Operating Systems and the IoT

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CEIS106 INTRO TO OPERATING SYSTEMS

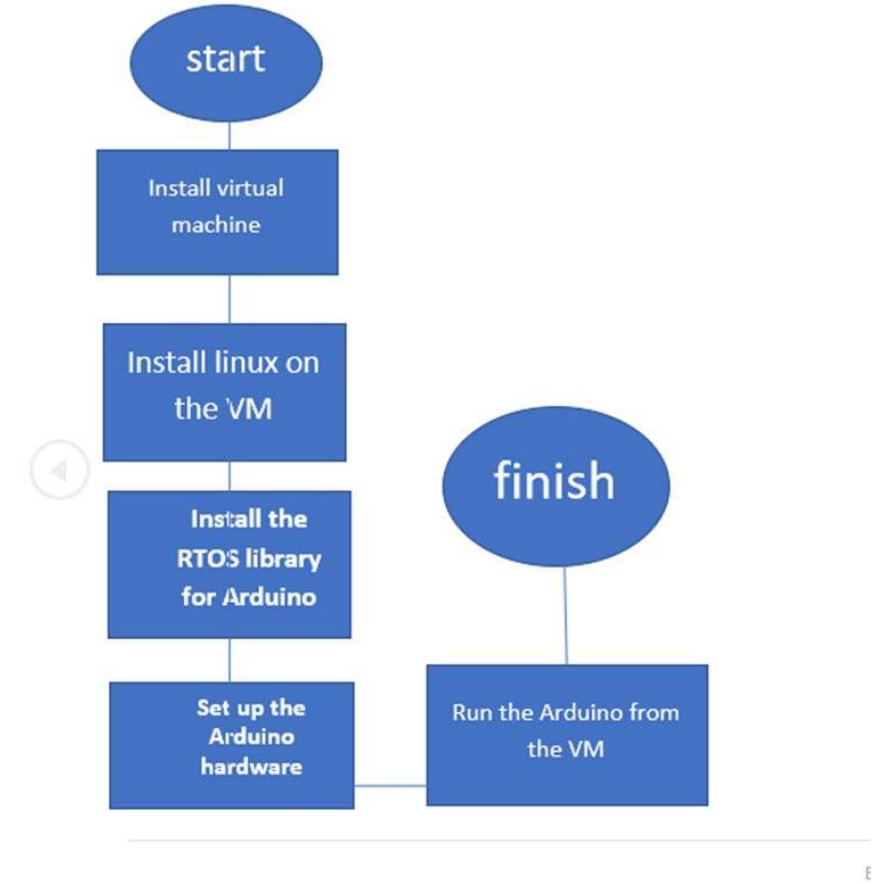
Introduction

In this project I started with my windows machine which is a hp laptop and an Arduino kit. Them goal was to create a virtual machine running a Linux platform on my windows machine. Once I have the virtual machine up and running then I need to install the Arduino ide to I can program my Arduino to collect data from a potentiometer.

In this presentation I will walk you through the process I used to make all this happen stape by step.

