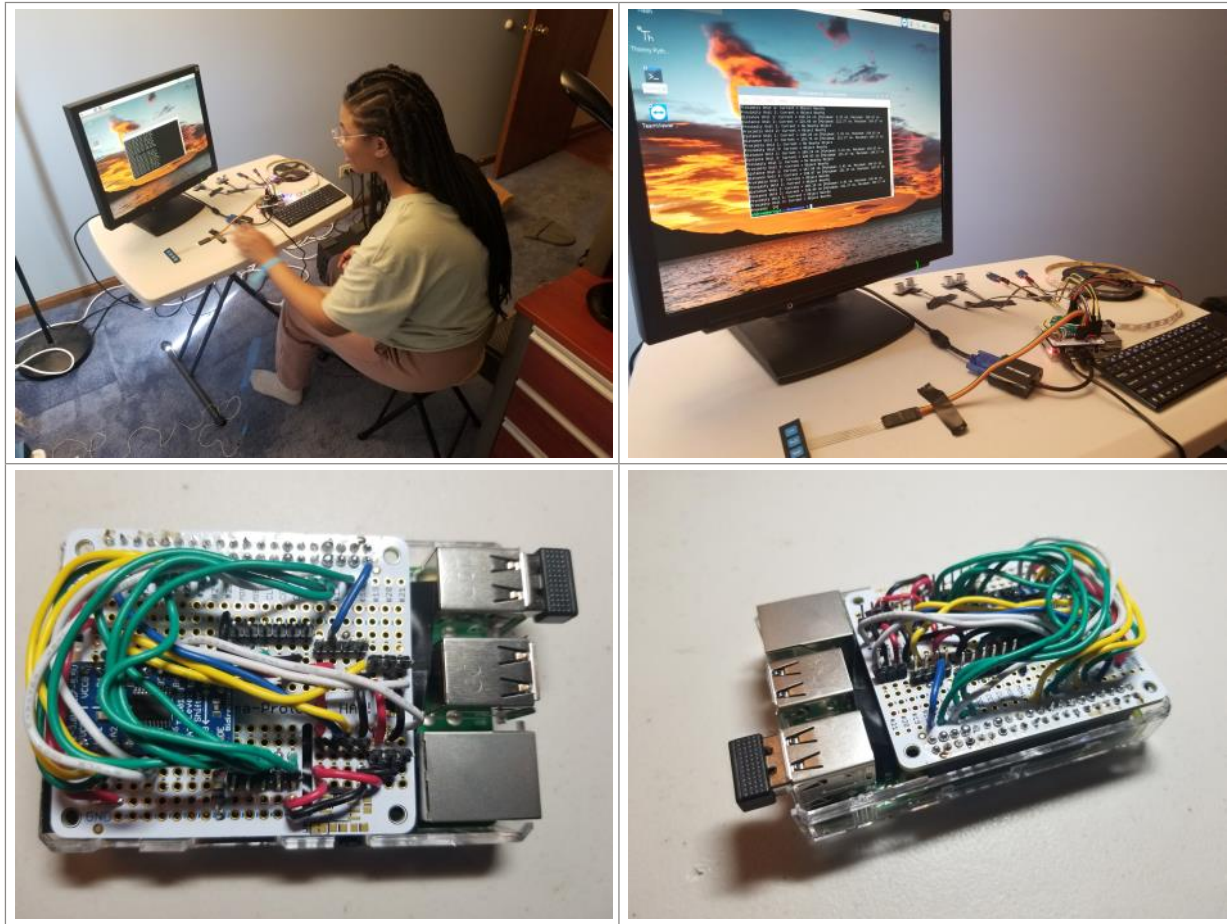


Assembly Instructions for the Raspberry Pi-based Lighting Controller for Imani Brown's Thesis Project - 2022-03-28

