I. Description of Overall Test Plan

Since this project deals with both hardware and software components, this test plan will split these two into separate portions, with a set of tests specifically for the integration of these two portions. The software tests will ensure that data is able to be read from all the sensors, the data is able to be properly modified, the data is able to be stored or retrieved, and that all software components can interact with one another. The hardware tests will ensure that the physical components are able send input to the software portions, as well as receive output to the screen and SD card.

II. Test Case Descriptions

SA1.1   **Sensor API – Laser Range Finder**
SA1.2   This test ensures that measurements from the laser range finder can be retrieved.
SA1.3   This test will simulate a request for a distance measurement, and then expect to receive a reading from the laser range finder. For this test to be complete, a reading should be received from the sensor.
SA1.4   *Inputs:* Simulated request for a laser range finder distance measurement sent to the Sensor API.
SA1.5   *Outputs:* A distance measurement reading from the laser range finder.

SA1.6   Normal

SA1.7   Blackbox

SA1.8   Functional

SA1.9   Unit

SA2.1   **Sensor API – Inclinometer**
SA2.2   This test ensures that measurements from inclinometer can be retrieved.

SA2.3   This test will simulate a request for an angle measurement, and then expect to receive a reading from the inclinometer. For this test to be complete, a reading should be received from the sensor.
SA2.4   *Inputs:* Simulated request for an inclinometer angle measurement sent to the Sensor API.
SA2.5   *Outputs:* An angle measurement reading from the inclinometer.

SA2.6   Normal

SA2.7   Blackbox

SA2.8   Functional

SA2.9   Unit

SA3.1   **Sensor API – Magnetometer**

SA3.2   This test ensures that measurements from magnetometer can be retrieved.

SA3.3   This test will simulate a request for a cardinal direction measurement, and then expect to receive a reading from the magnetometer. For this test to be complete, a reading should be received from the sensor.

SA3.4   *Inputs:* Simulated request for a magnetometer cardinal direction measurement sent to the Sensor API.

SA3.5   *Outputs:* A cardinal direction measurement reading from the magnetometer.

SA3.6   Normal

SA3.7   Blackbox

SA3.8   Functional

SA3.9   Unit

DP1.1   **Data Processor – Request Reading**

DP1.2   This test ensures that the Data Processor can request and retrieve readings from the Sensor API.

DP1.3   This test will simulate a request for a full measurement point, which should receive readings from all three sensors. For this test to be complete, it should be able to request and receive readings from all three sensors.

DP1.4   *Inputs:* Simulated request for a full measurement point.

DP1.5   *Outputs:* Readings from all three sensors.

DP1.6   Normal

DP1.7   Blackbox

DP1.8   Functional

DP1.9   Integration

DP2.1   **Data Processor – Data Formatting**

DP2.2   This test ensures that the Data Processor is able to combine all the readings into JSON formatting.

DP2.3   This test will simulate the outputs from all three sensors, and the Data Processor format these points correctly into the JSON format. For this test to be complete, this JSON should match a manually generated format.

DP2.4   *Inputs:* Simulated outputs from all three sensors.

DP2.5   *Outputs:* Correctly formatted JSON format.

DP2.6   Normal

DP2.7   Blackbox

DP2.8   Functional

DP2.9   Unit

DP3.1   **Data Processor – Data Storage**

DP3.2   This test ensures that the Data Processor is able to store formatted data to the SD card.

DP3.3   This test will simulate a formatted JSON input, and attempt to store it into the SD card. The SD card will then be opened on a separate computer, and the storage will be verified. For this test to be complete, the SD card must contain the same JSON that was simulated as an input.

DP3.4   *Inputs:* Simulated JSON data.

DP3.5   *Outputs:* JSON data read from a separate computer.

DP3.6   Normal

DP3.7   Blackbox

DP3.8   Functional

DP3.9   Integration

DP4.1   **Data Processor – Data Retrieval**

DP4.2   This test ensures that the Data Processor is able to retrieve formatted data to the SD card.

DP4.3   This test will simulate storing JSON data on the SD card using a separate machine, and attempt to have the Data Processor read in this data. For this test to be complete, the Data Processor should output the same JSON that was stored using a separate machine.

DP4.4   *Inputs:* Simulated JSON data placed on the SD card.

DP4.5   *Outputs:* JSON data read from the SD card into the Data Processor.

DP4.6   Normal

DP4.7   Blackbox

DP4.8   Functional

DP4.9   Integration

IO1.1   **I/O Controller – Calculation Selection**

IO1.2   This test ensures that the I/O Controller chooses the appropriate calculation based off of the input command.

IO1.3   This test will simulate the various commands that a user can choose from, and attempt to send the correct calculation command to the simulated Data Processor. For this test to be complete, the I/O Controller should output the correct calculation commands according to the user command.

IO1.4   *Inputs:* Simulated user commands.

IO1.5   *Outputs:* Calculation commands for the Data Processor.

IO1.6   Normal

IO1.7   Blackbox

IO1.8   Functional

IO1.9   Unit

IO2.1 **I/O Controller – Data Received**

IO2.2   This test ensures that the I/O Controller is able to interact with the Data Processor.

IO2.3   This test will simulate user commands, and will attempt to receive simulated processed data from the Data Processor. For this test to be complete, the I/O Controller should be able to request and receive data from the Data Processor.

IO2.4   *Inputs:* Simulated user commands and simulated processed data.

IO2.5   *Outputs:* Simulated processed data from the Data Processor.

IO2.6   Normal

IO2.7   Blackbox

IO2.8   Functional

IO2.9   Integration

PD1.1 **Physical Device – Command Selection**

PD1.2   This test ensures that physical button interface is able to send a command to the I/O Controller.

PD1.3   This test will send various user commands through the physical button interface to the I/O Controller.

PD1.4   *Inputs:* User commands.

PD1.5   *Outputs:* Commands received in the I/O Controller.

PD1.6   Normal

PD1.7   Blackbox

PD1.8   Functional

PD1.9   Integration

PD2.1 **Physical Device – Command Selection**

PD2.2   This test ensures that LCD screen is able to read output data from the I/O Controller.

PD2.3   This test will send simulated processed data to the I/O Controller, and attempt to display this data on the LCD screen.

PD2.4   *Inputs:* Simulated processed data.

PD2.5   *Outputs:* Simulated processed data appearing on the LCD screen.

PD2.6   Normal

PD2.7   Blackbox

PD2.8   Functional

PD2.9   Integration

III. Test Case Matrix

Test Case	Normal/ Abnormal	Blackbox/ Whitebox	Functional/ Performance	Unit/ Integration
SA1	Normal	Blackbox	Functional	Unit
SA2	Normal	Blackbox	Functional	Unit
SA3	Normal	Blackbox	Functional	Unit
DP1	Normal	Blackbox	Functional	Integration
DP2	Normal	Blackbox	Functional	Unit
DP3	Normal	Blackbox	Functional	Integration
DP4	Normal	Blackbox	Functional	Integration
IO1	Normal	Blackbox	Functional	Unit
IO2	Normal	Blackbox	Functional	Integration
PD1	Normal	Blackbox	Functional	Integration
PD2	Normal	Blackbox	Functional	Integration