Farmer Connect

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ABSTRACT

Agriculture is the heart of India's monetary action and our experience amid the most recent 70 years has shown the solid connection between rural development and financial riches. However traditional techniques are still being followed , which has many drawbacks : in traditional farming Farmers have to spent mainly about 15 hours to harvest the crops that its it takes a long time to harvest hence being sold more expensive prices to earn back the time taken to mature the crops. Pesticides are used to prevent pests from attacking the crops. Hence, plants are not so healthy. The farmers tend to invest their money without knowing the actual yield. If the yield does not meet their expectation due to any reason then they suffer a loss.

In our project we have used three sensors namely humidity sensor, temperature sensor and soil moisture sensor along with raspberry pi. These sensors collect the data and display them on the site. This data can be seen by the farmer from any place by accessing the site. The registered user will get have his own username and password and if the farmer is not a registered user then he can register himself. The registered user can see the data collected by the sensors, which are displayed on the site, at anytime and from anywhere. This system predicts the estimated yield using multiple linear regression algorithm of machine learning, the farmers can invest their money according to this estimated yield which lowers the risk of suffering a loss due to low yield of crops. The farmers can also chat with other farmers and can talk to experts as well, in order to gain some information or advice.

C O N T E N T S

Chapter 1
Overview

1.1 Introduction

Internet and its applications have become an integral part of today's human lifestyle. It has become an essential tool in every aspect. Due to the tremendous demand and necessity, researchers went beyond connecting just computers into the web. These researches led to the birth of a sensational gizmo, Internet of Things (IoT). Communication over the internet has grown from user-user interaction to device – device interactions these days. The Sensor Network Lab concepts were proposed years back but still, it's in the initial stage of commercial deployment. Home automation industry and transportation industries are seeing rapid growth with Sensor Network Lab. Yet not many articles have been published in this field of study. This paper aims in structuring a state of the art review on Sensor Network Lab. The technology, history and applications have been discussed briefly along with various statistics. Since most of the process is done through the internet we must have an active high speed internet connection. The technology can be simply explained as a connection between humans-computers-things. All the equipment's we use in our day to day life can be controlled and monitored using the Sensor Network Lab. A majority of the process is done with the help of sensors in Network Lab. Sensors are deployed everywhere and these sensors convert raw physical data into digital signals and transmit them to its control centre. By this way, we can monitor environmental changes remotely from any part of the world via the internet. This systems architecture would be based on the context of operations and processes in real-time scenarios.

Farmer connect- one stop solution for farmers works in a similar manner with the combination of sensors namely Humidity sensor, temperature sensor and soil moisture sensor.

A humidity sensor (or hygrometer) senses, measures and reports both moisture and air temperature. Through measuring humidity, you can ensure that the whole process runs smoothly, and when there is any sudden change, action can be taken immediately, as sensors detect the change almost instantaneously. A device, used to measure amount of heat energy that allows to detect a physical change in temperature from a particular source and converts the data for a device or user, is known as a Temperature Sensor. The soil moisture sensor is a simple device for measuring the moisture level in soil and similar materials. The soil moisture sensor is straight forward to use

1.2 Importance of the Project

Agriculture is a very important part of life for the human species, it plays vital role in the development of nation's economy, modernization and improvement. It also acts as a very big option for business to the general population. Development in agriculture field is fundamental for the improvement of financial state of the nation.

Tragically, numerous farmers still utilize the conventional methods of cultivating which brings about low yielding of harvests. Because automation has been actualized the yield has been enhanced and less manual work is needed. The greater part of the project means the utilization of remote sensor which gathers the information and after that sends it to principle server utilizing remote convention for agriculture system. The collected information can be used to decide irrigation, harvesting parameters of that plant.

The traditional method used for farming has a lot of drawbacks and is unfavorable under many circumstances, therefore it is better to use a better and smarter version of the technology available which can improve the efficiency and reduce the cost and manpower.

Drawbacks of the traditional method:

1. More manual work
2. Low yield of crops
3. Time consuming
4. Yield of crops cannot be predicted because of which the estimation of the investment cannot be made which causes a huge loss to the farmers.

