VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"Jnana Sangama", Belagavi – 590018, Karnataka

Course Code: 18ECP3

Course Name: Project Work Phase-2

A

PROJECT WORK ON

"E-COMMERCE PLATFORM FOR FARMERS"

Carried out

by

Aditi Dubey	:	1KS20EC002
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Submitted in partial fulfillment for the award of

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

Under the guidance of

Mr Santhosh Kumar BR

Associate Professor, Deptof ECE, KSIT

2023-24

K. S. INSTITUTE OF TECHNOLOGY

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CERTIFICATE

This is to certify that the project work entitled

"E-COMMERCE PLATFORM FOR FARMERS"
is a work carried out by

Aditi Dubey	:	1KS20EC002
Gandhamani CM	:	1KS20EC030
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is a bonafide work carried out at K.S. institute of Technology, Bangalore in partial fulfillment for the award of Bachelor of Engineering Degree in Electronics and Communication from Visvesvaraya Technological University, Belgaum during the year 2023-2024. It is certified that all corrections and suggestions indicated during internal assessment have been incorporated in the report deposited in the department library. The project report has been approved as it satisfies the academic requirements in respect of Project Work prescribed for Bachelor of Engineering Degree.

Signature of Guide Signature of HOD Signature of Principal

EXTERNAL VIVA:

Name of Examiners Signature with Date

1.________________________ ____________________

2.________________________ ____________________

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DECLARATION

We Aditi Dubey USN:1KS20EC002, Gandhamani CM USN:1KS20EC030, Harshitha J USN:1KS20EC035 and Meghashrre M USN:1KS20EC057 students of 8^{th} semester B.E., Department of Electronics and Communication Engg., K.S. Institute of Technology, Bengaluru declare that the project entitled "E-COMMERCE PLATFORM FOR FARMERS" has been carried out by us and submitted in partial fulfillment of the course requirements for the award of degree in B.E. in Electronics and Communication, Visvesvaraya Technology University, Belgaum during the academic year 2023-2024. Further, the matter embodied in dissertation has not been submitted previously by anybody for the award of any Degree or Diploma to any other University.

Signature of the candidates

Place: Bengaluru
Date:

ACKNOWLEDGEMENT

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We are also thankful to our internal guide, **Mr. Santhosh Kumar BR , Professor, Electronics & Communication Engg. Department, KSIT,** who has provided valuable support and guidance to make this project a success.

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Last but not the least the project would not have been a success without the grace of **god** and support of our **parents** and **friends**.

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ABSTRACT

The proposed website will serve as an online marketplace where farmers can showcase and sell their produce to consumers. To enhance efficiency, various electronic systems will be employed throughout the supply chain.. This technology will enable consumers to access detailed information about the origin and journey of the products they purchase, fostering trust and accountability. Additionally, sensors will be embedded in farms to monitor temperature, humidity, and other environmental factors. These sensors will provide real-time data to farmers and distributors, ensuring optimal storage conditions and minimizing product spoilage. Furthermore, incorporating automated inventory management systems will facilitate better stock control and reduce wastage. Agricultural marketing is a significant problem in rural India. So to remove these middlemen from agricultural marketing, we are proposing the use of a web application that provides farmers with regulated markets, thereby ensuring that farmers are not exploited and can get reasonable prices for their produce. This easy-to-use website takes care of all marketing of agricultural products. In this web application, farmers can upload their agricultural products through operators. The operator foresees the addition and removal of goods. This web application, in turn, will be viewed by buyers who will buy the goods providing a market to farmers.

CHAPTER 1
INTRODUCTION

This project focuses on the development of an innovative Farmer-to-Consumer (F2C) website platform fortified with cutting-edge electronic systems. The primary goal is to create a seamless digital interface that connects farmers directly with consumers while employing advanced electronic solutions to optimize the agricultural supply chain.

The proposed platform will serve as an online marketplace where farmers can exhibit and vend their produce directly to consumers. This system will enable consumers to access comprehensive product information, including origin, cultivation practices, and transit details, ensuring transparency and authenticity.

To bolster efficiency and reduce spoilage, sensors will be implemented within storage facilities. These sensors will continuously monitor environmental variables like temperature and humidity, transmitting real-time data to stakeholders to maintain optimal storage conditions and prevent product degradation.

KISAN MART is web application that will help farmers create agricultural marketing that leads to increased success and increased their standard of living. The Marketing Center will allow farmers to view orders made and related information on their accounts. Farmers and Customers will be provided with a separate ID to access their accounts which leads to secure access. In this web-based system every registered Farmer can build their own store and the customer can easily follow them.. The main purpose of the project is to create a website that will help farmers from the Indian subcontinent to sell their products to various city markets directly to customers without the help of intermediaries or agents. It is a computerized system for better and clearer sales.

CHAPTER 2
LITERATURE SURVEY

The increasing demand for food, both in-order to ensure quality and quantities, has accelerated the need of industrial growth and intensive methods of production in agriculture. At the forefront of the new agricultural era, there is an emerging Internet of Things (IoT) market that is suggesting several creative solutions. Research organizations and scientific associations are seeking to increase their own scope and speed by connecting with IoT, contributing technologies and goods to a range of different agriculture markets. The IoT idea gained prominence in the year 2000, with the development of the Auto-ID at MIT and the subsequent market research reports. In IoT, these systems communicate, perceive, and connect with internal & external state embedded technologies[1].

ICT(Information and Communication Technologies) being integrated into conventional agricultural activities is helping to spark a fourth farming revolution. An important facet of technologies such as machine learning, UAVs (Unmanned Aerial Vehicles), Remote Sensing, Big Data Analytics, etc. is having the capability to boost farming activities to new heights. A broad variety of agricultural parameters, such as environmental factors, production status, soil condition, irrigation water, herbicides and pesticides, weed control, and greenhouse output climate, may be tracked in smart agriculture to increase crop yields, minimize costs, and maintain process inputs. Smart agriculture and the use of reduced pesticides and fertilizers in crops will help to mitigate leaching issues and pollution, as well as the effects of climate change, in precision agriculture [2].

Burgeoning IoT technology offers many new solutions and further growth opportunities, particularly for novel ideas in the agricultural sector. We also benefited greatly from recent developments in communication systems and protocols,primarily on the lower layers, which is the physical, network, and link layer. Besides that, the protocols in the topmost layers of the network are critical for effective data exchange and gathering. There are many applications, procedures, and designs that can be used in the agricultural sectoras a whole. There are several ongoing developments in IoT agriculture research that involve network engineering and applications, device design, security challenge.[3]

A major challenge in greenhouses is determining the exact amount of water required. To prevent unnecessary water use, smart sensors are installed and operated using a variety of IoT techniques. Water storage in greenhouses is achieved by the use of automated drip irrigation, which is regulated by a soil moisture threshold. Water management may be handled effectively via IoT technology by avoiding water waste through the use of various kinds of sensors. The sensors are used to monitor the amount of water in the tank, and data is saved on the cloud through a mobile application [4].

Farmers may monitor the water level using their cell phones. The motor will operate automatically as a result of this technology. If the water level drops, the motor automatically turns on, and if the water level is high, the motor will shut down. Up to 50% of this water is lost in conventionalirrigation systems owing to over-watering due to inadequancies in traditional irrigation techniques and systems [5].

2.1 PROBLEM IDENTIFICATION

1. The smart farming based only on instrumentation need farmer to know and learn the employment of technology
2. Due to lack of monitoring crops die.
3. Many farmers are still relying on traditional farming techniques which will lead to reduce in production.
4. Existence of Middle men.
5. Younger generation are moving to urban areas.

2.2 OBJECTIVES

- Direct Communication between farmer and consumer to avoid middle men.
- Develop a website which includes farmers and consumer menu.
- Using soil moisture, temperature, humidity, and NPK sensors to monitor environmental conditions in real time.
- Store the data on the database and predict yield production by using various data analytics tools like Power BI.

CHAPTER 3

METHODOLOGY

3.1 FLOW CHART

3.1.1HARDWARE

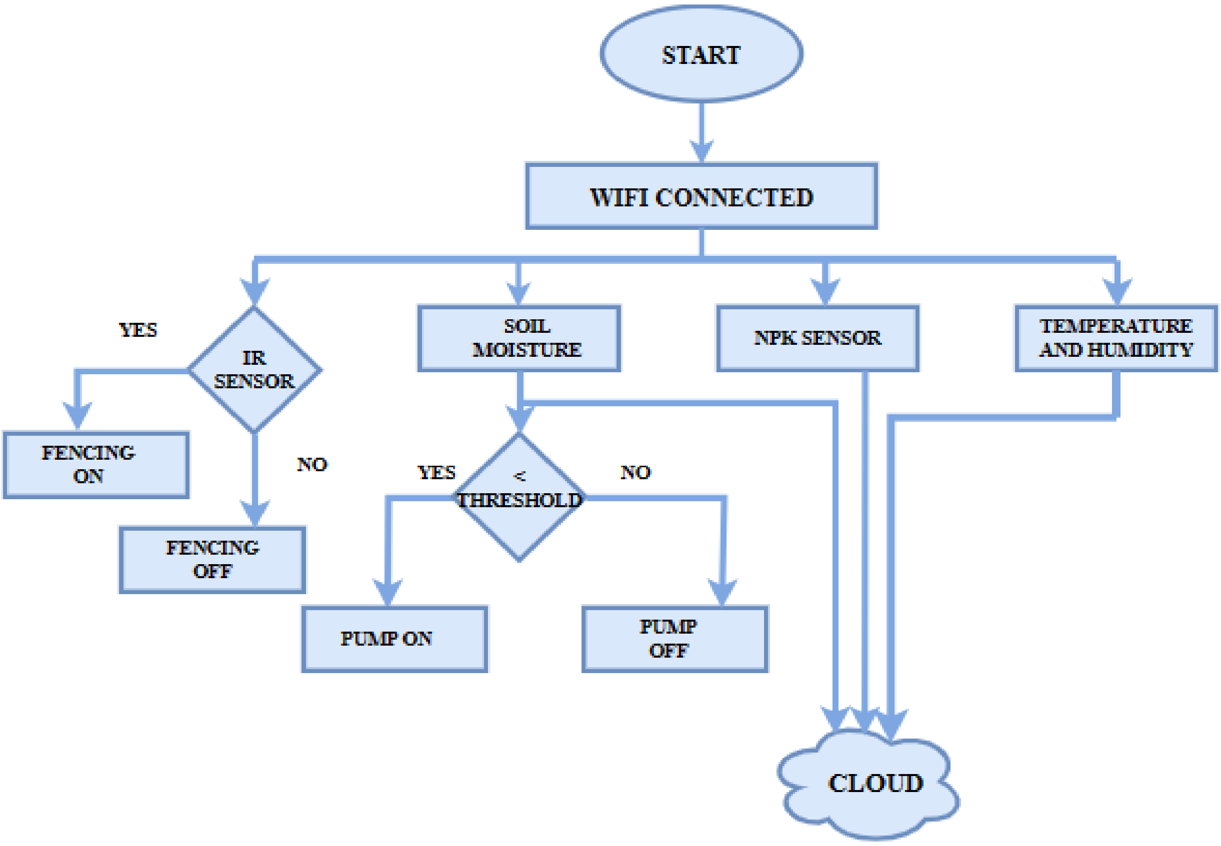


Fig 3.1.1 Flowchart for the hardware components

The above Flow chart represents the flow of working of the Hardware Components. When there is an entity trying to enter the field the current passes on to the fencing and LED's are On. When the moisture of the Soil exceeds above threshold value of around 700 then the pump is off which depicts the Soil Contains the required moisture level.

The Sensor Values are then sent to the cloud and then these values are retrieved from cloud and then sent to the website backend to make real time crop predictions.

3.1.2 CONSUMER MENU:

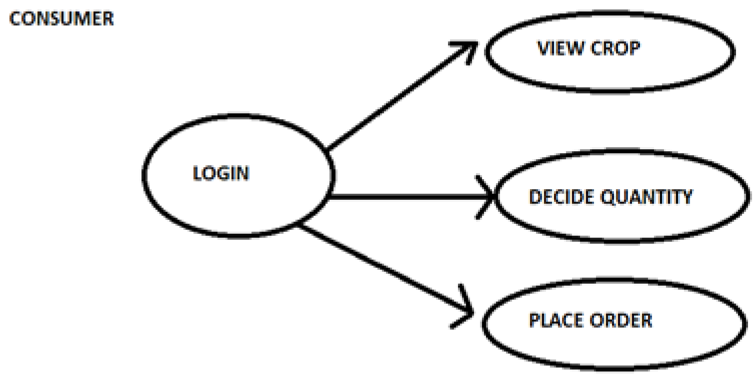


Fig 3.1.2 Consumer Menu

The website is designed to provide a comprehensive platform that integrates both the Farmer and Consumer menus. The primary goal of this project is to offer a unified platform for farmers and consumers to meet their respective needs. The website is a one-stop solution for farmers to seek crop recommendations while consumers can purchase commodities from the same platform. The Consumer menu is equipped with an array of features that cater to their needs. This menu offers real-time updates on market prices, weather conditions, crop availability, rental equipment for farming, and a feedback section. The market price section provides consumers with the latest updates on the prices of various commodities. The weather section gives real-time updates on weather conditions, which is useful for farmers to plan their crop cultivation. The crop availability section keeps consumers informed about the availability of various crops. The rental equipment section offers a range of equipment and machinery for farming that can be rented by farmers at an affordable cost. The feedback section allows consumers to provide their valuable input to improve the platform further. In summary, the website is a comprehensive platform that caters to the needs of farmers and consumers. With its easy-to-use interface and a range of features, the website offers a hassle-free experience to its users.