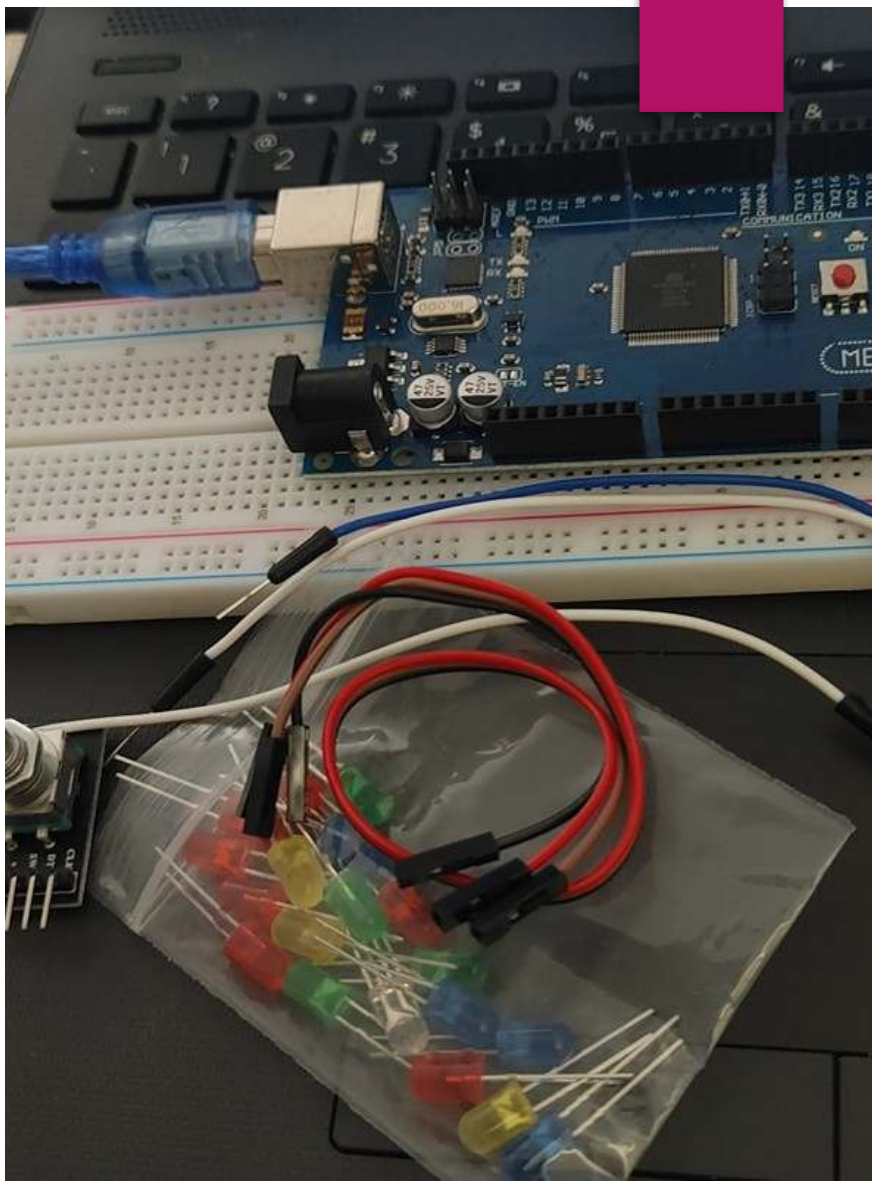
Flow Chart

- **I created a plan for this project using a flowchart that incorporated the following…**
- **Install Virtual machine**
- **Install Linux on the VM**
- **Install Arduino on the Linux image**
- **Install the RTOS library for Arduino**
- **Set up the Arduino hardware**
- **Run the Arduino from the VM**