Advantages of this System:

1. Less manual work
2. Yield of crops can be predicted and hence money can be invested accordingly.
3. By using sensors humidity, temperature and soil moisture can be checked
4. Farmers can communicate with each other for help or for gaining information
5. The farmers can see the data on a web portal

1.3 Motivation

Concerns of agricultural products safety have grown steadily during the past decades. Modern consumers expect that agricultural food is fresh, nutritious, and palatable. Besides they also wish that the foods they buy and consume in various ways are with good quality and adequate shelf life. However, agricultural products safety remains a severe problem in the world wide. Therefore, improving agricultural products quality and safety is an important research topic. In particular, agricultural products quality and safety is the **f**undamental factor in the food sector. Agricultural products quality and safety is not only

related to the public health, but also affected social stability, economic development and national security, which become a global issue with a growing concern. Agricultural products can be affected by pesticides, heavy metals, microorganisms and other harmful substances.

In our project we have used temperature sensor, humidity sensor and soil moisture sensor, these sensors collect the data and display the information on the web portal. Expected yield is also displayed on the web portal. The farmer can see all of this information and then can invest his money, which means that the farmers invest their money after knowing the yield thus he doesnot experience a loss. The farmer can ask a question directly or can talk to an expert and can connect with other farmers who can help him by giving necessary information and advice.

1.4 Objectives and Scope of the project

1. To help farmers connect with other farmers
2. Ask queries to experts
3. See live parameters of farm on web application
4. See analysis of parameters and yield prediction.

1.5 Methodology used.

- Django framework to build web application
- Raspberry pi to collect sensor data n transfer to server
- Machine learning to predict yield based on farm parameters

Chapter 2
Literature Survey & Proposed Work

2.1 Introduction

A literature review surveys scholarly articles, books, dissertations, conference proceedings and other resources which are relevant to a particular issue, area of research, or theory and provides context for a dissertation by identifying past research. Research tells a story and the existing literature helps us identify where we are in the story currently. It is up to those writing a dissertation to continue that story with new research and new perspectives but they must first be familiar with the story before they can move forward.

2.2 Literature Survey Table

Reference No.	**Year of Publication**	**Name of the Authors**	**Topic**	**Proposed Solution after key findings**	**Research Gaps**
DOI:10.25165/j.ijabe.20181105.309	2018	Hua Ping, Jihua Wang, Zhihong Ma, Yuanfang Du	Mini-review of application of IoT technology in monitoring agricultural products quality and safety	IoT technologies will help farmers to reduce generated wastes and enhance productivity.	Feature Scaling and feature Engineering can be used

DOI:10.1016/j.sbspro.2013.12.027	2013	Gulden Kaya Uyanik, Nese Guler	Study on Multiple linear regression analysis	Helpful in predicting the value of a variable based on the value of two or more other variables.	Deep learning can be used to improve accuracy of prediction
ISSN 2348-120X	2018	Prof. B Nithya Ramesh, Akshay Ambalii, Vivekanada Mahanta	Django The Phython web framework	Django is better than many frameworks	Use of Java Script framework in front end can improve user interface

Table 2.1: Literature Survey

2.3 Problem definition (Phase wise)

PHASES OF PROJECT:-

Phase 1: Planning, Analysis, Designing and Implementation.

Planning:

After analysis we will first study about it and do some research on it for our better understanding of the project and also getting a rough picture about what would be our problem definition for the particular project.

Analysis:

Getting clear idea of the project title and doing research on it we will get our definition and after that then we will first create the Literature Survey of the project and do the whole documentation.

Designing:

Then we will construct the design of the project and according to that, will list down all the requirements needed for the construction for the prototype of our project.

Implementation: After acquiring the requirements we will proceed to the construction of the application.

Phase 2: Testing and Deployment.

Testing:

After the prototype is ready we will first connect the hardware with the assigned code and then we will check if it supports the mechanism or not. If not we will solve the issues regarding to it and will check again.

Deployment:

After, complete integration and testing of project real time running and operation of the system will be done. Students are expected to validate against their previously stored data in the database to obtain their mark sheets and transcripts.