3.1.3 FARMER MENU:

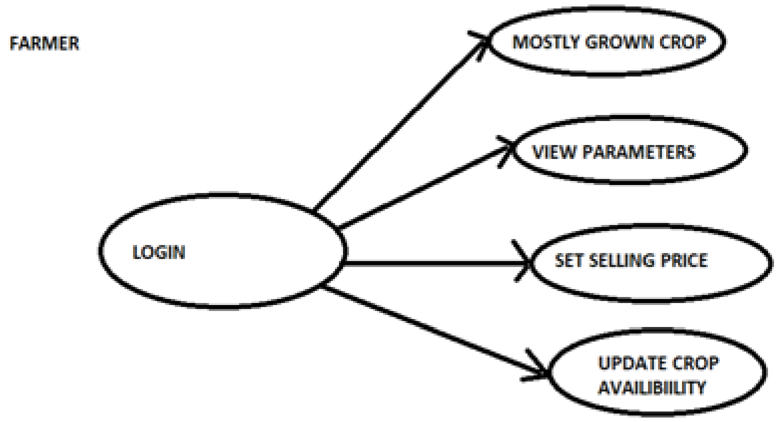


Fig 3.1.3 Farmer Menu

The software system is designed to assist farmers with crop prediction, fertilizers, and leaf disease prediction. The hardware component values are uploaded onto the website via the cloud using several crop prediction Machine Learning Algorithms like Random Forest, Linear Regression, and leaf disease prediction. These algorithms help predict the type of crops that can be grown based on the soil type, weather conditions, and other environmental factors. They also predict the type and quantity of fertilizers required to enhance the crop yield. The prediction of crops and fertilizers is provided to the farmers to help them make informed decisions about their farming practices. By using this software system, farmers can optimize their crop yields and reduce unnecessary expenses. Additionally, the farmers can upload information about crop availability, set selling price, and update the information regarding rental tools on the website. This information is directly reflected on the consumer menu and is visible to consumers. This feature helps farmers to reach out to potential customers and sell their produce directly, thereby eliminating the need for middlemen and increasing their profits. Overall, the software system provides an efficient and effective way for farmers to manage their farms and crops, while also helping them increase their profitability and success.

3.2 BLOCK DIAGRAM

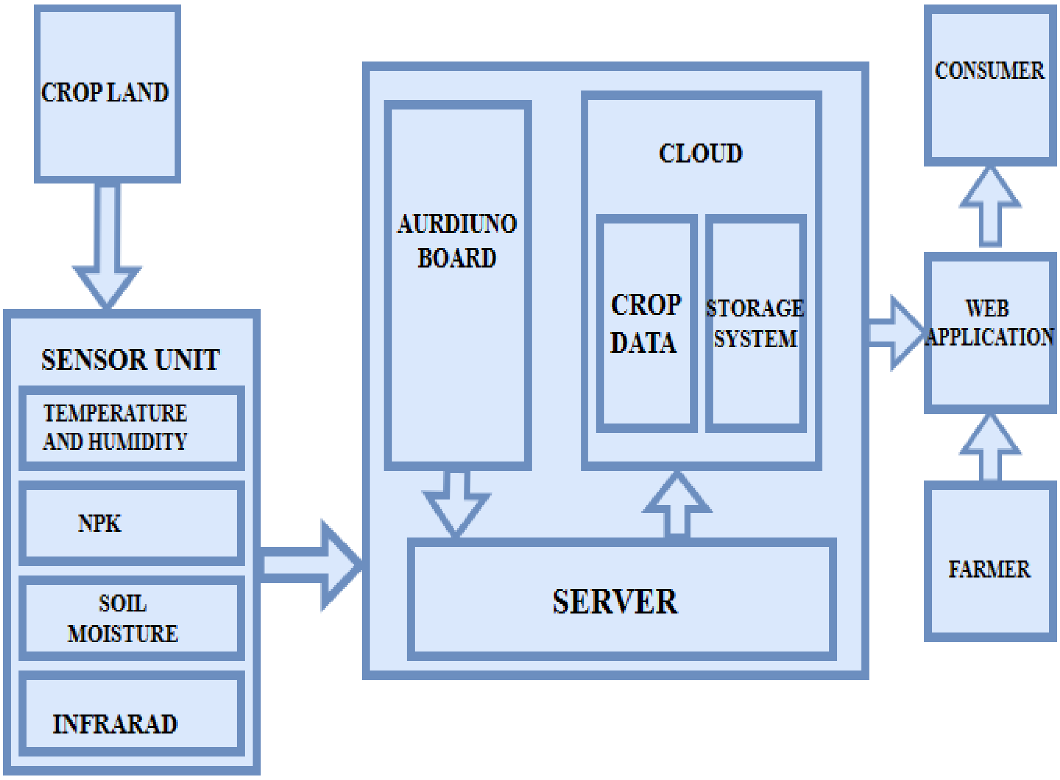


Fig 3.2 Block Diagram depicting the integration of Hardware and Software

The block diagram presented here provides comprehensive details of the hardware infrastructure employed in this project. The Arduino Uno microcontroller collects data from the sensors and sends it to the ESP-01 module through a serial communication protocol. The ESP-01 module then uses the TCP/IP protocol to securely transmit the data to the cloud platform ThingSpeak. This cloud-based platform processes the received data and makes it accessible to the website through the backend. The website uses advanced algorithms to analyze the received data and provide highly detailed and personalized crop recommendations to farmers. These recommendations are based on the latest agricultural research and are tailored to the specific needs of individual farms, taking into account factors such as soil pH, moisture levels, and temperature.

3.3 WEB DEVELOPMENT

1.Define Requirements: Understand the purpose, functionality, and target audience of the website. Gather requirements from stakeholders and create a detailed plan.

2.Plan and Design: Create wireframes or mockups to visualize the layout and structure of the website. Design the user interface (UI) and user experience (UX) elements.

3.Choose a Technology Stack: Select the appropriate technologies for development, including programming languages (such as HTML, CSS, JavaScript), frameworks (like React, Angular, Vue.js), and any backend technologies (such as Node.js, Python with Django, Ruby on Rails).

4.Set Up Development Environment: Install necessary software tools and set up a development environment. This may include text editors or integrated development environments (IDEs), version control systems (such as Git), and web servers (like Apache or Nginx).

5.Develop Frontend: Start coding the frontend of the website using HTML for structure, CSS for styling, and JavaScript for interactivity. Implement responsive design to ensure the website looks good on different devices and screen sizes.

6.Develop Backend: If the website requires server-side logic or database interactions, develop the backend using appropriate technologies. This involves implementing business logic, handling requests, and interacting with databases.

7.Integrate Frontend and Backend: Connect the frontend and backend components to create a functioning website. This may involve setting up APIs (Application Programming Interfaces) for communication between the frontend and backend.

8.Test: Perform testing to ensure the website functions correctly and meets the requirements. This includes unit testing, integration testing, and user acceptance testing (UAT). Identify and fix any bugs or issues.

9.Optimize Performance: Optimize the website for performance by optimizing code, images, and assets, minimizing load times, and improving responsiveness.

10.Security: Implement security measures to protect the website from common threats such as SQL injection, cross-site scripting (XSS), and CSRF (Cross-Site Request Forgery). Use HTTPS to encrypt data transmitted between the client and server.

11.Deploy: Choose a hosting provider and deploy the website to a production environment. Set up domain name, configure server settings, and ensure everything is running smoothly.

12.Monitor and Maintain: Regularly monitor the website for performance, security, and usability issues. Perform updates and maintenance as needed to keep the website running smoothly and up-to-date with latest technologies.

13.Iterate and Improve: Gather feedback from users and stakeholders, analyze website analytics, and make iterative improvements to the website to enhance its effectiveness and usability over time.

3.4 FRONTEND DEVELOPMENT

1. Understand Requirements: Gather requirements from stakeholders and understand the purpose, target audience, and key features of the website.

2. Wireframing and Design: Create wireframes or mockups to visualize the layout, structure, and user interface (UI) elements of the website. Design the overall look and feel, considering branding guidelines and user experience (UX) principles.

3.Choose Frontend Technologies: Select the appropriate frontend technologies based on project requirements and preferences. This typically includes HTML for structure, CSS for styling, and JavaScript for interactivity.

4.Set Up Development Environment: Install necessary tools and set up a development environment. This may include code editors like Visual Studio Code or Sublime Text, version control systems like Git, and frontend frameworks or libraries like React, Angular, or Vue.js if needed.

5.HTML Structure: Start by coding the HTML structure of the website based on the wireframes or design mockups. Create semantic HTML markup for better accessibility and SEO.

6.CSS Styling: Apply CSS styles to the HTML elements to achieve the desired visual appearance. Use techniques like CSS Grid or Flexbox for layout, and CSS preprocessors like Sass or Less to streamline development.

7.Responsive Design: Implement responsive design techniques to ensure the website looks good and functions properly on various devices and screen sizes. Use media queries and viewport meta tags to adjust layout and styling accordingly.

8.JavaScript Interactivity: Add JavaScript code to enhance interactivity and functionality on the website. This may include event handling, DOM manipulation, form validation, and integrating third-party libraries or APIs.

9.Optimization: Optimize frontend assets such as images, CSS, and JavaScript files to improve performance and loading times. Minify and concatenate files, use compression techniques, and leverage browser caching.

10. Cross-Browser Compatibility: Test the website across different web browsers (such as Chrome, Firefox, Safari, and Edge) to ensure compatibility and consistent behavior. Use browser developer tools for debugging and fixing issues.

11.Accessibility: Ensure the website is accessible to users with disabilities by following accessibility standards (such as WCAG). Use semantic HTML, provide alternative text for images, and ensure keyboard navigation and screen reader compatibility.

12.Testing: Perform thorough testing of the frontend code to identify and fix any bugs, errors, or inconsistencies. Test for functionality, usability, performance, and compatibility.

13.Deployment: Deploy the frontend code to a web server or hosting platform. Set up domain configuration, server settings, and SSL certificates if necessary.

14.Monitor and Maintain: Monitor the performance and usability of the website post-deployment. Perform regular updates and maintenance to keep the frontend codebase secure and up-to-date with best practices.

15.Iterate and Improve: Gather feedback from users and stakeholders, analyze website analytics, and make iterative improvements to the frontend code to enhance usability, accessibility, and overall user experience.

3.6 BACKEND DEVELOPMENT

1.Requirement Gathering: Understand the requirements of the website or web application. Gather information about the features, functionalities, and data handling needs from stakeholders.

2.Selecting Technologies: Choose appropriate backend technologies based on project requirements, scalability needs, and personal/team expertise. Common choices include programming languages (e.g., Python, JavaScript/Node.js, Ruby), frameworks (e.g., Django, Flask, Express.js, Ruby on Rails), and databases (e.g., MySQL, PostgreSQL, MongoDB).

3.Setting Up Development Environment: Install necessary software and tools for backend development. This typically includes a code editor or IDE, version control system (e.g., Git), and the chosen backend framework and database management system.

4.Database Design and Modeling: Design the database schema based on the data requirements of the application. Define tables, relationships, and constraints. This could involve using tools like Entity-Relationship Diagrams (ERDs).

5.Backend Architecture: Plan the overall architecture of the backend, including how different components will interact with each other. Decide on the structure of routes/endpoints, middleware, and separation of concerns.

6.Implementing Business Logic: Write code to implement the business logic of the application. This involves handling requests, processing data, and enforcing application-specific rules and workflows.

7.API Development: If the backend will serve data to a frontend or other clients, design and develop APIs (Application Programming Interfaces) to expose the required functionality. Use RESTful principles or GraphQL for designing APIs.

8.Authentication and Authorization: Implement user authentication and authorization mechanisms to secure access to resources and endpoints. This may involve using techniques like JSON Web Tokens (JWT), OAuth, or session-based authentication.

9.Data Validation and Sanitization: Validate and sanitize incoming data to ensure it meets the expected format and is safe to use. Prevent common security vulnerabilities like SQL injection and Cross-Site Scripting (XSS) attacks.

10.Error Handling and Logging: Implement robust error handling mechanisms to gracefully handle exceptions and errors. Log relevant information for debugging and monitoring purposes.

11.Testing: Write unit tests, integration tests, and end-to-end tests to verify the correctness and reliability of the backend code. Use testing frameworks and tools appropriate for the chosen technology stack.

12.Performance Optimization: Optimize the backend code and database queries for performance and scalability. Identify and address bottlenecks, optimize resource usage, and implement caching strategies where applicable.

13.Deployment: Deploy the backend code to a production environment. Configure server settings, set up database connections, and ensure proper security measures are in place.

Consider using containerization (e.g., Docker) and orchestration tools (e.g., Kubernetes) for deployment and scaling.

14.Monitoring and Maintenance: Monitor the performance and health of the backend system in production. Set up logging and monitoring tools to track errors, performance metrics, and user activity. Perform regular maintenance tasks such as database backups, security updates, and code refactoring.

15.Iterative Improvement: Gather feedback from users and stakeholders, analyze performance metrics, and make iterative improvements to the backend codebase. Continuously update and optimize the backend to meet evolving requirements and address user needs.

3.7 DATA BASE MANAGEMENT SYSTEM (DBMS)

SQLite is a lightweight, serverless, self-contained, and transactional SQL database engine. It's commonly used in applications where a full-fledged relational database management system (RDBMS) like MySQL or PostgreSQL might be overkill. Here's how data storage works in SQLite:

Database Creation: To start storing data in SQLite, you first need to create a new SQLite database file. This can be done using various tools or programming languages that support SQLite, such as the SQLite command-line shell, SQLiteStudio, or through code using SQLite APIs.

Table Creation: Once the database is created, you can create tables to store your data. Each table consists of columns and rows.

Inserting Data: After creating tables, you can insert data into them using the INSERT INTO SQL statement.

Querying Data: You can retrieve data from the database using SQL SELECT statements.

Updating Data: Data in the database can be updated using the UPDATE statement

Deleting Data: You can remove data from the database using the DELETE statement.

Transactions: SQLite supports transactions, which allow you to group multiple SQL statements into a single unit of work. Transactions ensure data integrity and consistency by allowing you to commit changes or roll them back if an error occurs.

Indexes: You can create indexes on columns to improve query performance. Indexes allow SQLite to quickly locate rows based on the indexed columns

Constraints: SQLite supports various constraints such as primary key, foreign key, unique, not null, etc., to enforce data integrity and define relationships between tables.

SQLite is quite versatile and widely used in various applications, including mobile apps, desktop applications, embedded systems, and small-scale web applications. It's important to note that while SQLite is powerful and convenient, it may not be suitable for high-concurrency environments or applications that require extensive scalability.

3.8 DATA CLEANING

Data cleaning is a crucial step in the data analysis process to ensure that the data is accurate, complete, and consistent. Here are some common data cleaning methods:

1.Handling Missing Values:

Identify missing values in the dataset and decide on an appropriate strategy for handling them.

Options include removing rows or columns with missing values, imputing missing values with mean, median, or mode, or using advanced techniques like interpolation or machine learning-based imputation.

2.Removing Duplicate Records:

Identify and remove duplicate records from the dataset to avoid redundancy and ensure data integrity.

Use built-in functions or libraries to detect and eliminate duplicate rows based on selected columns or criteria.

3.Standardizing Data:

Standardize data formats to ensure consistency across the dataset. This may involve converting data to a consistent unit of measurement, formatting dates or timestamps, or normalizing text data.

4.Handling Outliers:

Identify outliers in the data that may skew analysis results and decide on an appropriate approach for handling them.

Options include removing outliers, transforming the data, or using robust statistical methods that are less sensitive to outliers.

