communicate with communicate? [rotslocalhost -J# cd /var rotslocalhost var]# ls -ls -cd /var rots -ls -

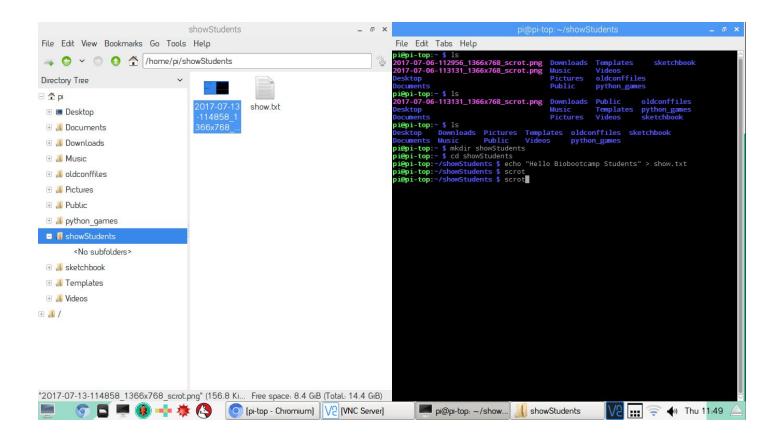


Linux is awesome because it is built around both a CLI and a GUI.

The CLI lets you interact with the computer quickly and efficiently



CLI vs GUI Demo



The Anatomy of a Linux Command

sudo program options -flags





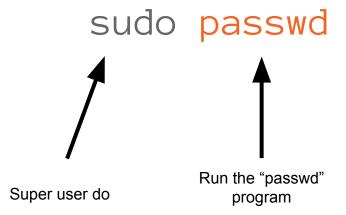


- This is optional and you should use it with caution. It stands for "Super User Do".
- Use when you need to install or update software or access restricted files
- Here I say program but there are also built-in commands in linux that you would write here
- Try typing "1s" into your command line

 Some programs run fine on their own and some need extra options or commands

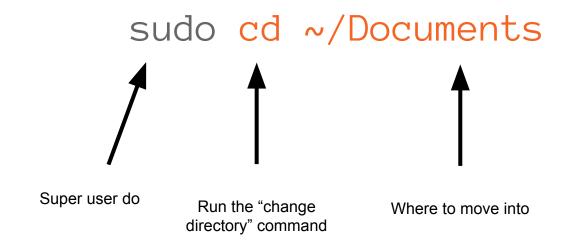


Change your password

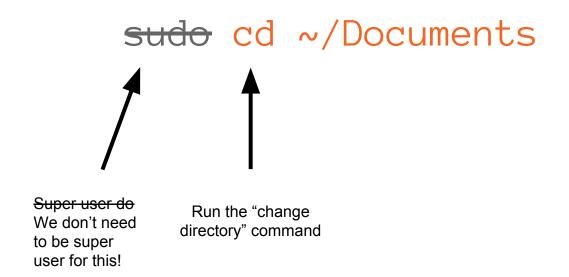


This command will allow you to change your unix password. This is the main password for your computer. If you forget it, you can not reset it! Make sure it is something that you will remember!

Move to your document folder

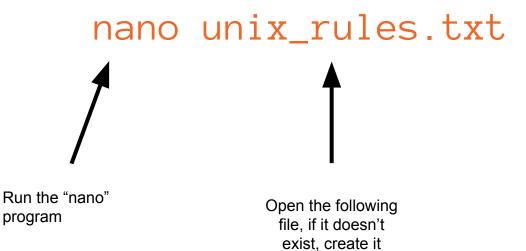


Move to your document folder



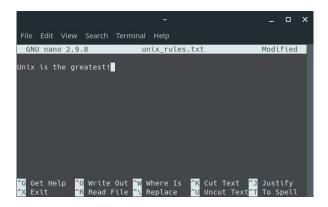
If no argument is supplied for cd, it will automatically take you home. Isn't that nice?

Create a text file named unix_commands.txt



Now we are in the nano program

Type a few sentences. Whatever comes to mind...

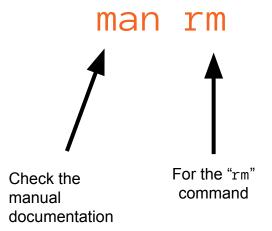


See the little help box below? It is telling you how to do stuff. Nano is like the lightweight, free, open-source, hacker version of Microsoft Word.

