Yellowstone Sensors Project

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http://yellowstone.soe.ucsc.edu

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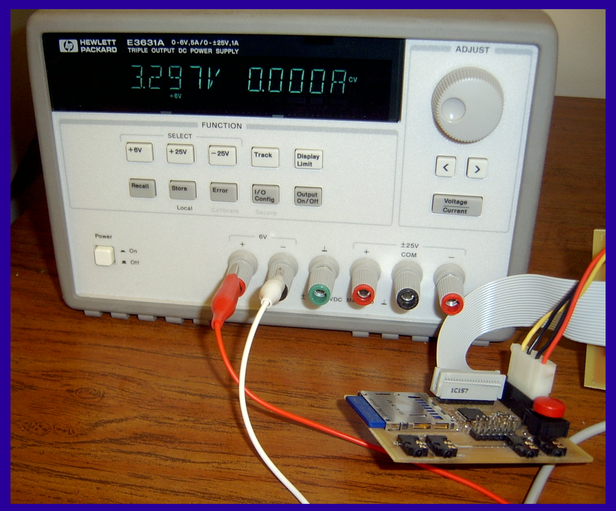
Hardware

MSP430-F149 ultra low power microcontroller

SD card for temperature data storage

Radiotronix Wi.232FHSS-250 radio module for short range (200m) transmission.

AeroComm AC4490 radio for long range (1-5km) transmissions



We clock the MSP430 at 32kHz to save power. In this photo the node is actually on, but drawing less current than the power supply can report.

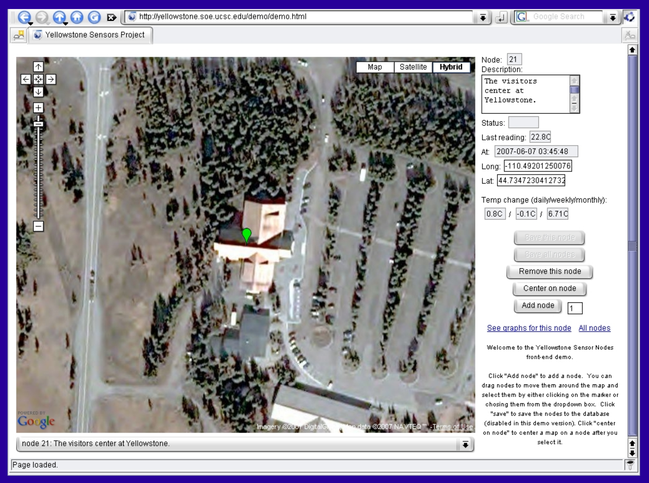
The US Geological Survey (USGS) currently monitors the temperature of various parts of Yellowstone National Park. At their request, we are designing a wireless sensor network which will automatically record and upload temperature readings to a server. This sensor network must be low power, failure tolerant, long-range and survive under adverse environmental conditions.

Software

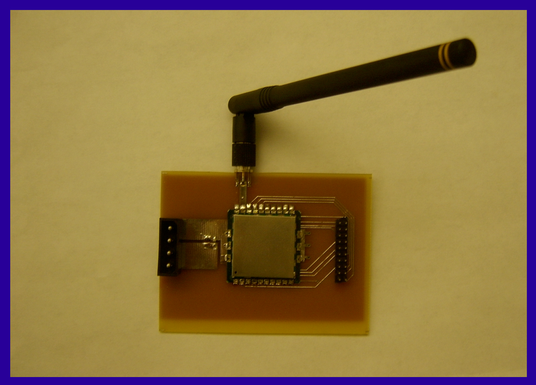
The base station periodically queries nodes for their temperature data and uploads it to our server.

The server parses the data and stores it in a MySQL database.

Our website makes the data available to a USGS server, and displays graphs of the temperature values.

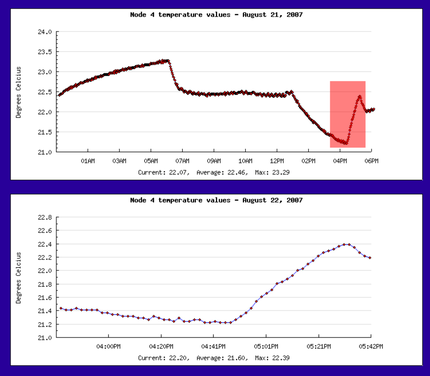


Our Google maps interface helps keep track of the locations of all the nodes.

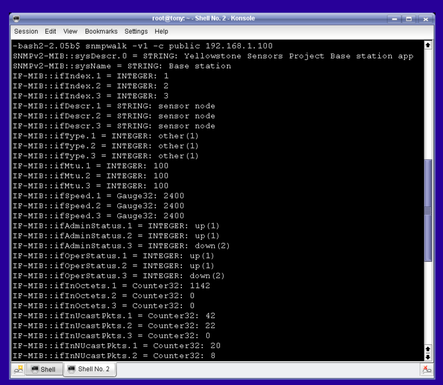


Each node has a Radiotronix Wi.232FHSS-250 radio which transmits at 250mW at 2400bps.

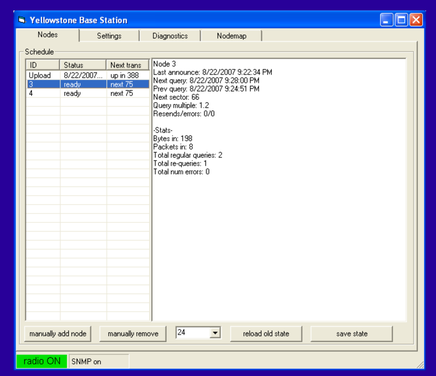
Our system battery was chosen because it contains chemically inert compounds. Experimentation and estimation show that it will be able to power a node for over six months.



All temperature graphs on our website are zoomable. You can highlight any region of the graph to view in more detail.



The base station internally runs a stripped down SNMP server, with each node treated as a separate interface.



Our base station's main job is to query and collect temperature data from the nodes.

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