5.Correcting Errors:

Identify and correct any errors or inconsistencies in the data. This may involve manually reviewing the data, cross-referencing with external sources, or using data validation rules to identify erroneous values.

6.Data Transformation:

Perform transformations on the data to make it more suitable for analysis. This may include scaling numeric features, encoding categorical variables, or creating derived features through mathematical operations or aggregations.

7.Handling Skewed Data:

Address skewness in the data distribution to improve the performance of statistical models. Techniques such as logarithmic transformation or Box-Cox transformation can help normalize skewed data.

8.Dealing with Text Data:

Clean and preprocess text data by removing special characters, punctuation, stopwords, and performing stemming or lemmatization to reduce variation in word forms.

Tokenize text data into individual words or phrases for further analysis.

9.Addressing Inconsistencies:

Identify and resolve inconsistencies in categorical data by standardizing labels or categories. This ensures that similar values are represented consistently throughout the dataset.

10.Validation and Quality Checks:

Perform validation checks to ensure data quality and integrity. This includes checking for referential integrity, data completeness, and adherence to predefined constraints or business rules.

3.9 DATA VISUALIZATION USING POWER BI

1.Data Preparation:

Import or connect to the data sources you want to analyze in Power BI. This can include Excel files, databases, online services, and more.

Transform and clean the data as needed using Power Query Editor to ensure it's in the right format for analysis.

2.Modeling:

Create relationships between different tables if your data comes from multiple sources.

Define measures and calculated columns using DAX (Data Analysis Expressions) to perform calculations and aggregations.

3.Visualization:

Drag and drop fields from your data model onto the canvas to create visualizations such as charts, graphs, tables, and maps.

Customize the appearance and formatting of visualizations using the formatting pane.

Add slicers, filters, and drill-down capabilities to allow users to interact with the data dynamically.

4.Dashboard Creation:

Once you've created individual visualizations, you can combine them into a dashboard.

Click on "New Dashboard" to create a new dashboard and then drag visualizations from the report canvas onto the dashboard.

Arrange and resize the visualizations on the dashboard canvas to create a layout that makes sense for your analysis.

5.Interactivity and Filtering:

Use interactivity features such as cross-filtering and highlighting to enable users to explore data relationships.

Set up slicers and filters on the dashboard to allow users to filter data dynamically based on their preferences.

6.Sharing and Collaboration:

Once your dashboard is ready, you can share it with others within your organization or externally.

Publish the dashboard to the Power BI service to share it with colleagues or stakeholders. You can control access permissions to determine who can view or edit the dashboard.

Collaborate with others by allowing them to provide feedback, add comments, or even create their own visualizations based on the shared dataset.

7.Scheduled Data Refresh:

Set up scheduled data refresh to ensure that your dashboard reflects the latest data from your data sources.

Configure refresh settings in Power BI Service to automatically refresh the dataset on a daily, weekly, or custom schedule.

8.Monitor and Maintain:

Monitor the performance and usage of your dashboard using usage metrics and reports available in the Power BI Service.

Regularly review and update your dashboard as needed based on changing business requirements or feedback from users.

By following these steps, you can create effective and visually appealing dashboards in Power BI to analyze and present your data.

3.9.1 MACHINE LEARNING ALGORITHMS

To predict crops based on data collected from sensors, you can use various machine learning algorithms, depending on factors such as the nature of the data, the size of the dataset, and the desired prediction accuracy. Here are some commonly used machine learning algorithms for this task:

1.Decision Trees and Random Forests:

Decision trees and random forests are popular for classification tasks like predicting crop types.

Decision trees split the data based on features at each node, while random forests use an ensemble of decision trees to improve prediction accuracy and reduce overfitting.

2.Support Vector Machines (SVM):

SVM is effective for both classification and regression tasks.

It finds the optimal hyperplane that separates different classes in feature space.

SVM can handle high-dimensional data and is robust to overfitting.

3.K-Nearest Neighbors (KNN):

KNN is a simple and intuitive algorithm for classification tasks.

It predicts the class of a data point based on the majority class of its nearest neighbors.

KNN is non-parametric and doesn't require training, but it can be computationally expensive for large datasets.

4.Logistic Regression:

Logistic regression is commonly used for binary classification tasks, but it can be extended to multi-class classification as well.

It models the probability of each class using a logistic function and predicts the class with the highest probability.

5.Gradient Boosting Machines (GBM):

GBM is an ensemble learning technique that builds a series of weak learners (typically decision trees) sequentially.

Each new tree corrects the errors of the previous ones, leading to improved prediction accuracy. Popular implementations include XGBoost, LightGBM, and CatBoost.

6.Deep Learning Models:

Deep learning models, such as neural networks, can learn complex patterns from sensor data.

Convolutional Neural Networks (CNNs) are effective for image-based data from sensors, while Recurrent Neural Networks (RNNs) or Long Short-Term Memory (LSTM) networks are suitable for sequential data.

Deep learning models require large amounts of data and computational resources for training.

7.Ensemble Methods:

Ensemble methods combine multiple base models to produce a stronger model that typically performs better than any individual model.

Besides random forests and gradient boosting machines, ensemble methods like AdaBoost and Bagging can be used for crop prediction tasks.

3.9.2 API's

An API (Application Programming Interface) is a set of rules, protocols, and tools that allow different software applications to communicate with each other. APIs define how different software components should interact and exchange data, enabling developers to access the functionality of other applications or services without needing to understand their underlying implementation.

There are various types of APIs, including:

1.Web APIs: These APIs are exposed over the internet and typically use HTTP protocols to enable communication between different web-based systems. Web APIs are commonly used for integrating with third-party services, accessing data from remote servers, or building web applications.

2,RESTful APIs: Representational State Transfer (REST) is an architectural style for designing networked applications. RESTful APIs adhere to REST principles and use HTTP methods (GET, POST, PUT, DELETE) to perform CRUD (Create, Read, Update, Delete) operations on resources. They typically return data in JSON or XML format.

3.SOAP APIs: Simple Object Access Protocol (SOAP) is a protocol for exchanging structured information in the implementation of web services. SOAP APIs use XML for message formatting and can be more complex than RESTful APIs. They are often used in enterprise systems and applications that require advanced features like security and transactions.

4.GraphQL APIs: GraphQL is a query language and runtime for executing queries against a data schema. Unlike RESTful APIs, where clients receive fixed data structures, GraphQL APIs allow clients to specify the exact data they need, reducing over-fetching and under-fetching of data.

5.Library APIs: Many software libraries and frameworks provide APIs that developers can use to interact with their functionality. For example, programming languages like Python and JavaScript have standard libraries with APIs for performing various tasks such as file I/O, network communication, and data manipulation.

CHAPTER 4
HARDWARE AND SOFTWARE COMPONENTS

4.1HARDWARE COMPONENTS

1. DHT11
2. HW080
3. PH SENSOR
4. WATER PUMP
5. AURDINO UNO
6. IR SENSOR
7. LCD DISPLAY
8. ESP 01

- **DHT11**

DHT11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc… to measure humidity and temperature instantaneously.

DHT11 humidity and temperature sensor is available as a sensor and as a module. The difference between this sensor and module is the pull-up resistor and a power-on LED. DHT11 is a relative humidity sensor. To measure the surrounding air this sensor uses a thermistor and a capacitive humidity sensor.DHT11 sensor consists of a capacitive humidity sensing element and a thermistor for sensing temperature. The humidity sensing capacitor has two electrodes with a moisture holding substrate as a dielectric between them. Change in the capacitance value occurs with the change in humidity levels. The IC measure, process this changed resistance values and change them into digital form.
For measuring temperature this sensor uses a Negative Temperature coefficient thermistor, which causes a decrease in its resistance value with increase in temperature. To get larger resistance value even for the smallest change in temperature, this sensor is usually made up of semiconductor ceramics or polymers.

The temperature range of DHT11 is from 0 to 50 degree Celsius with a 2-degree accuracy. Humidity range of this sensor is from 20 to 80% with 5% accuracy. The sampling rate of this sensor is 1Hz .i.e. it gives one reading for every second. DHT11 is small in size with operating voltage from 3 to 5 volts. The maximum current used while measuring is 2.5mA.

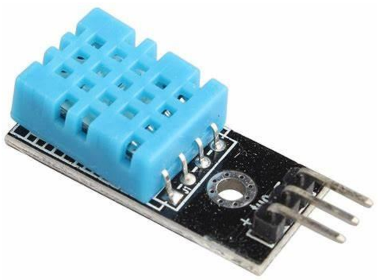


Fig 4.1.1 DHT11 Sensor

DHT11 sensor has four pins- VCC, GND, Data Pin and a not connected pin. A pull-up resistor of 5k to 10k ohms is provided for communication between sensor and micro-controller.

- **Soil Moisture Sensor(HW 080)**

The soil moisture sensor is one kind of sensor used to gauge the volumetric content of water within the soil. As the straight gravimetric dimension of soil moisture needs eliminating, drying, as well as sample weighting. These sensors measure the volumetric water content not directly with the help of some other rules of soil like dielectric constant, electrical resistance, otherwise interaction with neutrons, and replacement of the moisture content.

The relation among the calculated property as well as moisture of soil should be adjusted & may change based on ecological factors like temperature, type of soil, otherwise electric conductivity.

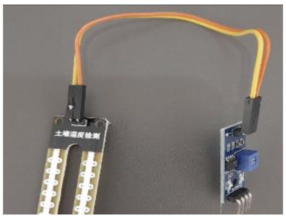


Fig 4.1.2 Soil moisture sensor

The microwave emission which is reflected can be influenced by the moisture of soil as well as mainly used in agriculture and remote sensing within hydrology.These sensors normally used to check volumetric water content, and another group of sensors calculates a new property of moisture within soils named water potential. Generally, these sensors are named as soil water potential sensors which include gypsum blocks and tensiometer.This sensor mainly utilizes capacitance to gauge the water content of the soil (dielectric permittivity). The working of this sensor can be done by inserting this sensor into the earth and the status of the water content in the soil can be reported in the form of a percent.This sensor makes it perfect to execute experiments within science courses like environmental science, agricultural science, biology, soil science, botany, and horticulture.

- **NPK SENSOR**

A sensor that is used to detect the hydrogen ions concentration within a solution and changes it into an equivalent usable o/p signal is known as pH sensor. This sensor includes a signal transmission part and chemical part. This sensor is used to measure alkalinity & acidity within water.The difference between alkaline & acidic substances is significant for any corporation that utilizes boilers, cooling towers, pool control manufacturing processes, a variety of environmental monitoring. Vegetables require within 6.5 to 7.5 pH range.Soil NPK sensors are innovative agricultural tools used to monitor and analyse the levels of essential nutrients in soil, namely nitrogen (N), phosphorus (P), and potassium (K). phosphorus (P), and potassium (K). By accurately measuring these nutrient concentrations, farmers can make informed decisions regarding fertilization practices, leading to optimised crop growth and higher yields. By accurately measuring these nutrient concentrations, farmers can make informed decisions regarding fertilization practices, leading to optimized crop growth and higher yields. This article will introduce the concept of soil NPK sensors, explain their working principles, and explore their applications in various agricultural scenarios. applications in various agricultural scenarios.

Fig 4.1.3 NPK sensor

- **Water pump**

The working principle of a water pump mainly depends upon the positive displacement principle as well as kinetic energy to push the water. These pumps use AC power otherwise DC power for energizing the motor of the water pump whereas others can be energized other kinds of drivers like gasoline engines otherwise diesel. The water pump is a portable device and can be applied in several household applications. These pumps are used for pumping the huge amount of water from one place to another. The main purpose of a water pump is versatile. A quality pump which can be selected carefully may be perfect for draining water from a low flooded region, refilling the swimming pool, and bathtub, circulating pesticides otherwise fertilizers.

Fig 4.1.4Water pump

- **Arduino UNO**

The **Arduino UNO R3** is frequently used microcontroller board in the family of an +++Arduino. This is the latest third version of an Arduino board and released in the year 2011. The main advantage of this board is if we make a mistake we can change the microcontroller on the board. The main features of this board mainly include, it is available in DIP (dual-inline-package), detachable and ATmega328 microcontroller. Arduino Uno R3 is one kind of ATmega328P based microcontroller board. It includes the whole thing required to hold up the microcontroller; just attach it to a PC with the help of a USB cable, and give the supply using AC-DC adapter or a battery to get started. The term Uno means “one” in the language of “Italian” and was selected for marking the release of Arduino’s IDE 1.0 software. The R3 Arduino Uno is the 3rd as well as most recent modification of the Arduino Uno.

Arduino board and IDE software are the reference versions of Arduino and currently progressed to new releases. The Uno-board is the primary in a sequence of USB-Arduino boards, & the reference model designed for the Arduino platform

Fig 4.1.5 Arduino board

- **IR Sensor**

IR technology is used in a wide range of wireless applications which includes remote controls and sensing. The infrared part in the electromagnetic spectrum can be separated into three main regions: near IR, mid-IR & far IR. The wavelengths of these three regions vary based on the application. For the near IR region, the wavelength ranges from 700 nm- 1400 nm, the wavelength of the mid-IR region ranges from 1400 nm – 3000 nm & finally for the far IR region, the wavelength ranges from 3000 nm – 1 mm. The near IR region is used on fiber optic & IR sensors, the mid-IR region is used for heat sensing and the far IR region is used in thermal imaging. The range of frequency for IR is maximum as compared to microwave and minimum than visible light.

Fig 4.1.6 IR Sensor

LCD Display

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light-emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.

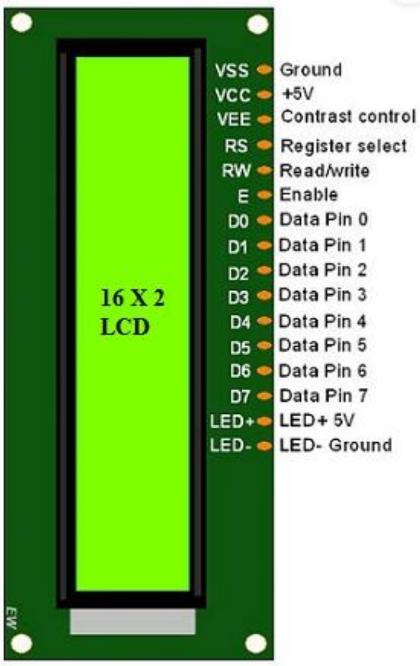


Fig 4.1.7 LCD Display

- **ESP 01**

ESP-01 is a WiFi module which allows Microcontroller easily access to WiFi network. It is one of the primarily incorporated WiFi chip in the industry, it assimilates the antenna switches, Radiofrequency balun, power amplifier, low noise receiver amplifier, and power executive elements. This module requires minimum internal circuitry, its entire solution, including the front end module is designed to occupy minimum PCB area. ESP-01 module is termed as a system on chip (SOC) because it acts as a standalone Microcontroller itself, so we don't need to interface it with any other microcontroller (i.e. Arduino, Atmel, PIC Microcontroller, etc.) in order to use its I/O Pins.

