

# Designing an Information and Communications Technology (ICT) to Increase Smallholder Farmers' Access to Markets and Knowledge - Final Report

CREU Final Reports 2015

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## **Goals of the Project**

The purpose of this project was to identify the needs and define opportunities through which innovative information and communication technology (ICT)-based applications and systems can increase agricultural small-holder productivity, profitability, and sustainability.

The CREU project was an opportunity to implement an ICT that could make a drastic difference in the lives of many smallholder farmers. One of the main focuses of the project was to determine which of these applications would be the most valuable for smallholder farmers. Finding the most efficient design of the ICT system and providing visualization of the data collected is also part of the goal.

## **Process**

We began by gathering information on the current flow of information between farmers to find ICT systems with potential for adoption by farmers. After speaking with multiple experts in relevant fields, such as professors, our advisor came across a contact in Kenya who was interested in gathering rainfall information. Our task then became to develop a cost-efficient rainfall sensor and use it to gather information which would be later used to visualize rainfall patterns.

During the first semester of the project, we defined the scope of the research to implementing rainfall sensors in a developing region and aggregating the information into a database for simple visualization of the weather data. We

began designing prototypes of rainfall sensors that would be both cost-efficient and scalable. We researched various parts to build the device, including studying microcontroller technology options and tools to design and edit PCB layouts. Our first iteration in prototype development turned out to be unsuccessful and did not give accurate readings due to water fluctuations. The second iteration was to use capacitive sensing along with an Arduino but the approach used too much power and did not seem ideal. The third iteration was to use a pre-existing rainfall device, specifically the Acurite Wireless Rain Gauge, to abstract the mechanical aspects of water level detection and begin work on the software side of the project.

During the second semester of the project, we began working on doing data analysis on previously acquired data from a field study conducted by Prof. Parikh. Our advisor, Tapan Parikh, had previously been a part of a field study called Avaaj Otalo, an interactive voice application for small-scale farmers in Gujarat, India. In parallel with developing the rainfall sensor, we began running data analysis on the results of the field study. Analyzing this data allowed for us to continue making progress during the periods of delay in receiving supplies for the rainfall sensor. With the help of Prof. Parikh and another graduate student, we found several research questions we could answer with queries from the Avaaj Otalo data.

As we near the end of the academic year, we have been working to use the Acurite rain gauge to get some rainfall information on which to do analysis. As for the Avaaj Otalo project, we have been able to extract some simple results and are now working to do further analysis to answer more in-depth research questions on the results of the field study.

## **Conclusions and Results**

This CREU project eventually split into two projects. The first project was the development of the rainfall sensor for gathering rainfall information. Due to the delays in progress from receiving supplies, we began another project which also aligned with our original goal. We learned about data analysis on past voice-control social platforms. In the end, we learned much about working in a research team, working on hardware and software platforms, and performing analysis in writing a paper.

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