Computer Systems and Networks Project.

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Course: H.Dip in Computer Science.

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# **Introduction.**

The purpose of this project was to demonstrate the capabilities of the MQTT protocol, and to gain a better understanding of the issues and challenges of a connected world (IOT Infrastructure).

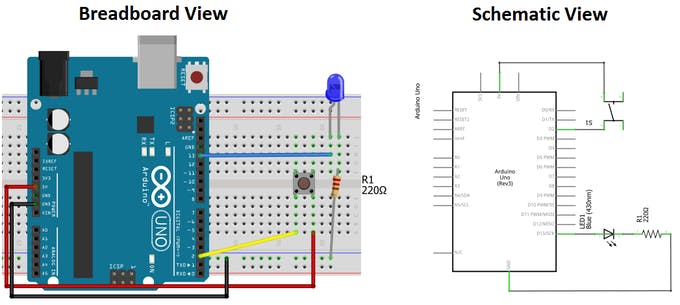
# **Block Diagram.**

The following Block Diagram was how I broke this project down into different individual sections.

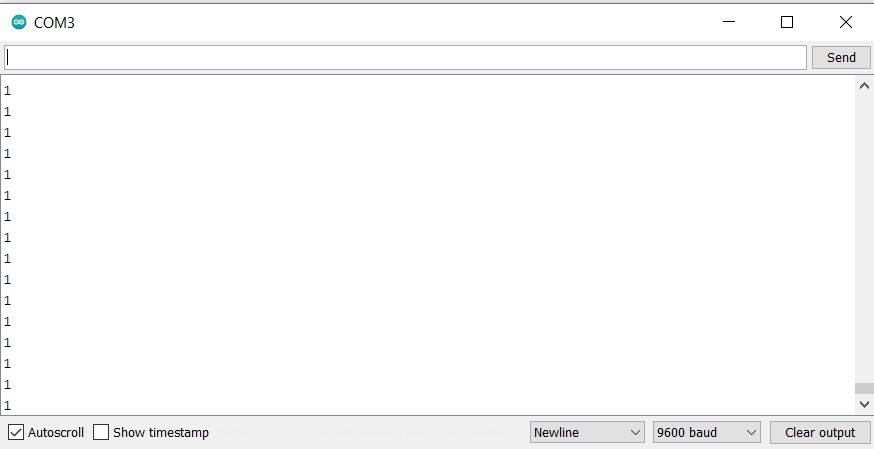
# **Research.**

## **Button Tests.**

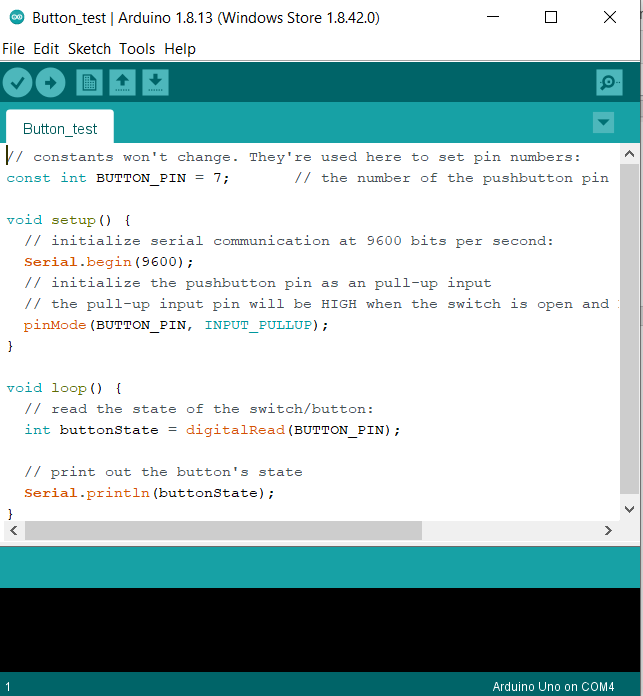
This simple circuit is to test a button, the button is pressed the LED will light, and a logic 1 value will print up to the serial port, when the button is not pressed a logic 0 is printed to the serial port.



