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E-commerce With Auction – Web Application Using MERN Technology

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Abstract - With the increasing popularity of e-commerce, businesses are seeking ways to provide unique and engaging shopping experiences for their customers. One way to achieve this is through an auction system, which adds a layer of excitement and engagement to the shopping experience. This research paper examines the development and implementation of an e-commerce platform with an integrated auction system, which aims to enhance user experience and ensure security. The paper discusses the design and features of the platform, including the auction system, secure payment system. The platform will provide a user-friendly and responsive interface for buyers and sellers to interact with each other. The platform will allow sellers to list products for auction and buyers to bid on these products. Buyers will be able to browse products, view item details, and place bids on the products they are interested in. The MERN technology stack will provide several benefits for this Ecommerce auction platform. MongoDB will offer a flexible and scalable database solution for storing user and product data. Express will provide a robust server-side framework for handling user authentication, product listing, and bidding. React will offer a dynamic client-side interface that can be easily customized to meet the needs of the platform. Node.js will offer an efficient runtime environment for building scalable and performant server-side applications. Overall, this research paper provides insights into the development and implementation of an e-commerce platform with an integrated auction system and highlights the benefits it can offer to businesses and customers alike.

Key Words: E-Commerce, Auction, MERN Stack, E-commerce with Integrated Auction, Bidding

I. INTRODUCTION

Ecommerce is a growing industry that provides opportunities for businesses to expand their reach and increase sales. With more and more businesses moving online to sell their products, to remain competitive in the e-commerce market, businesses are looking for ways to provide unique and engaging shopping experiences for their customers. One way to achieve this is through an auction system, Auctions are a popular sales model that allow buyers to bid on products and acquire them at a lower cost. In this paper, we present an E-commerce and Auction platform that utilizes a three-panel system: an admin panel, a seller panel, and a main website.

The admin panel verifies sellers for legitimacy by taking personal information and business information. Admins can also upload products and delete inappropriate/wrong information/fake product which is uploaded by sellers. The seller panel enables sellers to list products and add products for auction with detail information such as image, description, price and etc. The main website enables users to buy general product and bid on products through Ecommerce and Auction House and make purchase using 3rd party API such as PayPal. This paper outlines the design and development of the platform, the methodology used, and the results of testing.

II. PROBLEM STATEMENT

The rapid growth of the Ecommerce industry has created a demand for more efficient and secure online shopping experiences. Auction platforms have emerged as a popular way to buy and sell goods and services online, but existing platforms have limitations in terms of usability, security, and scalability. In addition, many auction platforms are standalone systems, requiring users to create separate accounts and manage different payment systems, which can be cumbersome and time-consuming. To address these challenges, we developed an Ecommerce with Auction platform using the MERN stack, which aims to provide a more streamlined, secure, and user-friendly solution for online shopping and auctions. Our platform offers a range of features, including secure payment processing, real-time bidding, and personalized user profiles, all in a single, integrated system. This research paper aims to evaluate the effectiveness of this platform and to demonstrate its potential to improve the online shopping and auction experience.

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The research will focus on the usability, security, and scalability of the platform, drawing on relevant literature and best practices in software development to inform our evaluation. Ultimately, our goal is to provide a more efficient and user-friendly Ecommerce with Auction platform that can benefit both buyers and sellers in the online marketplace.

III. ECOMMERCE WITH AUCTION USING MERN

E-commerce refers to the buying and selling of goods and services online, typically through an online platform. Auction is a process of buying and selling goods or services through competitive bidding, where the highest bidder at the end of the auction wins the item.

When combined, e-commerce with auction creates an online platform where buyers and sellers can engage in competitive bidding for products and services. This platform allows sellers to reach a larger audience and potentially obtain higher prices for their products, while buyers have the opportunity to acquire goods and services at a potentially lower price through competitive bidding.

A. MERN Technology

MERN technology refers to a stack of web development technologies that includes MongoDB, Express.js, React, and Node.js. MongoDB is a NoSQL database used for storing and retrieving data. Express.js is a web application framework for Node.js. React is a JavaScript library used for building user interfaces. Node.js is a server-side runtime environment used for executing JavaScript Code. In our Project, the use of MERN technology enables the development of a robust and scalable e-commerce with auction platform.

MongoDB provides a flexible and scalable database system for storing and retrieving data related to products, bidders, users, and auctions. Express.js simplifies the development of the backend, allowing for easy integration with React on the frontend. React provides a dynamic and interactive user interface for the platform, allowing for real-time updates and smooth user experience. Node.js provides a fast and efficient runtime environment for executing the code, ensuring high performance and scalability.

