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E-Agriculture for Direct Marketing of Food Crops Using Chatbot

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Abstract

This venture, titled "E-Agriculture for Direct Marketing of Food Crops Using Chatbot(DMCF CHATBOT) was created with PHP as the front end and MySQL as the Back end.The reason for this venture is to construct an offering handle, to make a stage where bidders and dealers can come together to exchange different things. The framework shows the time cleared out to be offered and the number of offers. It comprises of a web entry where enlisted clients can propose modern biddings, make offers, send messages to other clients, and get programmed overhauls through E-MAIL when they get modern offers, when an offering is over, etc. The online offering venture holds biddings of different items on a site, serving vendors and bidders in a like manner. It permits clients to set up their items for offering and bidders to enlist and offer for different items are accessible for bidding.

Keywords: E-Agriculture, Direct Marketing, Online Bidding System, Chatbot Integration, PHP Web Application, MySQL Database, Agricultural Marketplace, Buyer-Seller Platform, Real-time Auction, Digital Agriculture

1. INTRODUCTION

Encouragement of direct contact between farmers and consumers may greatly enhance the agricultural market since it is crucial for the economy. Named "E-Agriculture for Direct Marketing of Food Crops Using Chatbot (DMCF Chatbot)," the project is an online platform meant to change the way agricultural products are sold.

This system links bidders (buyers) with farmers (sellers) by means of an automatic, clear, and efficient bidding mechanism. Using MySQL for the database, PHP for the back end, HTML and Bootstrap for the front end, the platform promises a user-friendly interface and reliable data management for nonstop operations.

The site offers sellers a venue to present their agricultural products for auction together with important details like the length of the auction, the level of bids, and the current offered pricing. Buyers may browse live auctions, monitor their activity, and bid in real time.

The system also sends automated email alerts to notify users of important events including new bids, auction closures, and transaction status updates. Incorporating a chatbot with 70–80% question accuracy guarantees sellers can quickly find their favorite auctions, therefore improving user engagement and satisfaction.

To create a robust online marketplace that addresses the particular needs of the agricultural sector, the

DMCF Chatbot finally wants. By using technology to connect farmers directly with consumers, the platform promotes openness, reduces intermediaries, and enables them to receive a fair price for their products.

2. Requirement Analysis

2.1 Problem Definition

Traditional rural markets primarily depend on middlemen to facilitate trade between farmers and buyers. while these intermediaries simplify the selling process, they significantly reduce the income earned by farmers as they claim a substantial share of the profits. Additionally, existing online platforms for agricultural trading are often limited in functionality, lacking features such as real-time communication and automated updates. This creates inefficiencies in transaction processing and leads to slower decision-making. Furthermore, outdated interfaces and insufficient communication tools make it challenging for users, particularly farmers, to navigate these platforms effectively, ultimately discouraging widespread adoption.

The absence of timely updates in these systems adds to the inefficiencies. Users are often unaware of critical changes in the market or auction status, causing delays in decision-making and missed opportunities. This results in reduced profitability for farmers and diminishes the overall utility of these platforms. To fully realize the potential of online agricultural trading, it is essential to address these limitations by incorporating features like real-time communication, automated notifications, and user-friendly design to ensure a more efficient and productive system.

2.2 Objectives of Proposed System

The proposed system leverages technology to create a robust platform for direct marketing of food crops, eliminating the need for middlemen. By integrating a web portal with a chatbot, it facilitates seamless communication and bidding for both buyers and sellers. Registered users can initiate new bids, place offers, and communicate effectively within the platform. Automated email notifications provide real-time updates on bidding statuses, market developments, and auction closures, ensuring users remain informed at all times. This system streamlines the trading process and enhances user engagement, addressing many of the challenges faced by existing systems.

A key innovation is the chatbot, which enables instant interaction and assists users in navigating the platform efficiently. By reducing communication barriers, the chatbot fosters direct interactions between buyers and sellers, increasing transparency and trust. This approach not only enhances the overall trading experience but also ensures that participants have access to timely and accurate information, helping them make informed decisions. The system focuses on optimizing the bidding process, from initiation to closure, to support farmers and buyers in achieving their goals effectively.