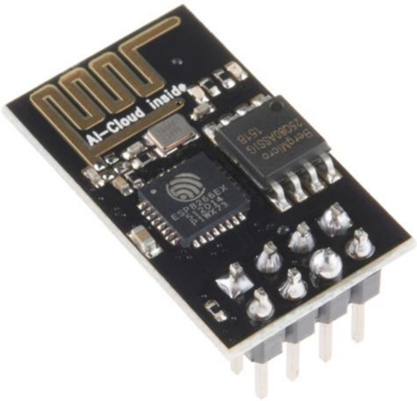


Fig 4.1.8 ESP-01

4.2SOFTWARE

1. POWER BI
2. SQL
3. ARDUINO IDE
4. THINGSPEAK
5. HTML
6. CSS
7. PYTHON

- **Power BI**

Power BI is a powerful business intelligence tool from Microsoft that enables users to transform unrelated data sources into coherent, visually immersive, and interactive insights. It's designed to serve various roles within an organization, from business analysts who create extensive reports to sales professionals who might use it to monitor progress on sales quotas. Power BI also includes_advanced features like AI Insights which uses artificial intelligence to find patterns and insights_within data sets.

For developers, Power BI provides APIs to push data into models or embed dashboards and reports into custom applications. If you're looking to create custom visuals, Power BI allows for that as well[1].

Whether you need to create detailed reports, real-time dashboards, or paginated reports, Power BI has the tools to support data-driven decision-making across your organization

- **SQL**

Structured Query Language (SQL) is a domain-specific language used to manage data, especially in a relational database management system (RDBMS). It is particularly useful in handling structured data, i.e., data incorporating relations among entities and variables.

Introduced in the 1970s, SQL offered two main advantages over older read–write APIs such as ISAM or VSAM. Firstly, it introduced the concept of accessing many records with one single command. Secondly, it eliminates the need to specify *how* to reach a record, i.e., with or without an index.

Originally based upon relational algebra and tuple relational calculus, SQL consists of many types of statements,[6] which may be informally classed as sublanguages, commonly: Data query Language (DQL), Data Definition Language (DDL), Data Control Language (DCL), and Data Manipulation Language (DML).

The scope of SQL includes data query, data manipulation (insert, update, and delete), data definition (schema creation and modification), and data access control. Although SQL is essentially a declarative language (4GL), it also includes procedural elements.

SQL was one of the first commercial languages to use Edgar F. Codd's relational model. The model was described in his influential 1970 paper, "A Relational Model of Data for Large Shared Data Banks".Despite not entirely adhering to the relational model as described by Codd, SQL became the most widely used database language.

- **Arduino IDE**

The Arduino Software (IDE) makes it easy to write code and upload it to the board offline. We recommend it for users with poor or no internet connection. This software can be used with any Arduino board.

There are currently two versions of the Arduino IDE, one is the IDE 1.x.x and the other is IDE 2.x. The IDE 2.x is new major release that is faster and even more powerful to the IDE 1.x.x. In addition to a more modern editor and a more responsive interface it includes advanced features to help users with their coding and debugging.

The Arduino Integrated Development Environment - or Arduino Software (IDE) - connects to the Arduino boards to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino.

Fig 4.2.1 Ardiuno IDE

- **HTML**

HyperText Markup Language or HTML is the standard markup language for documents designed to be displayed in a web browser. It defines the content and structure of web content. It is often assisted by technologies such as Cascading Style Sheets (CSS) and scripting languages such as JavaScript.Web browsers receive HTML documents from a web server or from local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for its appearance.

HTML elements are the building blocks of HTML pages. With HTML constructs, images and other objects such as interactive forms may be embedded into the rendered page. HTML provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes, and other items. HTML can embed programs written in a scripting language such as JavaScript, which affects the behavior and content of web pages. The inclusion of CSS defines the look and layout of content. The World Wide Web Consortium (W3C), former maintainer of the HTML and current maintainer of the CSS standards, has encouraged the use of CSS over explicit presentational HTML since 1997.[2] A form of HTML, known as HTML5, is used to display video and audio, primarily using the <**canvas**> element, together with JavaScript.

- **CSS**

Cascading Style Sheets (CSS) is a style sheet language used for specifying the presentation and styling of a document written in a markup language such as HTML or XML (including XML dialects such as SVG, MathML or XHTML). CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.

CSS is designed to enable the separation of content and presentation, including layout, colors, and fonts.[3] This separation can improve content accessibility;] provide more flexibility and control in the specification of presentation characteristics; enable multiple web pages to share formatting by specifying the relevant CSS in a separate .css file, which reduces complexity and repetition in the structural content; and enable the .css file to be cached to improve the page load speed between the pages that share the file and its formatting.

Separation of formatting and content also makes it feasible to present the same markup page in different styles for different rendering methods, such as on-screen, in print, by voice (via speech-based browser or screen reader), and on Braille-based tactile devices. CSS also has rules for alternate formatting if the content is accessed on a mobile device.

The name *cascading* comes from the specified priority scheme to determine which declaration applies if more than one declaration of a property match a particular element. This cascading priority scheme is predictable

- **Python**

Python is a versatile, high-level programming language known for its readability, simplicity, and flexibility. Created by Guido van Rossum and first released in 1991, Python has since grown into one of the most popular programming languages worldwide, utilized in various domains such as web development, data science, artificial intelligence, machine learning, scientific computing, and more.One of Python's key features is its elegant syntax, which emphasizes code readability and allows developers to express concepts in fewer lines of code compared to other programming languages. Python uses indentation to define code blocks, making it easy to understand the structure of programs.Python's extensive standard library provides a wide range of modules and packages for tasks such as file I/O, networking, data manipulation, and more, reducing the need for external dependencies. Additionally, Python's package management system, pip, simplifies the installation and management of third-party libraries.

Python supports multiple programming paradigms, including procedural, object-oriented, and functional programming, allowing developers to choose the most suitable approach for their projects. Its dynamic typing system and automatic memory management through garbage collection contribute to its ease of use and productivity.The language's versatility is further enhanced by its cross-platform compatibility, with implementations available for various operating systems, including Windows, macOS, Linux, and others. This portability allows developers to write code once and run it on different platforms without modification.

Moreover, Python's community-driven development model fosters collaboration and innovation through initiatives such as the Python Enhancement Proposals (PEPs) and the Python Software Foundation (PSF). The PSF supports the development of Python-related projects, organizes conferences and events, and promotes the adoption of Python worldwide.

In recent years, Python has continued to evolve with regular releases introducing new features, performance improvements, and optimizations. Python 3, the latest major version of the language, introduced several backward-incompatible changes to address shortcomings and improve consistency, leading to a more robust and modern programming environment. Overall, Python's combination of simplicity, versatility, and community support has cemented its position as a leading programming language for a wide range of applications, making it an invaluable tool for developers, data scientists, researchers, and educators alike.

- **ThingSpeak**

ThingSpeak™ is an IoT analytics platform service that allows you to aggregate, visualize and analyze live data streams in the cloud. ThingSpeak provides instant visualizations of data posted by your devices to ThingSpeak. With the ability to execute MATLAB® code in ThingSpeak you can perform online analysis and processing of the data as it comes in. ThingSpeak is often used for prototyping and proof of concept IoT systems that require analytics.

Internet of Things (IoT) describes an emerging trend where a large number of embedded devices (things) are connected to the Internet. These connected devices communicate with people and other things and often provide sensor data to cloud storage and cloud computing resources where the data is processed and analyzed to gain important insights. Cheap cloud computing power and increased device connectivity is enabling this trend.

IoT solutions are built for many vertical applications such as environmental monitoring and control, health monitoring, vehicle fleet monitoring, industrial monitoring and control, and home automation.

At a high level, many IoT systems can be described using the diagram below:

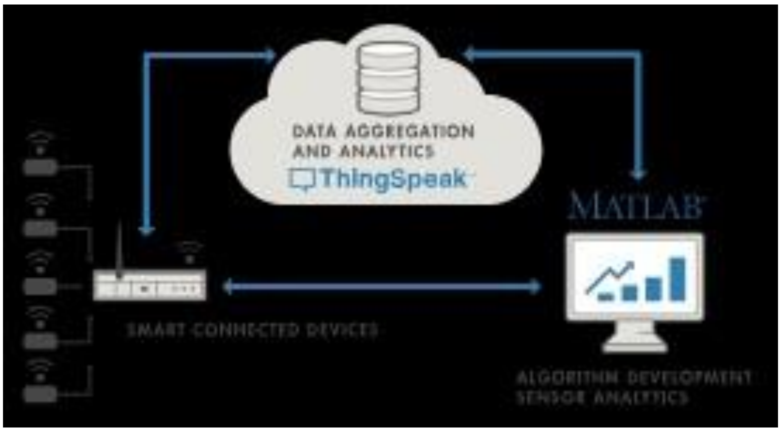


Fig 4.2.2 ThingSpeak

On the left, we have the smart devices (the "things" in IoT) that live at the edge of the network. These devices collect data and include things like wearable devices, wireless temperatures sensors, heart rate monitors, and hydraulic pressure sensors, and machines on the factory floor.

In the middle, we have the cloud where data from many sources is aggregated and analyzed in real time, often by an IoT analytics platform designed for this purpose.

The right side of the diagram depicts the algorithm development associated with the IoT application. Here an engineer or data scientist tries to gain insight into the collected data by performing historical analysis on the data. In this case, the data is pulled from the IoT platform into a desktop software environment to enable the engineer or scientist to prototype algorithms that may eventually execute in the cloud or on the smart device itself.

An IoT system includes all these elements. ThingSpeak fits in the cloud part of the diagram and provides a platform to quickly collect and analyze data from internet connected sensors.

CHAPTER 5

RESULTS

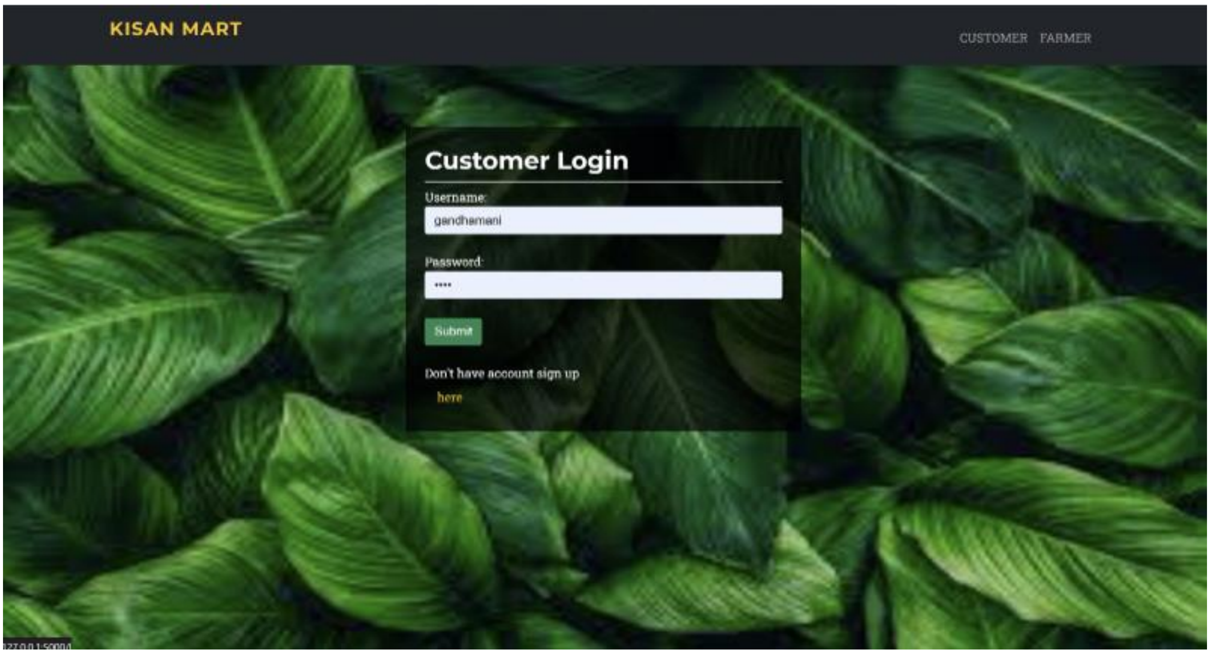
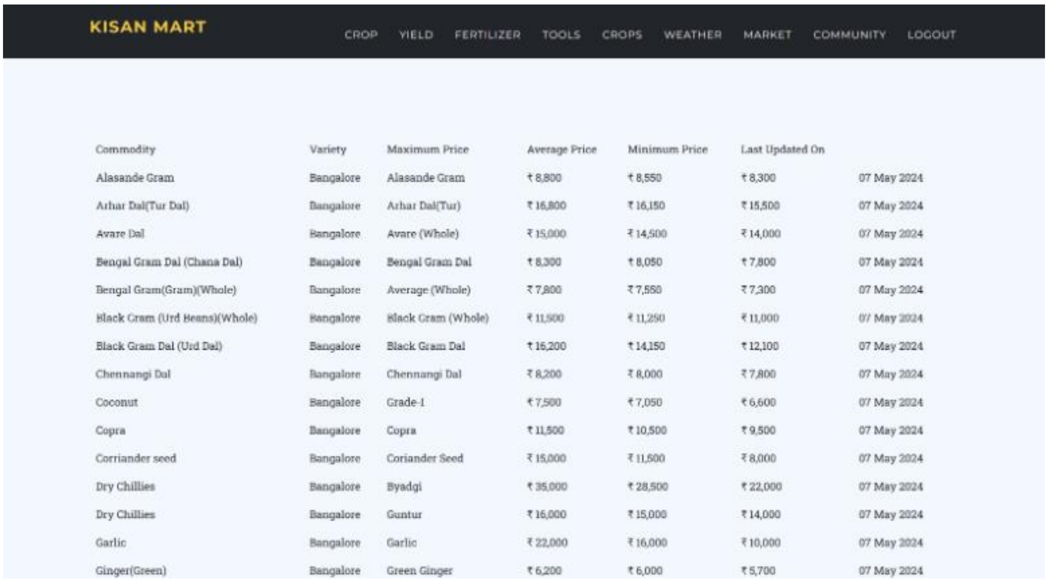


Fig 5.1 Website frontend

The above figure is the login page of our website . in this page we have two menus one for farmer and one for the customer . The website also shows the current market price of the goods listed in Bangalore Mandi website .



