

Remote Processing Flex Radios for Power and Antennas Switches

Marty Boroff - WD9GYM

In recent years I have become a “Snowbird”, a person who resides in the northern part of our country but spends their winter in the Sunshine state. Thanks to technology advances, a Ham can not only operate remotely but also manage powering devices on or off, switch antennas and a variety of other tasks that were visions of science fiction writers when I was growing up. This article describes how I used a Raspberry Pi and programmed the Pi with a message routing software package called Node-RED.

I have skills in several programming languages but this is my first opportunity to work with Node-RED. Node-Red comes installed on the latest version of the Raspberry Pi image. “Node-RED is a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways. It provides a browser-based editor that makes it easy to wire together flows using the wide range of nodes in the palette that can be deployed to its runtime in a single-click.”

The functions I had in mind when designing this projects were:

- 1) Power On/Off the Flex radio
- 2) Switch the radio between antenna and dummy load
- 3) Monitor the weather for thunderstorms
- 4) Alert me to power restoration after an outage

The Flex 6000 series radios were designed to be powered on/off via a RCA jack locate on the rear of the radio. Quoting form the hardware manual:

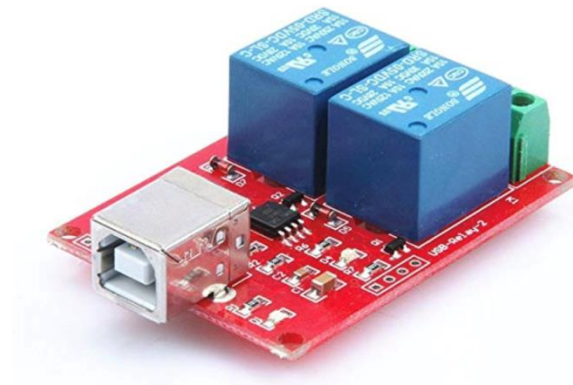
“This RCA connector is provided for remote power-on functionality. When the Remote Power ON feature is enabled, shorting this input to ground will activate the radio - opening this connector will disable power on the radio. Refer to the SmartSDR documentation for information on how to configure this input. (Note: 3.3VDC Max Input.)”

My first solution to work with this feature used a Smart power outlet and an enclosed AC/DC Power Relay. Connecting a mono phono cable to the normally closed terminals allowed a Smart AC/DC Wi-Fi switch to turn the relay on or off. For this project the Smart switch will be connected to the external radio power supply.



Remote Power and Antenna Switch

For this project a Raspberry Pi with activate a relay connect to the Pi via USB cable. Open source software to operate the relay is available for free.

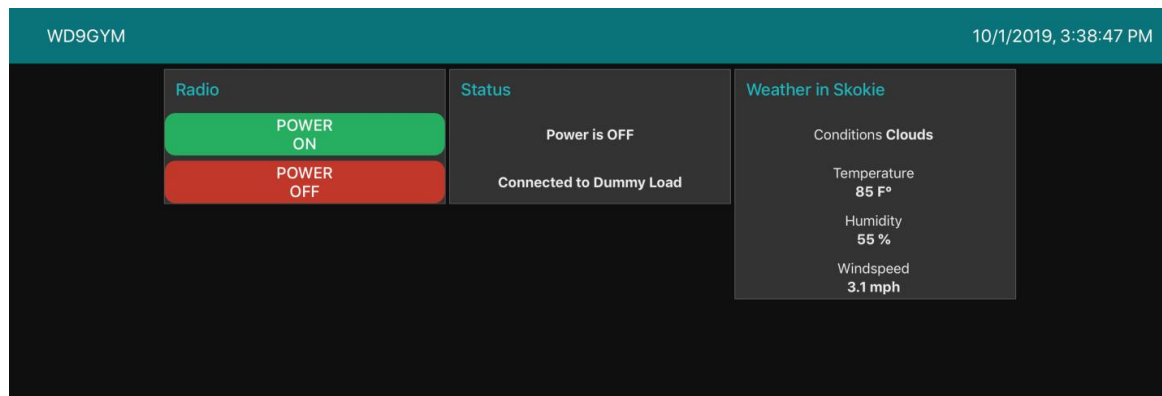


The relay board supports two relays. I am using an MFJ-4712 remote two position antenna switch controlled by the second relay. When the control unit for the antenna switch is set for switch position two and 12 DC is applied, antenna position two is active and position one goes to ground. Position one of the antenna switch will be wired with a dummy load. The slide switch on the control has the same effect as removing the power which then makes antenna one is active. The Pi controlled relay will manage power to the control unit, turning it on or off. Power will be supplied from the external radio power supply. The second relay will be connected to the Flex radio remote power jack.

