Well System Monitor

Build Manual

Version 2.0; date: 9/22/2018

Concept

We highly recommend that you first read the Project Concept document included in this package. The project concept document explains the use cases we address with the well system monitor (WSM) and discuss some of the limitations and future expansions.

The system consists of a microprocessor controlled system that monitors several sensors and reports their status to a cloud based storage facility. The project is based on the popular Water Leak Sensor by Team Practical Projects as found on GitHub. The reader will need to build the Water Leak Detector hardware before continuing on this project.

This project uses the Particle.io Photon microprocessor and Google Docs Spreadsheet cloud storage. MIT App Inventor 2 is used to create a test app for an Android smartphone.

Build The Hardware

Base Hardware

Download the Water Leak Sensor repository from the TeamPracticalProjects account on GitHub.

https://github.com/TeamPracticalProjects/WaterLeakSensor

Follow the detailed instructions there to build the electronics and case for the Water Leak Sensor.

Modify WLD to become WSM

Overview

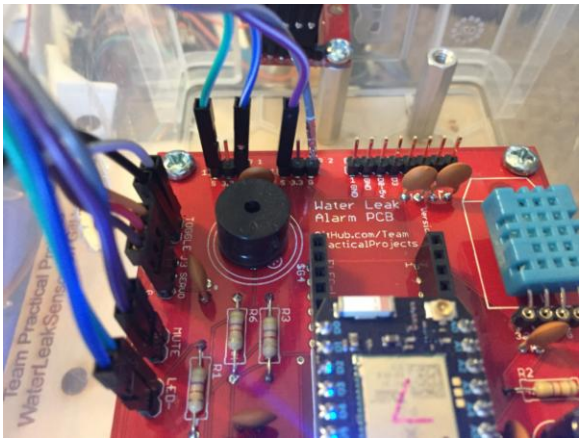
The modifications to create a Well System Monitor are fairly small.

Sensor Wiring

This is an optional step. If the relays you intend to monitor are in one cabinet, then you may prefer to run one telephone cable to the relay box instead of two. The WSM sensors only require ground and the sense line. In the two photos below you can see how we have used a four conductor cable to run between the two sensor headers on the PCB and the pin header on the RJ11 PCB. We have also removed the second RJ11 connector.

Referring to the figure below, use female - female jumper wires to connect the sensor pins on the printed circuit board to the RJ11 circuit board:

Photon printed circuit board connector/pin	**RJ11 circuit board pin**	**Telephone connector wire color**
J1, pin 1 (“S”)	Pin 2 (“B”)	Yellow
J1, pin 3 (“G”)	Pin 3 (“R”)	Green
J2, pin 1 (“S”)	Pin 4 (“Y”)	Red
J2, Pin 3 (“G”)	Pin 5 (“G”)	Black



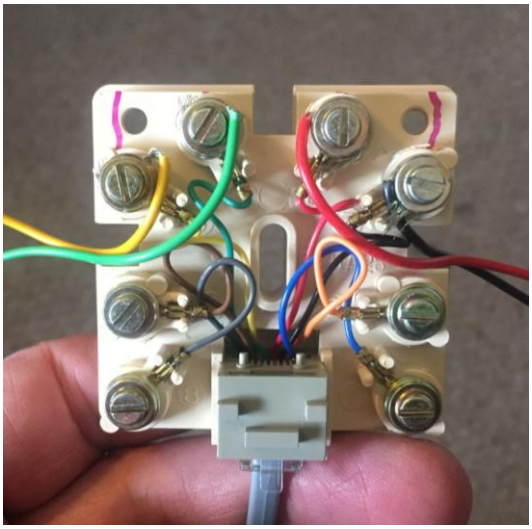
Note that when a standard telephone cable is used to interconnect the RJ11 connector in the electronics to a standard telephone wall box, the signal wires are reversed. This is reflected in the table above.

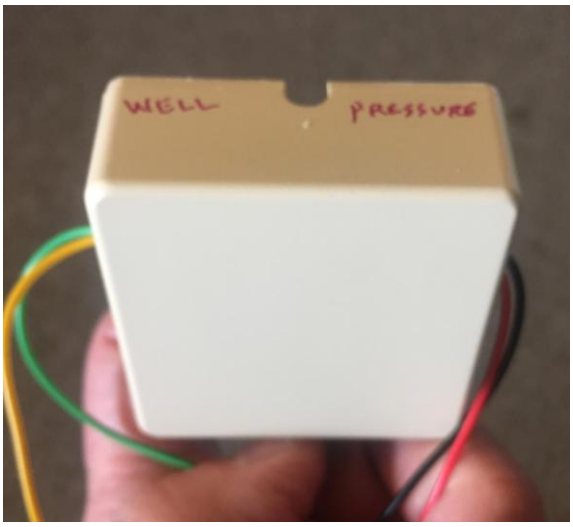
RJ11 Box

An RJ11 box makes for a neat and tidy, professional looking installation.

The well pump sensor uses the yellow and green wires; the pressure pump the red and black, when wired to the electronics printed circuit board as described above. Locate the RJ11 box near the relays in your system. Run wires to unused contacts on the relays. Our system assumes your relay will have normally open contacts.

In the two photos below you can see the wires connected inside the box and the box closed. Note that we labeled the case of the RJ11 box so it is easy to remember which wires go where.





Firmware

The well system monitor uses different firmware than the WLD. Use the instructions on the Particle.io site to flash the firmware to your Photon. We recommend using the desktop Particle Dev IDE. You can also copy/paste the firmware files to the Particle.io Web IDE. Make sure to copy and paste all of the firmware files into your project; all .cpp and .h files in addition to the .ino file.