Soil Monitoring

System for efficient soil biome management & Crop Guidance

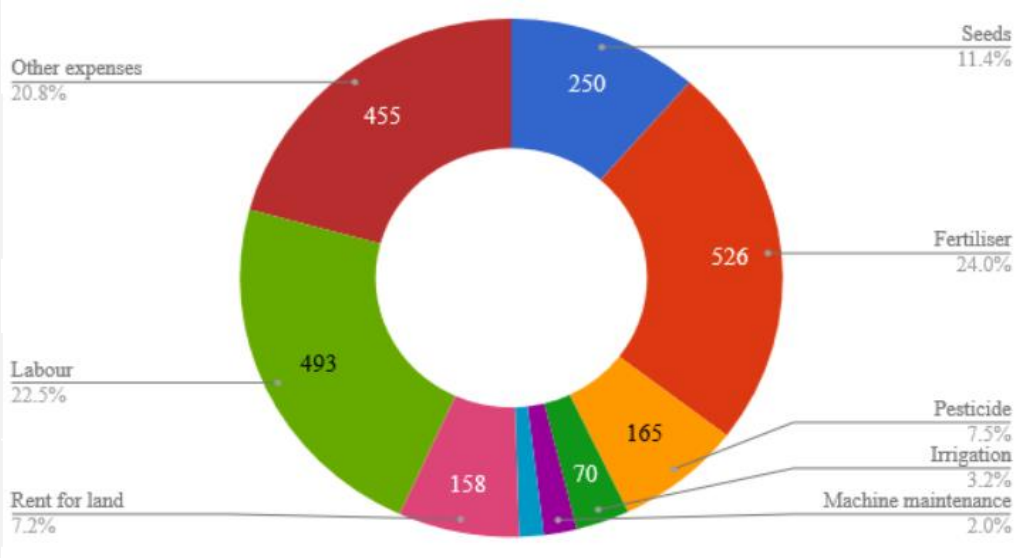
The Problems

- ✗ Lack of Knowledge among farmers about the importance of soil testing & optimal use of fertilizers.
- ✗ Excessive use of fertilizers & pesticides devastates the soil micro-biome.
- ✗ Leftover nitrogen that hasn't been absorbed by plants, reacts with the soil to produce dangerous greenhouse gas.
- ✗ Agriculture accounts for 80% of human-caused nitrous oxide emissions globally and for 8-14% of all greenhouse gases.
- ✗ Currently available soil monitoring systems are financially out of reach of the marginalized farmers(landholdings<1 hectare) of our country who account for 67% of India's Farmland.

Source: https://www.wri.org/blog/2014/05/everything-you-need-know-about-agricultural-emissions

Why Now ?

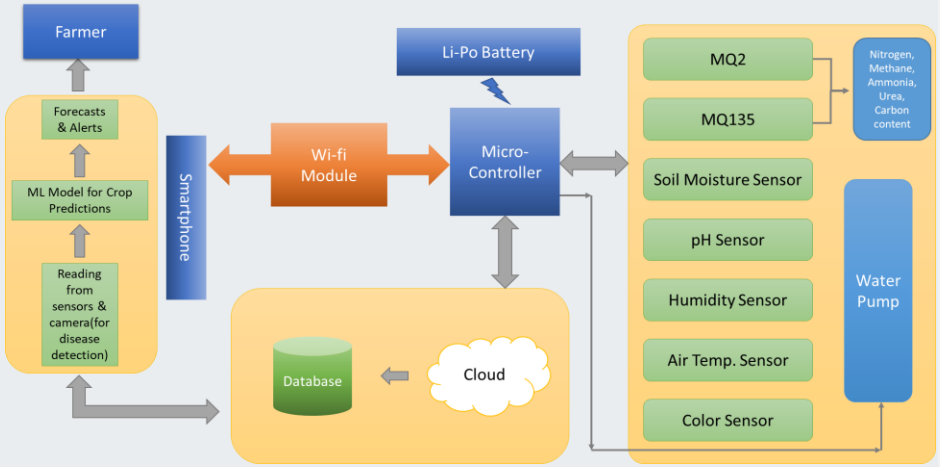
- It is clear from the surveys that fertilizers & Pesticides take up a huge chunk of income(about 32%) from an agricultural household but its effect is still detrimental to the soil health due to its overuse.
- This results in a significant financial inefficiency and added wastage of man-power to spread these fertilizers across the field.
- So why not take the help of technology to guide you not only about how much fertilizers to use but then again, provide you the best crop recommendations based on soil data.
- This solution would not only improve the overall yield of the farm, but also help the farmer's to save more of what they earn instead of wasting them on additional fertilizers.