After it is saved, find it on your computer using the GUI

Everything that you can do with a GUI you can do with a CLI. But usually the CLI is faster and gives you more control and options!

Investigate what rm command does



q is usually saved for quitting...

Delete the unix_rules.txt file from a different location!

cd ~/Downloads

rm ~/Documents/unix_rules.txt

The "path" to the file

Remember, in Linux everything is a folder or a file so it is easy to delete or add files that are in different locations than the one you are at! All you have to do is specify the "path" to the file of interest!

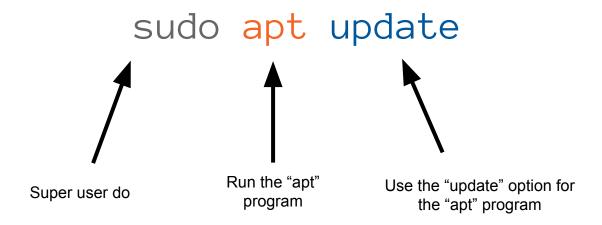
Go back home

cd ~

OR

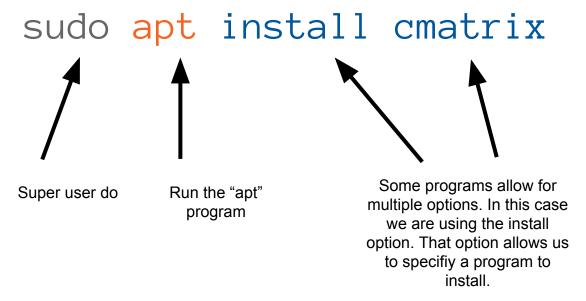
cd

See if there is updated software



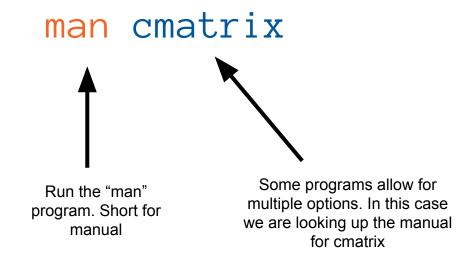
This command will run the apt program as super user and will go online and search for updated versions of programs. It will not install updated versions. I'll show you how to do this later

Install cmatrix



This command will run the apt program as super user and will go online and search for a program called cmatrix. If it finds it, it will install it. If it doesn't, it will return an error.

How to find out what a program does



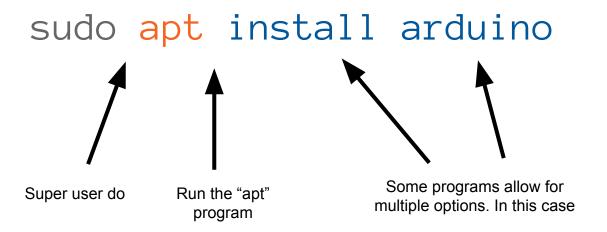
This command will display the manual for the cmatrix program. It shows us the different options we can use for the program.

Run Cmatrix

cmatrix

Press "q" to quit

Install a piece of software called cmatrix



This command will run the apt program as super user and will go online and search for a program called arduino. If it finds it, it will install it. If it doesn't, it will return an error.

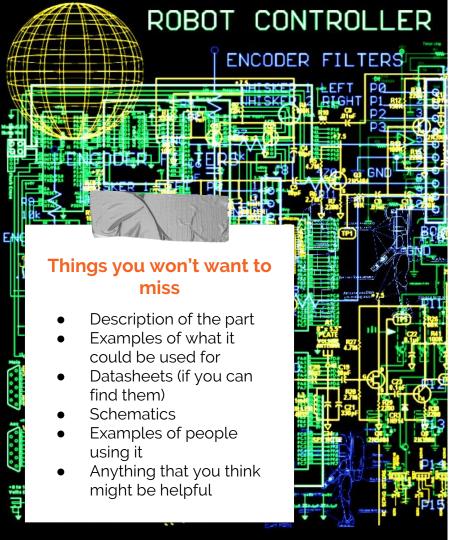
In linux there are a million ways to do things. I'll show you where Arduino is.



2. Linux Tips

- → If you get stuck...

 Google your problem! Lots of people will have had similar problems, you are probably not the first!
- Don't just type stuff in Try and figure out what it is that you are typing in
- → Use sudo sparingly When you run sudo, you CAN seriously mess up your computer. Don't just type in sudo commands that you find online if you need help. Be discerning.



Part Search

Find the person whose birthday is closest to yours.