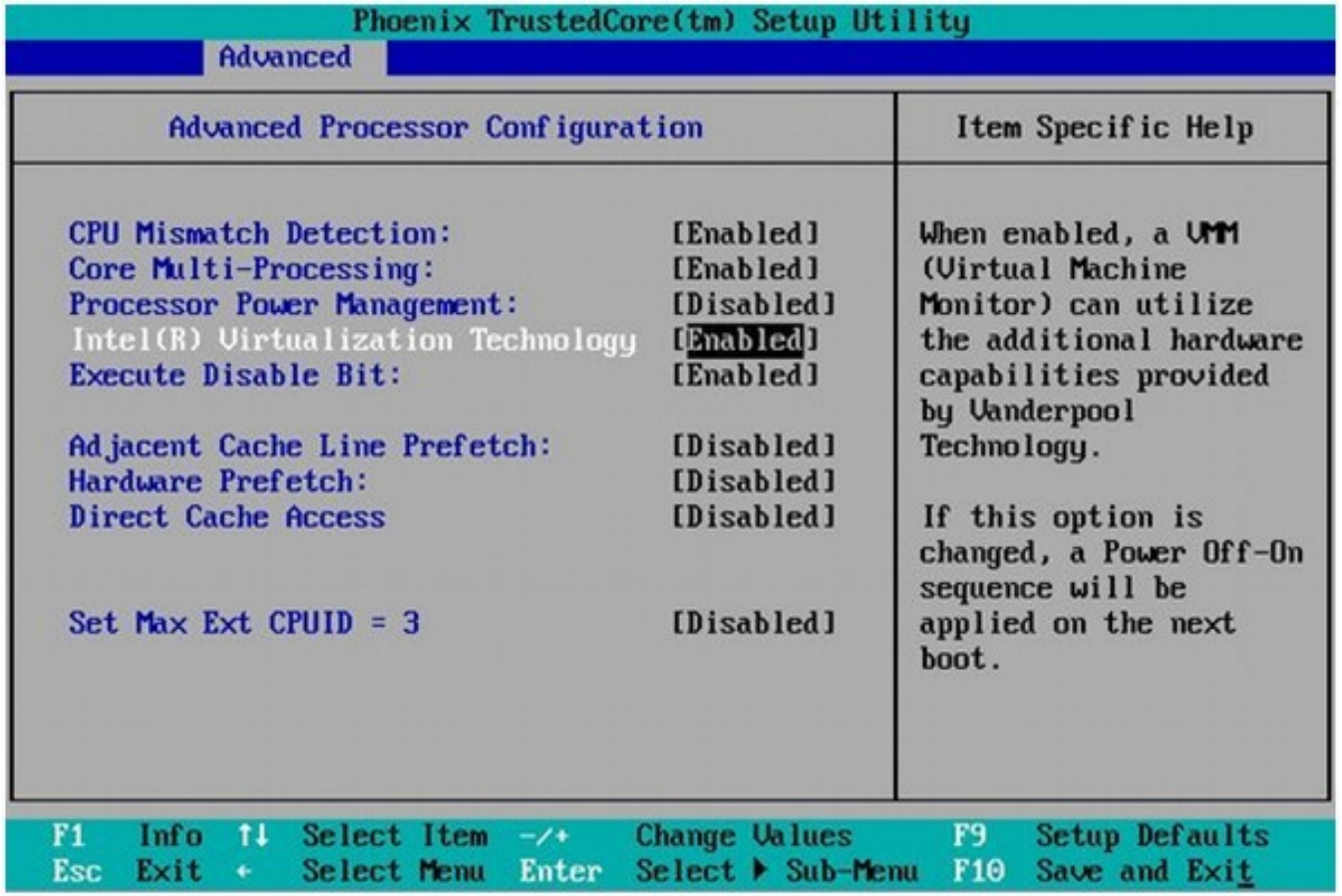
Inventory

- Potentiometer
- Arduino Mega Board
- Wires
- LED
- Breadboard



Enabling Virtualization

- The first step to creating my Linux virtual machine was enabling virtualization on my machine. To do this I had to access the bios in my core system. I entered the bios on my computer by going through the settings to update and security then selected recovery to advanced start up. I hit restart then went through advanced options into UEFI firmware settings then hit restart. This took to me a screen I navigated until I found the option for virtualization which I enabled then saved.