**Figure 1 - Arduino Button Test.**

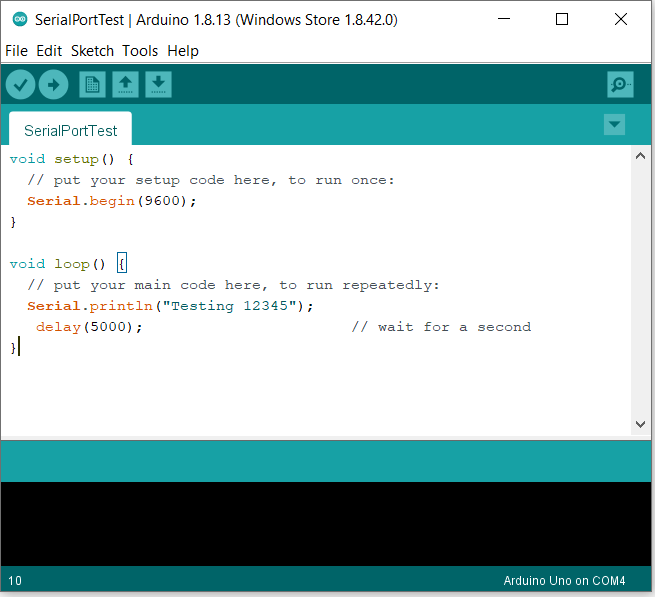


**Figure 2 -Serial Port Button Test.**



**Figure 3 - Button Test Code**

## **Serial Port Test.**



**Figure 4 - Serial Test Code.**

## 

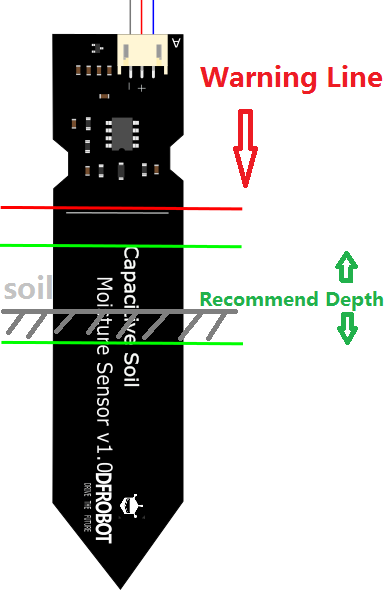
## **Capacitive Soil Moisture Sensor Test.**

This sensor is placed inside soil up to each grove on each side, it then sends back an analogue value based on how moist the soil is.