3. System Design

3.1 Input Design

Input design focuses on capturing user data accurately and ensuring it is processed efficiently by the system. The input modules are user-friendly, validated, and designed to minimize errors. Below is a list of modules that capture inputs and their respective data:

3.1.1 The objectives of input design are as follows

The following Inputs are

- Registration Module

- Login Module
- Auction Creation Module
- Bidding Module
- Review and Moments Module
- Chatbot Module.
- Admin Management Module

3.2 Database Design

Figure 2.2 Database Table Design

Users (Tables)

Database: eAuction, Table: users

userId	userName	userFirstName	userLastName	userEmail	userPasssword
userPhone	userProfileImg	userAccountNo	userAddress		
userRole	userStatus	creaedAT			

Auctions (Tables)

Database: eAuction, Table: auctions

aunctionId	auctionTitle	auctionStartPrice	auctionStartDate	auctionEndDate
auctionProductImg	auctionProductType	auctionProductQuantity		
auctionProductUnit	auctionAddrees	auctionDescription		
auctionCategoryId	auctionCreatedeBy	auctionStatus	createdAt	

Categories (Tables)

Database: eAuction, Table: categories

categoryId	categoryName	categoryImg	categoryStatus	createdAt

Bids (Tables)

Database: eAuction, Table: bids

bidId	bidAuctionId	bidUserId	bidAmount	createdAt

User_Activate (Tables)

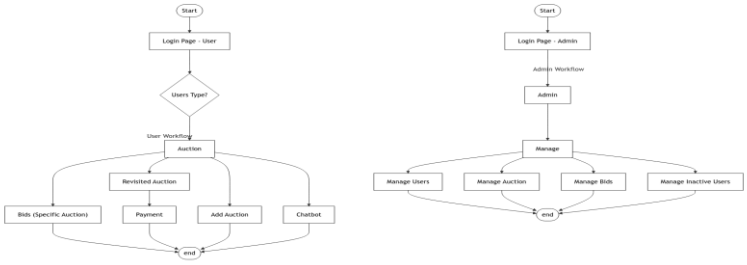
Database: eAuction, Table: user activate

userActivateId	userActivateUserId	userActivateToken	createdAt

3.3 Flow Diagram

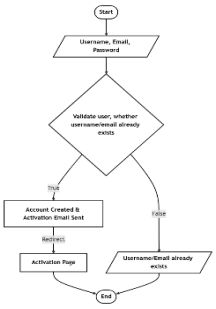
3.3.1 Overall Structure

Figure 3.3.1 Overall Workflow



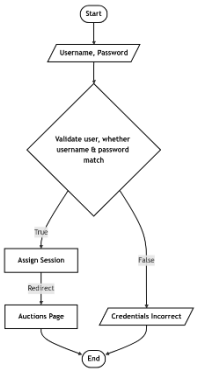
3.3.2 Register

Figure 3.3.2 Register Workflow



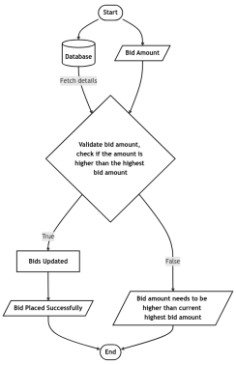
3.3.3 Login

Figure 3.3.3 Login Workflow



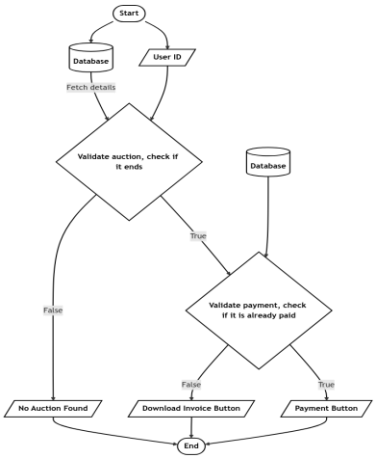
3.3.4 Bids

Figure 3.3.4 Bids Workflow



3.3.5 Payment

Figure 3.3.5 Payment Workflow



3.4 Output Design

The aim of output design is to present processed data in a manner both useful and instructive. The system's outputs in several formats promise the end user clarity and relevance.