2.4 Features of the project

1. See live parameters from farm on the web portal
2. Yield prediction
3. Connect with other farmers

2.5 Methodology used

- Django framework to build web application
- Raspberry pi to collect sensor data and transfer to server
- Humidity, temperature and soil moisture sensor to collect the data
- Machine learning to predict yield based on farm parameters

Chapter 3
Analysis and Planning

3.1 Introduction:

Getting a clear idea of the project title and doing research on it we will get our definition and after that then we will first create the Literature Survey of the project and do the whole documentation. After analysis, we will first study about it and do some research on it for our better understanding of the project and also get a rough picture about what would be our problem definition for the particular project.

3.2 Feasibility Study

1. Technical Feasibility - this assessment focuses on the technical resources available to the organization. It helps organizations determine whether the technical resources meet capacity and whether the technical team is capable of converting the ideas into working systems. It also involves the evaluation of the hardware, software, and other technical requirements of the proposed system.
2. Economic Feasibility - this assessment typically involves a cost/ benefits analysis of the project, helping organizations determine the viability, cost, and benefits associated with a project before financial resources are allocated. It also serves as an independent project assessment and enhances project credibility— helping decision makers determine the positive economic benefits to the organization that the proposed project will provide.
3. Legal Feasibility - this assessment investigates whether any aspect of the proposed project conflicts with legal requirements like zoning laws, data protection acts, or social media laws. Let's say an organization wants to construct a new office building in a specific location. A feasibility study might reveal the organization's ideal location isn't zoned for that type of business. That organization has just saved considerable time and effort by learning that their project was not feasible right from the beginning.
4. Operational Feasibility - this assessment involves undertaking a study to analyze and determine whether—and how well—the organization's needs can be met by completing the project. Operational feasibility studies also analyze how a project plan satisfies the requirements identified in the requirements analysis phase of system development.
5. Scheduling Feasibility - this assessment is the most important for project success; after all, a project will fail if not completed on time. In scheduling feasibility, an organization estimates how much time the project will take to complete.

3.3: Project planning

A. Raspberry Pi 3 Model B

The Raspberry Pi 3 Model B is a tiny credit card size computer. Just add a keyboard, mouse, display, power supply, micro SD card with installed Linux Distribution and you'll have a fully fledged computer that can run applications from word processors and spreadsheets to games. As the Raspberry Pi 3 supports HD video, you can even create a media centre with it. The Raspberry Pi 3 Model B is the first Raspberry Pi to be open-source from the get-go, expect it to be the defacto embedded Linux board in all the forums.

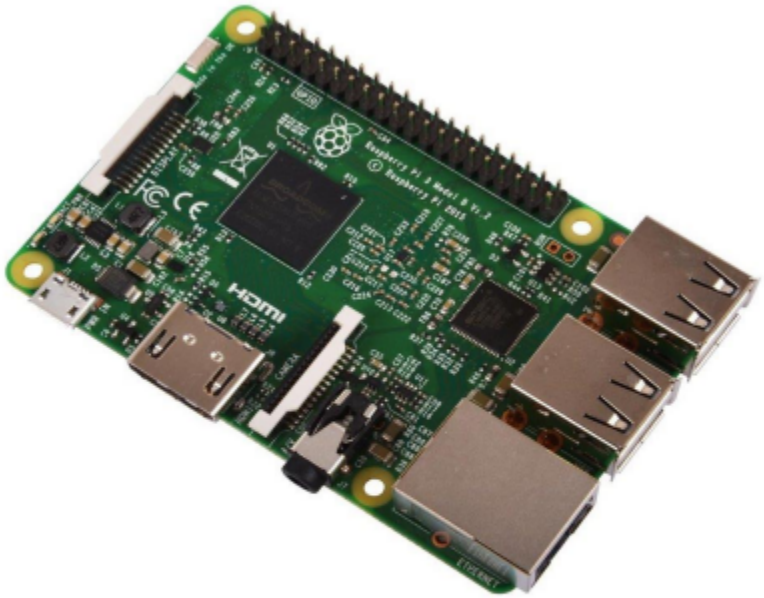


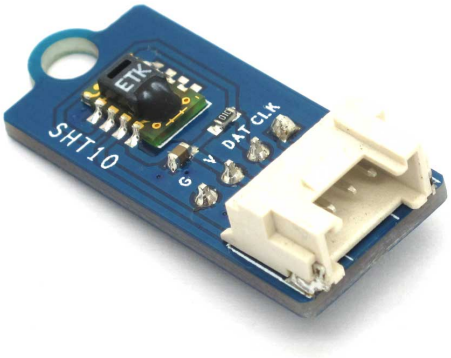
Fig 3.1: RASPBERRY PI

B.Node MCU

NodeMCU is an open source IoT platform.[4][5] It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module.[6][7] The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson[8] and SPIFFS.[9]