Commodity	Variety	Maximum Price	Average Price	Minimum Price	Last Updated On		
Alasande Gram	Bangalore	Alasande Gram	₹ 8,800	₹ 8,550	₹ 8,300	07 May 2024	
Arhar Dal(Tur Dal)	Bangalore	Arhar Dal(Tur)	₹ 16,800	₹ 16,150	₹ 15,500	07 May 2024	
Avare Dal	Bangalore	Avare (Whole)	₹ 15,000	₹ 14,500	₹ 14,000	07 May 2024	
Bengal Gram Dal (Chana Dal)	Bangalore	Bengal Gram Dal	₹ 8,300	₹ 8,050	₹ 7,800	07 May 2024	
Bengal Gram(Gram)(Whole)	Bangalore	Average (Whole)	₹ 7,800	₹ 7,550	₹ 7,300	07 May 2024	
Black Gram (Urd Beans)(Whole)	Bangalore	Black Gram (Whole)	₹ 11,500	₹ 11,250	₹ 11,000	07 May 2024	
Black Gram Dal (Urd Dal)	Bangalore	Black Gram Dal	₹ 16,200	₹ 14,150	₹ 12,100	07 May 2024	
Chennangi Dal	Bangalore	Chennangi Dal	₹ 8,200	₹ 8,000	₹ 7,800	07 May 2024	
Coconut	Bangalore	Grade-I	₹ 7,500	₹ 7,050	₹ 6,600	07 May 2024	
Copra	Bangalore	Copra	₹ 11,500	₹ 10,500	₹ 9,500	07 May 2024	
Corriander seed	Bangalore	Coriander Seed	₹ 15,000	₹ 11,500	₹ 8,000	07 May 2024	
Dry Chillies	Bangalore	Byadgi	₹ 35,000	₹ 28,500	₹ 22,000	07 May 2024	
Dry Chillies	Bangalore	Guntur	₹ 16,000	₹ 15,000	₹ 14,000	07 May 2024	
Garlic	Bangalore	Garlic	₹ 22,000	₹ 16,000	₹ 10,000	07 May 2024	
Ginger(Green)	Bangalore	Green Ginger	₹ 6,200	₹ 6,000	₹ 5,700	07 May 2024	

Fig 5.2 Bangalore Mandi website

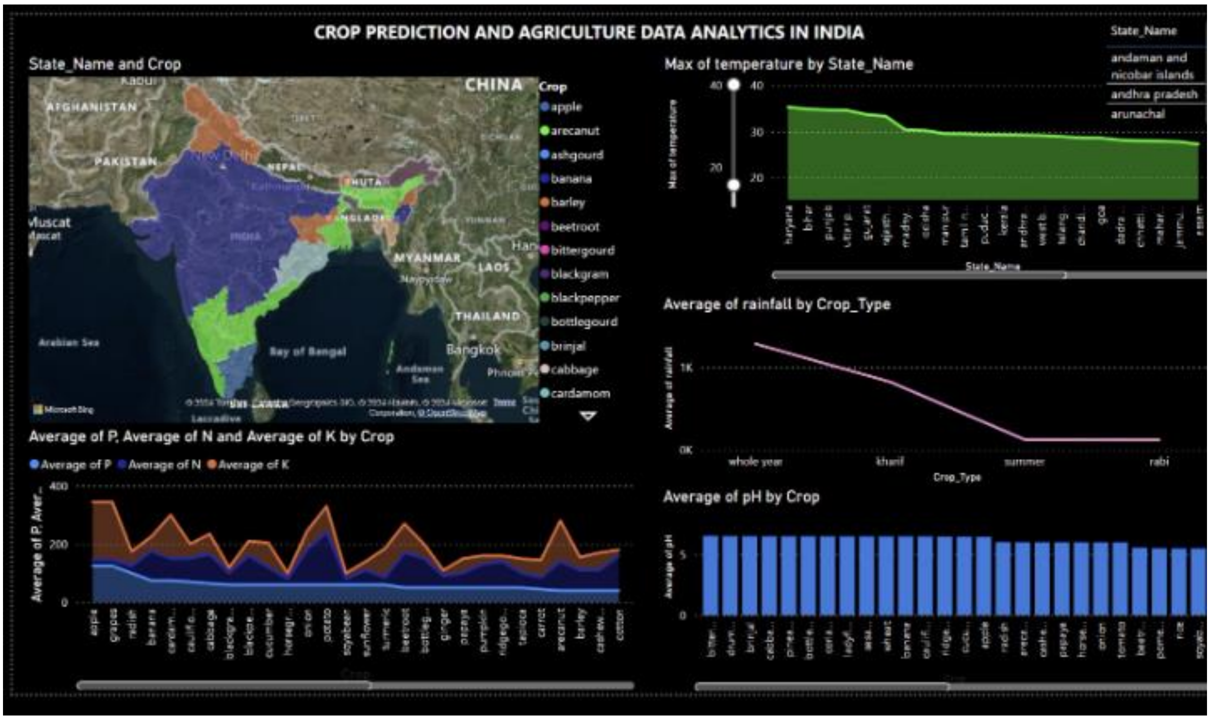


Fig 5.3 Dashboard for crop prediction

The above chart is the visualisation of the crops avaliable in India. The dashboard is an interactive dashboard which is interated with the real time data collected from the sensors and kaggle data set.

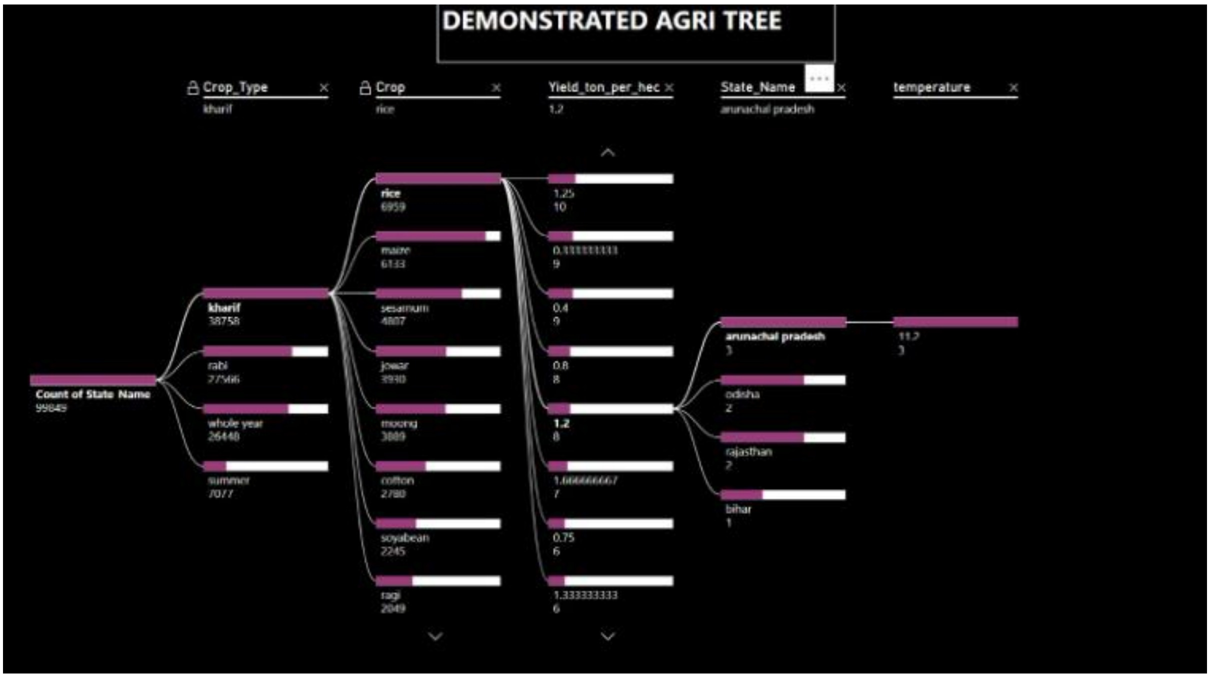


Fig 5.4 Demonstation tree

The demonstration tree will show the real time numbers and depicts accurate classification of data base.

Fig 5.5 Key influencers

Key influencers will show the key parameters of a particular region and the extensively grown crops of that particular region.

Fig 5.6 Sensor values on thingspeak

CHAPTER 6

APPLICATION

E-commerce platforms offer a range of applications that can significantly benefit farmers. Here are some key applications:

1.Direct Sales: Farmers can sell their produce directly to consumers or businesses, eliminating middlemen and increasing their profit margins

2.Wider Market Access: Online platforms provide farmers with access to a broader customer base beyond their local markets

3.Inventory Management: E-commerce enables efficient inventory management, helping farmers keep track of sales data and product deliveries

4.Financial Inclusion: Digital transactions facilitate better financial inclusion for farmers, allowing them to access new earning opportunities and potentially better external investments

5.Reduction of Wastage: By reducing the time needed for products to reach end consumers, e-commerce platforms can help in minimizing wastage

6.Enhanced Productivity: With tools for order management, customer management, and delivery management, farmers can streamline their operations and enhance productivity

7.Community Building: Farmers-to-farmers social networks and farmers-to-restaurants platforms can help in building a community and sharing best practices

CHAPTER7

CONCLUSION AND FUTUE SCOPE

CONCLUSION

Thus through KISAN MART, an e-commerce platform, we connected farmers with customers directly without the involvement of mediators and the agricultural marketing of the farmer's products was made in a more effective and eco-friendly way than that of mediators. Thus we saved the time and efforts of the farmer. Due to the increase in internet usage, e-commerce has become an important source of modern business. Ecommerce gained a huge value from the customers who want to buy goods from their living room. So the time came for farmers to modernize by adopting e-commerce to promote their products. E-commerce also opens up new business opportunities for both customers and farmers and allows them to compare prices with the competitors. So with this e-commerce platform, we are hoping to make a difference in the lives of farmers and customers by providing them with a unique user experience with our e-commerce platform.

FUTUE SCOPE OF WORK

- Including RFID card to avoid unauthorized entry into the field.
- GPS for real time Tracking and Navigation.
- Providing transport facilities on the website.

CHAPTER 8

PROJECT PLAN

WEEK	WORK DONE
WEEK1	LITERATURE SURVEY
WEEK2	PROBLEM IDENTIFICATION
WEEK3	DESIGING OF ALGORITHM
WEEK4	IMPLEMENTING EMBEDDED C ALGORITHM
WEEK5	PURCHASING COMPONENT
WEEK6	ASSEMBLING AND TESTING
WEEK7	LEARNING REQUIRED LANGUAGES
WEEK8	DEVELOPING FRONTEND AND BACKEND OF WEBSITE
WEEK9	TESTING WEBSITE
WEEK10	INTERGATING HARWARE AND SOFTWARE
WEEK11	MONITORING UPDATED DATA ON CLOUD
WEEK12	DEVELPOING DASHBOARDS

8.1 PROJECT COST

SL . NO	COMPONENT	QUNTITY	COST ESTIMATION	ACTUAL COST
1.	SOIL MISTURE SENSOR	2	400	600
2.	NPK SENSOR	1	400	450
3.	DHT11	1	200	270
4.	WATER PUMP AND PIPE	1	200	250
5.	AURDIUNO BOARD	2	550	600
6.	POWER REGULATOR	3	450	550
7.	ESP 01	1	100	200
8.	VOLTAGE REGULATOR	1	500	700
9.	LCD DISPLAY	1	100	90
	TOTAL		**2900**	**3710**

CHAPTER 9

DEMONSTRATION PLAN

- Four Different crops are grown.
- Parameters are collected by sensors and displayed on the website.
- Information on crop availability can be viewed on the website by the consumer.
- After the crops are dispatched, farmers will update the availability of the crops daily.
- The consumer can choose the crop and quantity based on his requirements.
- Values recorded by the sensors is used to create dashboards

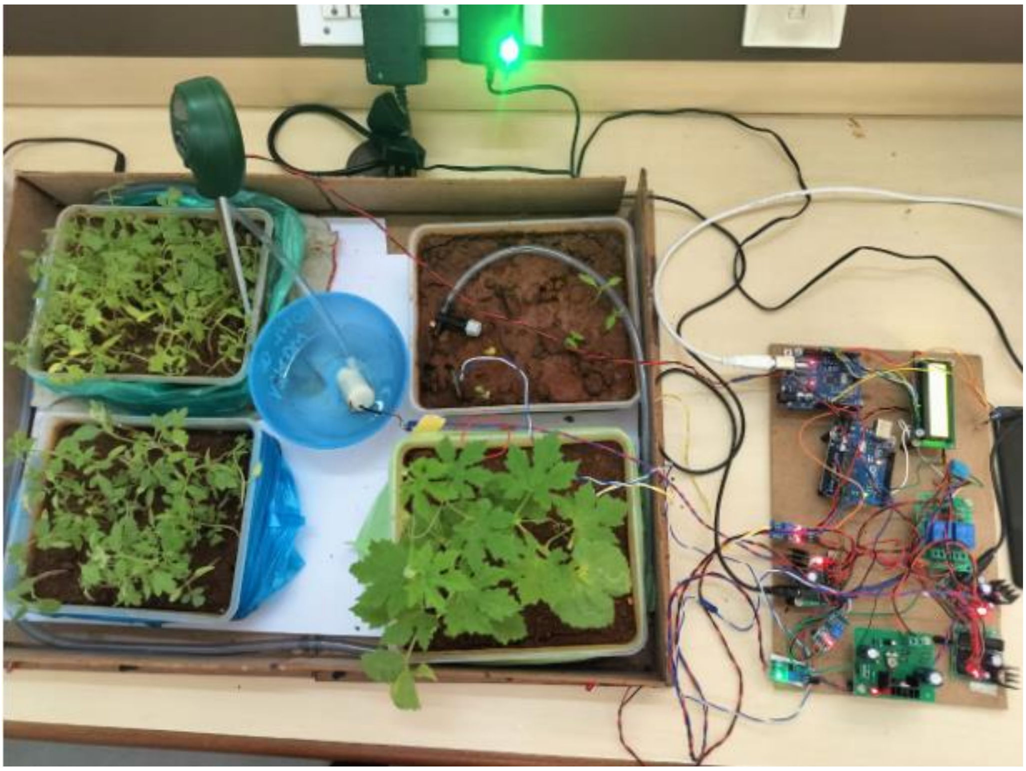


Fig 9 Demonstration setup

CHAPTER10

INDUVIUAL AND TEAM CONTRIBUTION

NAME	INDIVIDUAL CONTRIBUTION	TEAM CONTRIBUTION
Aditi Dubey	• Testing the components	• Ppt redrafting • Collecting information for report • Growing plants for demonstration
Gandhamani CM	• Developing the power bi dashboards	• Successfully establishing connections between conponents • Growing plants for demonstration • Collecting information for report
Harshitha J	• Developing frontend of the website	• Report redrafting • Growing plants for demonstration • Collecting information for paper
Meghashree M	• Developing backend of the website	• Growing plants for demonstration • Preparing poster • Publictioning paper

CHAPTER 11
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A Survey on Farmer-to-Consumer Website with Embedded Sensors.

