IOT in Crop Production

Project Synopsis

Of Major Project

Bachelor of Technology

Computer Science Engineering

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I. INTRODUCTION

India is a developing nation and an agriculture major country. Our honorable PM Mr. Narendra Modi talks about Smart Cities. We can put smartness in every object possible. We have heard a number of incidents where farmers are not able to maximize their crop production. In this project we are trying to take into consideration wide number of factors which involves in crop production. Internet of Things in Farming can really boost farmers status and our countries economy. We will try to solve the basic problem of utilizing complete area of the farming land taking consideration the weather, resources and the land to cultivate by Mixed Integer Linear Programming (MILP).

Internet of Things has become an important area of consideration. A very interesting concept of connecting everything around each one of us and access from round the globe. Our vision is to provide maximum output a farmer can get from his field so as to live a good life. I don't think that our current approach is friendly enough to be used by a farmer but surely will be one day. Maximizing the output from a field is not just affected by one or two possible factors. It depends on a number of factors which we will be treating as variables in our program. This project can be subdivided into 3 phases i.e., Algorithm to solve the problem, hardware to gather the physical information of the field and the surroundings and third is integrating the hardware with a user accessible interface on the cloud. Arduino will be the board we are focusing on to be used for the project with integration of a number of sensors physically present like humidity, temperature, soil moisture, pH sensor etc and some of them would be virtual sensors to be used. IBM Bluemix will be used for hosting the application on the cloud and node-RED for prototyping and visualizing the working of complete application. Mixed Integer Linear Programming or MILP is the algorithm which is to be used to generate the output. Inputs in the algorithm will be variables like Soil Moisture, Soil Acidity, Atmospheric Temperature, Atmospheric Moisture, Field Size, Number of Crops, Type of Soil, pH of Soil, Rainfall pattern in the Area and many more. We would be considering all the factors in the algorithm. The program will give the outputs like division of field for the crops and which plants to be planted. Output's provided will really help the farmers optimize their productivity. As we have become the second largest country operating Smartphone's, the outputs will be provided in a very interactive Android application with a beautiful user interface. This will really bring a new dimension to the agriculture sector of India.

Project pushes forward the possibilities in agriculture. Moral boost to the farmers. Countries agriculture sector can once again somehow hold its back. Maximum production means maximum profit to farmers and so as to the government. Possibility of 5% - 15% rise in production. Updates to the application will be provided on a regular basis consisting of bug fixes and more. As an addition to this project we will be creating an extension to it or a sub-project which will have an API for unifying the selling price of the seeds and the cost price of the crops for the farmers.

Field of project will be Internet of Things, Cloud Computing, Mobile Computing, Arduino Programming, Linear Programming, OOPs and RDBMS. Keywords—*Make in India*; *Arduino*; *Cloud Computing*; *Mixed Integer Linear Programming; Android, IBM Bluemix, Internet of Things, dashDB;*

II. FEASIBILITY STUDY

The below feasibility study states and justifies if the project is a go/no-go. Various feasibility studies have been performed for the same.

Technical feasibility Study: Arduino Uno Prototyping Board, Soil Moisture Sensor, DHT-22 Humidity & Temperature Sensor are easily available on online stores. pH Sensor Kit is too much costly for the prototyping so we will be using Virtual Sensor. Development of the application is doable on Android and the prototyping on node-RED.

Economic feasibility Study: This following study evaluates the money aspects of the project by performing price profit analysis:

- Cost of doing full system study = Estimated Price of Hardware + Purchasing Space on Google Play App Store.
- Estimated price of hardware = Rs. 3000 (Max).
- Estimated price of purchase of Account on Google Play App Store = $25 ≈ Rs. 1700.
- Total Estimated cost of the project = Rs. 5000 (Min).

Operational feasibility Study: It appears that the system may get an integration issue of a wide number of variables into the algorithm. Prototyping on node-RED would be performed for in-depth check of the operational possibilities for long run and product deployment.

Schedule feasibility Study: This project can take 2 - 3 months for completion and release. This time includes gathering of the resources, performing electrical assembly and deployment of application on cloud.

III. METHODOLOGY

Following are the steps followed for the completion of the project with the approximated time period required for completion of each step.

S. No.	Project Steps	Time Period (in days)
Phase I		
1.	Feasibility Study	1
2.	Gathering Resources	5-7
Phase II		
3.	Circuit Diagram	1-2
4.	Assembly of Electrical Components	1-2
5.	Coding of Arduino	2
Phase III		
6.	Node-RED Prototyping	5-7
7.	Integrating Arduino Setup	1-2
8.	Integration of Weather API	1-2
Phase IV		
9.	Algorithm generation	2-3
10.	User Interface	4-5
11.	Coding	Upto 10
Phase V		
12.	Deployment & Debugging	2-5
13.	Testing	2-4
14.	Finalizing	5

IV. FACILITIES REQUIRED FOR PROPOSED WORK

Software/Hardware required for the development of the project:

1. Arduino Uno Board
2. REES52 Soil Moisture Sensor
3. DHT-22 Humidity Temperature Sensor
4. IBM Bluemix Account
5. Virtual Sensor Application on Bluemix
6. dashDB DBMS Service
7. node-RED service
8. Android Boilerplate on Bluemix
9. Google Play Developer Account