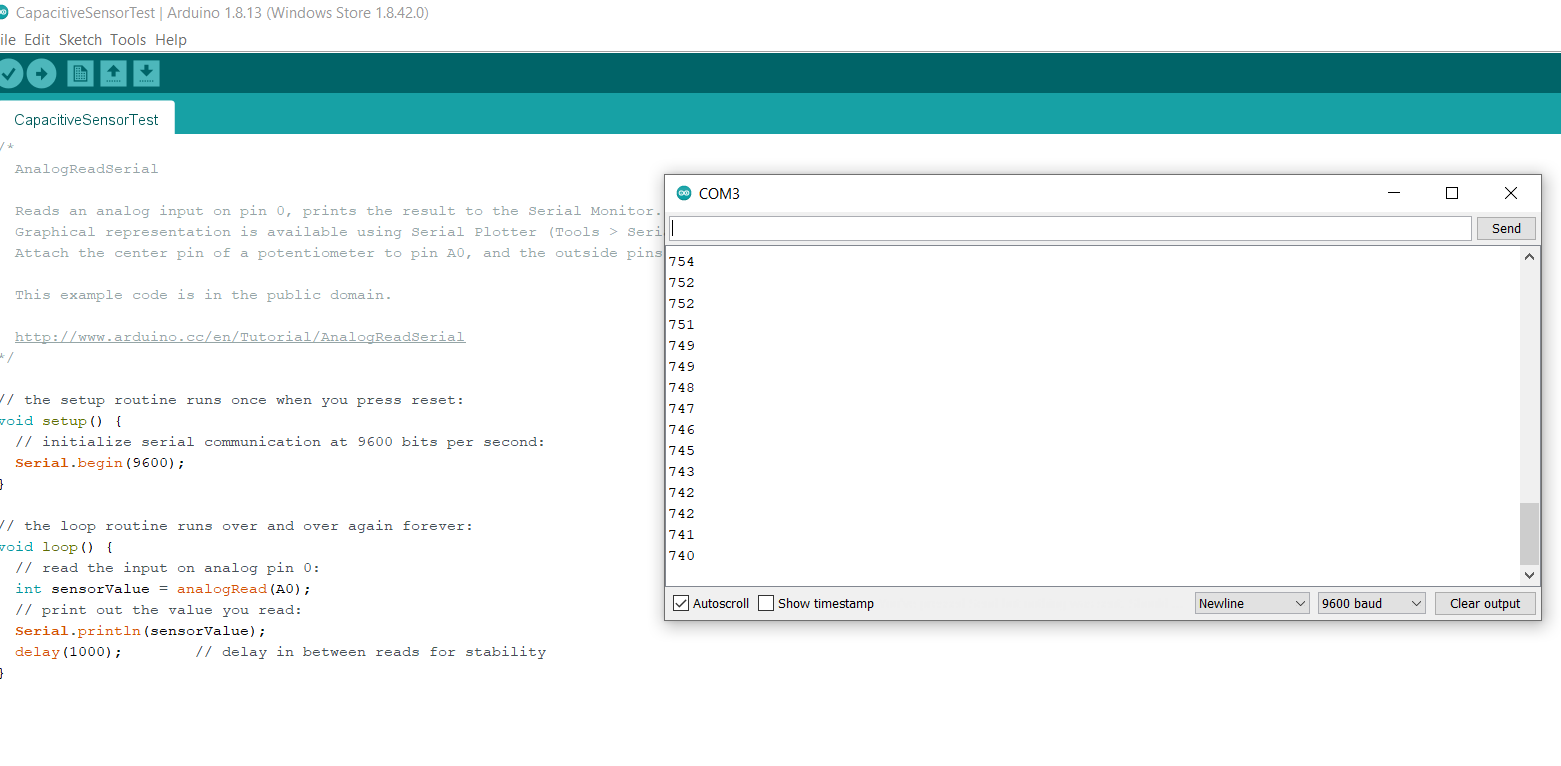
This soil moisture sensor measures soil moisture levels by capacitive sensing rather than resistive sensing like other sensors on the market. It is made of corrosion resistant material which gives it an excellent service life.



**Figure 5 -Capacitive Sensor Module.**



**Figure 6 - Recommended Soil Depth.**



**Figure 7 - Arduino Comm Port Reading Soil Module.**

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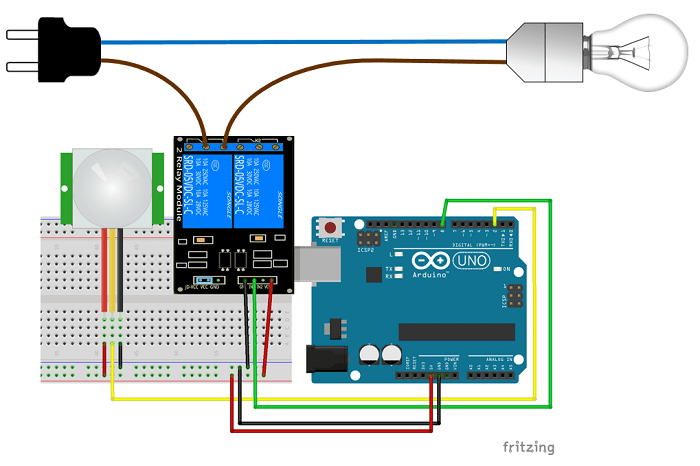
**Figure 8 - Actual Image of Soil Module.**

## **Relay Test.**

A relay is just a switch, it can be used to switch on and off high voltage applications.

In my case I replaced a bulb with an LED and I turned it on and off.

I Believe there is a video showing this.



**Figure 9 – Arduino Relay Module.**

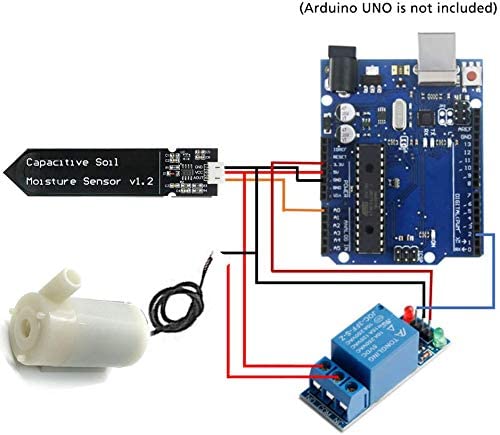
|  |  |
| --- | --- |
|  |  |

Figure 10 - Demonstrating A Relay.