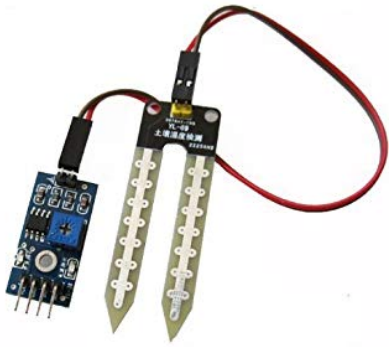
C.Temperature and Humidity Sensor

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). Its fairly simple to use, but requires careful timing to grab data. The only real downside of this sensor is you can only get new data from it once every 2 seconds, so when using our library, sensor readings can be up to 2 seconds old.



D.Soil Moisture sensor

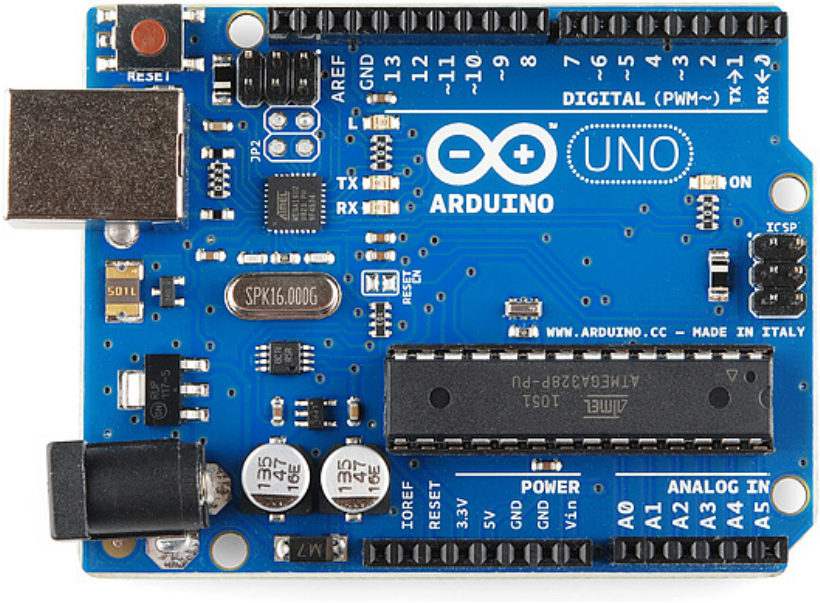
The Soil Moisture Sensor uses capacitance to measure the water content of soil (by measuring the dielectric permittivity of the soil, which is a function of the water content). Simply insert this rugged sensor into the soil to be tested, and the volumetric water content of the soil is reported in percent.



