

Remote Hand Pump Monitoring in West Africa

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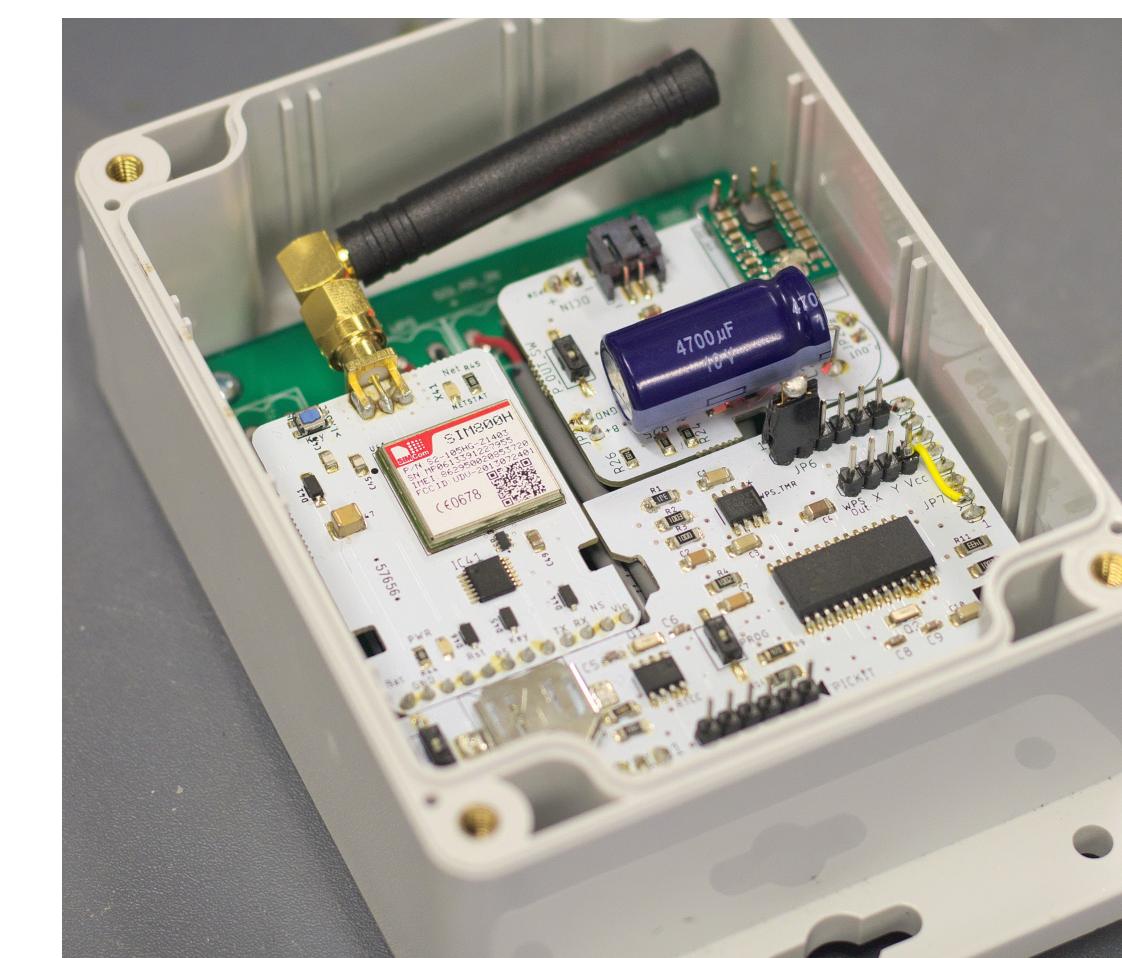


The Need

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 to the NGO.