## **Water Pump Test.**

This is a low voltage water pump, that turns on and off using 5v.

I use the relay to turn it on and off and I recommend turning it on for 100 milli seconds.

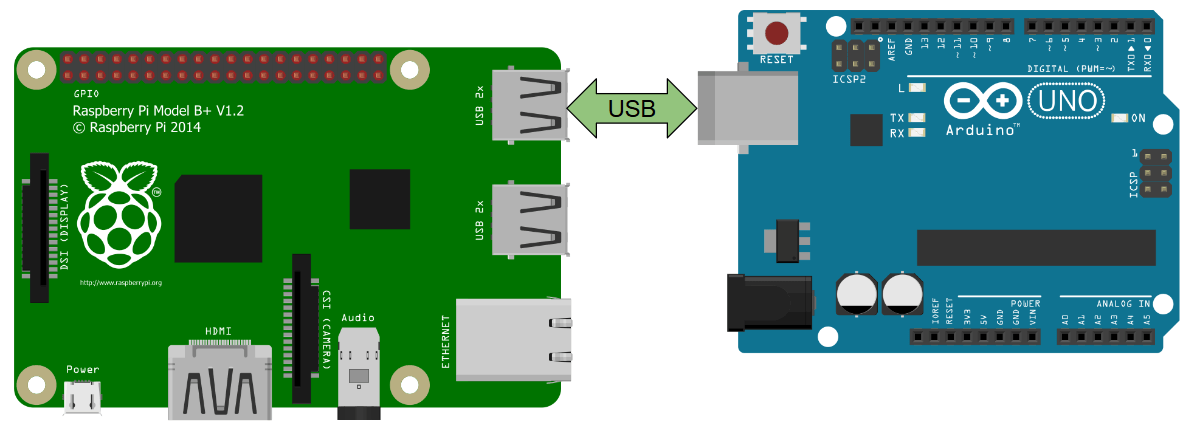


