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Remote Hand Pump Monitoring in Africa

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The Need

Millions of households in sub-Saharan Africa rely on hand pumps installed by various non-governmental organizations (NGOs). Studies have shown that more than 35% of these pumps are broken when people come looking for water, with significant delays before maintenance personnel arrive. The Intelligent Water Project (IWP) is working with NGOs such as World Vision to develop a system that not only tracks pump usage, but also monitors and reports pump health.

Partner: alignedworks

VENTURE TALENT

Advisor - Dr. Randy Fish

Student Team:

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. Amanda Issis
. Dan Labrie
. Evan Freed
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Further information

For more information about AlignedWorks:

https://aligned.works

For more information about Intelligent Water project

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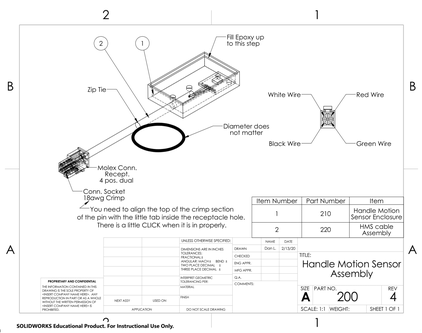
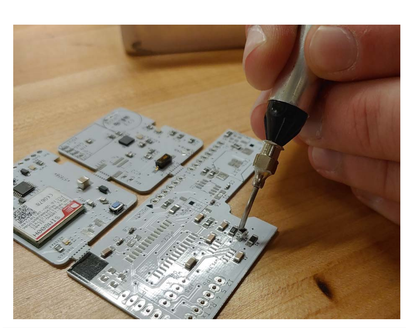
Acknowledgements: Joseph Longenecker

Current Work

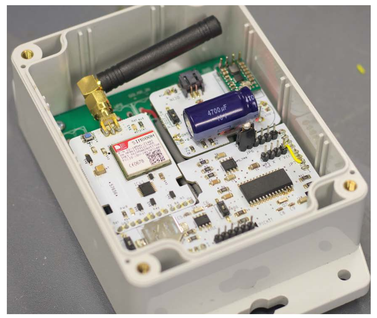
Accomplished Goals: The documentation of the system has been improved greatly. The manufacturing documents have been updated with figures and clarifications. The mechanical and PCB drawings of our systems have increased in quality. Along with these documentation improvements, system improvements were made. The PCBs were updated with part changes and redesign of the shape. The Quality Control procedure were completed.

Current Work: Getting ready for mass production by improving our documentation. We improved the manufacturing document in order to make our system easier to build. Mechanical and PCB drawings to give all of the components detailed 3D models. We also improved Quality Control documents to make sure our system functions properly.





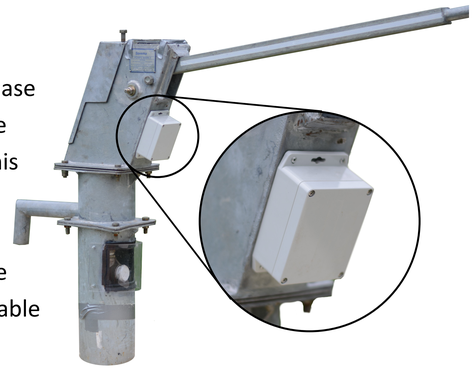
Our System



Main System Electronics

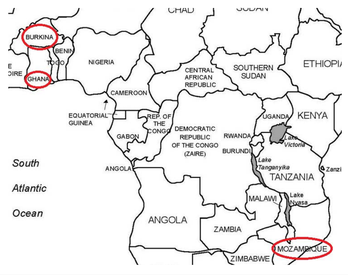
Our system consists of a handle movement sensor, water presence sensor, GSM module and PIC microcontroller electronics powered by a battery and a solar panel. Sensor data is processed to calculate volume of water pumped , maximum effort to prime the pump, and maximum leak rate. Each day this information is sent via text message to a remote database/web reporting system. The raw data in the text message is processed and used to inform client NGO's about the usage and condition of the pump.

In the summer of 2017, thirteen units were installed in northern Ghana. Since then broken accelerometer wires and irregular or failed text message communications has necessitated a phase of product evaluation to determine the cause of system malfunctions. With this in mind, we have addressed most of these issues and are continuing to improve upon them to meet our future goals of creating a sustainable and reliable product for use in the field.



Future Goals And Development

. Aligned works three country proposal
. Mozambique, Burkina Faso, and Ghana
. Translate Documentation
. Mass production



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