In a minute we will hand out the kit of parts that we are going to be using for this camp.

You will be assigned a part, with your partner, look up all the information you can about that part and add it to the Google Slide presentation.

When you are done, you will present your part to the group in a 2 min presentation.

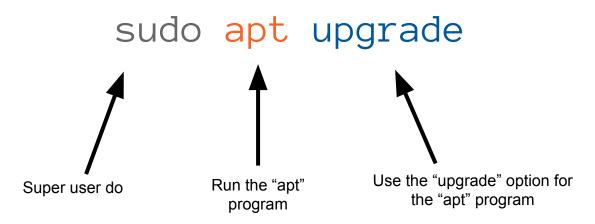
Part Search Presentations

You have 2 minutes to talk to the group about your part Highlight what you think it is going to be used for and what you learned

Any other information you want to add would be great!

Upgrade your software

* DO NOT TRY THIS YET *



When we ran the update command earlier, it went online and looked for updated versions of software. Most likely there were several updates available. By running this command it will upgrade all the software on your computer. The first time will take a while so lets wait...

While your RPi is updating, take a minute to reflect in your journal

Tip

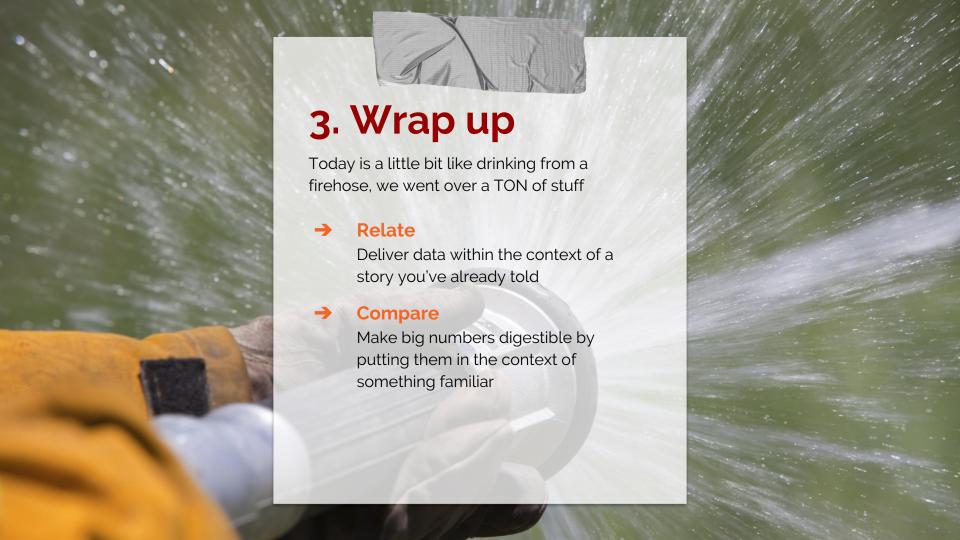
Write down whatever you want. They only thing we ask is that you take it seriously.

MIT Terminus

Optional "Homework"

https://goo.gl/DyCniv

Student pairing ideas



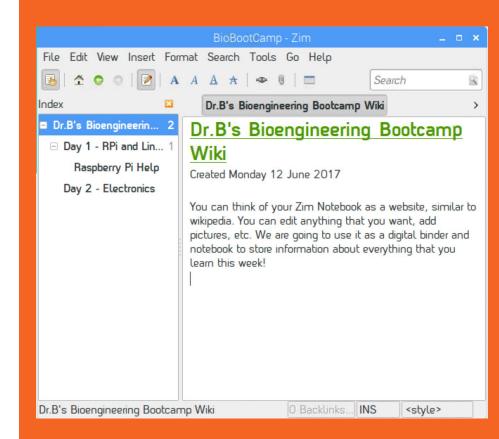
Concentric Circles

Meet Zim.

Zim is a free and open source program that we are going to be using throughout the week to keep notes.

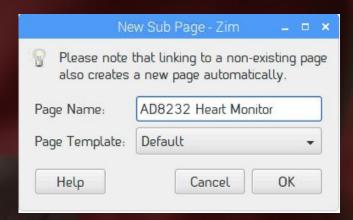
We are going to start by importing a notebook I have started for you.

When we are done, we will be able to export our notebooks as websites!



You need to create a "sub-page" underneath the Part Search page for your assigned item.

Name it after your assigned item.





Tip

Try and figure this stuff out on your own! There are a bunch of different ways that you can do it.