

# The Need

Millions of households in sub-Saharan Africa rely on hand pumps installed by various non-governmental organizations (NGOs). Studies have shown that at least 30 percent of these pumps are inoperative, with significant delays before maintenance people arrive. The Intelligent Water Project (IWP) works under the sponsorship of World Vision to develop a system that not only tracks pump usage, but also monitors pump health.







. Status at the start of the year: Installed 12 systems in Ghana, which monitor pumps to detect the flow rate of water to prevent pumps from failing prematurely. Use key detectors, such as prime time, battery levels, volume pumped, and leak rate to analyze the functionality of the

Inspect pilot systems for wear, performance, and maintainability Redesign the system based upon analysis and input from our manufacturing partners Optima Tech.

For more information about World Vision:

For more information about the Intelligent Water Project:

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## **OUR SYSTEM**

Our system uses a solar panel, accelerometer, water presence sensor, battery, PIC microcontroller, and GSM module to send a text message daily reporting the volume of water pumped, maximum time to prime the pump, maximum leak rate, and battery voltage. The text message data is saved to a database, processed and provided to the client on an IWP website. The website is used by the NGO partner to track pump usage and plan or deliver needed pump maintenance. The Intelligent Water Project delivered 12 units in Fall 2015 and after an inspection visit in January 2017, we went through a phase of redesign to improve

for our next site trip this summer.



SolidWorks model of system main electronics



### FUTURE GOALS AND DEVELOPMENT

- Site trip to Ghana August 2017
- System power saving strategy
- . Advance in design evaluation
- . Theory of operation document
- . Mass production
- . Optimization of IWP website