Soil Instrumentation for the Ranch

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Summary

Project Goals Knuth Farms is looking to establish some baseline remote temperature and soil moisture measurements around tree planting sites on a property, 'The Ranch', in order to begin to assess the impact of regenerative agriculture practices there.

Implementation Plan. The project goals will be addressed using two instrument setups, one at each measurement site ("biochar" and "non-biochar"). Each setup will operate on 12V battery power, and measure soil moisture and temperature locally every 30 minutes. One of the setups ("Remote Node", Fig 1) will send its data to a "Gateway Node" via LoRa radio; and the "Gateway Node" will then send the combined datasets to FarmOS via cellular modem.

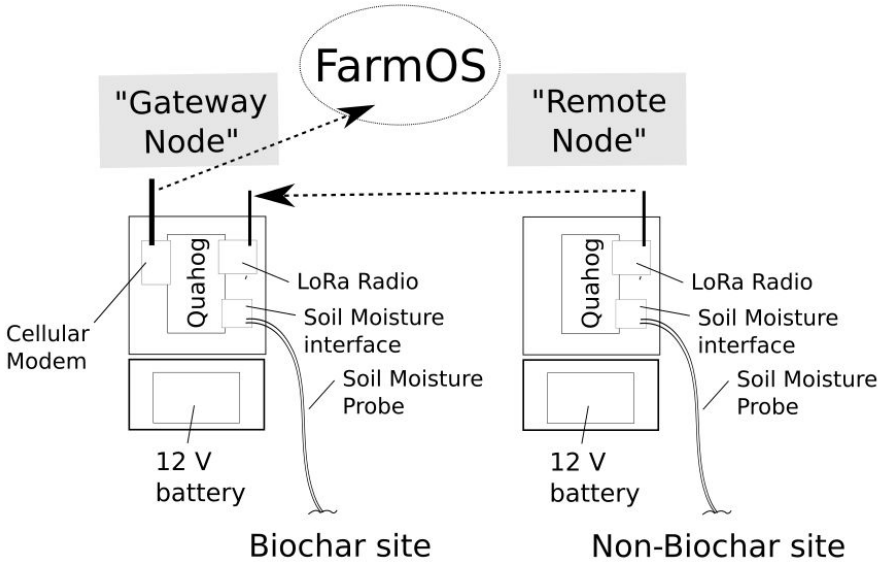

Figure 1

Project Costs

Materials Estimate	
Cellular Modem -- used in Gateway Node to send data to FarmOS -- $70 ea	$70
Two Sensor Nodes -- Quahog microcontroller -- $90 unassembled ea x 2	$180
Two Sensors -- Decagon Soil Moisture & Temp Probe, $150 ea x 2	$300
Two Batteries: 12 V batt, $30 ea x 2	$60
Materials Subtotal:	**$610**
Labor Estimate	
Cellular Modem -- 20 hours for software and hardware dev @ $75 / hr	$1500
Sensor Node Assembly -- 5 hours per node x2 = 10 hrs @ $75 / hr	$750
Sensor integration -- 12 hrs software and hardware dev @ $75 / hr	$900
Labor Subtotal:	**$2775**
Materials + Labor Subtotal:	**$3385**
Note: Due to the highly collaborative nature of this project, and in order to stay within available grant-based funding constraints, the **entire project will be estimated at $2500.** **Project Final Cost (Reduced):**	**$2500**

Estimated Timeline

The timeline goal will be to have the basic implementation outlined in this proposal completed by l**ate August / early September of 2019**.

Additional Notes

- **Unanticipated challenges.** If unforeseen materials or development costs emerge (e.g. if larger batteries are needed, or if sensors end up costing more than anticipated on Ebay, etc.), we will plan to discuss them ASAP and come to a decision as to whether a modified timeline, or additional funds are justified in order to facilitate purchasing of additional materials.
- **Attribution and Licensing.** All software and hardware designs will be considered **Open Source** and published online (at http://github.com and http://edgecollective.io) for the public to re-use and contribute back to. All work listed in this contract will be credited to a collaboration between Edge Collective, Knuth Farms, any grants / supporting institutions deemed relevant, and any individuals or organizations that contributed useful information / software / hardware designs.

Sign-off

ACCEPTED AND AGREED:

Don Blair / Date
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Angela Knuth / Date
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