

Smart Pot Automatic Plant Watering System Unit Test Plan (DVT)

Power System

- Use an oscilloscope to verify the 3.3 V on the output of the voltage regulator.
- Use an oscilloscope to verify 5V on the 5V pins.

PIC32 Microcontroller

- Use a DMM to verify no solder bridges and connection to all other components.
- Add code and use an oscilloscope to toggle a pin high/low to verify a clock speed of 40 MHz.

USB Serial System

- Use a logic analyzer to verify UART messages are correctly being sent from the PIC32.
- Use a logic analyzer to verify a keystroke from the computer is sent from the USB-UART TX line.
- Verify on a computer terminal that a message sent from the PIC32 is received at the terminal.
- Implement code on the PIC32 to verify keystrokes can be received from the USB-UART bridge via UART (i.e. by repeating the supplied keystroke to the terminal).
- Verify the TX and RX LEDs are correctly lighting up.

Pump System

- Ensure the pump motor is operational before adding to the board.
- Verify the MOSFET is operational by applying 3.3V to the gate.
- Add the pump and manually verify the MOSFET controls the pump by applying 3.3 V to the gate.
- Implement PIC32 code to show control of the pump through the microcontroller.
- If necessary, verify PWM can reduce the flow rate of the pump.

WiFi System

- Verify that the device can be programmed.
- Implement SPI on the PIC32 and ESP32 use test points and a logic analyzer to verify the correct messages are being sent.
- Use the terminal to verify messages are properly being sent and interpreted by the PIC32 and ESP32
- Verify the ESP32 can connect to an access point.

Temperature Display System and User Interaction System

- Ensure 5V signals coming from the 5V buffer.
- Use a logic analyzer to verify SPI messages from the PIC32.
- Using a DMM, verify the outputs of the shift register correspond to the SPI messages.
- Verify the 7-segment displays can display each of the 10 digits.

Temperature Sensor System

- Using a DMM, verify the resistance of the thermistor changes with temperature changes.
- Using an oscilloscope, verify the voltage output of the thermistor circuit changes with temperature changes (and in the correct direction).

- Verify the PIC32 ADC reads the same analog value as the oscilloscope.
- Verify the analog values read on the PIC32 are correlated to the temperature.

Soil Moisture Sensor System

- Add the soil moisture probes to the soil, add voltage to one, and verify the output of the other probe varies with moisture.
- Add the MOSFET and verify by applying 3.3V to the gate that the voltage on the probe is on or off when the 3.3V is removed.
- Verify the PIC32 can control turning on the probe via the MOSFET.
- Using an oscilloscope, verify the PIC32 ADC is correctly reading the analog voltage.

Low Water Sensor System

- Verify that the signal is high/low when the button is depressed/released.
- Add PIC32 software to read the status of the signal, provide any necessary debouncing, and verify button presses and button releases can be detected by the PIC32