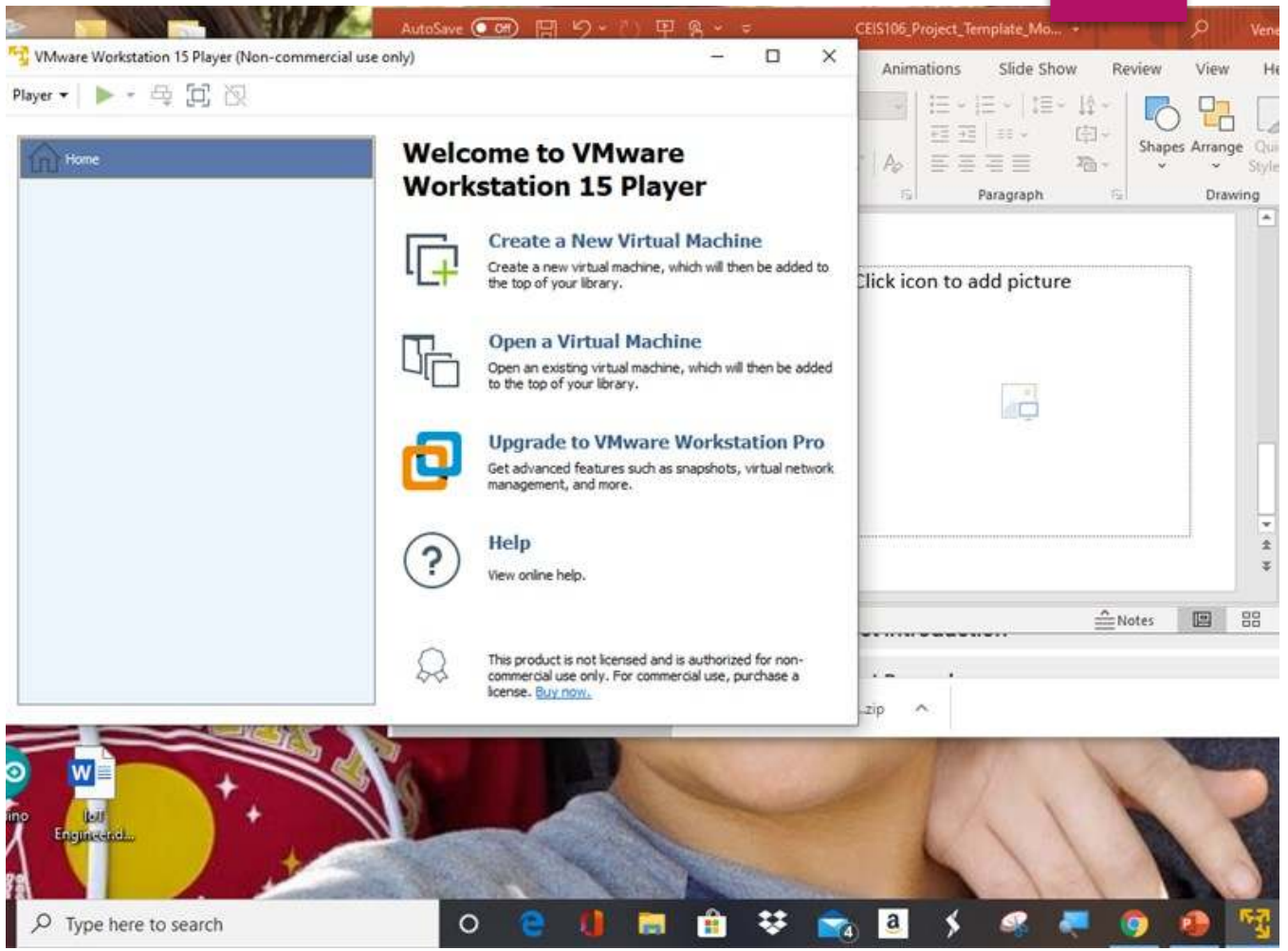


Installing The Virtual Machine

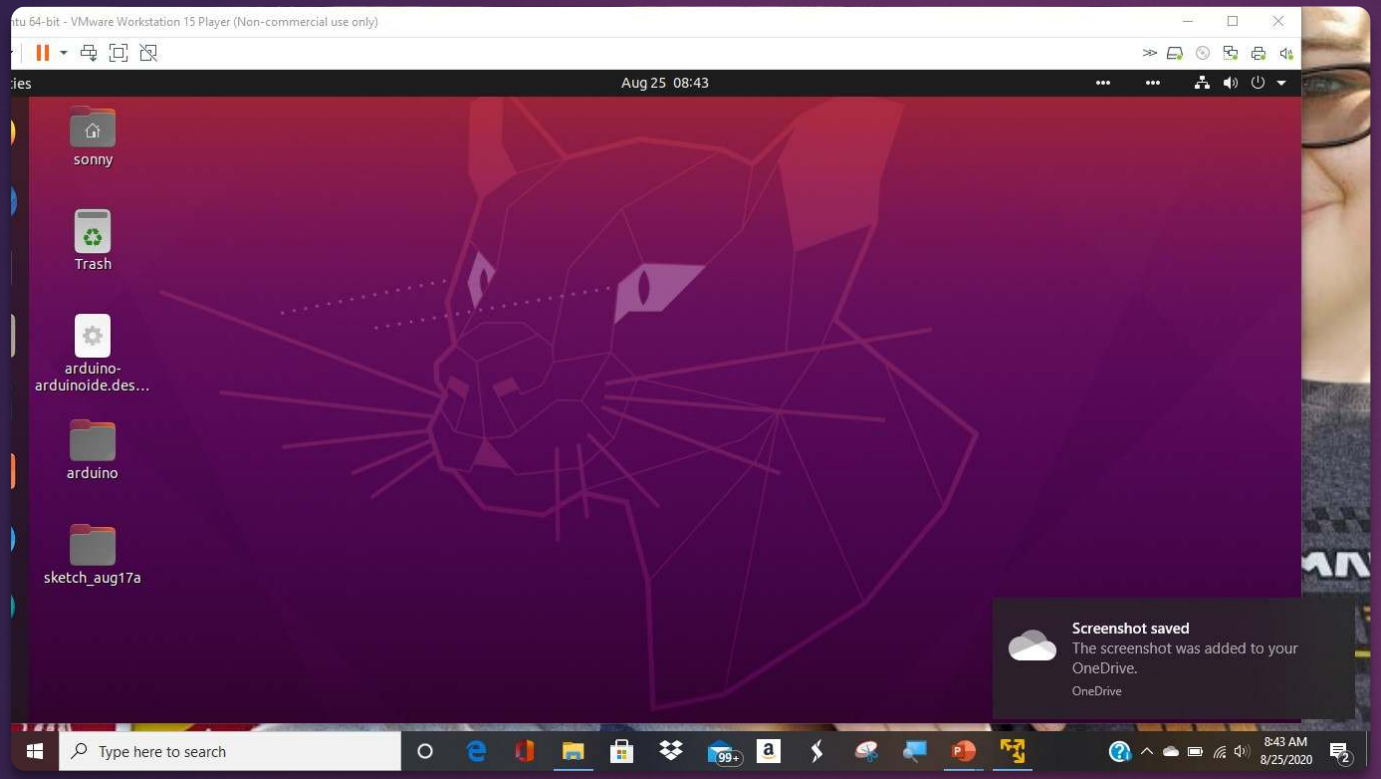
I had to install three deferent types of software to make this project possible.

- First I had to install VM ware.
- Then I had to install a version of Linux called ubuntu.
- Then I had to install the Arduino IDE onto the virtual machine.

