**Design and Implementation of a Smart Agricultural Marketplace for Rural Farmers**

## A PROJECT REPORT

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### *Under the guidance of,*

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School of Computer Science,

***in partial fulfillment for the award of the degree of***

**BACHELOR OF TECHNOLOGY**

**IN**

**COMPUTER SCIENCE AND ENGINEERING, COMPUTER ENGINEERING, INFORMATION SCIENCE AND ENGINEERING Etc.**

**At**



**PRESIDENCY UNIVERSITY**

**BENGALURU**

**FEBRUARY 2025**

**PRESIDENCY UNIVERSITY**

**SCHOOL OF COMPUTER SCIENCE ENGINEERING**

**CERTIFICATE**

This is to certify that the Project report **“Design and Implementation os a Smart Agricultural Marketplace for Rural Farmers”** being submitted by “Dhanya M U, Sneha A, Vennapusa Moksha Sravani, Pragathi MS” bearing roll number(s) “20211CSE0464, 20211CSE0232, 20211CSE0210, 20211CSE0409” in partial fulfillment of the requirement for the award of the degree of Bachelor of Technology in Computer Science and Engineering is a Bonafide work carried out under my supervision.

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**DECLARATION**

We hereby declare that the work, which is being presented in the project report entitled Design and Implementation of a Smart Agricultural Marketplace for Rural Farmersin partial fulfillment for the award of Degree of **Bachelor of Technology** in **Computer Science and Engineering**, is a record of our own investigations carried under the guidance of **Dr. Pajany M Assistant Professor,** **School of Computer Science Engineering, Presidency University, Bengaluru.**

We have not submitted the matter presented in this report anywhere for the award of any other Degree.

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**ABSTRACT**

This project focuses on developing a comprehensive platform that bridges the gap between farmers and consumers, allowing users to purchase agricultural products directly from farmers. The application provides seamless online payments, user and farmer profile management, and real-time inventory updates. Administrators play a key role in fostering trust by onboarding verified farmers and uploading schemes beneficial to farmers. Future expansions include vehicle and land renting functionalities as well as fertilizer management to further support farmers.

**ACKNOWLEDGEMENT**

First of all, we indebted to the **GOD ALMIGHTY** for giving me an opportunity to excel in our efforts to complete this project on time.

We express our sincere thanks to our respected dean **Dr. Md. Sameeruddin Khan**, Pro-VC, School of Engineering and Dean, School of Computer Science Engineering, Presidency University for getting us permission to undergo the project.

We express our heartfelt gratitude to our beloved Associate Deans **Dr. Shakkeera L and Dr. Mydhili Nair,** School of Computer Science Engineering, Presidency University, and **Dr. Asif Mohammed**, Head of the Department, School of Computer Science Engineering, Presidency University, for rendering timely help in completing this project successfully.

We are greatly indebted to our guide **Dr. Pajany M,** assistant professor and Reviewer **Ms. Tintu Vijayan,** associate professor**,** School of Computer Science Engineering & Information Science, Presidency University for their inspirational guidance, and valuable suggestions and for providing us a chance to express our technical capabilities in every respect for the completion of the project work.

We would like to convey our gratitude and heartfelt thanks to the PIP4004 Internship Coordinators **Dr. Sampath A K, Dr. Abdul Khadar A and Mr. Md Zia Ur Rahman,** department Project Coordinators and Git hub coordinator **Mr. Muthuraj.**

We thank our family and friends for the strong support and inspiration they have provided us in bringing out this project.

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**CHAPTER 1**

**INTRODUCTION**

**1.1 General**

The agricultural sector has long faced challenges with transparency, efficiency, and market accessibility, leaving farmers without direct avenues to reach consumers and maximize their profits. The motivation behind this project is to empower farmers by bridging the gap between them and consumers, creating an ecosystem that ensures fairness, trust, and accessibility. By integrating technology with agriculture, this platform provides farmers with tools to manage their products, streamline payments, and access beneficial schemes. This will not only uplift farmers' livelihoods but also foster a sustainable farm-to-consumer relationship, enhancing the overall agricultural economy.

**1.2 Problem Statement**

Traditional agricultural marketplaces often suffer from a lack of transparency and inefficient payment processes. Farmers are often isolated from direct market access, and consumers have limited opportunities to purchase fresh products directly from the source. This project addresses these gaps by creating a platform that connects farmers directly with consumers, ensuring transparency in product quality and prices, along with efficient payment processing.