Source: https://www.thehindu.com/data/does-it-pay-to-be-a-farmer-in-india/article10895031.ece

Our Solution

We aim to provide a cost-effective IoT & Cloud-based solution to counter the aforementioned agrarian crisis. We are prototyping a IoT sensor module that can be left at the farms to track various key chemical and physical parameters of the soil and the surrounding environment in real-time.

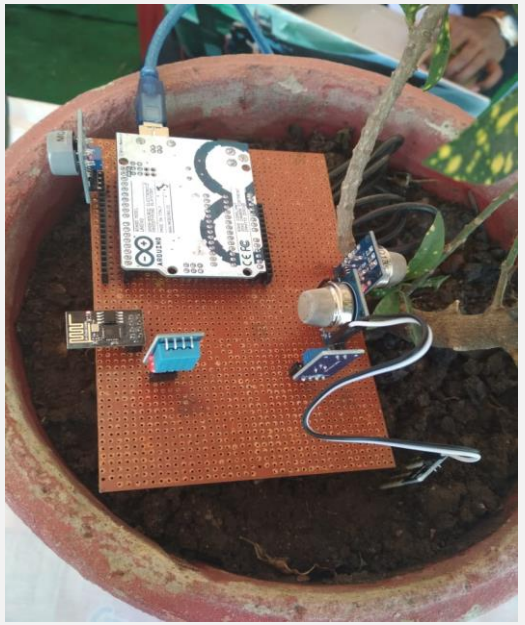


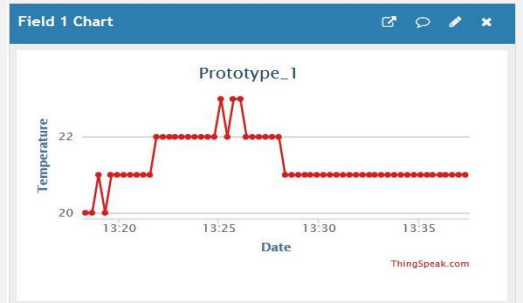
Then channel it back to the cloud for some basic preprocessing and then, eventually to the easy-to-use app where various data analysis tasks will generate insights for the farmers like which crop-cycle would work best, how to get the maximum yield by using the right variety of crop, alerts about weather, denitrification, water needs and provide counter-measures, how to naturally replenish the soils mineral content with minimal fertilizer inputs etc.

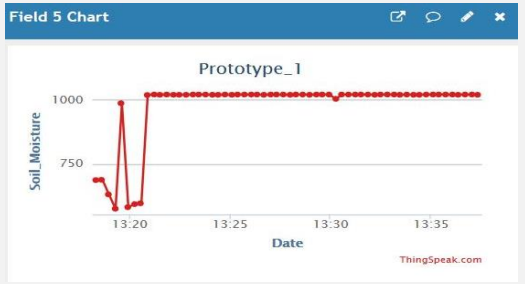
Once the device is deployed on the fields it could provide real-time analysis & visualizations to the end user through an easy-to-use app. Another service we aim to provide, that makes us totally unique in the market is the facility to home-deliver Soil Health cards directly from the laboratories under The Soil Health Card Scheme 2015, that would further reduce the effort input into the soil-testing process by the farmers which is a major reason behind the limited usage of such a visionary scheme.

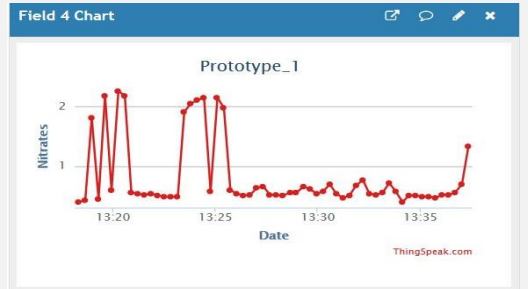
Working Prototype & Visualizations

- We have prototyped an initial level functional IoT device that uses a variety of sensors like DHT-11, MQ-2, MQ-7 to name a few and sends the data to a REST API deployed on Heroku as of now.
- Take a look at one of our API endpoints: https://soil-monitoring-system.herokuapp.com/sensors
- This endpoint of the API gives the last reading taken and sends it to the cloud and generate alerts if any parameter is out of the optimal range like soil moisture alert, denitrification alert, etc.
- There are other endpoints for providing the current weather details(..herokuapp.com/weather) of the device's location and provide counter-measures to protect the crop from damage if weather is getting bad.
- Then, we have made one (..herokuapp.com/location) for suggesting crops based on the location & above parameters.
P.S: Still in Research Phase.