A Screen Shot of The VM ware



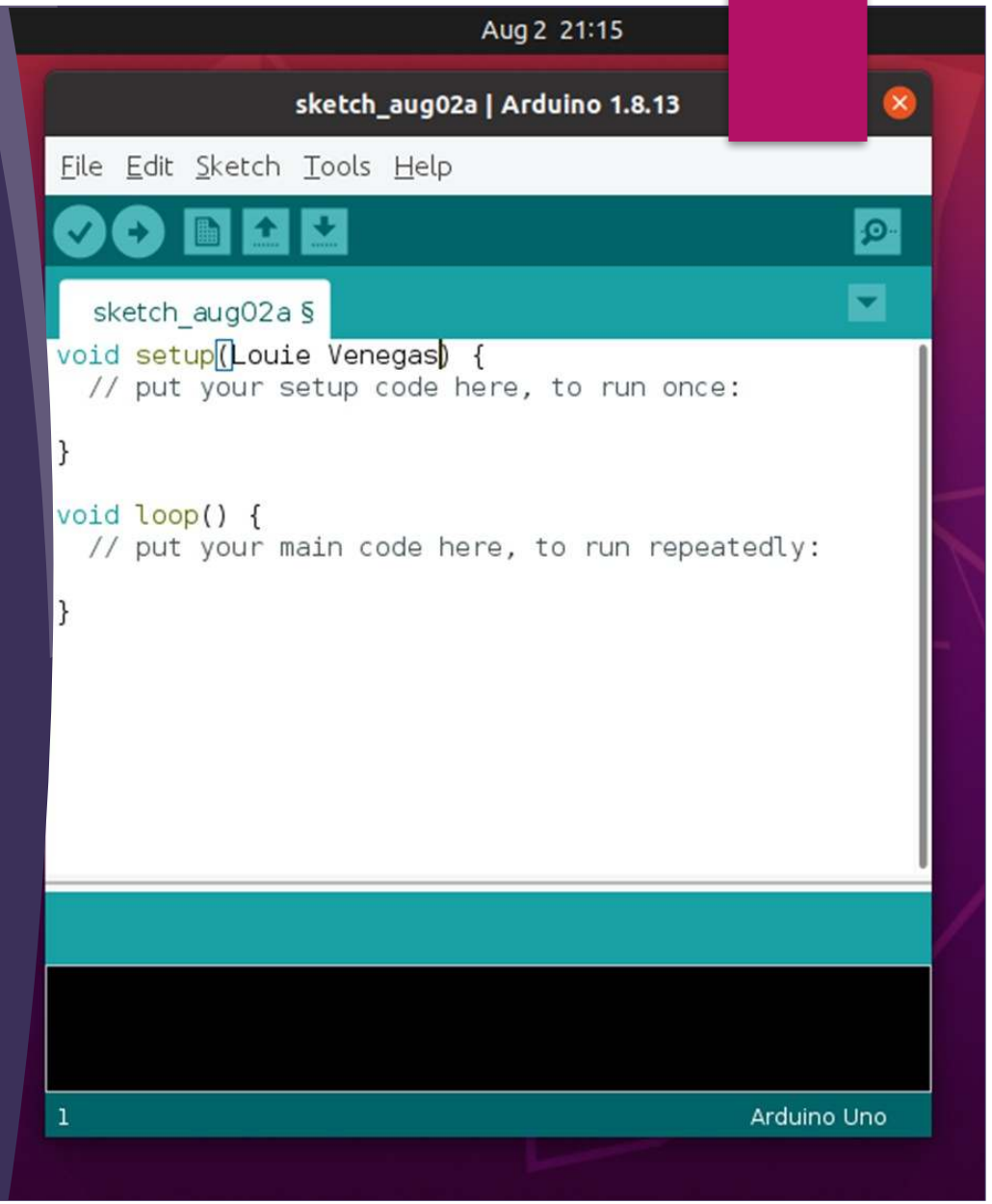
Ubuntu Linux Virtual Machine



A Screen Shot of my Linux Virtual Machine Running Ubuntu. The browser that comes with ubuntu is Firefox and the default office software is Libre office both of which I notice run almost the same as their Windows counterparts. The most important part of the Ubuntu system is the terminal. Right click on the desktop anywhere and click open terminal from the drop-down menu.

Installing Arduino IDE on my Linux VM

- I used Firefox to navigate to the Arduino homepage and downloaded the IDE software. Once it was downloaded, I proceeded to the file which downloaded as a tar ball file and extracted it. Once it was downloaded I had to use the terminal window to finish the download process. I right clicked in the folder so that the terminal window opened to that directory. I entered the command “ sudo sh install.sh ” then hit enter and entered my password when prompted. Once the terminal told me it was finished, I then closed the terminal and opened the Arduino IDE from my apps tab in ubuntu.



Free_RTOS

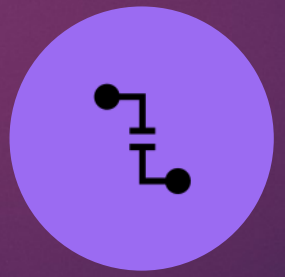
In this project I wanted my Arduino board to do multiple things at once which was run my LED based on my potentiometer. The Arduino_Free_RTOS library is not automatically downloaded when you install the Arduino IDE. So I went to add/manage libraries searched for FREE RTOS. Then I proceeded to install the library. FreeRTOS is an open source real-time operating system for embedded systems. Most of FreeRTOS's code involves prioritizing, scheduling, and running user-defined tasks.