**1.3 Objective**

The objective is to develop an application that connects consumers directly with farmers, offering a seamless and secure payment gateway, profile management, and inventory system. The platform will allow users to view and purchase products from verified farmers. Provide farmers with tools to manage their product listings, receive payments, and stay informed about government schemes. Enable administrators to maintain trust within the system by onboarding verified farmers and providing them access to beneficial schemes.

**1.4 Scope of the Study**

The project focuses on creating a user-friendly mobile application that facilitates transactions between farmers and consumers. Users can browse, purchase, and make payments for farm products, while farmers can manage their inventory and receive payments directly via UPI. Admins will manage farmer onboarding and upload relevant agricultural schemes. Future extensions include vehicle renting for transporting produce, land renting, and fertilizer management systems.

**1.5 Significance of the Study**

This project connects farmers directly with consumers, eliminating middlemen and ensuring fair Prices. Features like UPI payments, real-time inventory management, and access to government schemes enhance efficiency and transparency. It empowers farmers financially while providing consumers with fresh, affordable produce. Ultimately, the platform promotes sustainable **agriculture and rural development**.

**CHAPTER 2**

**LITERATURE SURVEY**

**2.1 General**

The agricultural sector faces challenges like limited market access and middlemen reducing farmers' profits. Studies highlight mobile applications as a solution, offering **direct farmer-to-consumer sales, price forecasting, and AI-driven pest control**. The Covid-19 pandemic further emphasized the need for digital marketplaces to ensure fair pricing and accessibility. Research supports **mobile-based solutions for sustainable, transparent, and profitable agriculture**.

**2.2 Existing Methods**

1. **Pranav Shriram; Sunil Mhamane | Android App to Connect Farmers to Retailers and Food Processing Industry | 15-16 November 2018:** This mobile application enables farmers to buy and sell agricultural products directly, ensuring fair pricing, market transparency, and ease of use with native language support.
2. **L.A. Imalka; K.G.A. Gunawardana; K.M.S.K. Kodithuwakku; H.K.E. Arachchi; S.M.B. Harshanath | Farming Through Technology Driven Solutions for Agriculture Industry Ceylon E-Agro mobile application-find technology-based solutions for agricultural problems | 16-18 September 2022:** This mobile application supports maize farmers in Sri Lanka by offering AI-driven pest control, price forecasting, IoT-based soil monitoring, and a marketplace connecting farmers with buyers.
3. **R. Ranjana; T. Subha; Pravin Kumar P; Sneka L; Varsha S; Jothishree N | Integrated App for Farmers - Agreliance | 16-17 December 2021:** This mobile app enhances farmers' financial and mental well-being through telehealth, expert consultations, online retailing, and access to loan facilities.
4. **Niket Chauhan; M. Krishnakanth; G. Praneeth Kumar; Prerna Jotwani; Utkarsh Tandon; | Crop Shop – An application to maximize profit for farmers | 30-31 March 2019:** This mobile app connects farmers directly with retailers and consumers, eliminating middlemen to ensure fair prices and higher profits for farmers.
5. **Aina Marie Joseph; Nurfauza Jali; Amelia Jati Robert Jupit; Suriati Khartini Jali | eMarket for Local Farmers | 23-25 November 2021:** This study develops and evaluates a mobile marketplace that connects local farmers with consumers, ensuring fresh produce access and stable income during the Covid-19 pandemic.

#### **Disadvantages:**

1. Fragmented processes lead to inefficiencies in connecting farmers with consumers.
2. Lack of seamless payment solutions hinders transaction completion.
3. Limited visibility of government schemes results in missed opportunities for farmers.

**CHAPTER 3**

**RESEARCH GAPS OF EXISTING METHODS**

Existing agricultural systems face challenges like middlemen exploitation, limited market access, and lack of digital integration, highlighting the need for a more efficient and transparent solution.