Monday, March 28, 2022 5:21 PM



Components

- Raspberry Pi 3 Model B - <https://www.raspberrypi.com/products/raspberry-pi-4-model-b/>
- Adafruit Perma-Proto HAT for Pi Mini Kit - No EEPROM - <http://adafru.it/2310>
- Adafruit 8-Channel Bidirectional Logic Level Converter [TXB0108] - <http://adafru.it/395>
- OSEPP Ultrasonic Sensor Module [HC-SR04] - <http://www.piddlerintheroot.com/hc-sr04/>
- OSEPP Infrared (IR) Detector [IR-DET01] - <https://www.osepp.com/electronic-modules/sensor-modules/64-ir-detector>
- Adafruit Membrane 1x4 Keypad - <http://adafru.it/1332>
- Alitove 5V 60A 300W Power Supply [5V-60A-T] - https://www.alitove.net/product?product_id=60&limit=75
- Miscellaneous additional components

Software Libraries

- adafruit-circuitpython-neopixel
- adafruit_matrixkeypad

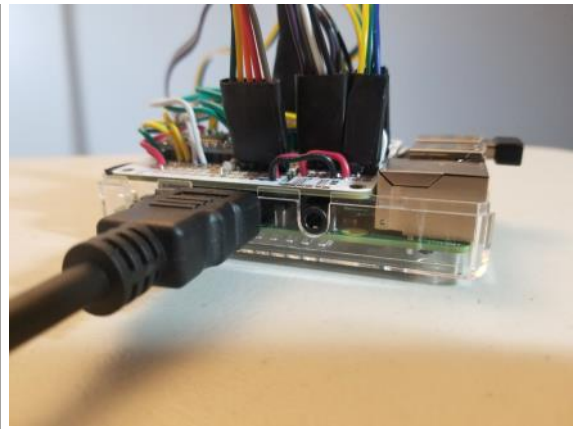
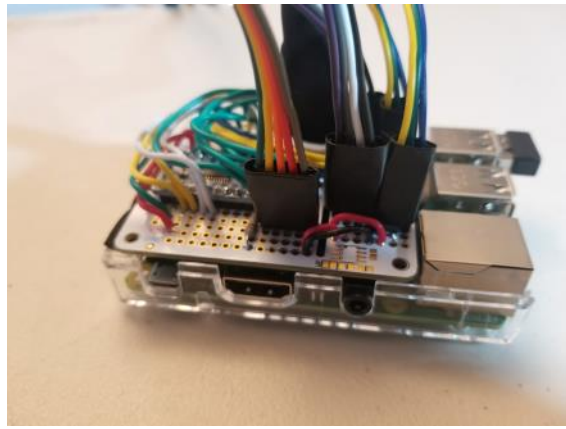
- neopixel
- RPi.GPIO

Assembly

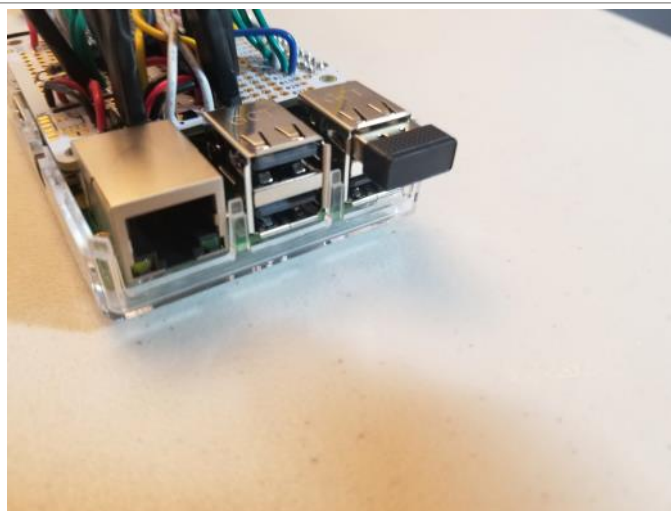
1. Ensure that both the Raspberry Pi power module and the 5V 60A 300W power supply are disconnected from power and are not connected to the hardware.



1. Using the procedures in the [appendix below](#), locate and install the following components
 - a. [Two Infrared Detectors with 3-pin connectors](#)
 - b. [Two Ultrasonic Sensors with 4-pin connectors](#)
 - c. [One 4-button Keypad with 5-pin connector](#)
 - d. [One LED Strip Jumper Cable with 6-pin connector](#)
2. When the procedures 2a, 2b, 2c, and 2d are completed, connect the HDMI monitor cable



3. Insert the Wireless Keyboard fob into one of the available USB ports on the Raspberry Pi and turn on the keyboard. If the indicator light on the keyboard does not turn on then the keyboard may need to be recharged.