3.4.1 User Interface Outputs

The Auction Page serves as a centralized overview of all active auctions, presenting key information such as product name, starting price, current highest bid, remaining time, and total bids placed. Each listing is interactive, allowing users to click for more information, with the layout designed for simple navigation to help users quickly find and explore auctions of interest.

The Bidding Page offers a detailed, real-time view of individual auctions. It displays product specifications, auction status, and a live leaderboard of top bidders. Users can place bids directly from this page, with the system ensuring bids meet the required minimum increment. The interface updates dynamically, supporting an engaging and competitive bidding environment.

3.4.2 Notifications And Alerts

The Notifications and Alerts Module is designed to keep users informed about critical auction activities through automated updates. It ensures that both buyers and sellers receive timely information regarding their transactions and bidding status, reducing the need to constantly monitor the platform. Key events such as new bids, auction closings, and successful deals trigger automated email notifications, keeping participants up to date.

In addition to email updates, the module provides real-time alerts within the platform. These instant notifications inform users about bid changes, auction status updates, and payment confirmations, enhancing overall engagement. By delivering relevant and timely information, the module contributes to a smoother, more efficient auction experience.

3.4.3 Admin Dashboard Outputs

The Dashboard and Analytics Module equips administrators with a clear and structured view of platform activity, presenting key performance metrics for effective monitoring and decision-making. It highlights essential data such as total users, active auctions, number of bids, and inactive users, allowing administrators to quickly assess engagement and participation levels.

Interactive charts further enhance the module by visualizing trends like user growth, bidding behavior, and auction outcomes over time. These insights help identify patterns and guide strategic improvements.

With real-time data and visual analytics, the module strengthens platform management and supports a more efficient and seamless auction experience.

3.4.4 Reports And Invoices

The Transaction Records and Reporting Module promotes transparency by providing both users and administrators with detailed documentation of auction transactions and platform activity. After completing a payment, the winning bidder can download an invoice containing auction details, payment confirmation, and seller information, serving as an official record of the purchase.

For administrators, the module generates in-depth reports that summarize key metrics such as total bids, completed transactions, and user engagement. These reports support effective monitoring and help identify platform trends. By offering clear, accessible records for users and insightful reports for administrators, the module ensures financial accountability and strengthens overall platform management.

4. Modules

4.1 Users

4.1.1 Registration And Login Module

The Registration and Login Module is a core feature of the eAgriAuction platform, designed to provide secure and user-friendly access for all participants. It handles account creation, authentication, and password recovery while maintaining strong security protocols. During registration, users input basic details such as a username, email, and password. The system verifies email addresses and validates required fields to prevent duplicate or incomplete registrations. Passwords are encrypted to safeguard sensitive information from breaches.

For login, the module authenticates user credentials before granting access, with added security measures like CAPTCHA or temporary lockouts after multiple failed attempts. Users who forget their passwords can reset them through a secure email verification process. Additionally, session management ensures users remain securely logged in during active use and are automatically logged out after inactivity. By combining convenience with robust security practices, this module ensures safe and controlled access to the auction platform.

4.1.2 Auction Management Module

The Auction Management Module is a vital component of the eAgriAuction platform, designed to empower sellers with full control over their auction listings. It allows sellers to create auctions by entering key details such as product name, description, images, starting price, and auction duration, ensuring buyers have the information needed to make informed bids. Before bidding starts, sellers can use the editing feature to update listings, adjust pricing, or change the auction timeline, enhancing listing accuracy and flexibility. Unwanted or incorrect auctions without bids can be deleted, keeping the platform clean and well-organized.

The module also includes real-time status tracking, enabling sellers to monitor ongoing auction activity, including bid count and highest offers. Automated notifications further enhance the experience by alerting sellers to key events like auction start, closure, or a successful sale. By offering a suite of intuitive tools, the Auction Management Module streamlines auction operations, promotes transparency, and supports an efficient and trustworthy agricultural trading environment.