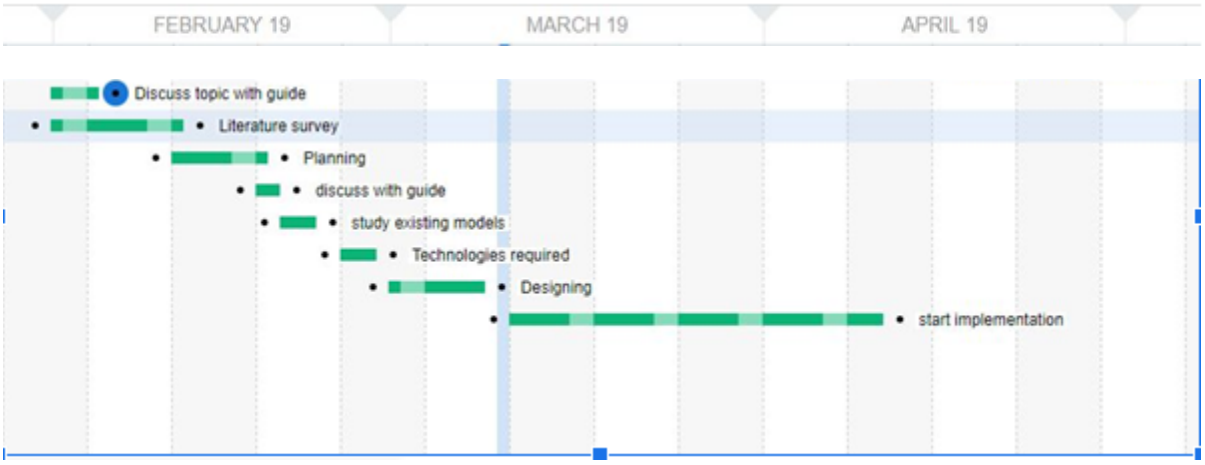
E. Arduino

Arduino Is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board -- you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