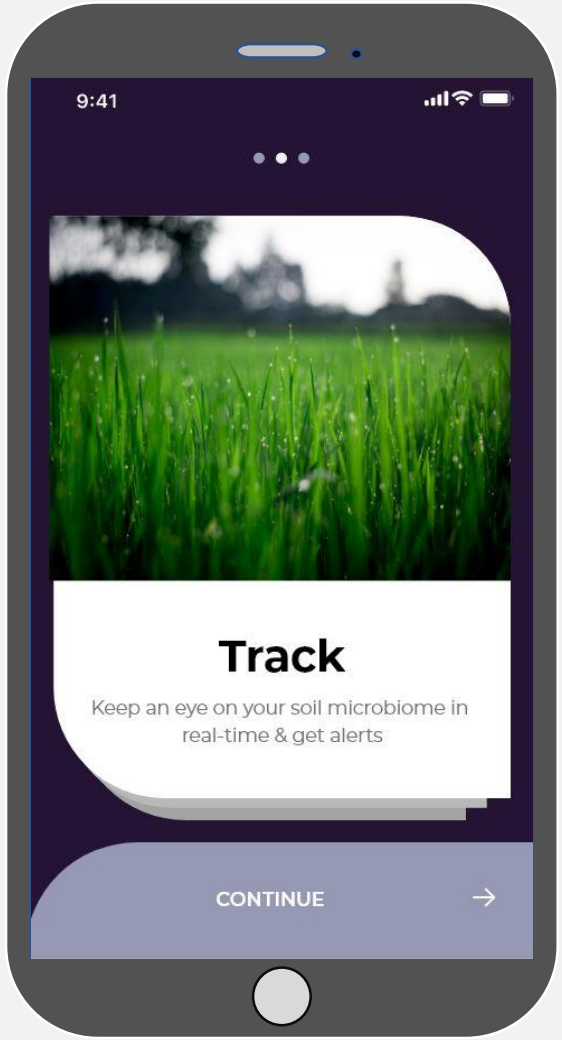


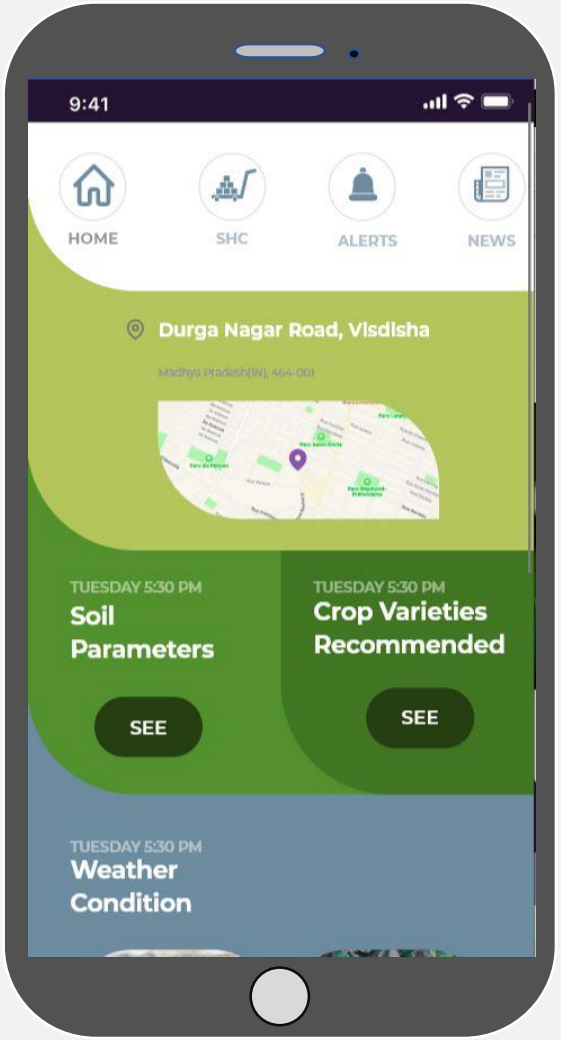




Our App

- The aim of our app would be to provide an easy-to-use interface that doesn't intimidates even the most novice users.
- It would provide notification on sensor alerts, visualizations, latest Govt. news based on the farmer's profile, and a gateway to obtain a Soil Health Card from the nearest soil testing lab.
- We are currently focused on making the app available in the most commonly used regional languages in India for better acceptance among the target audience.





