

Lab 1 Test Plan

Feature: As a user, I should be able to power on a durable hardware device and use it to see temperatures without an internet connected computer.

- **Scenario 1:** I can still use the device after mishandling or dropping it
 - 1) Drop the enclosed hardware device from a height of 3.5 feet onto the ground
 - 2) Ensure that all parts are still connected and nothing is loose
 - 3) Turn the enclosed hardware device upside down and slightly shake for 10 seconds
 - 4) Ensure that all parts are still connected and nothing is loose
- **Scenario 2:** I can easily connect and disconnect the temperature sensor
 - 1) Plug in the temperature sensor into the open connector on the enclosed hardware device
 - 2) Unplug the temperature sensor from the connector
 - 3) Ensure this was easy to do and required little to no effort
 - 4) Plug the temperature sensor back into the open connector
 - 5) Drop the enclosed hardware device from a height of 3.5 feet onto the ground
 - 6) Ensure that all parts are still in working order and nothing has broken off. Note: it is ok for the temperature probe to come unconnected, but the connector should not be damaged in any way
- **Scenario 3:** I can control the power for the box using the on/off switch
 - 1) Ensure the hardware device's power switch is in the "off" position
 - 2) Press the button on the device
 - 3) Ensure that nothing happens. For example, the LEDs should not light up
 - 4) Move the device's power switch to the "on" position
 - 5) Press the button on the device
 - 6) Ensure that some of the LEDs on the device are now lit
- **Scenario 4:** I can view the current temperature in binary format using the LEDs on the device
 - 1) Ensure that the device's power switch is in the "on" position and the connector is plugged into the temperature sensor
 - 2) Press and hold down the button
 - 3) Ensure that the binary displayed through the LEDs is correct for the current room temperature. For example, if the temp is 22 °C, the LEDs should be 0010110. Data should be displayed with no noticeable delay, ie within ~20 ms of pressing the button
 - 4) Release the button
 - 5) Ensure that the LEDs are no longer lit
 - 6) Press and hold down the button
 - 7) Place your fingers on the temperature sensor
 - 8) Ensure that the LEDs indicate that the temperature is slowly increasing
 - 9) Touch the temperature sensor with the end of a soldering iron
 - 10) Ensure that the LEDs indicate that the temperature is increasing more quickly

- 11) Release the button
 - 12) Cool the temperature sensor to below 0 °C using a coolant such as dry ice
 - 13) Press and hold the button
 - 14) Verify that the temperature displayed in binary format is 2's complement
 - 15) Release the button
- **Scenario 5:** I can easily tell when there is an error reading the temperature on the box
 - 1) Ensure that the device's power switch is in the "on" position and the connector is NOT plugged into the temperature sensor
 - 2) Press and hold down the button
 - 3) Ensure that the LEDs are all blinking at the same rate every second to indicate that there is an error in the reading
 - 4) Release the button
 - 5) Connect the temperature sensor to the device
 - 6) Press and hold the button
 - 7) Ensure that the device is reading a temperature
 - 8) Unplug the temperature sensor from the device
 - 9) Ensure that the LEDs are again blinking to indicate an error
 - 10) Plug the temperature sensor back into the device
 - 11) Ensure that the LEDs are reading a temperature
 - 12) Release the button
 - 13) Ensure that the LEDs are all off and are not blinking

Feature: As a user, I should be able to view temperatures on the internet

- **Scenario 1:** I can easily see the current temperature on the web page
 - 1) Ensure the device is on, the temperature sensor is plugged in, and you are on the correct webpage
 - 2) Verify that you can see the current temperature on the screen
 - 3) Place your fingers over the temperature sensor
 - 4) Verify that you can see the current temperature increasing every 1 second
 - 5) Remove your finger from the sensor
 - 6) Verify that you can see the current temperature decreasing every 1 second
 - 7) Unplug the sensor from the device
 - 8) Verify that "Unplugged Sensor" is displayed on the screen instead of the temperature
 - 9) Plug the sensor back into the device
 - 10) Verify that the current temperature is displayed on the screen
 - 11) Power off the device
 - 12) Verify that "No Data Available" is displayed on the screen instead of the temperature
 - 13) Power the device back on
 - 14) Verify that the current temperature is displayed on the screen
 - 15) Toggle the display between Fahrenheit and Celsius on the screen and confirm the conversion is working correctly

