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# Preparing For Extended Field Tests of the Intelligent Water System

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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

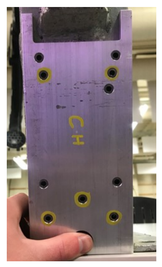
## Student Team:

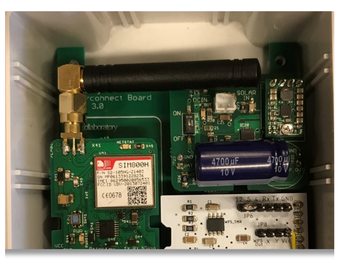
. Dan Labrie
. Josiah McCarthy
. Evan Freed
. Jared Groff

## Current Work

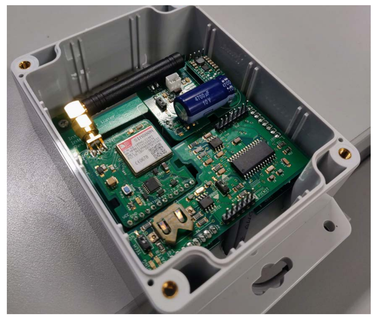
Accomplished Goals: Multiple changes were made to the system firmware In response to issues identified by past field trial prototypes. These changes reduced PIC storage requirements from 98% to 83%, refined a feature which allowed a technician servicing the pump to interact with the system via text messaging, and increased the accuracy of volume measurements by the system. In addition to these firmware changes we updated our quality control procedures to improve verification of system functionality and tracking of shipped units, designed a multi-purpose installation jig to improve drilling needed for system installation, and began testing on a simpler mounting technique for the Handle Motion Sensor.

Current Work: In order to get our system ready for mass production, we need to finish testing the functionality of the hose clamp HMS mounting technique, and complete the design of our 3G cell phone circuit.





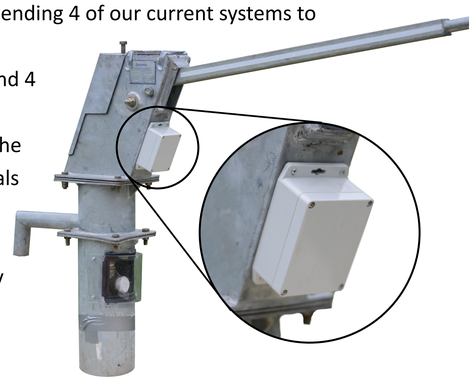
## Our System



*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 order to accomplish our future goal of creating a sustainable and reliable system for use in the field, we have used the feedback from the previous field installations in Ghana and Burkina Faso. Looking forward, we will be sending 4 of our current systems to Burkina Faso for a field trial starting in the summer of 2021. Following this, we will send 4 systems to Ghana and 4 systems to Mozambique for similar field trials during the 2021-2022 academic year. During these trials we will gather valuable feedback from our partners overseas testing the systems to determine if our system is ready for mass manufacturing.



## Further Information

For more information about AlignedWorks:

*https://aligned.works*

For more information about Intelligent Water project

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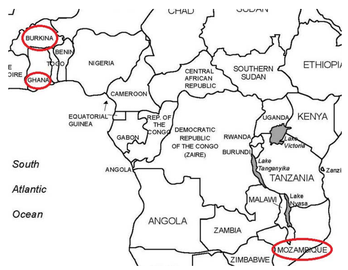
*Acknowledgements: Joseph Longenecker*

## Future Goals And Development

. Send 4 systems to Burkina Faso
. Continue Testing in Mozambique, Ghana, and Burkina Faso
. Translate Documentation
. Mass production

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