Missouri School for the Deaf Remote Weather Station

As Built System Description

1.0 System Description

The National Weather Service Cooperative Observers Station for Fulton, Mo has been relocated from its former location to the Missouri School for the Deaf. In order to continue transmitting daily reports even during adverse weather when immediate physical access to the NWS equipment is not available, an automated remotely accessible set of instruments will be designed and built at the Missouri School for the Deaf. This set of instruments will be used to provide preliminary data reports with the "official" data being gathered when access to the station is available.

1.1 Required Data:

Temperature:

- High temperature during the previous 24 hours in °F to the nearest °F
- Low temperature during the previous 24 hours in °F to the nearest °F
- Current temperature in °F to the nearest °F

Precipitation:

- Cumulative rainfall during the previous 24 hours in inches to the nearest 0.01"
- Cumulative snow/ice during the previous 24 hours in inches to the nearest 0.1"
- Water equivalent of the cumulative snow/ice fall during the previous 24 hours to the nearest 0.01"
- Total snow/ice on the ground to the nearest 1"

1.2 General Requirements:

- The system must allow for remote retrieval of its accumulated data.
- The system must be able to gracefully recover from power disruptions.
- The system must be able to withstand the environment in which it will be operating with minimal maintenance. Components should be able to survive exposure for at least 5 years.

1.3 Desirable Features:

- The system should be accessible using the TCP/IP protocol and the internet, although other standard communications methods will be considered.
- The system should require minimal resources (wiring, power, communications) be provided by the school.
- If possible, the system should provide at least 48 hours of hourly data readings.
- The data from the system should be available to students, staff and the general public in the form of a web page.

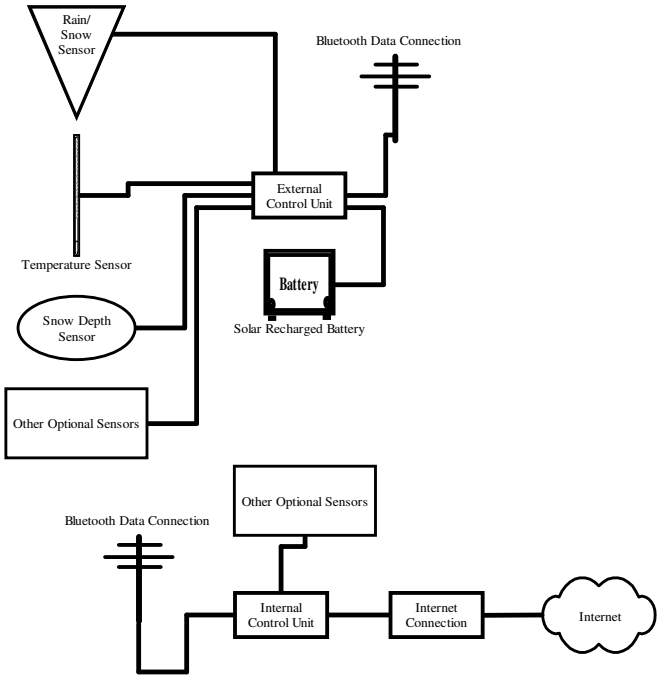
1.4 Optional Data Elements:

The following data elements are optional, but may be included if not cost prohibitive.

- Relative Humidity
- Barometric pressure
- Wind speed and direction
- Solar Cell and Battery Voltages – to evaluate solar cell / battery performance

2.0 Design Overview:

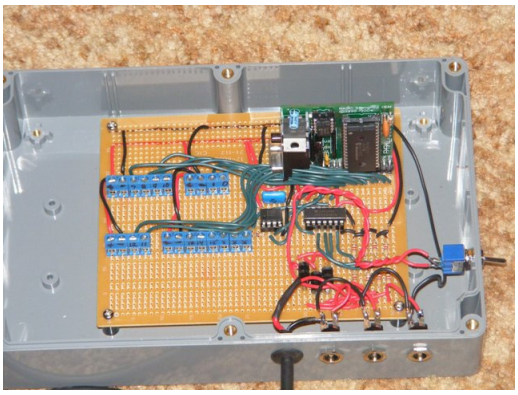
The overall arrangement of the solution is shown in the sketch below:



Each of the components is described in the sections that follow.

3.0 External Control Unit

The External Control Unit is responsible for reading the attached sensors and transmitting the data to the Internal Control Unit. The logical control is accomplished with a Parallax Basic Stamp 2 microcontroller OEM Board (Item Number: 27291). The Bluetooth Data Connection is an A7 Engineering EmbeddedBlue eb501-SER and SMA antenna.
The controller and all the sensors are housed in a shelter built by the Missouri School for the Deaf woodworking class.



Electronics Compartment

Shelter in position at the Missouri School for the Deaf

Also included in the Internal Controller is an ADC 0834 to measure the voltage from the three solar panels and the battery pack. The voltages are fed through a voltage divider to bring them into the 5v range of the ADC.