4.1.3 Bidding Module

Allowing users to take part in auctions by bidding on agricultural products, the Bidding Module is one of the main features of the eAgriAuction platform. Real-time bid placement is made possible, so keeping

participants involved and informed by instantly revising the top offer and total bid tally. Users are rated based on their bids on a live Top Bidders List, which promotes competitive participation. Automated notifications inform users when they have been outbid or when an auction is about to close, helping them to stay competitive throughout the process. The module has strict bid validation policies that limit bidding to the active period of the auction and need minimum bid increases in order to preserve platform integrity and fairness. With a clear bid history log, users can view past behavior, therefore building trust and helping bidders to analyze trends. Security procedures including anti-fraud detection guarantee a just and safe bidding environment by stopping bots or dubious activity. Taken together, the Bidding Module offers a fair, transparent, and competitive auction experience in line with the core ideals of the platform.

4.1.4 Notification And Communication Module

The Notification and Communication Module plays a key role in enhancing user engagement and transparency on the eAgriAuction platform. It ensures users are promptly informed about critical auction events through automated email notifications, such as new bids, auction closures, and completed transactions. Payment reminders are also sent to successful bidders, encouraging timely follow-through. Push notifications offer instant updates on bid status, auction deadlines, and other time-sensitive activities, helping users stay actively involved without needing to constantly monitor the platform.

Beyond notifications, the module facilitates seamless interaction through a built-in messaging system that allows secure communication between buyers and sellers for discussing product details or clarifying terms. A chatbot feature provides real-time assistance by answering common queries and guiding users through the platform, improving usability. Additionally, administrators can broadcast announcements regarding policy changes or maintenance through the Admin Announcement Feature. By integrating various communication tools, this module supports an interactive, transparent, and user-friendly auction experience.

4.1.5 Payment Modules

The Payment Module is a vital part of the eAgriAuction platform, designed to facilitate secure and efficient financial transactions between buyers and sellers. It supports payments via debit and credit cards through an integrated, encrypted payment gateway that safeguards sensitive user data. Upon successful payment, buyers receive instant confirmation, and sellers are immediately notified. To ensure transparency, the module offers a payment tracking system that allows both parties to monitor the status of transactions, reducing the risk of misunderstandings or disputes.

In addition, the module generates detailed, downloadable invoices for each transaction, serving as official proof of purchase. To maintain security and integrity, it includes fraud detection mechanisms that monitor and flag suspicious activities. The module also supports automated refunds and a structured dispute resolution process, ensuring fair handling of issues such as non-delivery. By offering secure payments, real-time tracking, and buyer-seller protection, the Payment Module enhances trust, transparency, and reliability on the eAgriAuction platform.

4.2 Admins

4.2.1 User Management

The User Management Module is a key administrative tool within the eAgriAuction platform, designed to ensure a secure and well-regulated user environment. It enables administrators to monitor user activity, enforce platform policies, and take actions such as viewing, suspending, or deleting accounts when users violate rules or exhibit suspicious behavior. These controls help maintain platform integrity and prevent

fraudulent or disruptive participation in auctions.

Additionally, the module supports user approval workflows, allowing admins to verify and activate accounts before granting full access, reducing the presence of spam or fake users. For greater transparency, audit logs track all administrative actions on user accounts, enabling thorough oversight and accountability. Overall, this module plays a crucial role in maintaining a safe, fair, and trustworthy auction space for all participants.

4.2.2 Auction Management

The Auction Monitoring Module provides administrators with comprehensive oversight of all auctions on the eAgriAuction platform to ensure compliance with policies and uphold marketplace integrity. It enables admins to track ongoing and completed listings, verify product authenticity, and monitor auction activities to guarantee fair conduct. This vigilant oversight helps prevent fraudulent practices and maintains trust between buyers and sellers.