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Abstract: The proposed website will serve as an online marketplace where farmers can showcase and sell their produce to consumers. To enhance efficiency, various electronic systems will be employed throughout the supply chain. RFID (Radio-Frequency Identification) tags will be utilized to track and trace products, ensuring transparency and authenticity from farm to table. This technology will enable consumers to access detailed information about the origin and journey of the products they purchase, fostering trust and accountability.

Additionally, sensors will be embedded in farms to monitor temperature, humidity, and other environmental factors. These sensors will provide real-time data to farmers and distributors, ensuring optimal storage conditions and minimizing product spoilage. Furthermore, incorporating automated inventory management systems will facilitate better stock control and reduce wastage.

***IndexTerms*–Sensors, Farmer to Consumer F2C, Precision Farming,IOT, Data Analytics.**

I. Introduction

This project focuses on the development of an innovative Farmer-to-Consumer (F2C) website platform fortified with cutting-edge electronic systems. The primary goal is to create a seamless digital interface that connects farmers directly with consumers while employing advanced electronic solutions to optimize the agricultural supply chain.
The proposed platform will serve as an online marketplace where farmers can exhibit and vend their produce directly to consumers. A core aspect involves the utilization of RFID (Radio-Frequency Identification) technology to establish a robust product tracking mechanism. This system will enable consumers to access comprehensive product information, including origin, cultivation practices, and transit details, ensuring transparency and authenticity.

To bolster efficiency and reduce spoilage, sensors will be implemented within storage facilities. These sensors will continuously monitor environmental variables like temperature and humidity, transmitting real-time data to stakeholders to maintain optimal storage conditions and prevent product degradation.

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In summary, this final-year electronics project endeavors to create an integrated F2C website platform fortified with sophisticated electronic components. The project's objectives revolve around enhancing transparency, efficiency, and trust within the agricultural supply chain, contributing to a more resilient and technologically advanced agricultural ecosystem.

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II. LITERATURE SURVEY

The increasing demand for food, both in order to ensure quality and quantities, has accelerated the need for industrial growth and intensive methods of production in agriculture. At the forefront of the new agricultural era, there is an emerging Internet of Things (IoT) market that is suggesting several creative solutions. Research organizations and scientific associations are seeking to increase their scope and speed by connecting with IoT and contributing technologies and goods to a range of different agriculture markets. The IoT idea gained prominence in the year 2000, with the development of the Auto-ID at MIT and the subsequent market research reports. In IoT, these systems communicate, perceive, and connect with internal & external state-embedded technologies [1].

ICT(Information and Communication Technologies) being integrated into conventional agricultural activities is helping to spark a fourth farming revolution. An important facet of technologies such as machine learning, UAVs (Unmanned Aerial Vehicles), Remote Sensing, Big Data Analytics, etc. is having the capability to boost farming activities to new heights. A broad variety of agricultural parameters, such as environmental factors, production status, soil condition, irrigation water, herbicides and pesticides, weed control, and greenhouse output climate, may be tracked in smart agriculture to increase crop yields, minimize costs, and maintain process inputs. Smart agriculture and the use of reduced pesticides and fertilizers in crops will help to mitigate leaching issues and pollution, as well as the effects of climate change, in precision agriculture [2].

Burgeoning IoT technology offers many new solutions and further growth opportunities, particularly for novel ideas in the agricultural sector. We also benefited greatly from recent developments in communication systems and protocols, primarily on the lower layers, which are the physical, network, and link layers. Besides that, the protocols in the topmost layers of the network are critical for effective data exchange and gathering. There are many applications, procedures, and designs that can be used in the agricultural sector as a whole. Several ongoing developments in IoT agriculture research involve network engineering and applications, device design, and security challenges. Furthermore, in several nations and institutions around the world, various IoT guidelines and policies have been adopted in agriculture. However, an impressive amount of research has been done on IoT and there is still a great need for further research on the topic in the agricultural field. This survey paper examines numerous challenges and trends related to smart agriculture [3].

A major challenge in greenhouses is determining the exact amount of water required. To prevent unnecessary water use, smart sensors are installed and operated using a variety of IoT techniques. Water storage in greenhouses is achieved by the use of automated drip irrigation, which is regulated by a soil moisture threshold. Water management may be handled effectively via IoT technology by avoiding water waste through the use of various kinds of sensors. The sensors are used to monitor the amount of water in the tank, and data is saved on the cloud through a mobile application [4].
Farmers may monitor the water level using their cell phones. The motor will operate automatically as a result of this technology. If the water level drops, the motor automatically turns on, and if the water level is high, the motor will shut down. Up to 50% of this water is lost in conventional irrigation systems owing to over-watering due to inadequacies in traditional irrigation techniques and systems [5].

It is in charge of anticipating the design, improvement, operation and management of irrigation systems. Tracking water requirements of crops based on gathered data and actuating the water flow in accordance with the anticipated needs without the participation of human operators is one of the objective of irrigation systems. It uses dispersed sensors to monitor different soil, water body, plant, and micro-climate factors. The irrigation technique (e.g., spray, drip, flooding and nebulizer) has an influence on how to properly monitor the water body as well as the actuation mechanism. Weather is one of the most significant variables in calculating agricultural water needs. The IoT will help to upgrade the new irrigation infrastructure in a more fascinating way. By tracking weather and soil conditions, a farmer can refine his irrigation system in a variety of ways. Weather prediction data, manage and track the whole farm from almost anywhere, Ethernet, and WIFI are all exemplars of how IoT technology tracks irrigation systems [6].

Soil management entails determining various soil parameters such as pH, moisture content, and so on. These parameters can be conveniently calculated using IoT sensors. Farmers will then take measures such as fertilization, drainage, irrigation, and so on. Soil management assists in the discovery of the right plant breed. It also assists in the identification of fertilizer needs in the soil. It necessitates a low-latency network for urgent intervention. For both enterprises and farmers, soil monitoring has been among the most challenging activities in agriculture. There are several environmental concerns in soil testing that have an impacts on crop productivity. If these types of problems are correctly defined, farming patterns and procedures can be readily understood. Soil Humidity, Precipitation, Fertilization, and Temperature are among the factors being monitored. The moisture content of soil is monitored using moisture and humidity sensors. The findings of a soil testing research survey improve crop production and propose fertilization options to farmers [7].

Many relevant factors are combined to preserve and establish an optimal ambience for plants while staying under strict limits, such as airflow, temperature, CO_2, and O_2 levels. This can be achieved by deploying an IoT-enabled ecosystem, in which smart sensors and devices exchange data for improved decision making. Weather have the greatest impact on crop production. Farmers can decide the best time for planting, irrigation, and harvesting using an IoT-enabled weather forecasting system. Probabilistic weather analyses were done using sensors in IoT applications. Farmers can learn about environmental conditions such as soil moisture, humidity, and air temperature by embedding remote sensors in the fields. Farmers should prepare accordingly and adjust the harvesting and irrigation period to boost the crop based on historical results. Farmers should take proactive measures to ensure a safe crop harvest by arranging and reviewing collected data [8].

The Internet of Things (IoT) proposes a waste disposal solution. IoT sensors may be used to create intelligent trash cans. This could be used to read, store, and transfer waste-related data through a network. Governance of waste can be accomplished with the aid of certain intelligent and streamlined algorithms [9].

The growth of agricultural production to provide adequate food for the world's population is becoming a growing worldwide issue. As a result, the significance of livestock management in farmland is essential for survival. Farmers, on the other hand, are trying to maintain their cattle in the context of rising worry over land and water supplies. Apart from that, farmers continue to focus on reducing waste and lowering total expenses. New technological advances are critical in helping to enhance the quality and quantity of agricultural output. The Internet of Things (IoT) enters the scene at this point. It allows farmers to improve the health of their livestock via remote access and data-driven decisions. Cattle Watch is a system for monitoring livestock. This cloud-based technology is often used to remotely track the well-being of livestock and aids in the identification of livestock locations using communication and energy sensors [10].

Farm management systems centralize, administer, and optimize a farm's output and operations. IoT-based farm management system automates the collection and storage of farm data, manages business expenditure, and agricultural budgets, and monitors and analyses farm operations and consumption. Smart farming raises production while lowering environmental effects, but this smart farming approach is only feasible with the help of FMS. For smart farming, FMS is an important component for production, planning, and decision-making [11].

Crop management involves assessing and recording the well-being of a crop. Plant and crop diseases can be detected using IoT sensors and RFID chips. These details can be gleaned from RFID tags and shared across the internet by the reader. This data is processed remotely by the farmer, and necessary steps are taken. This will keep pests away from the crops. In the agricultural sector, production tracking and prediction have played an important role in delivering benefits to users to produce valuable output while minimizing losses [12].

IoT has expanded steadily in last few years and a variety of IoTbased frameworks have been formulated in a variety of domains, most notably in agriculture. This review article discussed the prevailing state of the IoT in agriculture by reviewing key works of literature, analyzing current IoT research trends, and investigating common IoT sensors, devices, agriculture APPs, benefits & challenges, and analytics in IoT-based agricultural production. Despite of many challenges, IoT is an innovative breakthrough with a predicted exponential rate of growth of 27.1 billion connected components by 2021, it links diverse gadgets, devices, and individuals. The upcoming studies, inventions, and initiatives mostly in field of IoT-based smart agriculture would improve the quality of living for farmers and result in significant improvements in the agricultural sector. However, a variety of questions remain unresolved in order to make things sustainable for small and medium-scale growers. Security and expense are critical considerations. As competitiveness in agriculture intensifies and beneficial policies are adopted, it is projected that the increasing adoption of IoT for framing a smart agricultural environment will increase proportionately [13].

III. BLOCK DIAGRAM

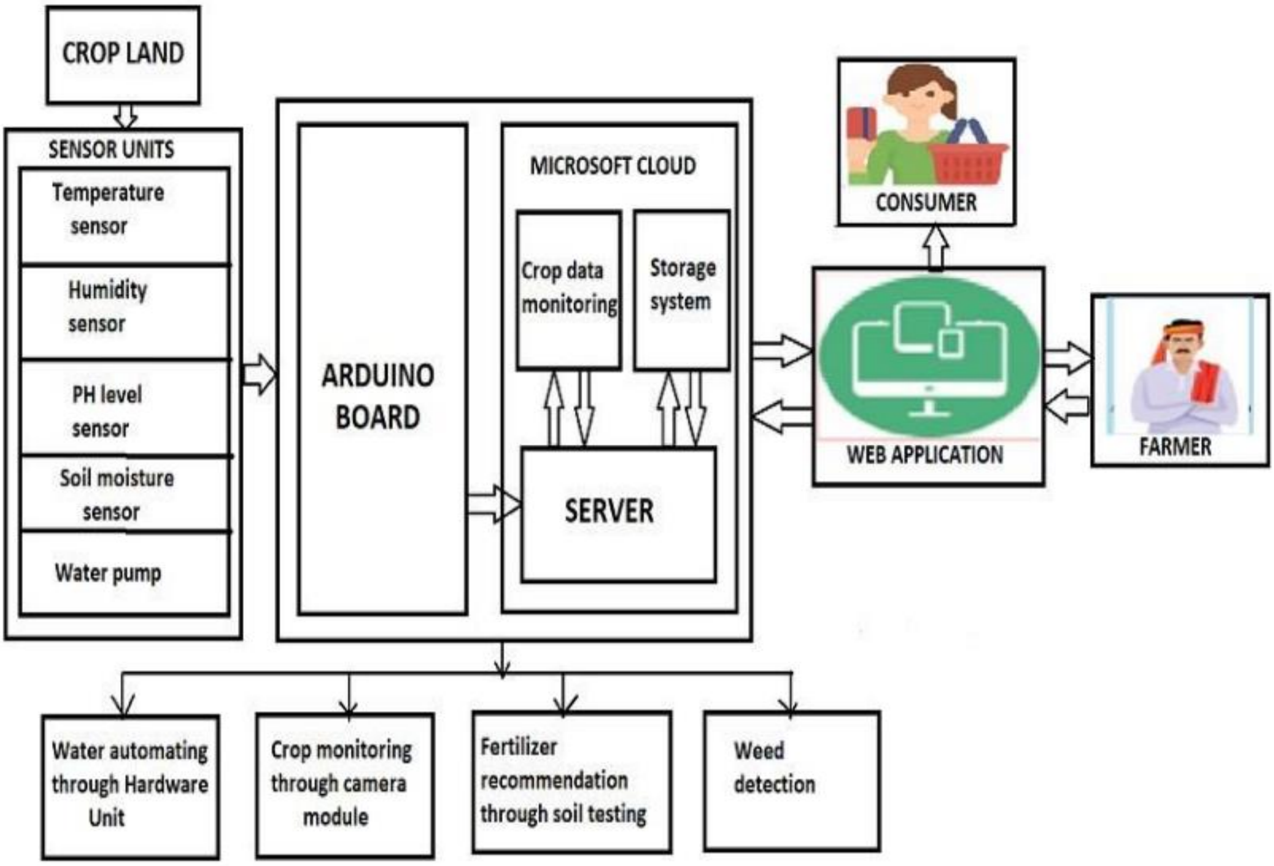

Fig 1.1 Infrastructure of Hardware Environment for Smart Farming

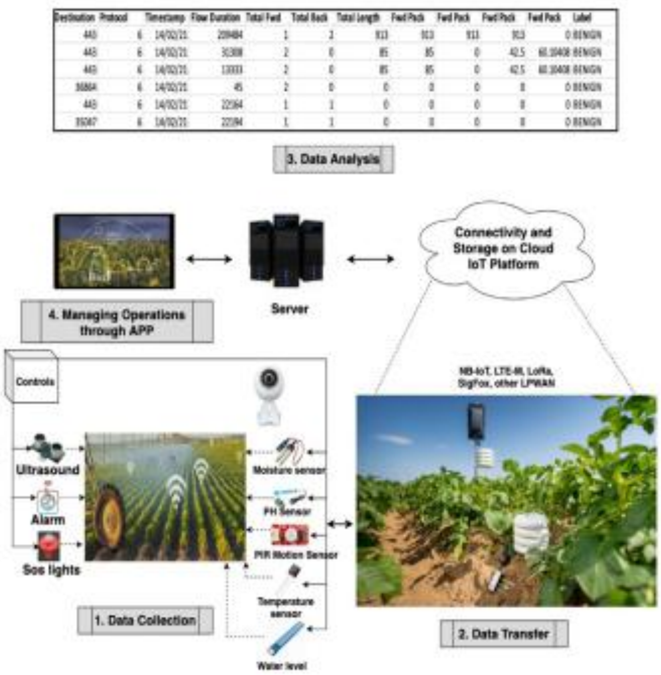

Fig. 1.2 Data Analytics Model for Crop Prediction

IV. SURVEY OUTCOME

The study clearly illustrated changes in consumer marketing practices and focused on online purchasing by farmers. The company has gained too much popularity due to the best services in providing high-quality fruits and vegetables. Farmeeco's marketing website helps consumers buy fresh fruits and vegetables and get them at the best price. The company has also utilized advanced software and hardware tools to manage the entire process with ease. They monitor the entire process from the beginning and use high-quality biofertilizers and pesticides to care for their plants. The main objective of this study was to create a profitable business model for selling vegetables and fruits online and help modern people improve the way they sell vegetables and fruits. Online selling of vegetables is the right way for modern people.

