

Testing Procedures

Blue 5 Block Testing

1. GUI

- 1.1. Connect Raspberry Pi to power and turn on server
- 1.2. Access server through mobile device
- 1.3. Confirm that GUI appears on mobile device
- 1.4. Verify that the state and current value for each channel are displayed
- 1.5. Verify that each ON/OFF button corresponds to the correct state for each channel
- 1.6. Verify that sound control button is present and disables/enables the microphone control of the system

Test Pass condition: Each of the mentioned buttons appears in an easily accessible location and produces the corresponding change in the system.

This test is done to ensure that all parts of the GUI are visible, easily accessible, and provide the correct functionality.

2. Sound Sensor

- 2.1. Connect Arduino to power and flash testing program
- 2.2. Ensure proper connection between Arduino and Electret microphone module
- 2.3. Clap/Yell within 3 feet of microphone
- 2.4. Check that values recorded in serial monitor exceed hardcoded limits for sound detection

Test Pass condition: Serial monitor values exceed hardcoded limits when a clap/loud noise occurs and not otherwise

This test is done to ensure that the microphone is correctly picking up noise and correctly switches between on and off.

3. LED Strip

- 3.1. Connect GND and '+' pins to GND and VCC pins on Arduino UNO
- 3.2. Connect AO pin to desired digital pin on Arduino
- 3.3. Run test program on Arduino to control LEDs
- 3.4. Confirm that LEDs change color based on value of *currentData* variable

Test Pass condition: All 8 LEDs displays red, green, and blue at varying levels of *currentData*

This test is done to confirm that the LEDs have RGB functionality and can be controlled by an external variable.

4. Server/RPi0

- 4.1. Connect Raspberry Pi (abbr. RPi0) to power, display, and WiFi
- 4.2. Start server
- 4.3. Verify GUI is accessible on web browser via mobile device
- 4.4. Connect 2 GPIO output pins to resistors in series with an LED each on a breadboard

- 4.5. Use GUI to turn on/off the corresponding GPIO pins (check code) and receive visual confirmation from LED state.
- 4.6. Measure potential of designated GPIO pins and verify that output is 3.3V
- 4.7. Attach load to pins and measure current from each (~3mA)
- 4.8. Measure potential of 5V pin

Test Pass condition: GUI control correctly controls LED states. GPIO pins measure 3.3V when *on* and 0V when *off*. Each draws 3mA under load. The potential on the 5V pin is near 5V.

This test is done to confirm characteristics of RPi and verify functionality of server/GUI code.

5. **Arduino UNO**

- 5.1. Connect Arduino UNO to power
- 5.2. Measure 5V out and GND pins using multimeter
- 5.3. Measure voltage on output pins while both *on* and *off*

Test Pass condition: 5V and GND pins measure 5V and 0V respectively. Output pins measure 5V while *on* and 0V while *off*.

This test is done to confirm characteristics and functionality of purchased Arduino UNO.

6. **Fuse**

- 6.1. Connect fuse enclosure to AC power (120 VAC) using power cord
- 6.2. Connect load generator to both ground (black) and hot (red) wires
- 6.3. Set AC load generator to 2A at 120VAC (current should run straight through as if it were plugged directly into the wall)
- 6.4. Now set load generator to 5A at 120VAC (fuse should break, creating an open circuit)

Test Pass condition: The 2A load should run smoothly through the fuse. The 5A load should break the fuse, creating an open circuit.

This test is done to test the threshold of the fuse and confirm the safety of system.

7. **Power Supply**

- 7.1. Connect power supply to wall outlet (fuse can be included if already tested)
- 7.2. Wire both the ground (black) and hot (red) wires to the load generator
- 7.3. Set load generator to 120mA at 5V
- 7.4. Now set the load generator to 2.5A at 5V

Test Pass condition: Power supply successfully delivers 120mA at 5V. Power supply delivers 2.5A at 5V

This test is done to confirm peak and nominal current values for the power supply. To test the functionality of the power supply, it can be simply plugged into the Arduino UNO using the state of the UNO as its pass condition.

8. **Enclosure**

8.1. Take a 1 mm object and attempt to fit in all seams

Test Pass condition: Object is not able to enter the enclosure at any point.

This test is done to prove the ruggedness of the enclosure, which means that no object of 1 mm diameter may enter the system.