Accessing the Serial Port

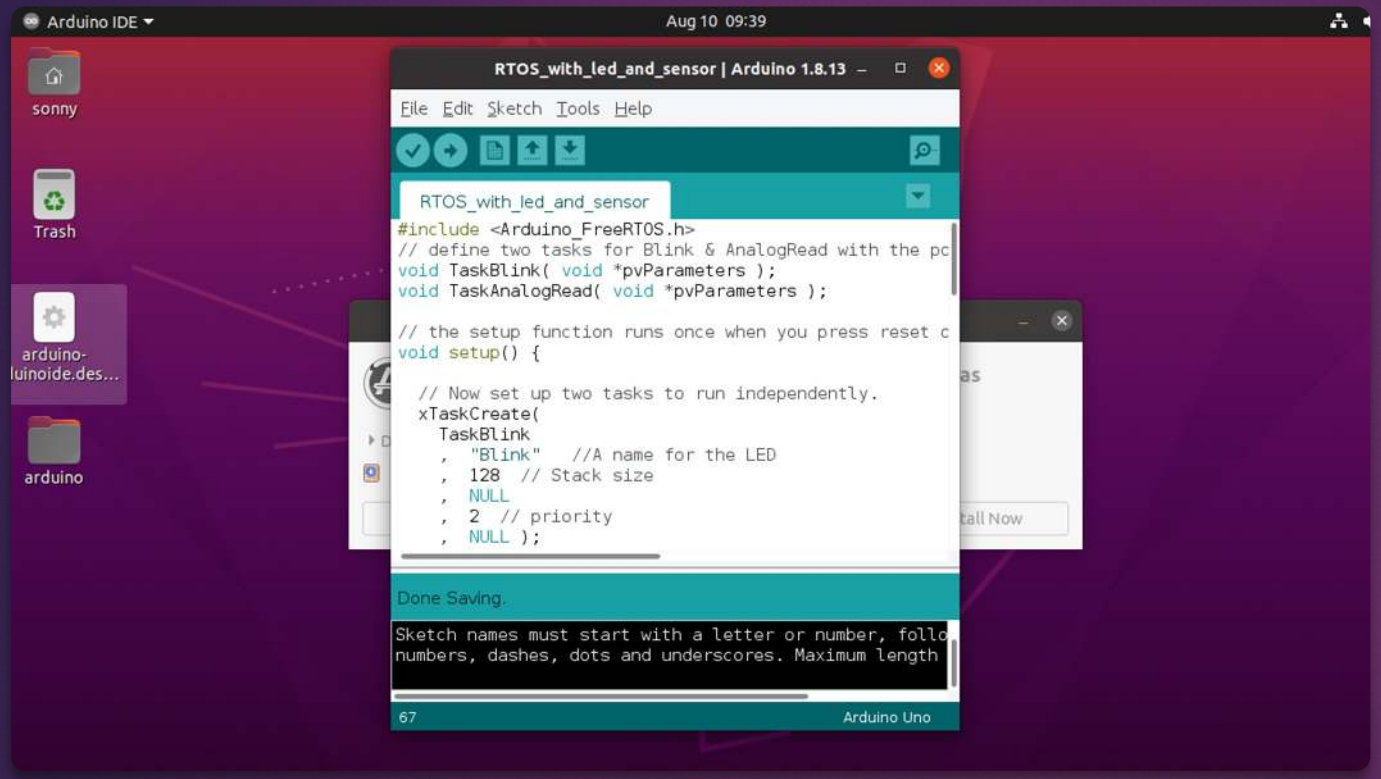
Before I was able to write code to the Arduino from my VM I had to give permissions.