V. WEBSITE DESIGN

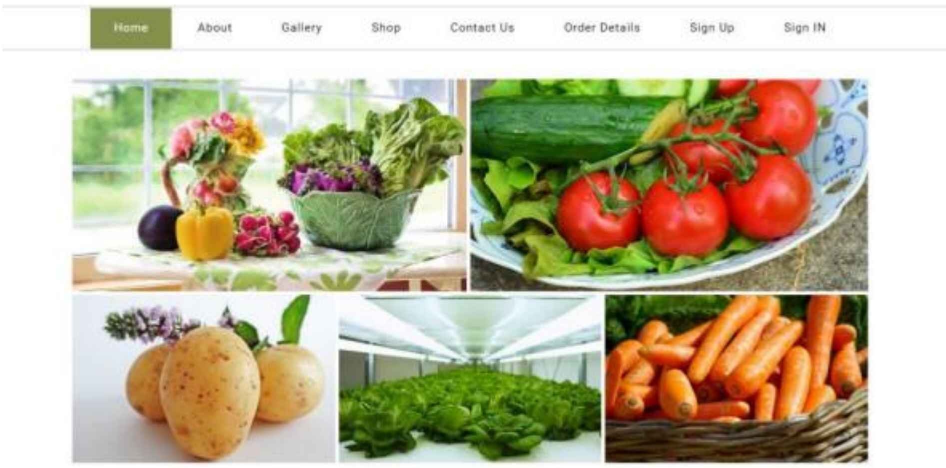

Fig 1.3 Web Page Design

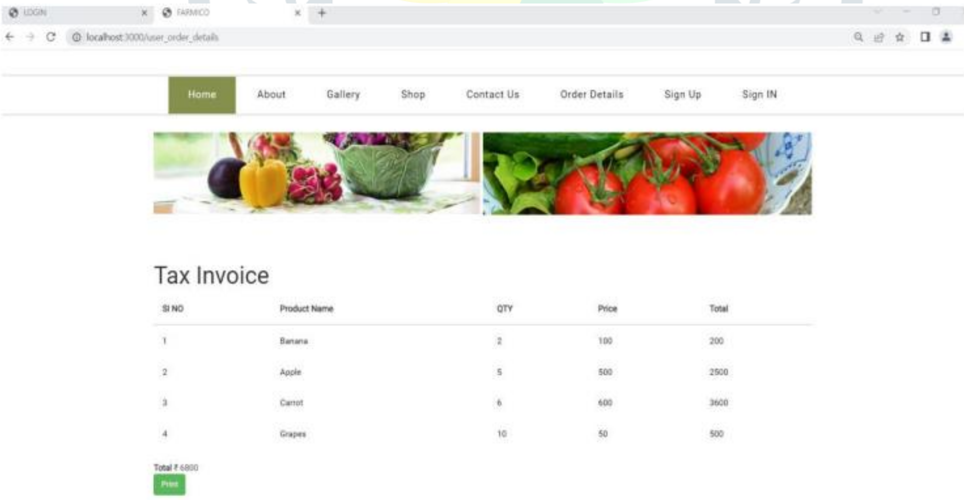

Fig 1.4 Payment Slip

VI. SYSTEM DESIGN

Select Suitable Sensor Technology:
Research and choose appropriate sensors based on accuracy, compatibility with web integration, cost-effectiveness, and scalability.

Develop the Website Infrastructure:
Engage web developers and designers to create the website interface. Ensure it's user-friendly for both farmers and consumers, incorporating sections for sensor data display, product listings, and user interaction.

Integrate Sensor Data Acquisition:
Establish protocols for collecting data from sensors (APIs, IoT platforms, etc.).
Implement connectivity solutions to gather data from sensors and transfer it to the website's backend.

Database Setup and Management:
Set up a robust database system capable of storing and managing large volumes of sensor data securely.
Design data structures and schemas to efficiently organize and retrieve sensor information.

Data Processing and Analytics:
Implement algorithms or analytics tools to process raw sensor data into meaningful insights (predictive analytics, trend analysis, etc.).
Generate reports or visualizations that farmers and consumers can easily understand.

User Interface Development:
Create user interfaces for farmers to access and interpret sensor data, manage their inventory, and update product listings.
Design consumer-facing interfaces that showcase product information, sensor-derived quality metrics, and purchasing options.

Security and Privacy Measures:
Implement robust security protocols to safeguard sensitive sensor data and user information.
Ensure compliance with data privacy regulations and best practices.

Testing and Validation:
Conduct thorough testing to validate the functionality, accuracy, and reliability of sensor data integration.
Gather feedback from farmers and consumers to refine the user experience and functionalities.

Deployment and Maintenance:
Deploy the integrated system and provide necessary training and support to farmers and consumers for using the platform.
Establish a maintenance plan to regularly update and improve the website, fix issues, and upgrade sensor technologies as needed.

Continuous Improvement and Innovation:
Continuously gather feedback and iterate on the platform based on user experiences and technological advancements. Explore new sensor technologies and data analytics techniques to enhance the system's capabilities over time.

VII. SURVEY TABLE

CROP	TEMPERATURE In degree (Celsius)	HUMIDITY	pH LEVEL	TYPE OF SOIL	DURATION
CORN/ MAIZE	18 – 27	55 – 65%	6 – 6.5	SANDY	95 DAYS
RICE	21-27	60 – 80%	6	SANDY	18 - 22 DAYS
TOMATO	21 - 24	60 – 85%	5 - 7	SANDY	50 DAYS
MARIGOLD	16 - 25	70 – 80%	7 -7.5	SANDY	110-120 YS

VIII. CONCLUSION

This adoption of smart and sustainable agriculture is useful for farmers for getting real-time soil parameters at their fingertips, without waiting for soil testing lab results. The farmer is monitoring the field at regular intervals of time. Weed is identified without a farmer in the field. A successful disease detection model is being built where a farmer uploads a pic (disease-affected part) is being processed. The main task in agriculture is irrigation now becomes automatic, and a crop successfully gets sufficient water through automatic irrigation at intervals. Farmers can able to cultivate their crops with greater yield. And this information can be uploaded to the developed website which includes the farmer and consumer menu. Consumers can choose the required crop and quantity and place the order via the website. So, there is direct communication between the farmer and the consumer to eliminate the middleman.

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An E-Commerce Platform for Farmers.

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Abstract: The proposed website will serve as an online marketplace where farmers can showcase and sell their produce to consumers. To enhance efficiency, various electronic systems will be employed throughout the supply chain. RFID (Radio- Frequency Identification) tags will be utilized to track and trace products, ensuring transparency and authenticity from farm to table. This technology will enable consumers to access detailed information about the origin and journey of the products they purchase, fostering trust and accountability.

Additionally, sensors will be embedded in farms to monitor temperature, humidity, and other environmental factors. These sensors will provide real-time data to farmers and distributors, ensuring optimal storage conditions and minimizing product spoilage. Furthermore, incorporating automated inventory management systems will facilitate better stock control and reduce wastage.

***IndexTerms*–Sensors, Farmer to Consumer F2C, Precision Farming,IOT, Data Analytics.**

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Farmers may monitor the water level using their cell phones. The motor will operate automatically as a result of this technology. If the water level drops, the motor automatically turns on, and if the water level is high, the motor will shut down. Up to 50% of this water is lost in conventional irrigation systems owing to over-watering due to inadequacies in traditional irrigation techniques and systems [5].

It is in charge of anticipating the design, improvement, operation and management of irrigation systems. Tracking water requirements of crops based on gathered data and actuating the water flow in accordance with the anticipated needs without the participation of human operators is one of the objective of irrigation systems. It uses dispersed sensors to monitor different soil, water body, plant, and micro-climate factors. The irrigation technique (e.g., spray, drip, flooding and nebulizer) has an influence on how to properly monitor the water body as well as the actuation mechanism. Weather is one of the most significant variables in calculating agricultural water needs. The IoT will help to upgrade the new irrigation infrastructure in a more fascinating way. By tracking weather and soil conditions, a farmer can refine his irrigation system in a variety of ways. Weather prediction data, manage and track the whole farm from almost anywhere, Ethernet, and WIFI are all exemplars of how IoT technology tracks irrigation systems [6].

Soil management entails determining various soil parameters such as pH, moisture content, and so on. These parameters can be conveniently calculated using IoT sensors. Farmers will then take measures such as fertilization, drainage, irrigation, and so on. Soil management assists in the discovery of the right plant breed. It also assists in the identification of fertilizer needs in the soil. It necessitates a low-latency network for urgent intervention. For both enterprises and farmers, soil monitoring has been among the most challenging activities in agriculture. There are several environmental concerns in soil testing that have an impacts on crop productivity. If these types of problems are correctly defined, farming patterns and procedures can be readily understood. Soil Humidity, Precipitation, Fertilization, and Temperature are among the factors being monitored. The moisture content of soil is monitored using moisture and humidity sensors. The findings of a soil testing research survey improve crop production and propose fertilization options to farmers [7].

Many relevant factors are combined to preserve and establish an optimal ambience for plants while staying under strict limits, such as airflow, temperature, CO2, and O2 levels. This can be achieved by deploying an IoT-enabled ecosystem, in which smart sensors and devices exchange data for improved decision making. Weather have the greatest impact on crop production. Farmers can decide the best time for planting, irrigation, and harvesting using an IoT-enabled weather forecasting system. Probabilistic weather analyses were done using sensors in IoT applications. Farmers can learn about environmental conditions such as soil moisture, humidity, and air temperature by embedding remote sensors in the fields. Farmers should prepare accordingly and adjust the harvesting and irrigation period to boost the crop based on historical results. Farmers should take proactive measures to ensure a safe crop harvest by arranging and reviewing collected data [8].

The Internet of Things (IoT) proposes a waste disposal solution. IoT sensors may be used to create intelligent trash cans. This could be used to read, store, and transfer waste-related data through a network. Governance of waste can be accomplished with the aid of certain intelligent and streamlined algorithms [9].

The growth of agricultural production to provide adequate food for the world's population is becoming a growing worldwide issue. As a result, the significance of livestock management in farmland is essential for survival. Farmers, on the other hand, are trying to maintain their cattle in the context of rising worry over land and water supplies. Apart from that, farmers continue to focus on reducing waste and lowering total expenses. New technological advances are critical in helping to enhance the quality and quantity of agricultural output. The Internet of Things (IoT) enters the scene at this point. It allows farmers to improve the health of their livestock via remote access and data-driven decisions. Cattle Watch is a system for monitoring livestock. This cloud-based technology is often used to remotely track the well-being of livestock and aids in the identification of livestock locations using communication and energy sensors [10].

Farm management systems centralize, administer, and optimize a farm's output and operations. IoT-based farm management system automates the collection and storage of farm data, manages business expenditure, and agricultural budgets, and monitors and analyses farm operations and consumption. Smart farming raises production while lowering environmental effects, but this smart farming approach is only feasible with the help of FMS. For smart farming, FMS is an important component for production, planning, and decision-making [11].

Crop management involves assessing and recording the well-being of a crop. Plant and crop diseases can be detected using IoT sensors and RFID chips. These details can be gleaned from RFID tags and shared across the internet by the reader. This data is processed remotely by the farmer, and necessary steps are taken. This will keep pests away from the crops. In the agricultural sector, production tracking and prediction have played an important role in delivering benefits to users to produce valuable output while minimizing losses [12].

IoT has expanded steadily in last few years and a variety of IoTbased frameworks have been formulated in a variety of domains, most notably in agriculture. This review article discussed the prevailing state of the IoT in agriculture by reviewing key works of literature, analyzing current IoT research trends, and investigating common IoT sensors, devices, agriculture APPs, benefits & challenges, and analytics in IoT-based agricultural production. Despite of many challenges, IoT is an innovative breakthrough with a predicted exponential rate of growth of 27.1 billion connected components by 2021, it links diverse gadgets, devices, and individuals. The upcoming studies, inventions, and initiatives mostly in field of IoT-based smart agriculture would improve the quality of living for farmers and result in significant improvements in the agricultural sector. However, a variety of questions remain unresolved in order to make things sustainable for small and medium-scale growers. Security and expense are critical considerations. As competitiveness in agriculture intensifies and beneficial policies are adopted, it is projected that the increasing adoption of IoT for framing a smart agricultural environment will increase proportionately [13].