B. Advantages

1. Efficient Development: The MERN stack is a popular and efficient way to develop web applications, which can save time and resources during the development process.
2. Scalability: MERN stack applications can be easily scaled to accommodate increased traffic and users as the auction platform grows in popularity.
3. Real-Time Updates: MERN stack applications with use of Web-Sockets can provide real-time updates to users, such as when a new bid is placed, which can enhance the user experience and increase engagement.
4. Cross-Platform Compatibility: MERN stack applications are compatible with multiple platforms, including desktop and mobile devices, which can increase accessibility for users.
5. Flexibility: The MERN stack provides a lot of flexibility in terms of choosing the most suitable technologies and tools to create an Ecommerce auction platform that meets the specific needs of the business.

C. Disadvantages

1. Learning Curve: Developers who are not familiar with the MERN stack may require time and resources to learn the technologies and tools, which could slow down the development process.
2. Technical Issues: Like any web application, MERN stack applications may experience technical issues, such as server downtime or website crashes, which can be frustrating for users and disrupt the auction process.
3. Security Vulnerabilities: MERN stack applications may be vulnerable to security risks, such as hacking or data breaches, if not developed with proper security measures in place.
4. Limited Community Support: While the MERN stack has a growing community of developers, it may not have the same level of support as more established web development stacks like LAMP or MEAN.
5. Integration Challenges: Integrating with third-party tools or services, such as payment gateways, may require additional effort and resources, as the MERN stack may not have as many pre-built integrations available compared to other web development stacks.

IV. LITERATURE REVIEW

Ecommerce auction platforms have become increasingly popular over the years, providing a convenient and accessible way for buyers and sellers to participate in online auctions. The literature on this topic covers a range of aspects, including user behaviour, auction design, and technological aspects. In this literature review, we will examine several studies and articles to gain a better understanding of Ecommerce auction platforms.

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User Behaviour: One of the main factors that contribute to the success of Ecommerce auction platforms is user behaviour. A study by Aggarwal and Yochum (2009) found that the amount of information available to users has a significant impact on their behaviour. They noted that users tend to bid more aggressively when they have more information about the product, the seller, and the other bidders. This highlights the importance of providing comprehensive and accurate product information, as well as seller and bidder feedback systems to help users make informed decisions.

Auction Design: The design of auctions is another important factor in the success of Ecommerce auction platforms. In their study, Bapna, Goes, and Gupta (2003) found that the duration of the auction has a significant impact on its outcome. They noted that longer auctions tend to result in higher selling prices, as they provide more time for bidders to compete with each other. However, shorter auctions may be more effective for sellers who want to sell their products quickly. This highlights the importance of considering the needs of both buyers and sellers when designing auction parameters.

Technological Aspects: The technological aspects of Ecommerce auction platforms also play a critical role in their success. In a study by Wu and Lee (2013), the authors found that the usability of the platform has a significant impact on user satisfaction and loyalty. They noted that a user-friendly and responsive interface is essential for providing a positive user experience. In addition, the authors highlighted the importance of secure payment processing systems to protect both buyers and sellers from fraud and other security risks.

In conclusion, Ecommerce auction platforms have become an increasingly popular way for buyers and sellers to participate in online auctions. The literature on this topic highlights the importance of several factors, including user behaviour, auction design, and technological aspects. By taking these factors into account and implementing effective strategies, Ecommerce auction platforms can provide a convenient and secure way for users to engage in online auctions.

V. METHODOLOGY

To develop and evaluate the e-commerce platform with an integrated auction system, we followed the following methodology:

Requirements gathering: We conducted a thorough analysis of the requirements for the e-commerce platform with an integrated auction system. This included identifying the key features and functionalities of the platform, such as browsing and filtering products, placing bids in auctions, and making payments.

Design and architecture: Based on the requirements, we designed the architecture of the platform and identified the different components, such as the web server, the application server, the database, and any external services or APIs that were required.

Implementation: We implemented the platform using a combination of React.js, HTML, CSS, JavaScript, Express.js, and Node.js. We also used Axios to handle HTTP requests and responses as well as other resources for adding functionality and user accessibility.

Testing: We conducted a series of tests to ensure that the platform was working as intended and met the requirements. This included unit testing of individual components as well as integration testing to ensure that the different components were working together as expected.