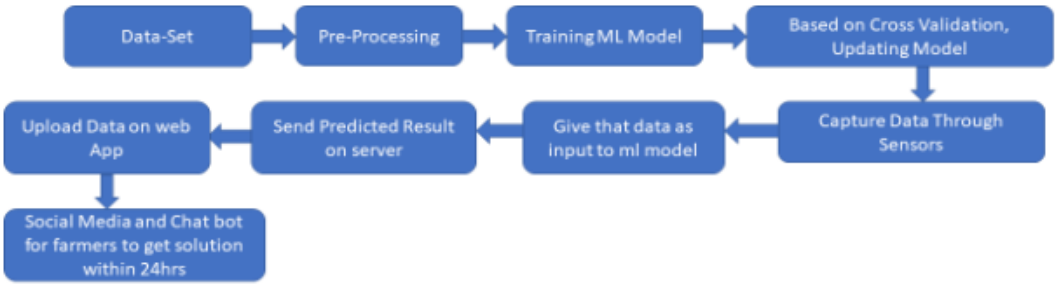


3.4 Scheduling



Chapter 4
Design Requirements

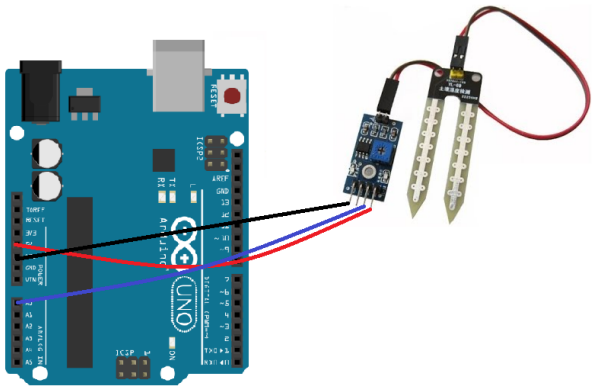
4.1 Block Diagram



4.2 Circuit Diagram

1. **Raspberry connection with Temperature and Humidity sensor**

2. **Arduino with soil moisture**



4.3 GUI Design (Screenshots)

1. Home Page

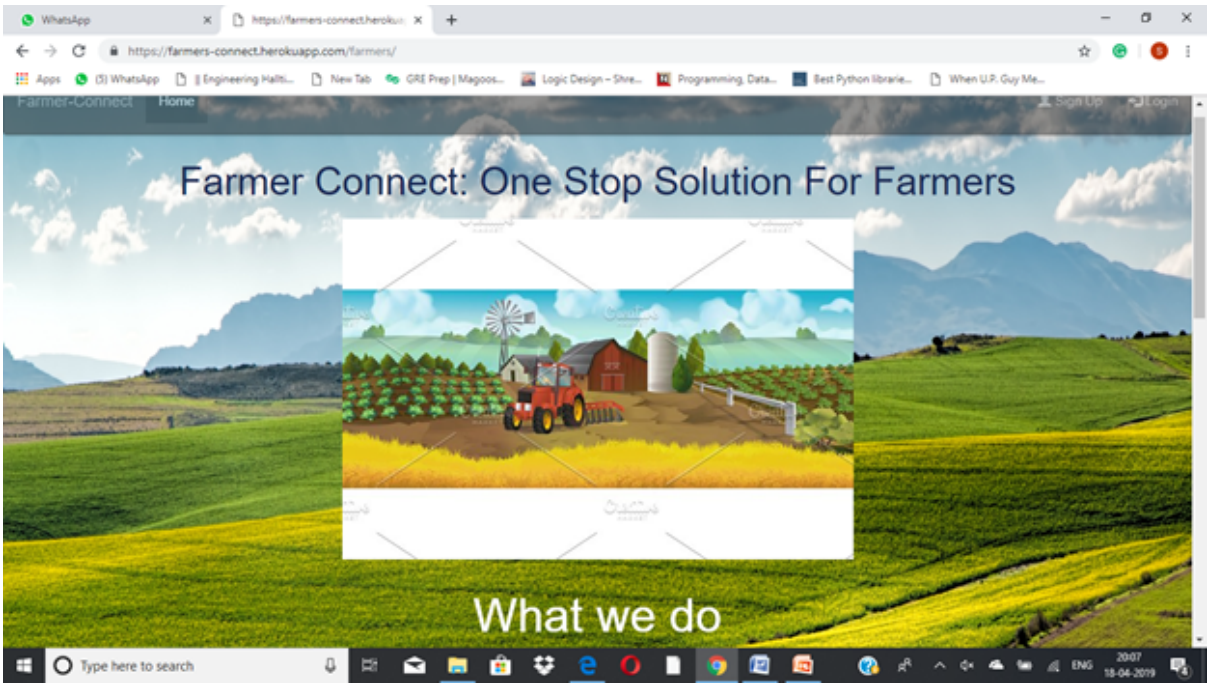


Fig 4.1: Home page

Fig 4.2: Home page

2. Login Page

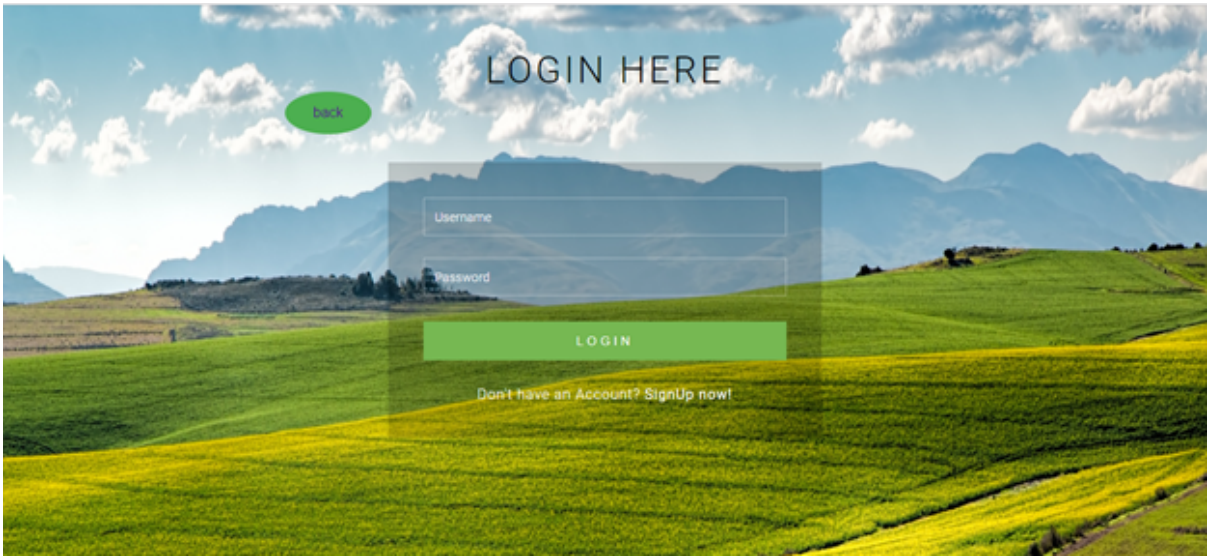


Fig 4.2: Login

3. Displaying the collected data

Fig 4.3: Collected data

4.predicted yield

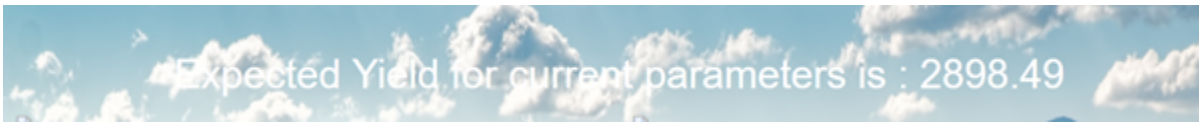


Fig 4.4: predicted yield

5.Chat bot

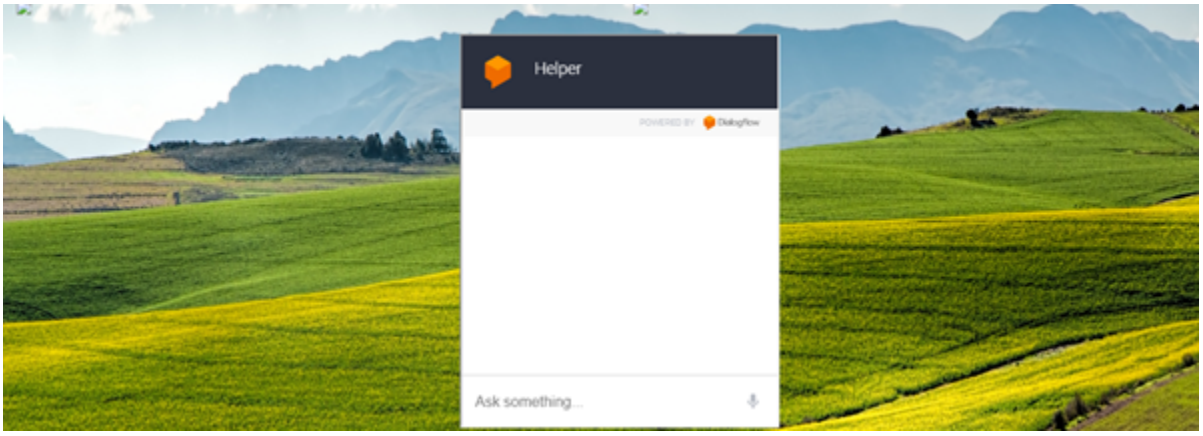


Fig 4.5: chat bot

6.Enquiry

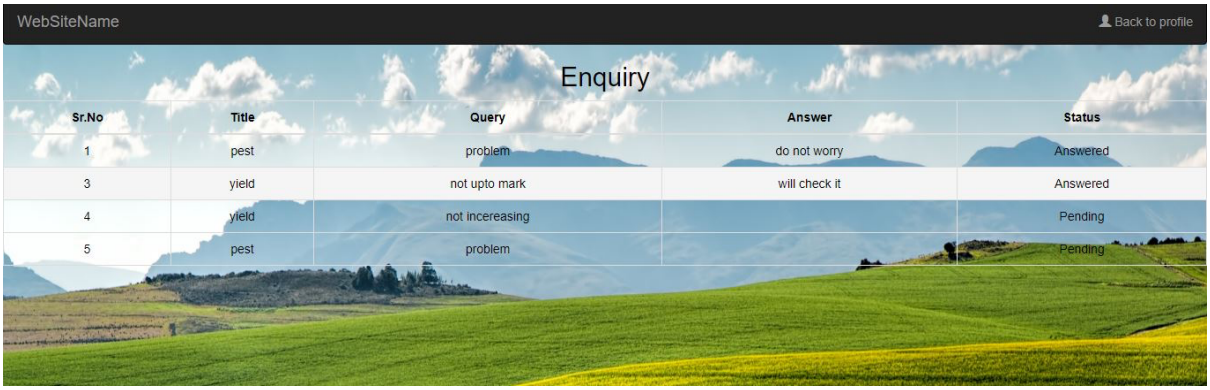


Fig 4.6: enquiry

7.Chat with Farmer

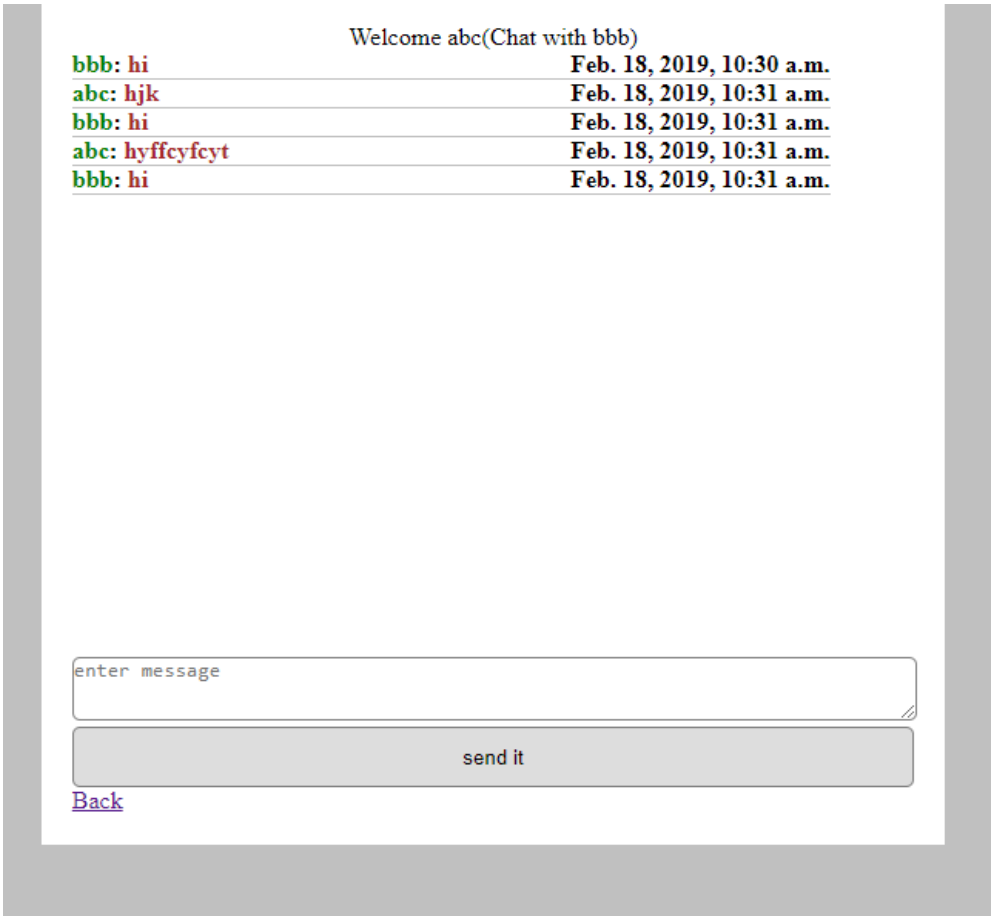


Fig 4.7: chat

Chapter 5
Results & Discussion

5.1 Actual Results

a. Outputs (Output of the project only)