Using the terminal window I entered the following command,

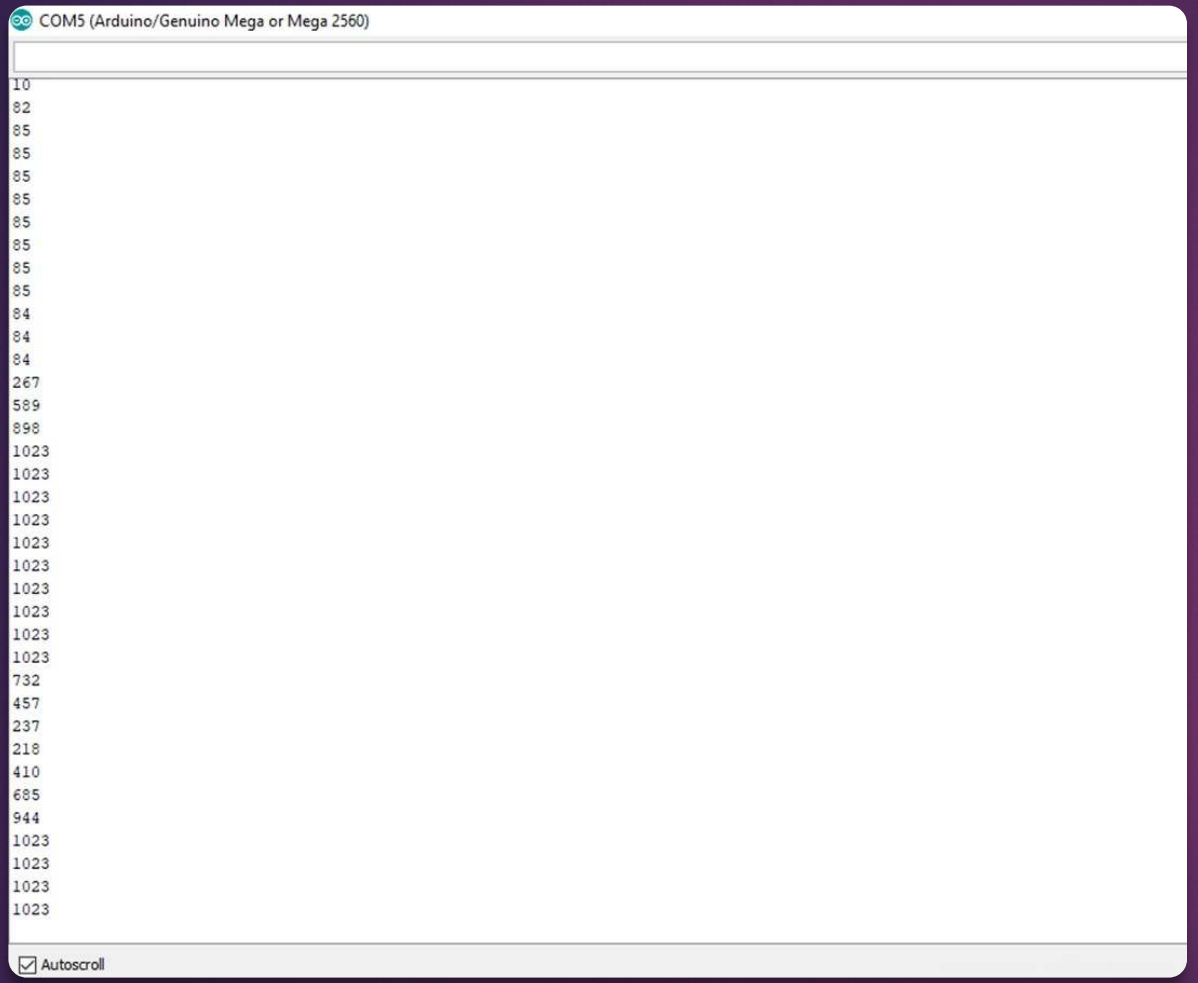
sudo sonny –a –G dialout yourname



The sudo command gave me superuser privileges to allow me access to serial port.



A Screen Shot of The Code Inside my Arduino Ide



A screen shot of my serial monitor collecting data from my potentiometer.

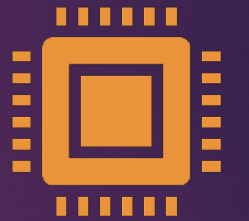
Challenges

- One challenge I had was I couldn’t run my machine because I had to enable virtual printers which I had to research how to enable.
- Another challenge was learning to install software on my Linux machine I'm so used to windows that this was a new experience.
- One other challenge I had was getting my code written to my Arduino board through the Linux machine. I had to disconnect the removable device from the host machine and connect it to virtual machine.

Career Skills Gained in This Project.

I gained experience installing and running a VM.

I learned how to use a linux terminal to install software and give permissions.



I assembled and programed a potential IoT device and used it to collect data.