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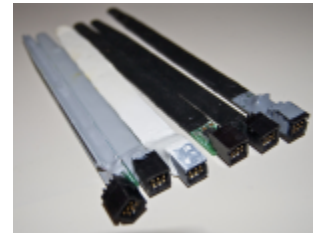
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Square One

Thursday, September 8, 2011 by [darco](#)
Posted in [Projects](#), [Electronics](#)

It has been a few weeks since I have updated this blog about how the whole soil moisture sensor project is going. I've had lots of ups and downs along the way, and I've learned quite a bit more about electrical engineering and materials science that I didn't have a firm grasp of before I started this project. Unfortunately, I've encountered a significant technical setback which necessitates abandoning my current approach and all but starting over.



So here is a breakdown of the current situation:

The cause of the weird "noisy" behavior I mentioned in an earlier blog post was because some moisture was actually making direct contact with one of the electrodes due to a hole in the insulation layer. This was easy enough to fix.

The next challenge was dealing with the drift issue. It turned out that pretty much every insulator imaginable ended up absorbing some tiny amount water over time which would cause the moisture reading to trend upward. I found some insulators that worked better than others, but all of them exhibited this effect to some degree or another. This effect could be minimized by separating the electrodes into two electrode prongs, but this wouldn't fix the next issue:

I noticed the other day that inserting more than one sensor into a potted plant caused the soil moisture readings to *double*. This was somewhat confusing to

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the electrodes from the rest of the circuit—something not easy to do given the current circuit design.

So, basically, I'm now back at square one. Ouch.

As depressing as this is, it is not a total loss: I've learned quite a bit through this process. I've got a few ideas for improved designs that I've been kicking around in the back of my head, so I'm not giving up.

Just don't expect v1.0 of this project to be released any time soon.

Just in case you were wondering what my prototypes looked like, here is a picture of all of my prototypes, from earliest at the top to the latest 'cross' design at the bottom:



Here are a few ideas for new approaches:

- Treat the length of the sensor as a transmission line and send very short pulses down it (much shorter than I can generate with the ATtiny25 unfortunately) and measure the time and magnitude of the reflection (which should vary with the capacitance)
- Make an oscillator which uses the soil capacitance to vary the generated frequency, which would then be measured by the μC .

Each of these approaches should be easy to electrically isolate, so I shouldn't run into the bad problems I was running into with the previous design.

Any other ideas or comments are welcome.

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