Achieved all outputs as shown above in GUI Screenshots.

b. Outcomes

The following are the outcomes were observed as a result of implementing the product:

- Farmer can monitor farm parameters through web app
- Social Network for Farmers.
- Farmers can ask for advice to experts.
- Farmers can get approx yield of crop based on parameters.

c. Discussion of the results

This web app will help farmers to monitor farm parameters online and also connect with farmers anywhere in country and discuss with them. Also expert section will answer query within 24 hrs. Ml chat bot answers common answers to farmers in seconds.
Because of Yield Prediction, farmers can get idea of how much yield will be produced in advance and can take appropriate steps to make more yield.

5.2 Future Scope:

Future Scope are as follows:

- Improve ML Algorithm
- Add new features to web app .
- Add camera feature so that farmer can keep look on farm from home.

Chapter 6
Conclusion

6.1 Conclusion

Our project is the implementation of Farmer connect which uses raspberry pi, humidity sensor, temperature sensor and soil moisture sensor. Theses sensors collect the data and display them on the site. This data can be seen by the farmer from any place by accessing the site. The registered user will get have his own username and password and if the farmer is not a registered user then he can register himself. The registered user can see the data collected by the sensors, which are displayed on the site, at anytime and from anywhere. This system finds out the estimated yield. the farmers can invest their money according to this estimated yield which helps the farmers in not experiencing a loss. The farmers can also chat with other farmers and can talk to experts as well. Therefore this project makes farming more efficient and is indeed an one stop solution to farmers.