**Figure 11 - Water Pump Configuration.**

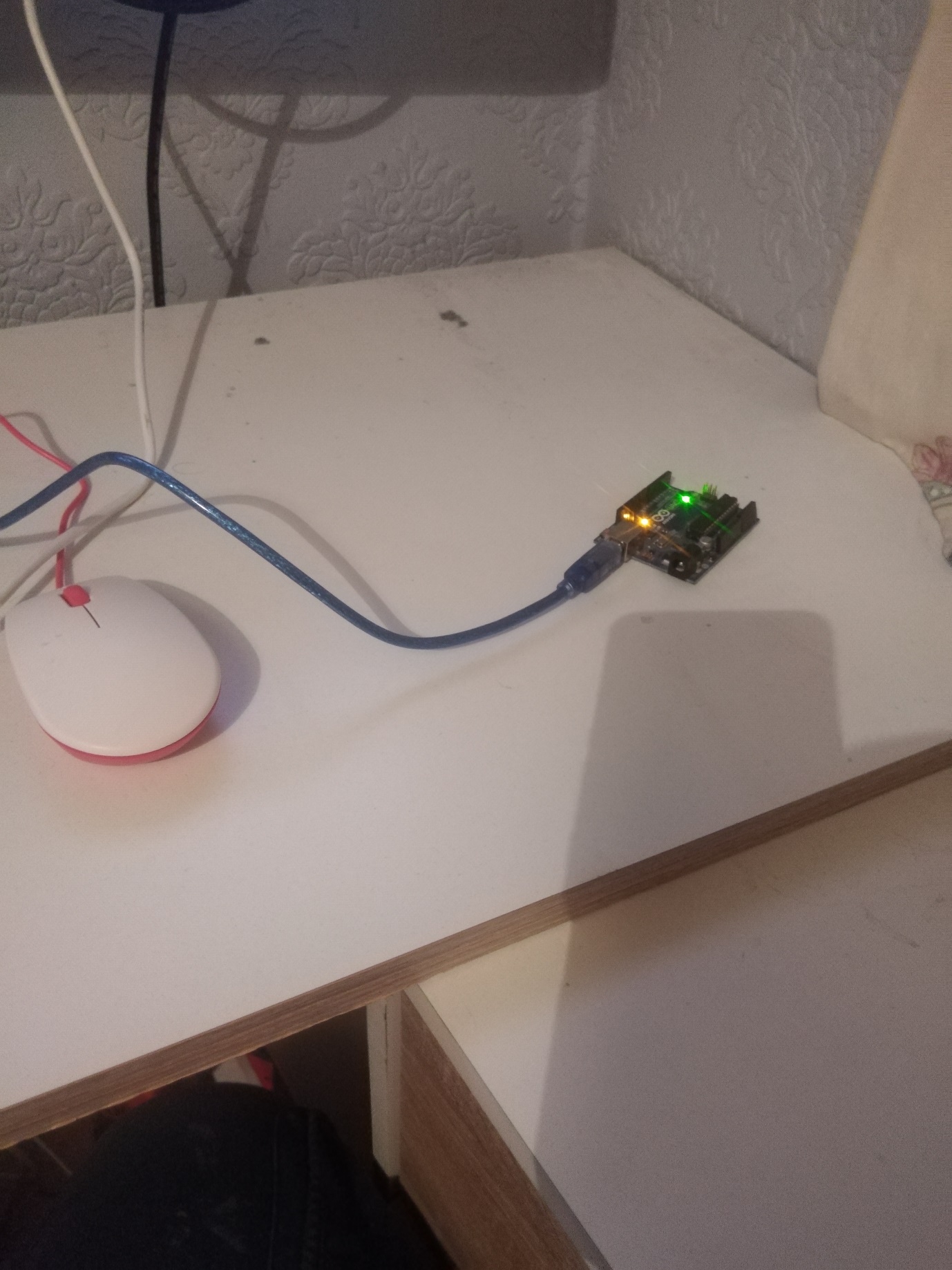


**Figure 12 - Waterpump Setup.**

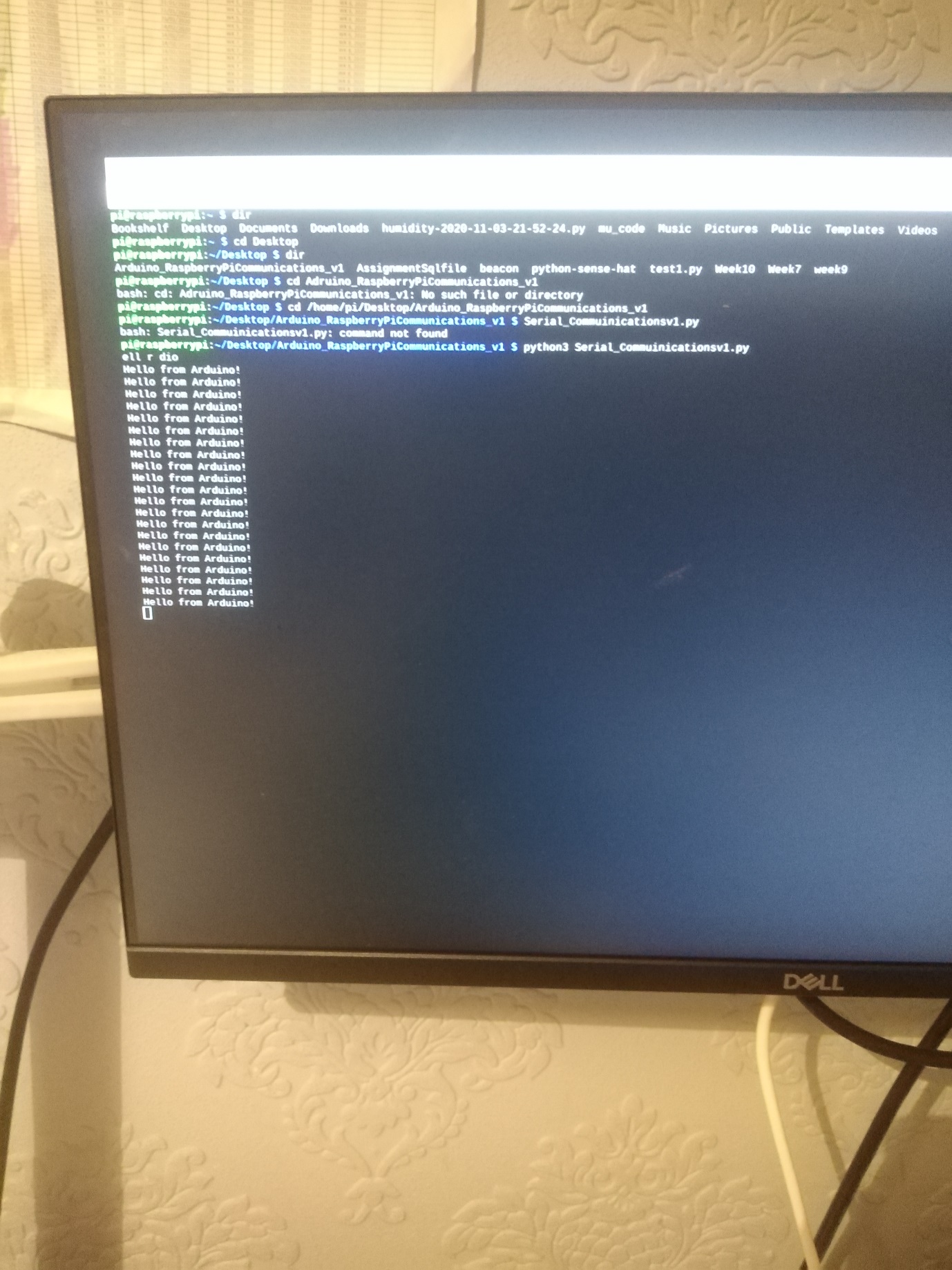
## **Pi Communication Tests to Arduino.**