- **Scenario 2:** I can toggle the displayed temperature between Fahrenheit and Celsius
 - 1) Ensure the device is on, temperature sensor is plugged in, and you are on the correct webpage
 - 2) Verify that you can see the current temperature on the screen
 - 3) Toggle the display between Fahrenheit and Celsius on the screen
 - 4) Confirm the conversion is working correctly
 - 5) Toggle the display back to the previous format and confirm the number displayed is back to the original
- **Scenario 3:** I can confirm the correct temperature at room temp and when placed in an ice-water mixture
 - 1) Ensure the device is on, temperature sensor is plugged in, and you are on the correct webpage
 - 2) Ensure that the sensor is currently at room temperature
 - 3) Verify that the displayed temperature is at 22 °C, +- 4 °C (18-26 °C)
 - 4) Place the temperature sensor into a cup filled with ice water and let the temperature stabilize
 - 5) Verify that the displayed temperature is at 0 °C, +- 2 °C (-2-2 °C)
- **Scenario 4:** I can see a correctly formatted graph on the screen
 - 1) Ensure the device is on, temperature sensor is plugged in, and you are on the correct web page
 - 2) Verify that you can see a graph displayed below the current temperature reading
 - 3) Verify that the graph is in °C
 - 4) Verify that the top of the graph is labeled 50 °C and the bottom is labeled 10 °C
 - 5) Verify that the graph scrolls horizontally as new temperature values are added to the right side of the graph and updated every 1 second
 - 6) Verify that temperatures older than 300 seconds are no longer displayed
 - 7) Verify that the label for the x-axis is "Seconds Ago from the Current Time" and there are tick marks ranging from 300->0
- **Scenario 5:** I can see a graph of the past 300 seconds of temperature readings on the screen within 10 seconds of powering on the device
 - 1) Ensure the device is off, temperature sensor is plugged in, and you are on the correct web page
 - 2) Verify you can see a blank graph displayed below the current temperature
 - 3) Turn on the device
 - 4) Verify that you begin seeing temperature readings show up every 1 second on the graph within 10 seconds of powering on
- **Scenario 6:** I can scale the graph by dragging it with the mouse pointer
 - 1) Ensure the device is on, temperature sensor is plugged in and you are on the correct web page
 - 2) Verify that you see a graph displayed below the current temperature with scrolling data every 1 second
 - 3) Drag the graph from the bottom right corner to a smaller size
 - 4) Verify that the data is being displayed and updated correctly

- 5) Drag the graph from the bottom right corner to a larger size
- 6) Verify that the data is being displayed and updated correctly
- **Scenario 7:** I can see on the graph when the temperature readings are not being taken
 - 1) Ensure the device is off, temperature sensor is plugged in, and you are on the correct web page
 - 2) Verify you can see a blank graph displayed below the current temperature
 - 3) Turn on the device
 - 4) Verify that you begin seeing temperature readings show up every 1 second on the graph
 - 5) After 10 seconds, unplug the temperature sensor from the device
 - 6) Verify that you see a break in the points displayed on the graph
 - 7) After 10 seconds, plug the temperature sensor back into the device
 - 8) Verify that you see temperature points being displayed again on the right side of the graph
 - 9) After 10 seconds, power off the device
 - 10) Verify that you see a break in the points displayed on the graph
 - 11) After 10 seconds, turn the device back on
 - 12) Verify that you see temperature points being displayed again on the right side of the graph

Feature: As a user, I should be able to interact with the hardware device from the internet

- **Scenario 1:** I can press a button on the web page to enable displaying the temperature in binary format on the hardware device. Response time should be within 1 second
 - 1) Ensure the device is on, temperature sensor is plugged in, and you are on the correct web page
 - 2) Press the button in the configuration section labeled "Display Temperature on Device"
 - 3) Verify that the device has LEDs turned on and is displaying the correct temperature within 1 second
 - 4) Unplug the temperature probe
 - 5) Verify that the LEDs begin blinking to indicate an error
 - 6) Verify that the web page is displaying "No Data Available"
 - 7) Plug the temperature probe back into the device
 - 8) Verify the LEDs are turned on and correctly displaying a temperature
 - 9) Verify the web page is displaying the correct data
 - 10) Press the button in the configuration section labeled "Stop Displaying Temperature on Device"
 - 11) Verify that the device has LEDs turned off within 1 second

Feature: As a user, I should be able to receive text messages to my phone number when the temperature goes above or below a designated maximum and minimum

- **Scenario 1:** I should receive a text message when the temperature sensor receives a reading that is outside of the range [minimum, maximum]. Range, text, and phone number should be customizable from the web page
 - 1) Ensure the device is on, the temperature sensor is plugged in, and you are on the correct web page
 - 2) Verify that you see a configuration section where you can change the maximum and minimum temperatures, the text to send, and the phone number to send to
 - 3) Change the minimum temperature to 10 °C
 - 4) Change the phone number to your phone number
 - 5) Change the minimum temperature alert text
 - 6) Put the temperature sensor into the ice water container
 - 7) Watch the temperature change on the screen until it hits 10 °C
 - 8) Verify that the phone number inputted received a message that the temperature hit a minimum
 - 9) Change the maximum temperature to 30 °C
 - 10) Change the phone number to your friend's phone number
 - 11) Change the maximum temperature alert text
 - 12) Remove the temperature sensor from the ice water and warm it with your finger
 - 13) Watch the temperature on the screen go up to 30 °C
 - 14) Verify that your friend receives a text message after the temperature goes above this range