Homework 3

Team members:

Andrew Sonnier- 100% Contribution

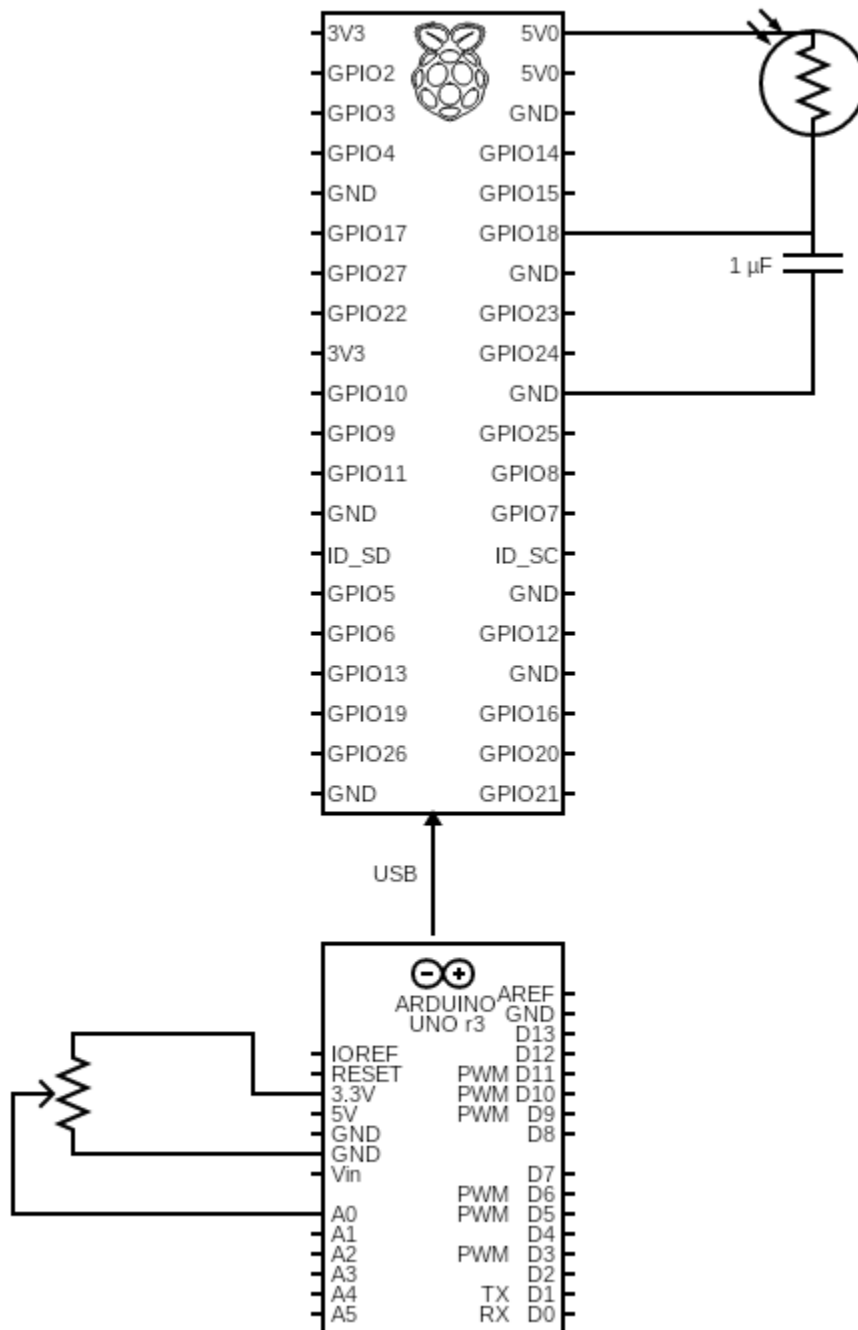Team Member Contribution:

	Andrew Sonnier
Laptop 2	100%
Pi A	100%
Pi B	100%
Pi C	100%

Raspberry Pi B Schematic:
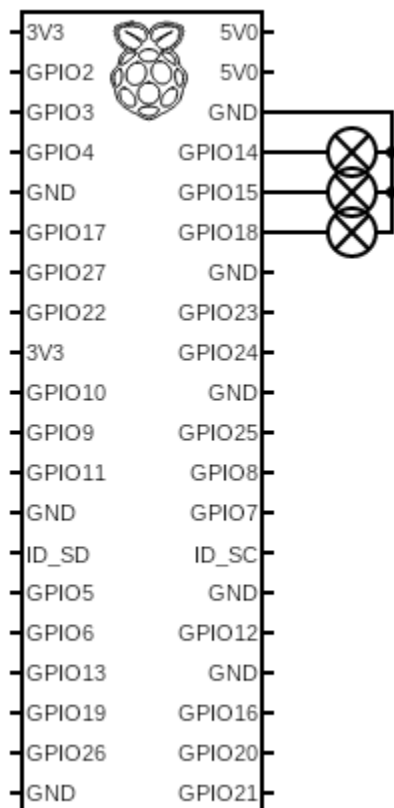
Raspberry Pi A Schematic, LDR to Pi, Potentiometer to arduino:

Design Choices:

When designing this system, careful considerations were made to make deployment and development as easy as possible. First, Docker was to be used for non hardware systems to make portability and deployment as ease as possible. This includes Pi C, Laptop 2 and the MQTT Broker. For my MQTT Broker, it was

decided to use the toke/mosquitto image found on docker hub as my group in HW2 experienced issues with the official mosquitto container. No extra configuration was done beyond port exposure. Both Pi C and Laptop 2 use the python 3.8 container as a base and install the mqtt client and link the containers directly. Instructions for installing these containers can be found in the repository README but the basic instructions are to install docker and then launch the docker compose deployment. For pi a, the original plan for the potentiometer was to use an ADC found in the ECE maker space; however there was little to no documentation found on how to use the chip with a raspberry pi. The implementation instead includes an arduino communicating over serial with the raspberry pi. The arduino is polling the potentiometer at once every 100 ms, which is mentioned in the instructions. The raw values of the potentiometer give us a range from 0 to 1024 and they were scaled from 0 to 1. LDR is automatically scaled by the *gpiozero* library for python from 0 to 1 making comparisons easy. In other cases, design decisions were made to minimize costs such as 2 raspberry pis instead of three, arduino instead of an ADC chip, using existing raspberry pis, photocells, leds etc.

For programming, python was chosen for familiarity and use in HW 2 with the paho mqtt client and gpiozero for gpio interaction.

For demo and ease of testing, a separate router is used to create a self contained LAN network with all devices connected via ethernet. THis was done to remove additional variables such as wifi connection issues and allowed me to hardcode in static ips.