Awesome Features

Location based crop Recommendations

Detailed Analysis, Alerts, & counter-measures

Multi-lingual

Home Delivery of Soil Health Cards

Carefully filtered Govt. Schemes

Customer Profiles

Farmers

Plantation Owners

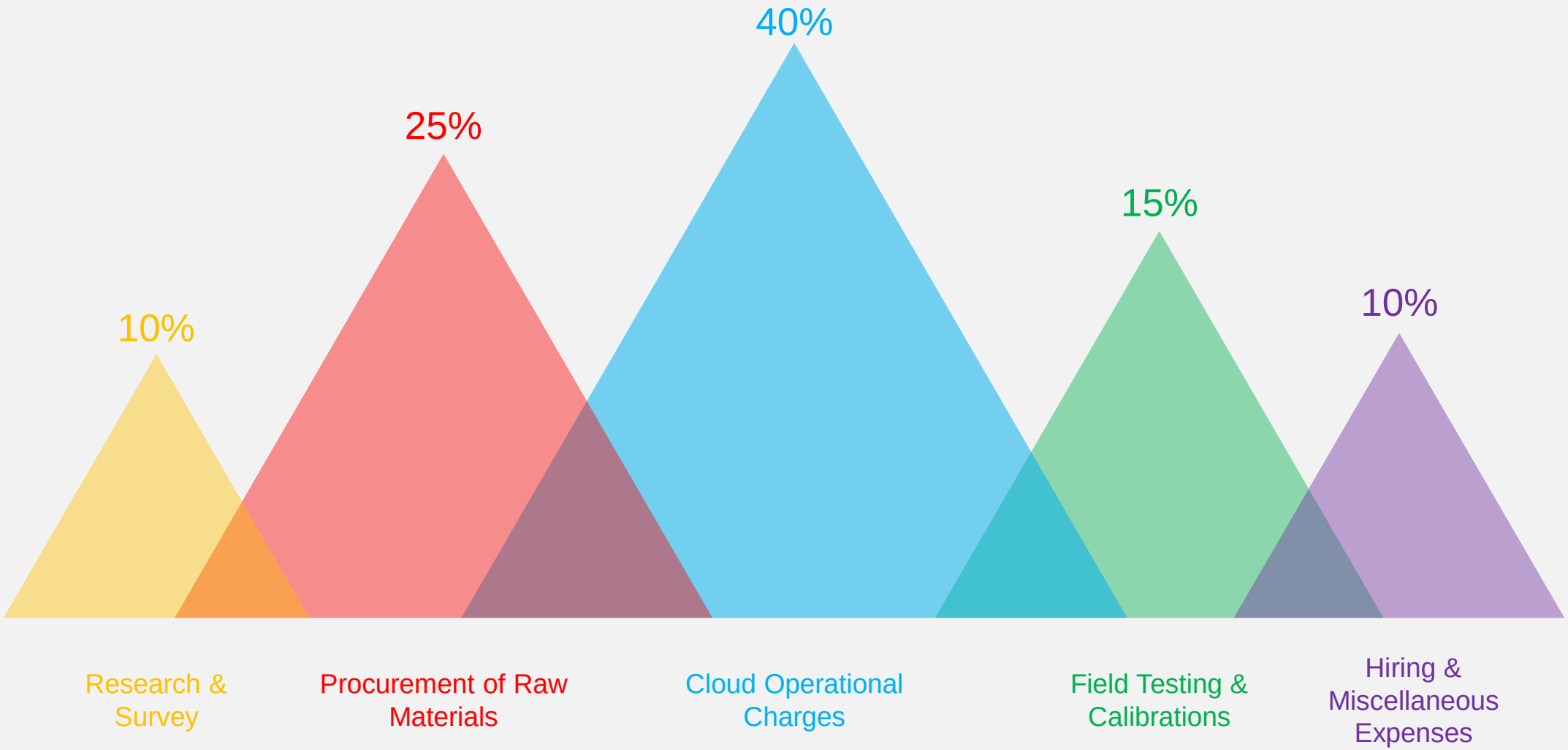
Greenhouse Owners

Hobbyists

Our Roadmap


Phase-1 Prototype Ready (Now)
Extensive research & Surveying for phase-2 (2 Months)
Field Testing & Calibration (3 Months)
User Feedbacks & Modifications (2 Months)
End of Phase

Budget Split



Our Team

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Keshav Singh
(Data Collection & Analysis)