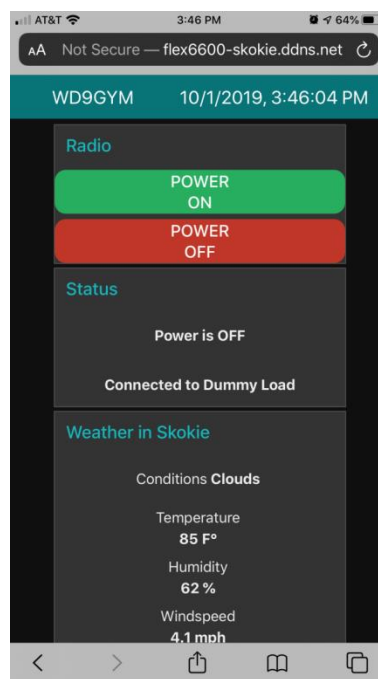


MFJ-4712 Remote Antenna Switch

A widget provided with Node-RED is the Open Weather Maps API. The application will poll for weather in a specified city and return information such as the current weather conditions. One of the conditions of descriptions return is "Thunderstorms". When the Pi receives this conditions the application will power off the radio and switch the antenna to a dummy load and send me a text. Likewise when the conditions change to any other condition, the radio will be powered on and the antenna switch will return to position one.



