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Testing Strategy-Smart Irrigation-Team iSlugs

Project Overview:

The smart irrigation system is designed to be an autonomous system which uses an arduino microcontroller that periodically polls a moisture and temperature sensor. The microcontroller should then send the moisture level, temperature value and a timestamp to another arduino that logs the data. This arduino should then send the signal to another microcontroller to turn on the water pump for that particular region if the soil need water.

Due to the limitations of not having certain hardware pieces available to the team, the data logging and water pump code cannot be tested. There is code that will write data to a sd card and send a signal to the water pump, but we don't have a shield to attach the sd to the arduino or the water pump circuit completed. Because of these reasons, testing is focused on hardware pieces available to the team such as the moisture sensors, temperature sensor and xbee wireless chips.

Black-Box Unit Testing:

Since the system is autonomous, a user of the product should not have to engage with the system directly. Instead a user must have complete confidence that the soil moisture and temperature will be polled and sent from one controller to another.

1. Moisture Sensor Testing
    a. Testing the moisture sensors involves using three pots filled with soil and different moisture levels. One pot will have no water, the second will have ½ cup and the third will have 1 cup of water. The microcontroller will poll the moisture sensor and display the soil moisture level. To make sure the moisture sensors are working correctly and the values are being interrupted correctly, there should be a distinct difference in the values read from each pot of soil.
2. Temperature Sensor Testing
    a. Testing the temperature sensor involves polling and displaying the temperature value read from the sensor and comparing that value to a thermometer to insure that the correct temperature value is being read.
3. Wireless Communication Testing
    a. To test the wireless communication, the values read from the sensors should be sent to a computer wirelessly during every polling event.

Glass-Box Unit Testing:

4. Moisture Sensor Code
    a. Moisture sensor is connected to a digital input pin and the code reading the moisture level reads from the specified pin. Code contains the correct pin number when doing a serial read.
5. Temperature Sensor Code
    a. Temperature data is being received from the digital input pin and stored correctly. Code contains the correct pin number for when doing a serial read.
6. Xbee Communication Code
    a. A unit test which uses a loop to send data packets from one xbee to another. The test will be a success if all data packets have been received error free.