Optional extender cord that also charges the Wireless Keyboard while in use.

4. Get the switchable power strip, turn the switch OFF, and then plug in both the Raspberry Pi power adapter and the 5V 60A 300W power supply. The monitor for the Raspberry Pi can be plugged into any outlet (it does not need to be on the same power strip as the light

controller).

5. Turn on the power on the power switch

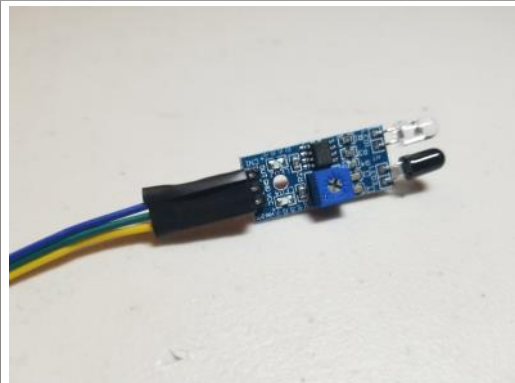
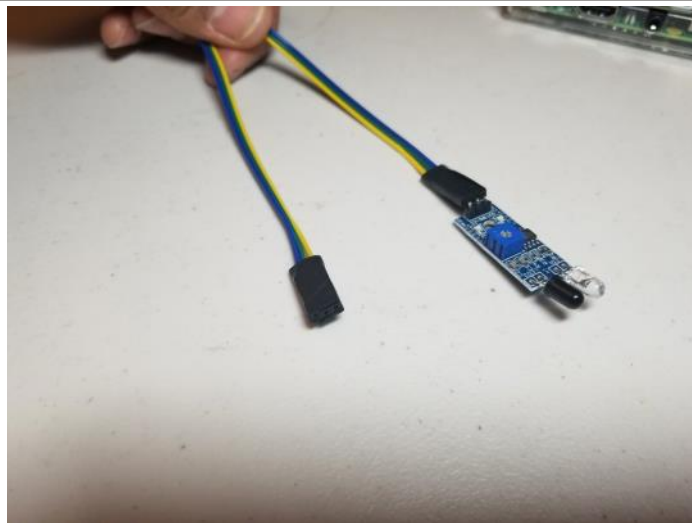


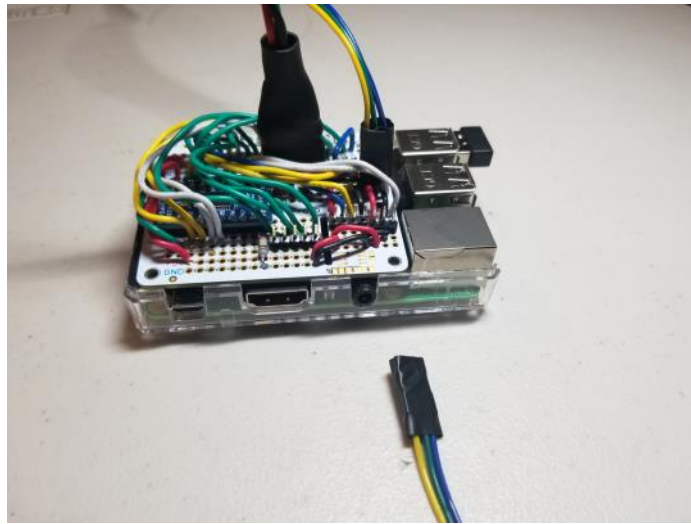
6. Wait for the system to initialize and display the desktop screen, which may take 5 minutes.