III. BLOCK DIAGRAM

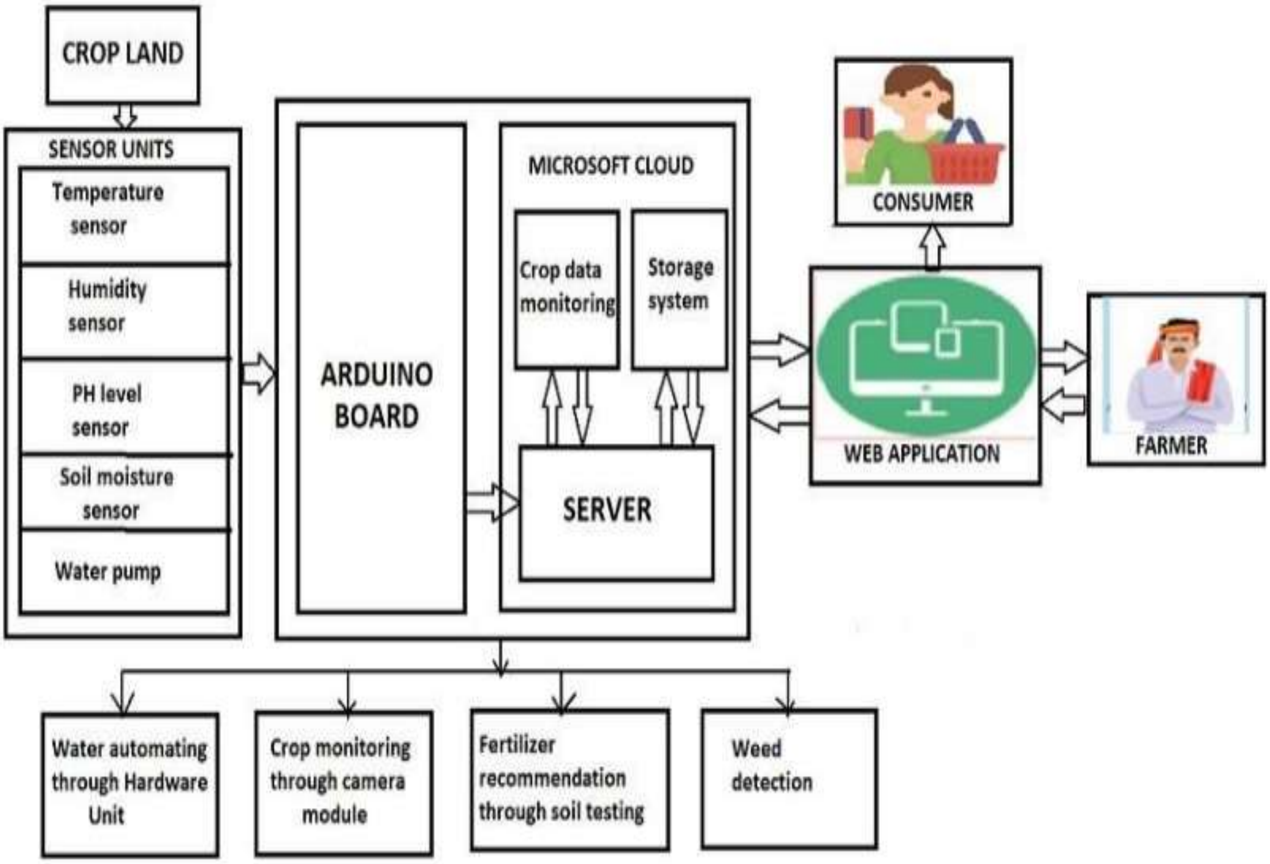


Fig 1.1 Infrastructure of Hardware Environment for Smart Farming

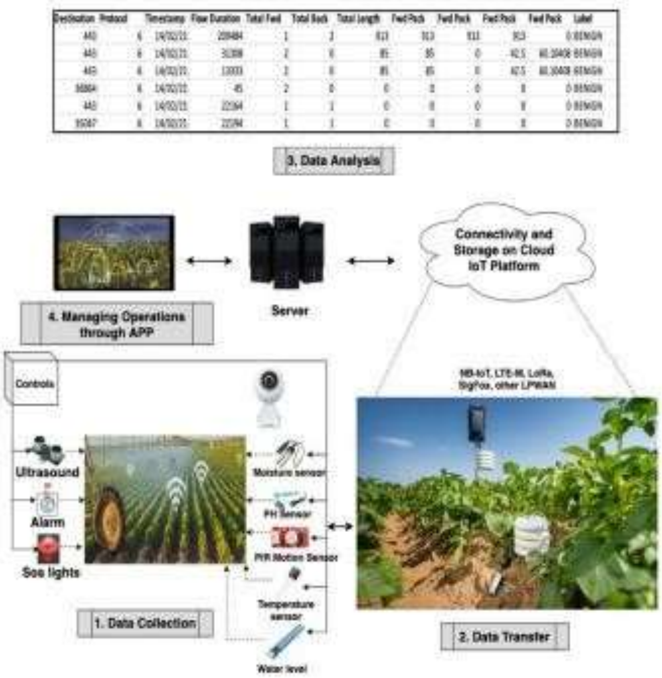


Fig. 1.2 Data Analytics Model for Crop Prediction

IV. SURVEY OUTCOME

The study clearly illustrated changes in consumer marketing practices and focused on online purchasing by farmers. The company has gained too much popularity due to the best services in providing high-quality fruits and vegetables. Farmeeco's marketing website helps consumers buy fresh fruits and vegetables and get them at the best price. The company has also utilized advanced software and hardware tools to manage the entire process with ease. They monitor the entire process from the beginning and use high-quality biofertilizers and pesticides to care for their plants. The main objective of this study was to create a profitable business model for selling vegetables and fruits online and help modern people improve the way they sell vegetables and fruits. Online selling of vegetables is the right way for modern people.

V. WEBSITE DESIGN

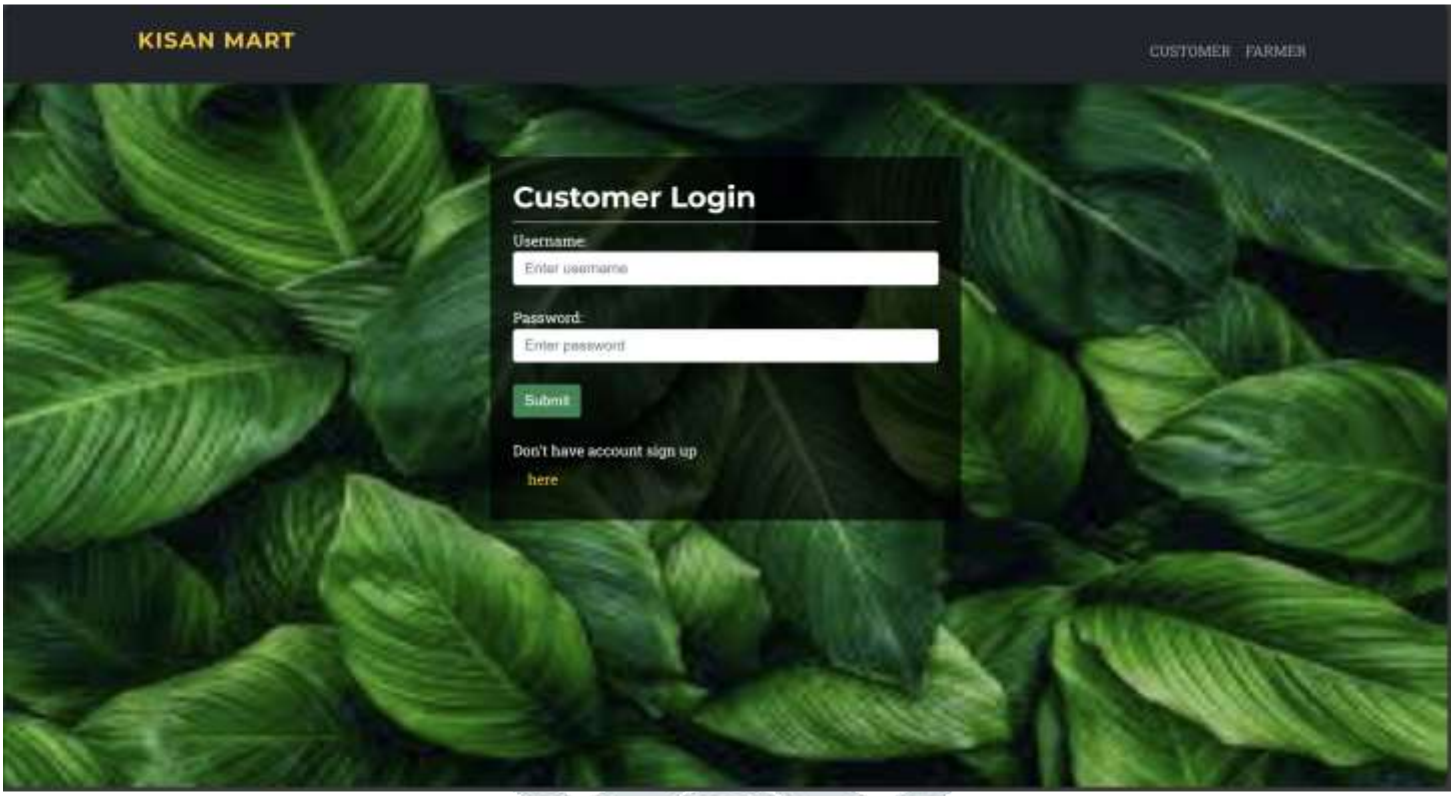
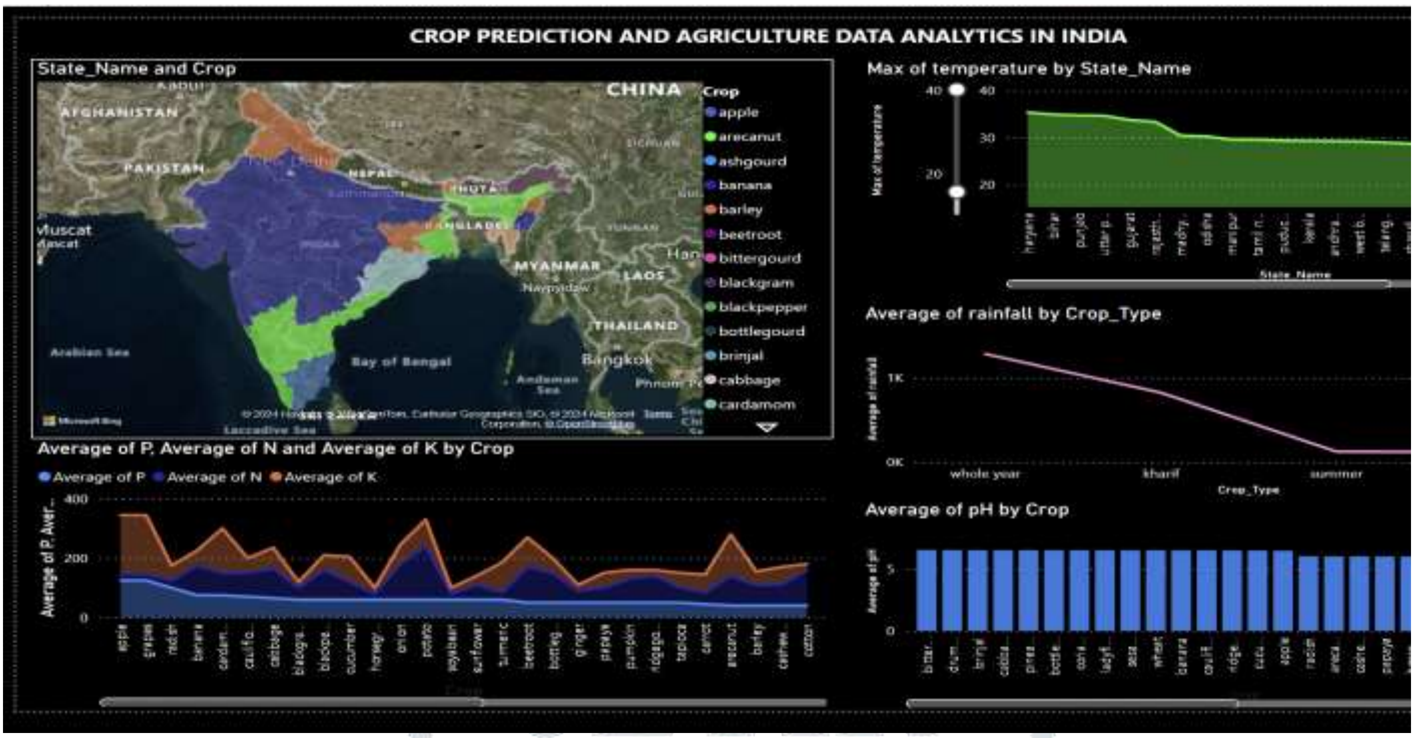


Fig 1.3 Web Page Design



VI. SYSTEM DESIGN

Select Suitable Sensor Technology:
Research and choose appropriate sensors based on accuracy, compatibility with web integration, cost-effectiveness, and scalability.

Develop the Website Infrastructure:
Engage web developers and designers to create the website interface. Ensure it's user-friendly for both farmers and consumers, incorporating sections for sensor data display, product listings, and user interaction.

Integrate Sensor Data Acquisition:
Establish protocols for collecting data from sensors (APIs, IoT platforms, etc.).
Implement connectivity solutions to gather data from sensors and transfer it to the website's backend.

Database Setup and Management:
Set up a robust database system capable of storing and managing large volumes of sensor data securely. Design data structures and schemas to efficiently organize and retrieve sensor information.

Data Processing and Analytics:
Implement algorithms or analytics tools to process raw sensor data into meaningful insights (predictive analytics, trend analysis, etc.). Generate reports or visualizations that farmers and consumers can easily understand.

User Interface Development:
Create user interfaces for farmers to access and interpret sensor data, manage their inventory, and update product listings. Design consumer-facing interfaces that showcase product information, sensor-derived quality metrics, and purchasing options.

Security and Privacy Measures:
Implement robust security protocols to safeguard sensitive sensor data and user information. Ensure compliance with data privacy regulations and best practices.

Testing and Validation:
Conduct thorough testing to validate the functionality, accuracy, and reliability of sensor data integration.
Gather feedback from farmers and consumers to refine the user experience and functionalities.

Deployment and Maintenance:
Deploy the integrated system and provide necessary training and support to farmers and consumers for using the platform. Establish a maintenance plan to regularly update and improve the website, fix issues, and upgrade sensor technologies as needed.

Continuous Improvement and Innovation:
Continuously gather feedback and iterate on the platform based on user experiences and technological advancements. Explore new sensor technologies and data analytics techniques to enhance the system's capabilities over time.

VII. SURVEY TABLE

CROP	TEMPERATURE In degree (Celsius)	HUMIDITY	pH LEVEL	TYPE OF SOIL	DURATION
CORN/ MAIZE	18 – 27	55 – 65%	6 – 6.5	SANDY	95 DAYS
RICE	21-27	60 – 80%	6	SANDY	18 - 22 DAYS
TOMATO	21 - 24	60 – 85%	5 - 7	SANDY	50 DAYS
MARIGOLD	16 - 25	70 – 80%	7 -7.5	SANDY	110-120 YS

VIII. CONCLUSION

This adoption of smart and sustainable agriculture is useful for farmers for getting real-time soil parameters at their fingertips, without waiting for soil testing lab results. The farmer is monitoring the field at regular intervals of time. Weed is identified without a farmer in the field. A successful disease detection model is being built where a farmer uploads a pic (disease-affected part) is being processed. The main task in agriculture is irrigation now becomes automatic, and a crop successfully gets sufficient water through automatic irrigation at intervals. Farmers can able to cultivate their crops with greater yield. And this information can be uploaded to the developed website which includes the farmer and consumer menu. Consumers can choose the required crop and quantity and place the order via the website. So, there is direct communication between the farmer and the consumer to eliminate the middleman.

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