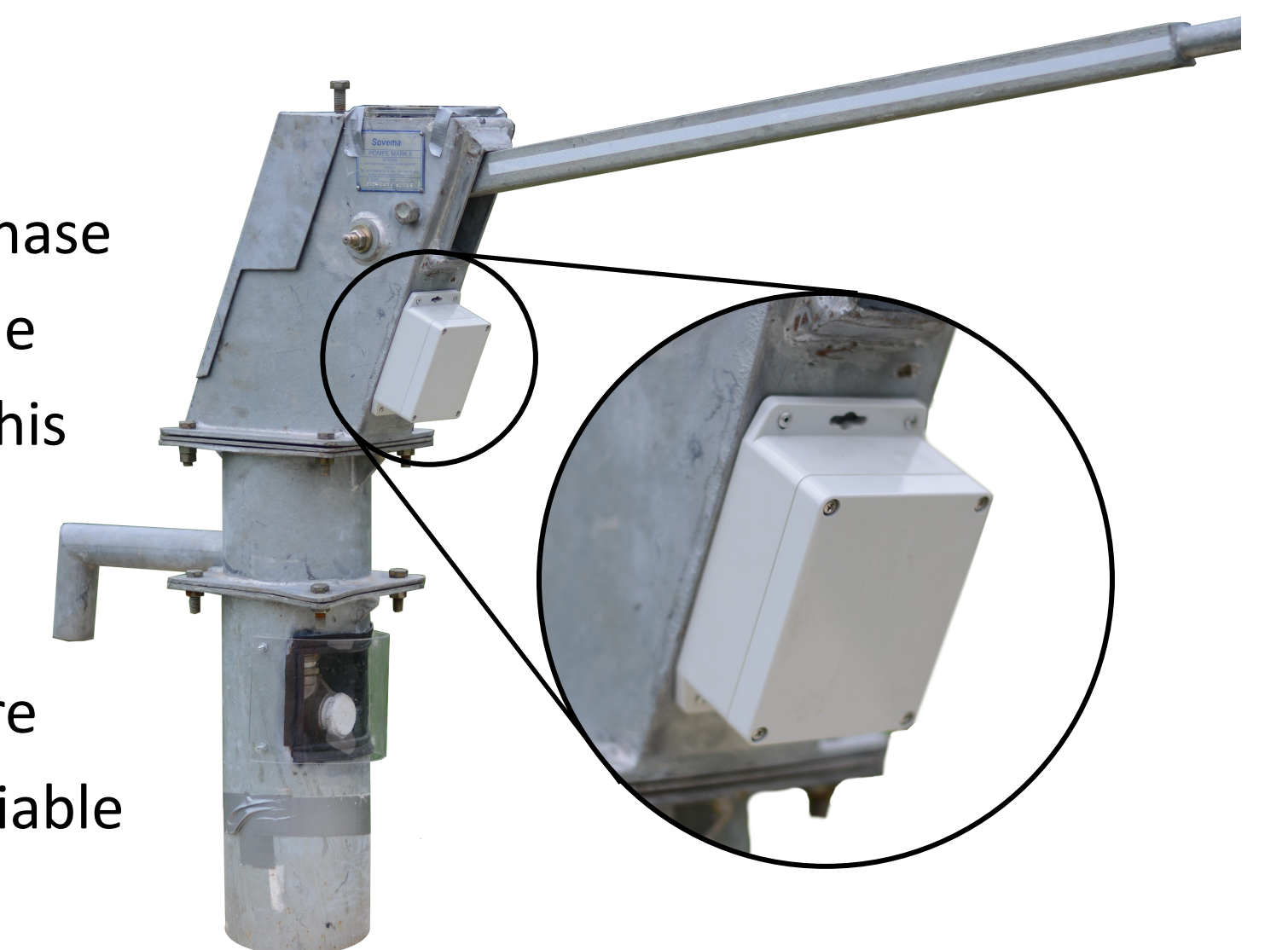
OUR SYSTEM



Main System Electronics

Our system consists of an accelerometer, 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.



PARTNER

alignedworks
VENTURE TALENT

ADVISOR - Dr. Randy Fish

STUDENT TEAM



- . Paul Zwart
- . Cory Brubaker
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- . Nicholas Sum
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THE GOAL

Accomplished Goals: The current system monitors relevant pump performance to catch pump failure early. Performance indicators include volume dispensed, time for the pump to prime, and the maximum daily leak rate. Performance is aggregated into a text message sent each day to a database reporting the performance indicators to maintenance personnel.

Current work: Testing, and improving the accuracy of reported volume of water pumped, leak rate, and priming effort. Mechanical components are being tested/modified to simplify system installation processes and increase assembly reliability. On-site diagnostic code has been added to assist with installation. Previously purchased PCBs have been replaced by in-house designs to support a lower cost, reliable, mass manufacturable product.

FURTHER INFORMATION

For more information about AlignedWorks: <https://aligned.works>

For more information about the Intelligent Water project

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FUTURE GOALS AND DEVELOPMENT

- . Continue improving system calculations and reliability
- . Develop custom cellular board intelligence
- . Improving installation methods
- . Mass production

