

Test Plan for the Auto-Irrigator

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System Under Test

The subject of this test plan is the Auto-Irrigator V. 1.2, which is essentially the same as the original version with the subtraction of a few excess features such as LED illumination of the plant.

Objectives

The overall purpose of this test plan is to confirm our breadboard design of the Auto-Irrigator and validate the construction of a final PCB circuit. Specifically, the first goal of this test plan is to perform unit tests on each module. The second goal is to perform iterative integration testing in which one module is added at a time to the processor and the system is tested. Once the system has been entirely assembled, we shall perform functional testing. Parametric testing will also be performed to determine the battery life.

Resources

- Hardware
 - One Auto-Irrigator V. 2.0
 - One potted plant
 - One vase filled with water
 - Tubing for water pump
 - Windows 10 PC
 - Multimeter
- Software
 - Test script for each module V. 1.0
 - Test script for full system V. 1.0
- Personnel
 - One person with basic knowledge of coding, electronic hardware, and microcontrollers
 - Basic system training/study required

Outline

1. Unit Testing
 - 1.1. Power Supply Test Case: Testing to confirm 5V and 3.3V V_{CC} .
 - 1.2. Processor Test Case: Testing to confirm that the processor receives code.
 - 1.3. WiFi Test Case: Testing to confirm that the processor transmits data over WiFi.
 - 1.4. Water Level Sensor Test Case: Testing to confirm that the processor detects input from the water level sensor.
 - 1.5. Moisture Sensor Test Case: Testing to confirm that the processor detects input from the moisture sensor.
 - 1.6. Water Pump Test Case: Testing to confirm that the water pump and its associated transistor switch can be actuated by the processor and powered by the power supply.
2. Integration Testing
 - 2.1. Moisture Detection Test Case: A half-system test to confirm that the processor actuates the water pump when moisture is *not* detected in the soil.
 - 2.2. Empty Reservoir Detection Test Case: A half-system test to confirm that the processor *does not* actuate the water pump when the water reservoir is empty.
3. Functional Testing
 - 3.1. Short-Term Operation Test Case: A full-system test to confirm successful short-term operation.
4. Parametric Testing
 - 4.1. Battery Life Test Case: A full-system test to confirm long-term battery life.

Test Case #1

Test Author: Jakob White				
Test Case Name:	Power Supply Test Case	Test ID#:	1.1	
Description:	This test confirms the rated output voltage of the voltage regulator and the Power Boost. The power source is not loaded during the test.	Type:	Unit Test	
Tester Information				
Name of Tester:		Date:		
Hardware Version:	Power Supply of Auto-Irrigator V. 1.2	Time:		
Setup:	Before testing, the power supply module should be disconnected from the system and the battery should be fully charged. Once fully charged, battery power should be applied to the input of the power boost. With the multimeter, the output voltage at the '5V' terminal of the power boost and the '3.3V' output of the voltage regulator should be measured.			
Step:	Action:	Expected Result:	P/NP:	Comments:
1	Disconnect Power Supply from System	The power supply should be isolated		
2	Charge Battery	The battery should be fully charged		
3	Connect Battery to 'BAT' and 'GND' of Power Boost	The battery should power the power supply		
4	Measure Voltage between '5V' and 'GND' of Power Boost	The multimeter should indicate 5V		
5	Measure Voltage between '3.3V' and 'GND' of voltage regulator	The multimeter should indicate 3.3V		
Overall Test Results:				

Test Case #2

Test Author: Jakob White				
Test Case Name:	Water Pump Test Case	Test ID#:	1.6	
Description:	This test confirms that the output from GPIO#5 of the processor can switch on the water pump using a transistor, and that the power supply to the water pump is enough for this application.	Type:	Unit Test	
Tester Information				
Name of Tester:		Date:		
Hardware Version:	Water Pump of Auto-Irrigator V. 1.2	Time:		
Setup:	Before testing, make sure that the only modules connected are the power supply, the processor, the water pump, and the switch transistor. The base of the transistor should be connected to GPIO#5, and the water pump should be between the 3.3V power supply and the collector. A water pump test script should be prepared to simply turn GPIO#5 to HIGH output.			
Step:	Action:	Expected Result:	P/NP:	Comments:
1	Download the test code for the water pump on to the processor	The code should be successfully downloaded		
2	Execute the script	The motor should be turned on and stay on.		
Overall Test Results:				

References

Faust, Mark. “Homework #7: Test Plan.” *Portland State University*, 2020, d2l.pdx.edu/d2l/le/content/823599/viewContent/5068014/View.

Faust, Mark. “Test Plan Rubric.” *Capstone Website*, 2020, web.cecs.pdx.edu/~faustm/capstone/forms/TestPlanRubric.pdf.

Faust, Mark. “Lecture #8: Testing and Documentation.” *Portland State University*, 2020, <https://d2l.pdx.edu/d2l/le/content/823599/viewContent/5068012/View>.