PC Browser View

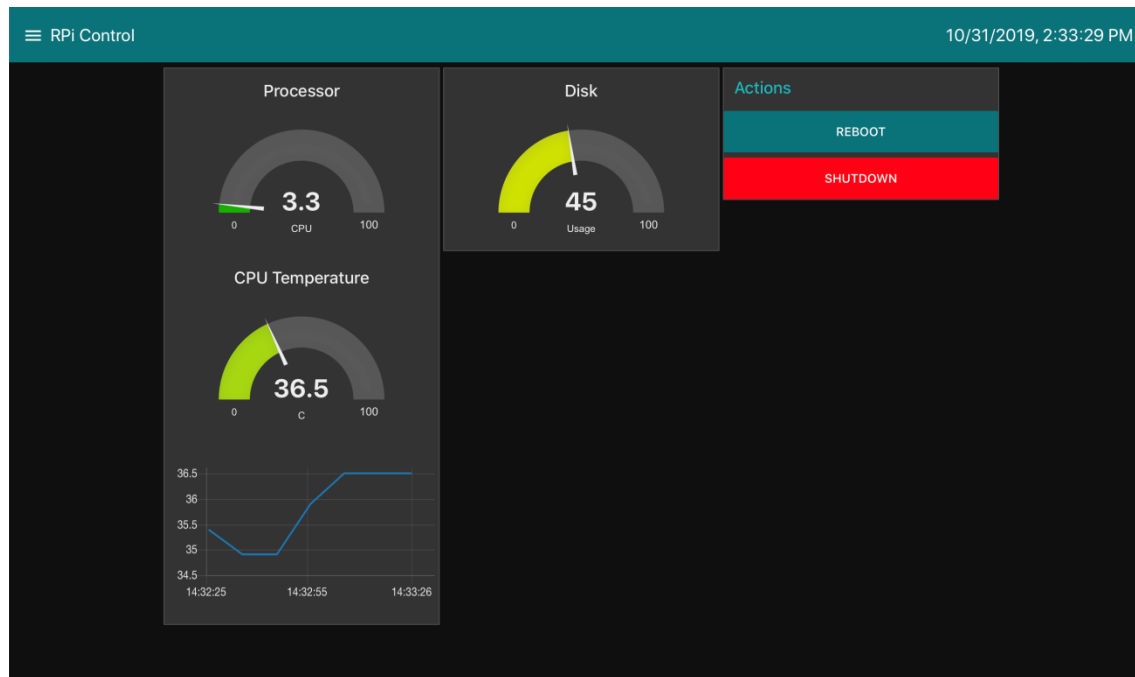


iPhone Browser View

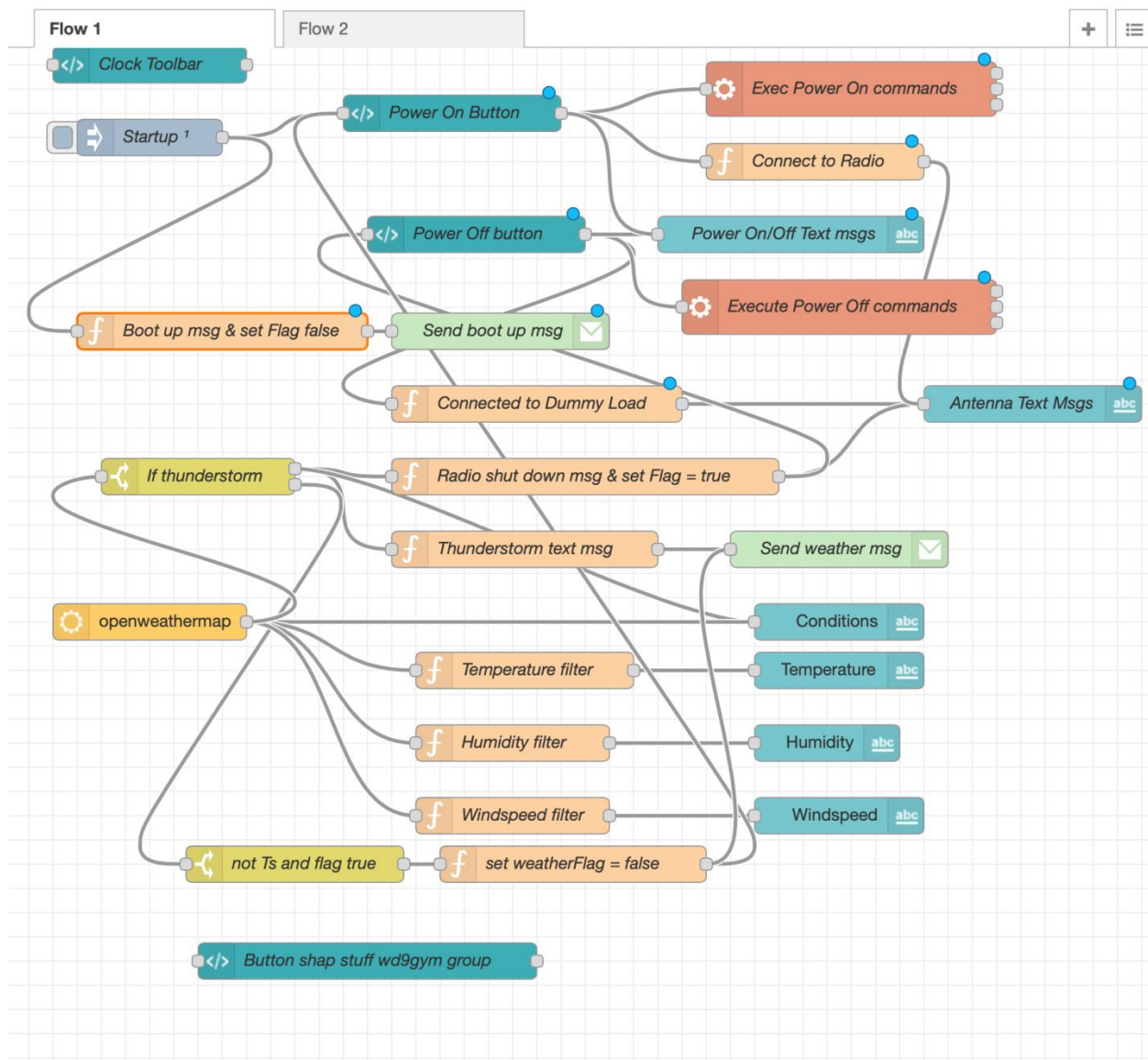
Like any good project I develop, I often wonder what other functions I can program this device to perform. After all the Raspberry Pi has plenty of processor performance and gobs of memory. found some Open Source code which performs the following functions:

- 1) Power off the Raspberry Pi
- 2) Re-Boot the Raspberry Pi
- 3) Display the internal temperature of the Raspberry Pi and graph the temperature
- 4) Display the amount of free disk space