Appendix: Procedures for Installing Sensors and Connectors

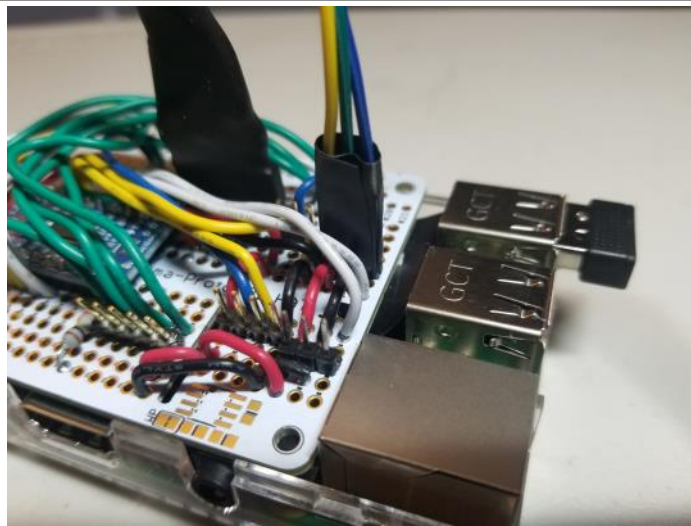
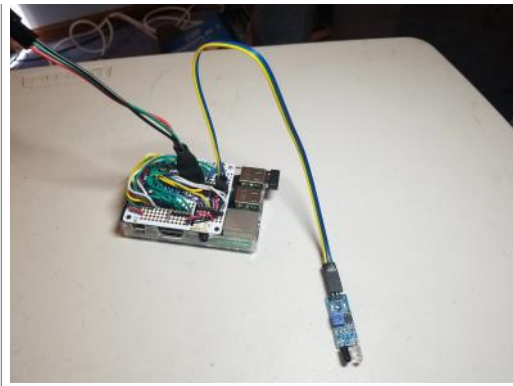
Two Infrared Detectors with 3-pin connectors

These sensors detect when objects are in proximity to the sensor. A small potentiometer on each sensor can be adjusted to set the sensitivity of the sensor. The sensor has 2 LED indicators, one as a power indicator and one that lights when an object is in proximity. Connect the 3-pin connector for each of the 2 sensors to the 3-pin headers on the board.





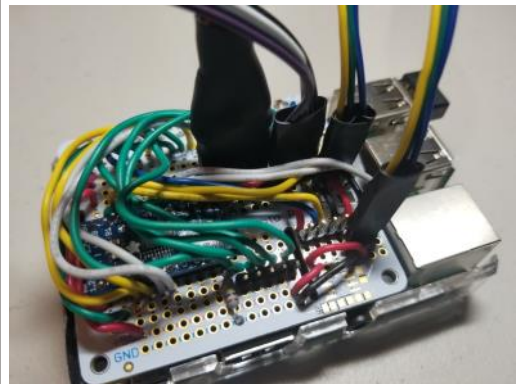
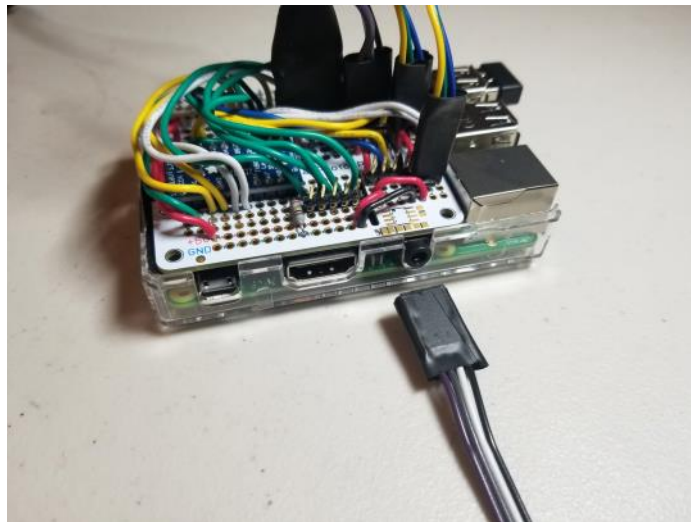
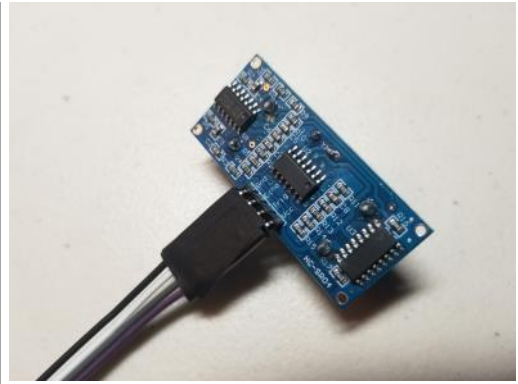
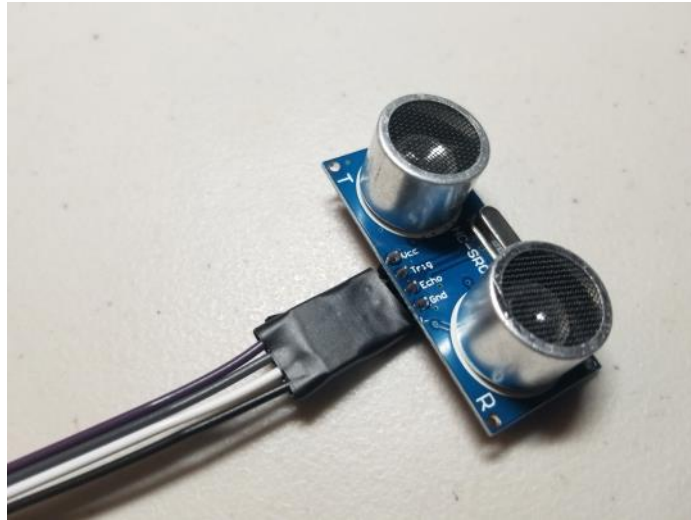
For the Infrared Detectors, the yellow wire on the connector cable is inserted into the left-most pin on the matching header on the board