1. **Dependence on Middlemen** – Many existing agricultural supply chains still rely on intermediaries, reducing farmers' profits and limiting their control over pricing.
2. **Limited Market Access** – Farmers often lack direct access to consumers and retailers, restricting their ability to sell at competitive prices.
3. **Lack of AI & IoT Integration** – While some platforms offer basic digital marketplaces, few incorporate **AI-driven pest control, price forecasting, or IoT-based soil monitoring** to enhance productivity.
4. **Usability & Language Barriers** – Many existing mobile applications lack **native language support**, making them less accessible to farmers with limited digital literacy.
5. **Absence of Health & Financial Support** – Current systems rarely include **telehealth consultations or awareness of loan facilities**, which are crucial for farmers' well-being and financial stability.
6. **Pandemic-Driven Market Disruptions** – Covid-19 exposed gaps in supply chain resilience, with **limited online platforms for direct farmer-to-consumer sales and home delivery**.
7. **Inconsistent Market Price Information** – Farmers often struggle with fluctuating prices due to the lack of real-time price updates and transparency in market trends.
8. **Limited Digital Payment Options** – Many existing systems do not fully integrate **secure digital payment methods like UPI**, making transactions less convenient for farmers and buyers.

Addressing these gaps, the proposed system aims to create a **fair, transparent, and efficient agricultural marketplace** with advanced digital solutions.

**CHAPTER 4**

**PROPOSED MOTHODOLOGY**

**4.1 System Overview**

The proposed system integrates a unified platform for farmers, users, and administrators. Users can browse and purchase products while completing payments through UPI-based gateways. Farmers can manage inventory, update product listings, and receive payments directly into their accounts. Administrators will onboard trusted farmers, upload helpful schemes, and manage the platform's ecosystem.

**4.2 Implementation Steps**

1. **Requirement Analysis & System Design** – Define system architecture, database schema, and business logic.
2. **Frontend Development** – Build the UI using **Kotlin in Android Studio**, including user authentication and product listing.
3. **Backend Development** – Implement APIs using **Java Spring Boot**, integrating UPI-based payments and notifications.
4. **Admin Panel Development** – Manage **farmer onboarding, government schemes, and system monitoring**.
5. **Testing & Deployment** – Conduct **unit, integration, and user acceptance testing**, then deploy on a secure cloud server.

**4.3 Integration and User Interface Design**

The system integrates a **Java Spring Boot backend with a Kotlin-based Android frontend** using REST APIs for smooth data exchange. A **secure UPI-based payment gateway** enables seamless transactions. The user interface, designed with **Constraint Layout in Android Studio**, ensures responsiveness and ease of use. Features like **product browsing, filters, multilingual support, and real-time notifications** enhance accessibility.

**4.4 Evaluation Metrics**

The system is evaluated based on **performance (response time and load handling), usability (ease of navigation and user satisfaction), and security (data protection and transaction safety)**. Success is measured through **user adoption rates, feedback, and transaction success rates**. Regular **testing and monitoring** ensure system efficiency and reliability.

**4.5 Maintenance and Updates**

Regular **bug fixes, performance optimizations, and security patches** are implemented to ensure smooth operation. **User feedback is analyzed** to introduce necessary updates and feature enhancements. Future updates will include **IoT-based smart farming and extended marketplace functionalities**.

**CHAPTER 5**

**OBJECTIVES**

1. Input Design is the process of converting a user-oriented description of the input into a computer-based system. This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.
2. It is achieved by creating user-friendly screens for the data entry to handle large volume of data. The goal of designing input is to make data entry easier and to be free from errors. The data entry screen is designed in such a way that all the data manipulates can be performed. It also provides record viewing facilities.
3. When the data is entered it will check for its validity. Data can be entered with the help of screens. Appropriate messages are provided as when needed so that the user will not be in maize of instant. Thus, the objective of input design is to create an input layout that is easy to follow.

**CHAPTER 6**

**SYSTEM DESIGN & IMPLEMENTATION**

**6.1 Introduction of Input design**

**INPUT DESIGN**

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data into a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy. Input Design considered the following things:

* What data should be given as input?
* How the data should be arranged or coded?
* The dialog to guide the operating personnel in providing input.
* Methods for preparing input validations and steps to follow when error occur.

**OUTPUT DESIGN**

1. Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.