When auctions violate platform guidelines—such as containing misleading information, prohibited items, or suspicious bidding—administrators can suspend or delete those listings to protect users and the platform. The module may also use automated flagging systems to highlight suspicious auctions based on criteria like unusually high starting prices or repeated violations. By enforcing rules and curbing misuse, the Auction Monitoring Module plays a crucial role in fostering a transparent, fair, and reliable auction environment.

4.2.3 Bid Management

The Bid Monitoring Module enables administrators to oversee and regulate bidding activities on the eAgriAuction platform, ensuring a fair and competitive auction environment. By tracking all bids in real time, admins can identify suspicious behaviors such as sudden price jumps, bot activity, or attempts to manipulate auctions, thereby maintaining transparency and fairness for all users.

In addition to monitoring, the module generates detailed reports on bidding trends, offering valuable insights into user engagement, auction performance, and market demand. Automated alerts notify administrators of suspicious bidding patterns, allowing prompt intervention to uphold platform rules. Overall, the Bid Monitoring Module plays a vital role in preventing bid manipulation, preserving auction integrity, and fostering trust between buyers and sellers.

4.2.4 Review And Moments Management

To guarantee all submissions comply with platform policies, the Review and Moments Management Module lets managers track and regulate user-generated content including reviews and shared moments. Approving or prohibiting content that is unsuitable, misleading, or in breach of policies, the module helps customers make wise decisions and shields sellers against false or damaging reviews by maintaining excellent, dependable feedback. Handle vast volumes of data efficiently by means of automated filtering mechanisms highlighting dubious posts for administrative inspection. Controlling the platform lets us preserve a professional and welcoming community vibe by stopping offensive content, spam, and promotional abuse. This module generally balances user engagement with content integrity, hence establshing eAgriAuction's reputation as a reliable and trustworthy platform.

4.2.5 Dashboard And Reporting Features

The Dashboard and Reporting Module equips administrators with real-time insights into platform activity, facilitating effective monitoring and data-driven decision-making. It provides a comprehensive overview of key metrics such as total users, active auctions, and bids placed, enabling quick assessment of platform engagement and early identification of trends or issues.

Beyond live tracking, the module generates visual reports and charts that analyze user growth, bidding activity, and auction performance over time. Customizable reporting tools may allow filtering by auction categories, user demographics, or seasonal trends, helping administrators optimize strategies for improved efficiency. Overall, this module supports transparency, operational efficiency, and continuous platform improvement on eAgriAuction.

5. System Implementation

The critical stage of system implementation is when the eAgriAuction platform moves from the design and development phase to a fully functional system. The platform is implemented, its different modules are integrated, and its flawless operation throughout all of its components is guaranteed during this procedure. A methodical implementation approach is used to make sure the platform is robust, safe, and prepared for practical application. Setting up the essential hardware and software infrastructure is the first step. This includes configuring the server, installing the necessary software, and creating a MySQL database for effective data management. The web server is set up to facilitate seamless interaction between the front end and back end. The platform's front end is built with PHP, HTML5, Bootstrap, and jQuery, providing a user-friendly and responsive experience across a variety of devices. For both buyers and sellers, this guarantees a seamless transaction. In the meantime, the backend provides a solid base for the platform's operations by handling essential features like user authentication, auction administration, bidding procedures, alerts, and chatbot interactions. Rigorous testing is carried out during the course of implementation to find and fix problems, improve performance, and confirm that all essential functions are functioning properly. The platform is made available to users through web browsers after testing is finished and it is deployed on a live server. Continuous maintenance and monitoring are performed after deployment to guarantee that the system functions efficiently and that any problems are resolved as soon as possible. This continuous assistance keeps the platform running smoothly and effectively, guaranteeing a flawless auction experience for everyone involved.

6. System Testing

6.1 Testing

System testing is a critical phase in the development process to ensure the eAgriAuction platform functions as intended. Various types of testing are performed to identify and fix errors, validate requirements, and optimize performance. Below are the key aspects of testing:

Types Of Testing

- Unit testing
- Integration testing
- System Testing
- Performance Testing
- Security Testing

6.1.1 Unit Testing

Unit testing focuses on verifying that individual modules or components of the eAgriAuction platform function correctly and meet their intended requirements. The primary objective is to validate the accuracy and reliability of specific units such as registration, login, bidding, and auction creation to ensure each performs as expected in isolation.

