8. Measure and Tx 1st Soil Probe

Purpose: Get the ATTiny84 to measure the value of a home-made sensor capacitor and send that data over to the RPi.

Goal: From the monitor on the Raspberry Pi, see the capacitor value of my 1st attempt at a home-made sensor cap; and see it change from in the air and in water.

Key References --

NOTE: All the code is under git version control. So the executables for both the ATTiny and RPi are on my desktop.

To Modify RPi side .cpp code --

Use Kate on my desktop.

Then copy to the RPi using below command:

```
scp /home/jroc/Dropbox/projects/MoistureSensor/CapSensor
/RPi/RPi_CapDataReceive.cpp pi@192.168.1.118:/home/rf24libs
/RF24/examples_linux/
```

Then on the RPi, cd into the build directory and execute 'make'

BUT if this is the first iteration of the program, you need to first add it to CMakeLists.txt in the examples_linux directory (above the build directory).

Raspberry Pi Login --

Pi user is: pi. So SSH login is:

`ssh pi@192.168.1.118`
password: `pi9012`

And then once in, get into the working directory for the nRF24 utilities and programs:

cd `/home/rf24libs/RF24/examples_linux/build`

The run the RPi receiving program:

```
./RPi_CapDataReceive
```

06/02/2023 --

Update: Failure. My belief: The parasitic capacitance of the circuit swamps the capacitance range of my home-made sensor.

When I disconnect my sensor from the circuit I get the exact same capacitance readings as with it in circuit. When I connect a 1uf cap it does accurately read that value - but with a variance range across multiple readings that is greater than my home-made sensor cap (as measured by my digital multimeter).

Note also that I did try my sensor in parallel with the 1uf cap to see if it would sense the air vs water difference off the higher total capacitance value in-circuit; but that didn't work.

Note also that I did have a 471nf cap that I tried in the circuit, and my circuit also couldn't measure that as it was below what I am assuming is the parasitic capacitance level.

Parasitic Capacitance Level: The parasitic capacitance seems to be 177nf. This is what the measurement shows, with or without my sensor. And with or without the 417pf cap.

And to confirm this, when I use a capacitance calculator online this checks out. 3MegOhm resistor, 3.2 volts (which is what the bench power supply was at while I was running the ATTiny), about 524 milliseconds to reach 2/3 charge level: .177uf (= 177nf).

Conclusion. So my conclusion is that I need to be able to fabricate a sensor cap that reaches up to the 1uf level; or figure out how to bring the parasitic capacitance of the circuit way down.

OR - perhaps it isn't really parasitic capacitance but, instead, unit conversion. Maybe the real issue is that when I do the math in the code I don't really have enough significant-digits to represent pF?

1F = 10^1

1uf = 1F^-6

1nf = 1D^-9

1pf = 1F ^-12

1uF = 1,000nF = 1,000,000pF