2. Select methods for presenting information.

3. Create document, report, or other formats that contain information produced by the system.

**6.2 System Modules and Components**

1. **User Module**: Users will sign up, log in, and browse a list of farmers and their products. After selecting products, users can purchase them and complete payments through a UPI-like dummy payment gateway. Users can manage their profiles, track orders, and view their order history.
2. **Farmer Module:** Farmers can log in, manage their profiles, and add or update products in the inventory. Farmers will receive notifications for new orders and can fulfil them. Payments will be credited directly to their UPI accounts. Farmers can view schemes uploaded by the admin, with notifications available in the app.
3. **Admin Module:** Admins will onboard trusted farmers, creating a verified environment for users. They will upload and manage schemes that are beneficial for farmers. Admins will also be responsible for suggesting and providing references for applying to these schemes, fostering an efficient farming ecosystem. They can also monitor platform performance and manage system operations.

**6.3 Implementation**

1. **System Architecture** – Built using a **three-tier architecture** (Frontend, Backend, and Database).
2. **Frontend Development** – Developed using **Kotlin in Android Studio**, ensuring a user-friendly and responsive interface.
3. **Backend Development** – Implemented using **Java Spring Boot**, providing RESTful APIs for seamless communication.
4. **Database Management** – **MySQL** is used to store user data, product listings, and transaction records.

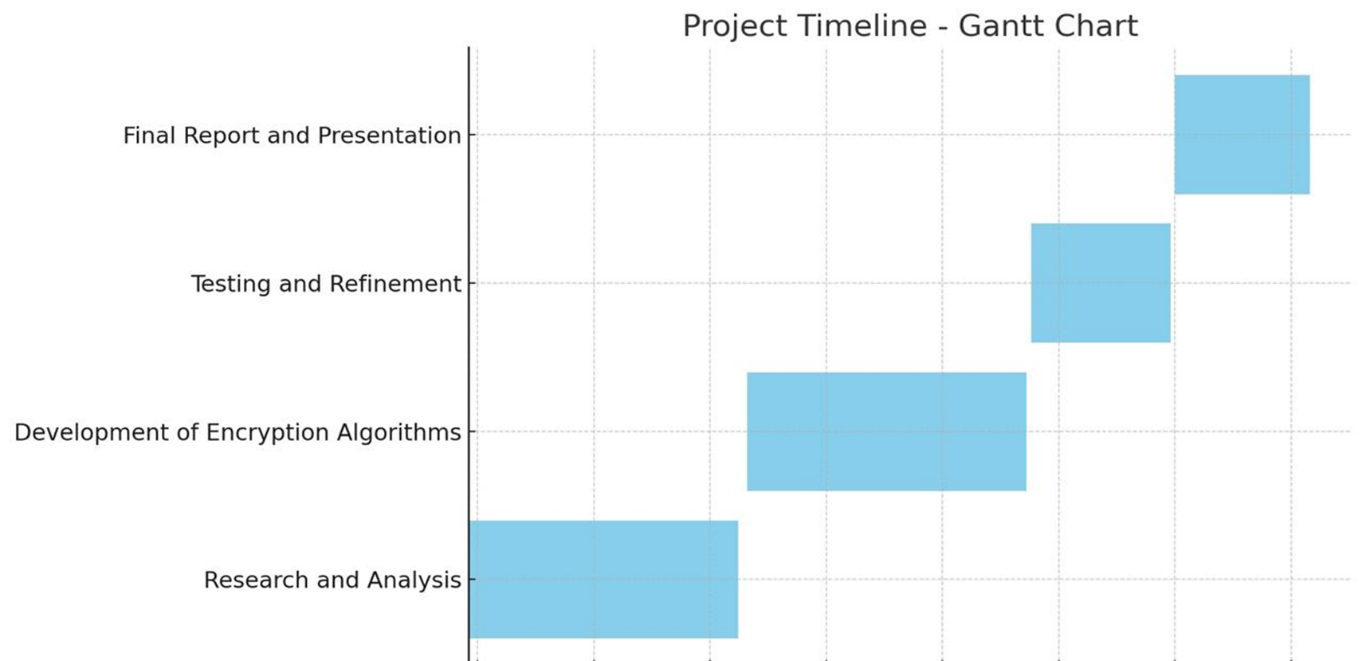
**6.4 Technologies Used**

1. **Programming Languages**: Java (Backend), Kotlin (Frontend), SQL (Database).
2. **Frameworks**: Spring Boot (Backend), Android Studio (Mobile App).
3. **Database**: MySQL
4. **Cloud Platforms**: AWS or Google Cloud for deployment and scalability.