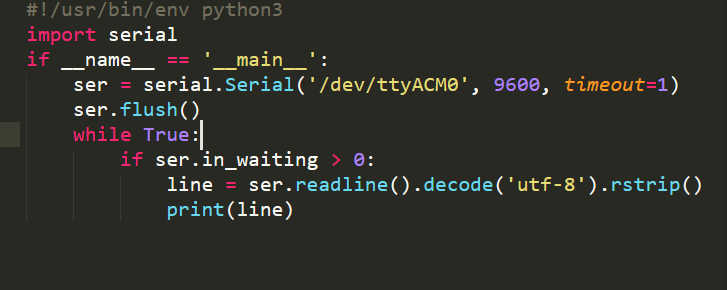
**Figure 13 - Arduino to Raspberry Pi Serial Communication**



**Figure 14 - Arduino And Raspberry Pi Attached Serially Over USB.**



**Figure 15 - Hello From Arduino.**



**Figure 16 - Raspberry Pi Code.**



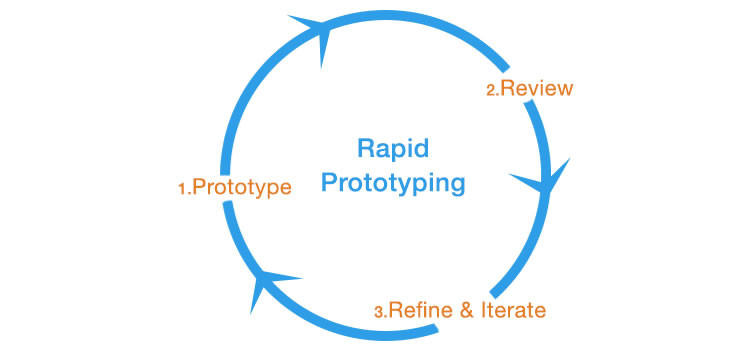
**Figure 17 - Arduino Raspberry Pi Communication.**

## **Pi Communication Tests to Blynk Website.**

# **Design Methods.**

The whole idea with this project was to design an IOT application rapidly over a short period of time.

The process I used was Rapid Prototyping.



**Figure 18 - Rapid Prototyping.**

I’ve broken the project down into 4 parts like the following:

ARDUINO AND PI COMMUNITCATIONS

PI PYTHON COMMUNITCATIONS.

PYTHON TO BLYNK COMMUNICATIONS.

SENSORS TO ADRUINO COMMUNICATIONS

Due to having a lot of the application prototypes individually all I have to really do is combine the individual prototypes.

# **Design.**

# **Conclusion.**