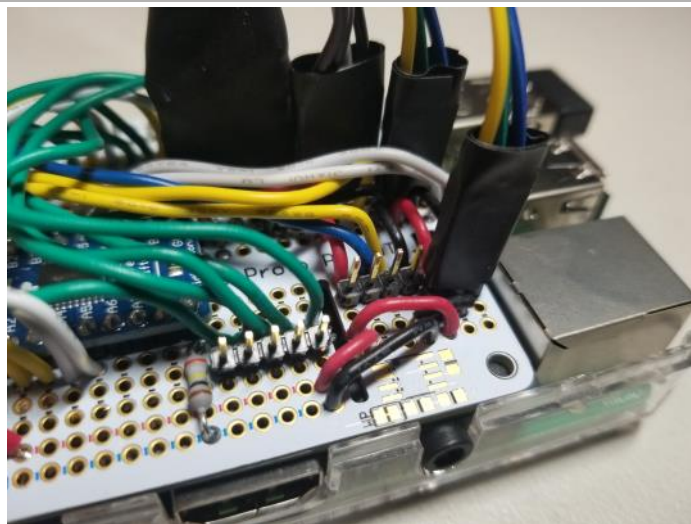
Two Ultrasonic Sensors with 4-pin connectors

The ultrasonic sensors detect the distance of an object/obstacle placed in front of the sensor by sending out an inaudible, ultrasonic pulse and sensing the return echo of the pulse that reflects off of the object. Distance to the object can be calculated by measuring the round trip time of the trigger to echo and calculating distance based upon the speed of sound 34,300 cm per second.

Connect the 4-pin connector for each of the 2 sensors to the 4-pin headers on the board.

