Summary Description: Testing Deep Sleep Mode On An ESP01 With A Worm Farm

Tags: electronics; software; nature projects; ESP-01; Arduino; DS18B20 Temperature Probe; batteries; IOT; AdafruitIO; Cayenne

Why I did this: I had some ESP-01 device and wanted to see if they could be a fit for low input, low power, deep-sleep-mode applications. I just started a worm farm in some 5-gallon pails (it’s just some layered pails with holes, filled with old vegetables and composting material; I wanted to build it for compost, and to get worms for fishing). I figured this worm farm could be an appropriate project to monitor pail temperatures and test the deep-sleeping capabilities of an ESP-01 device.

(summary pic of system)

Design Walkthrough:

Parts: ESP-01 controller; Arduino Uno controller (for programming ESP) Arduino IDE; Cayenne free account; DS18B20 Temperature Probe; 2x AAA batteries (or whatever combo batteries to get ~3.3V)

I initially wanted to test this with AdafruitIO as the web server for saving the temperature readings, but I wasn’t getting it a connection on their servers, so I tried Cayenne.

I started programming by using customizations of Cayenne example codes for data uploaded of a DS18B20 probe with the deep-sleep modes.

I had a heck of a time actually getting the ESP-01 programmed. I have programmed it before using an Arduino Uno as the serial uploader, but it took me like 20 tries (fiddling, adjusting wires, unplug/plugging) in order to get it to successfully upload.

I initially wanted to test this with AdafruitIO as the service for uploading and saving the temperature readings, but I wasn’t getting it a connection on their servers, so I tried Cayenne. Cayenne was also giving me issues with connectivity, but at least it was showing up on their servers (for like a split second). I then found custom code by Cayenne Community board user ‘Sven’ (who was also doing deep-sleep and using a DS18B20 probe) and found that the connectivity was much better, and I was able to see values stay on the Cayenne webpage.

After getting a stable connection I switched power to 3 AAA batteries that were already semi-drained (they were 1.2V so together at 3.6V; good enough to start testing with). I also place all the pieces inside a Tupperware container to protect it from the elements, then placed within the worm pails.

(pics of system)

Lessons Learned and Future Changes:

Where’s the history, Cayenne? Even though I was getting a consistent reading form the devices on the Cayenne server, it seemed to not be saving a history and I’m not sure why, so for now I’ll have to monitor it live with regular checkups; maybe I can try AdafruitIO later.

But how’s the battery? Preliminary tests showed it was drawing 80mA when in run mode (and nothing in deep-sleep). I hope to eventually tune this setup to get like months use out of the battery, but for now I’ll test short term draw. I don’t have a multimeter that accurately goes below the milliAmp range, so for now I’m just testing by checking periodical for battery drain. I read that removing the boards LEDs can help with lowering amperage.

References:

Cayenne web sever for devices: <https://cayenne.mydevices.com>

Programming ESP-01 via Arduino Uno as boot loader:

<https://www.engineersgarage.com/esp8266-with-arduino-and-ft232/>

DS18B20 and ESP01 tutorial: <https://myhomethings.eu/en/ds18b20-temperature-sensor-with-esp-01-module-for-iobroker/>

Sven’s setup: <https://community.mydevices.com/t/esp-01-ds18b20-cellphone-li-ion-battery/8137>