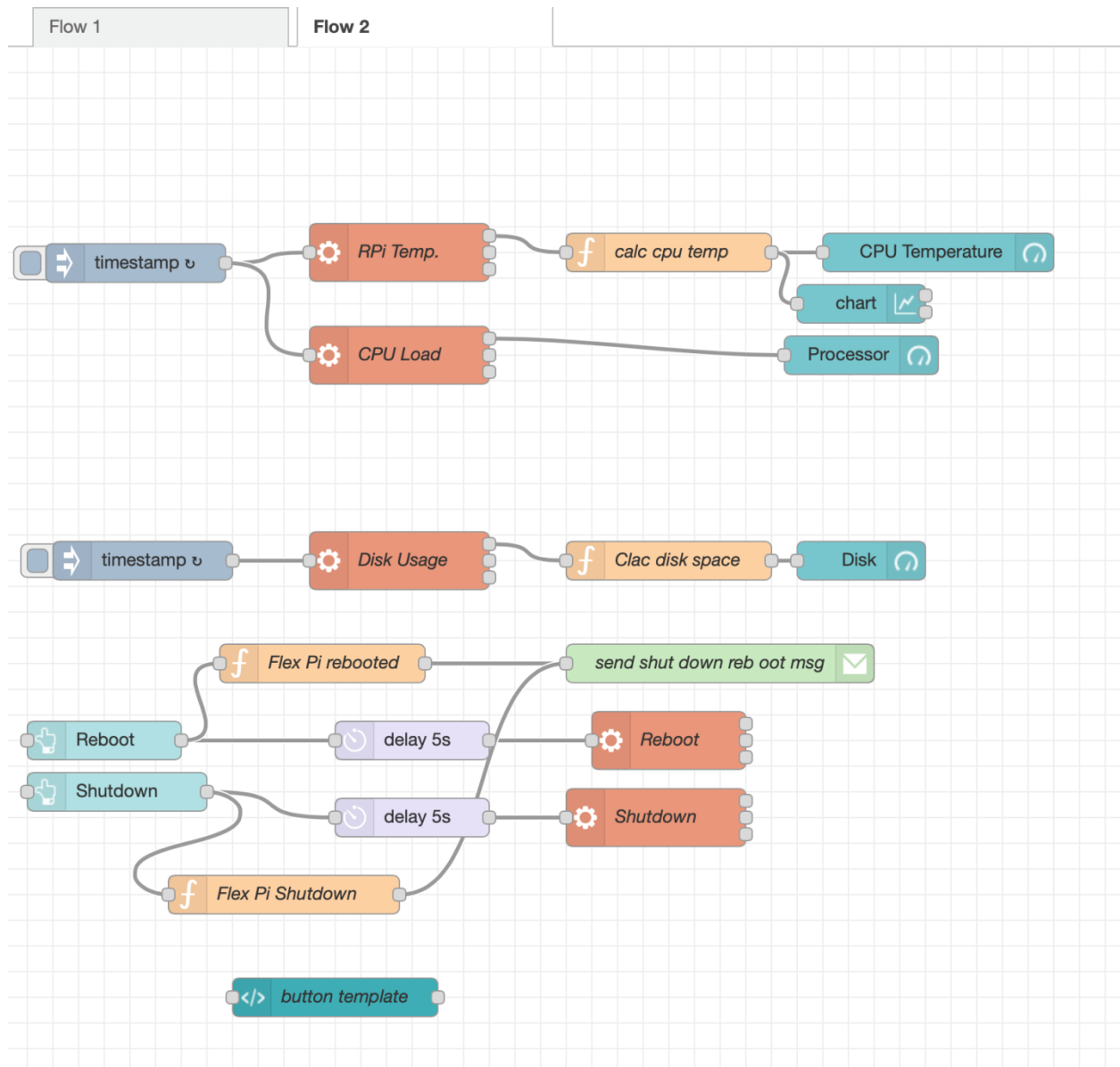
5) Display Processor Performance



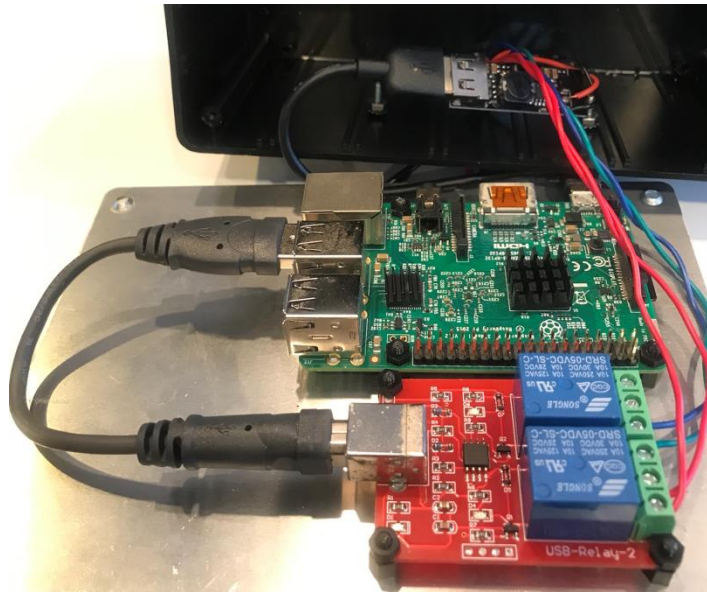
Integrating the two message flows and adding the text messages was a simple job. The open source code is simply imported to its own flow sheet. In this case, Flow 2. Adjustments were made to the dashboard settings and actions were added to send a text for power off or re-boot notification.



Flex Radio Switch Message Flow



Raspberry Pi Message Flow



Raspberry Pi and Relay boards are mounted to the top of the project box.

Parts

- Raspberry Pi 3B
- Micro SD Card
- Relay Board
- Project Box
- Buck
- USB Power Cable
- USB Cable
- Terminal Block
- Standoffs
- Led
- spst switch
- MFJ Two Position Antenna Switch

Software

- Raspbian
- USBRELAY
- Node-red