For backend testing, PHPUnit is used as the main tool to automate and manage these tests. For example, the registration module undergoes tests to validate input fields like email and password, checking for proper email formatting, enforcing strong password rules, and preventing duplicate account creation. The testing also includes verifying error handling by ensuring that appropriate validation messages are displayed and security measures are effective, such as guarding against SQL injection attacks and unauthorized access attempts.

6.1.2 Integration Testing

Integration testing focuses on verifying that different modules of the eAgriAuction platform work together smoothly and correctly. Its main objective is to validate the interactions and data flow between interconnected components such as auction creation, bidding, and notification systems, ensuring the overall system functions cohesively.

There are two primary approaches to integration testing: Top-Down Testing, which starts with testing the main modules and gradually integrates lower-level modules, and Bottom-Up Testing, which begins with testing lower-level modules before integrating them into higher-level components. For example, the integration tests confirm that bids are properly recorded according to auction rules, including minimum bid increments and timing constraints, while ensuring real-time updates during active auctions. The tests also validate interactions with user accounts to confirm bidder eligibility and prevent unauthorized or invalid bids, maintaining fairness and system integrity.

6.1.3 System Testing

System testing aims to confirm that the full eAgriAuction platform complies with all specified functional and performance requirements. The main objective is to evaluate the whole system, including essential features and overall performance, in order to guarantee a trouble-free user experience. Along with Functional Testing, which verifies critical features like user authentication, auction management, and bidding processes, this testing also encompasses non-functional testing, which assesses attributes including performance, scalability, and usability. For instance, the chatbot is put its through its paces to verify its capacity to properly understand consumer questions and deliver appropriate auction suggestions depending on keywords and preferences. Among other things, the system judges the chatbot's ability to gracefully address conflicting requests, give timely responses, and engage flawlessly with the auction database to deliver real-time product search and bidding information.

6.1.4 Performance Testing

Performance testing assesses the eAgriAuction platform’s responsiveness, stability, and scalability under various conditions to ensure it can handle real-world usage effectively. The primary objective is to evaluate how the system behaves under different levels of user load and stress.

This includes Load Testing, which simulates expected user traffic to verify that the platform operates smoothly during normal conditions, and Stress Testing, which pushes the system beyond typical limits to observe how it handles extreme scenarios. Using tools like JMeter, the system is tested by simulating scenarios such as 500 simultaneous bids on a single auction to measure response times, database stability, and overall performance. These tests confirm that bids are processed accurately and in real-time, preventing duplicates or failed transactions while maintaining a fair and reliable bidding environment.

6.1.5 Security Testing

Security testing ensures that the eAgriAuction platform is protected against vulnerabilities and potential threats, aiming to safeguard user data and maintain overall system integrity. The primary objective is to

identify and fix security weaknesses before they can be exploited.
This testing involves Vulnerability Testing, which scans for system weaknesses, and Penetration Testing, which simulates real-world attacks to evaluate the effectiveness of security measures. Using tools like OWASP ZAP, the login module is tested for SQL injection vulnerabilities by attempting to inject malicious code into input fields. The tests verify that the system properly sanitizes and validates user inputs, and confirm that prepared statements and parameterized queries are used effectively to prevent unauthorized access and ensure database security.

7. Conclusion

The "E-Agriculture for Direct Marketing of Food Crops Using Chatbot" project successfully transforms agricultural trading by providing a transparent, efficient platform that directly connects farmers and buyers. By removing intermediaries, it enables farmers to receive fair prices and buyers to access diverse products easily. The inclusion of a real-time Chatbot and automated notifications further enhances user engagement and simplifies navigation, ensuring that both parties stay well-informed throughout the auction process.
Overall, this platform fosters trust, improves trading efficiency, and creates a user-friendly environment that encourages active participation. By streamlining transactions and supporting direct communication, the project contributes to a more sustainable and profitable marketplace, ultimately empowering farmers and promoting growth within the agricultural sector.

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