**CHAPTER 7**

**TIMELINE FOR EXECUTION OF PROJECT**

**(GANTT CHART)**



|  |  |  |
| --- | --- | --- |
| **Phase** | **Activity** | **Task** |
| Review – 0 | Research and Analysis | Gather data, review existing methods, and identify research gaps. |
| Review – 1 | Development | Design the chatbot system, preprocess data, and implement the Naive Bayes algorithm. |
| Review – 2 | Testing and Refinment | Conduct testing with sample queries, refine the model, and integrate with user interface. |
| Review – 3 | Final Report and Presentation | Document findings, prepare the final report, and create a presentation for stakeholders. |

**CHAPTER 8**

**OUTCOMES**

1. **Direct Market Access**:

Farmers can sell produce directly to consumers, eliminating middlemen and increasing profits.

1. **User-Friendly Platform**:

The mobile app provides easy navigation, product filtering, and multilingual support.

1. **Improved Market Efficiency**:

Real-time inventory management and price transparency enhance market operations.

1. **Seamless Transactions**:

UPI-based payment integration ensures secure and instant payments.

1. **Scalability & Future Expansion**:

The system can integrate IoT-based smart farming and additional marketplace features.

1. **Government Scheme Awareness**:

Farmers can access relevant schemes, maximizing available benefits.

**CHAPTER-9**

**RESULTS AND DISCUSSIONS**

1. **Direct Farmer-to-Consumer Sales:**

The system enables farmers to sell their produce directly, removing middlemen and ensuring better profits.

1. **Seamless Payment Processing:**

UPI-based transactions provide secure, fast, and hassle-free payments.

1. **Efficient Inventory Management:**

Farmers can easily update product listings, track sales, and manage stock in real-time.

1. **Admin Control & Scheme Access:**

Administrators can onboard farmers, update government schemes, and monitor platform security.

1. **Enhanced Payment Security:**

The integration of UPI-based payments has improved transaction reliability and efficiency.

1. **Improved Accessibility:**

Multilingual support and a user-friendly interface have made the platform accessible to a larger farmer base.

1. **Challenges in Implementation:**

Internet connectivity in rural areas and limited digital literacy among farmers remain key obstacles.

1. **Impact on Agriculture Market:** The system increases transparency, efficiency, and sustainability, ultimately benefiting both farmers and consumers.

The proposed system successfully bridges the gap between farmers and consumers, ensuring fair pricing, secure transactions, and improved market access

**CHAPTER 10**

**CONCLUSION**

Agriculture remains a crucial sector, yet farmers often struggle with unfair pricing, market inefficiencies, and limited access to direct consumers. This project addresses these challenges by providing a **digital marketplace** where farmers can sell their produce directly, ensuring **fair trade and transparency**. With **UPI-based payments, real-time inventory management, and government scheme integration**, the platform simplifies transactions and boosts financial security for farmers. The user-friendly mobile interface, coupled with **multilingual support**, enhances accessibility, making it easier for farmers to adopt digital solutions. While challenges like **internet connectivity and digital literacy** remain, they can be mitigated through awareness programs and infrastructure improvements. Future enhancements, such as **IoT-based smart farming and logistics support**, will further optimize the system. Overall, this initiative **empowers farmers, strengthens rural economies, and promotes sustainable agricultural practices**, paving the way for a more efficient and equitable marketplace.

Overall, the implementation of this project empowers farmers by enabling **direct market access, fair pricing, and efficient transactions** through a digital platform

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2. L.A. Imalka; K.G.A. Gunawardana; K.M.S.K. Kodithuwakku; H.K.E. Arachchi; S.M.B. Harshanath | *Farming Through Technology Driven Solutions For Agriculture Industry Ceylon E-Agro mobile application-find technology-based solutions for agricultural problems | 16-18 September 2022*
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4. Niket Chauhan; M. Krishnakanth; G. Praneeth Kumar; Prerna Jotwani; Utkarsh Tandon | *Crop Shop – An application to maximize profit for farmers | 30-31 March 2019*
5. Aina Marie Joseph; Nurfauza Jali; Amelia Jati Robert Jupit; Suriati Khartini Jali | *eMarket for Local Farmers | 23-25 November 2021*