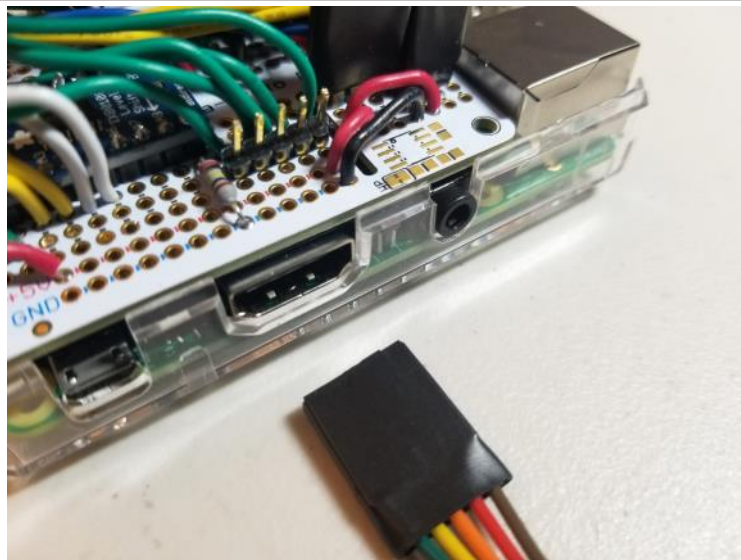
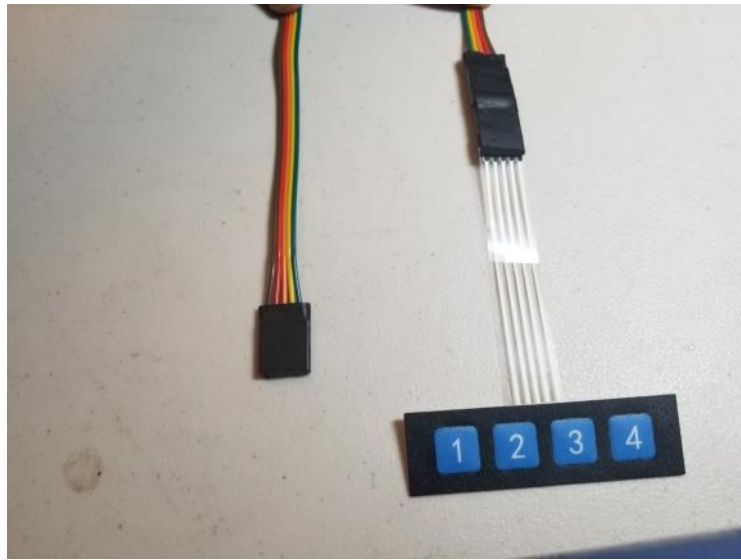


For the Ultrasonic Sensors, the dark purple wire on the connector cable is inserted into the left-most pin on the matching header on the board

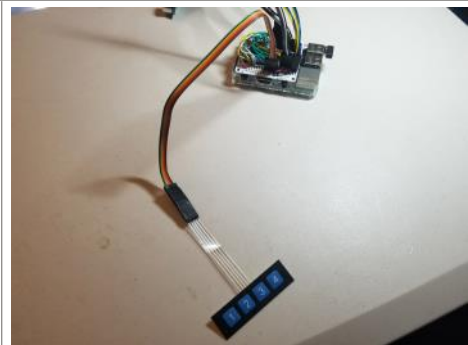
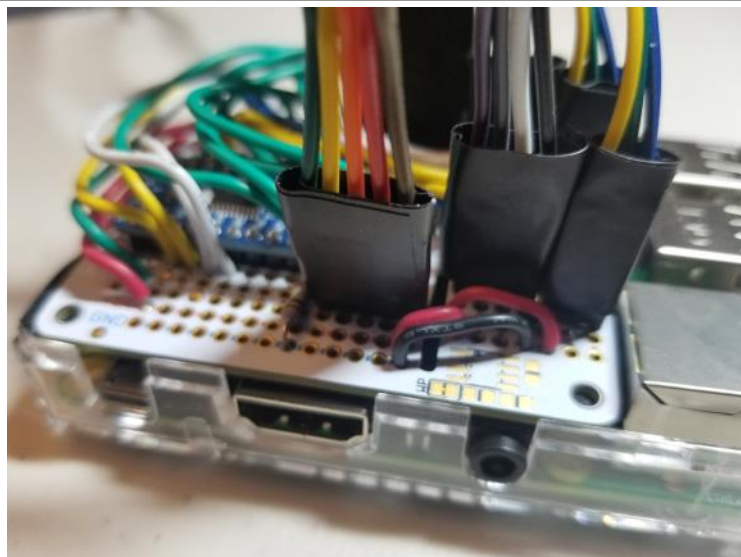


One 4-button Keypad with 5-pin connector

The keypad has 4 buttons, and programs can read the status of the keypad to determine which buttons are being pressed. More than one button can be pressed at the same time. Connect the 5-pin connector on the keypad to the 5-pin header on the board.



For the Keypad, the green wire on the connector cable is inserted into the left-most pin on the matching header on the board



One LED Strip Jumper Cable with 6-pin connector

This jumper cable connects the LED Light strip to the Raspberry Pi. One end of the jumper cable has a 6-pin connector, and the other end has a 3-pin locking connector that matches the connector on the LED Strip.

Connect the 6-pin connector on the Jumper to the Raspberry Pi and the 3-pin locking connector to the LED Strip.



On the LED Strip Jumper Cable, the red wire on the connector cable is inserted into the left-most pin on the matching header on the board