Evaluation: Finally, we evaluated the platform based on its performance, functionality, and usability. We collected feedback from users and analyse their behaviour on the platform to identify areas for improvement. Overall, this methodology allowed us to design, develop, and evaluate an e-commerce platform with an integrated auction system that met the requirements and provided a high-quality user experience.

VI. TECHNOLOGY STACKS

A. Backend Technology Stack Report:

•Node.js - an open-source, cross-platform JavaScript runtime environment that executes JavaScript code outside of a web browser.

•Express.js - a minimal and flexible Node.js web application framework that provides a set of robust features for web and mobile applications.

•MongoDB - a document-oriented NoSQL database program that stores data in JSON-like documents with dynamic schemas.

•Mongoose - a MongoDB object modeling tool designed to work in an asynchronous environment. It allows you to define schemas for your data and provides an easy-to-use API for querying and manipulating the data.

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•bcryptjs - a JavaScript implementation of the bcrypt password hashing function used for hashing passwords.

- JSON Web Tokens (JWT) - a JSON-based open standard for creating access tokens that can be used to authenticate and authorize access to resources.

•Cloudinary - a cloud-based service that provides an end-to-end image and video management solution.

•Dotenv - a zero-dependency module that loads environment variables from a .env file into process.env.

•Nodemon - a tool that helps develop node.js based applications by automatically restarting the node application when file changes in the directory are detected.

•Socket.io - a JavaScript library for real-time web applications that enables real-time, bi-directional communication between clients and servers. It provides a simple API for creating and managing realtime connections and events.

B. Frontend Technology Stack Report:

•React.js - a popular JavaScript library for building user interfaces.

•React Router Dom - a library for implementing client-side routing in React applications.

•Axios - a promise-based HTTP client for making API requests.

•Paypal React Paypal Js - a library for integrating PayPal payments into a React application.

•React Google Charts - a library for creating charts and graphs in a React application using Google Charts.

•React Toastify - a library for showing toast messages in a React application.

•Tailwind CSS - a utility-first CSS framework for building custom designs with minimal CSS code.

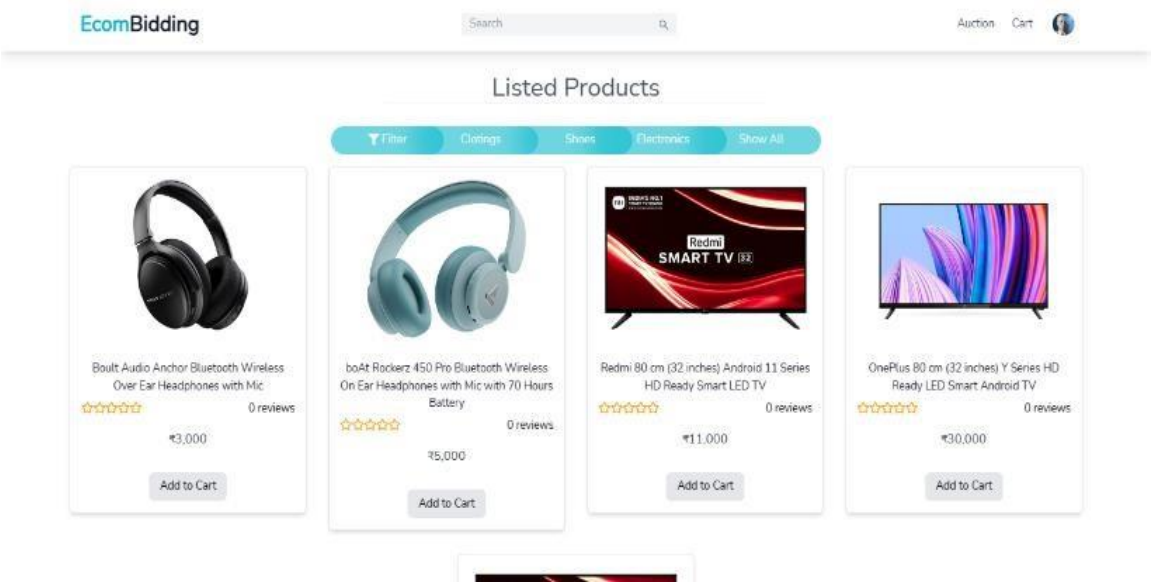
•Font Awesome - font and icon toolkit that provides a collection of scalable vector icons that can be customized using CSS.

•Context API - A React feature that allows you to manage global state without using props.

•Storage API - A web storage API that allows you to store key/value pairs in a web browser.

VII. RESULT

Landing Page



Landing Page showcases the listed product for E-commerce and header with option to navigate through different menu including Auction house.

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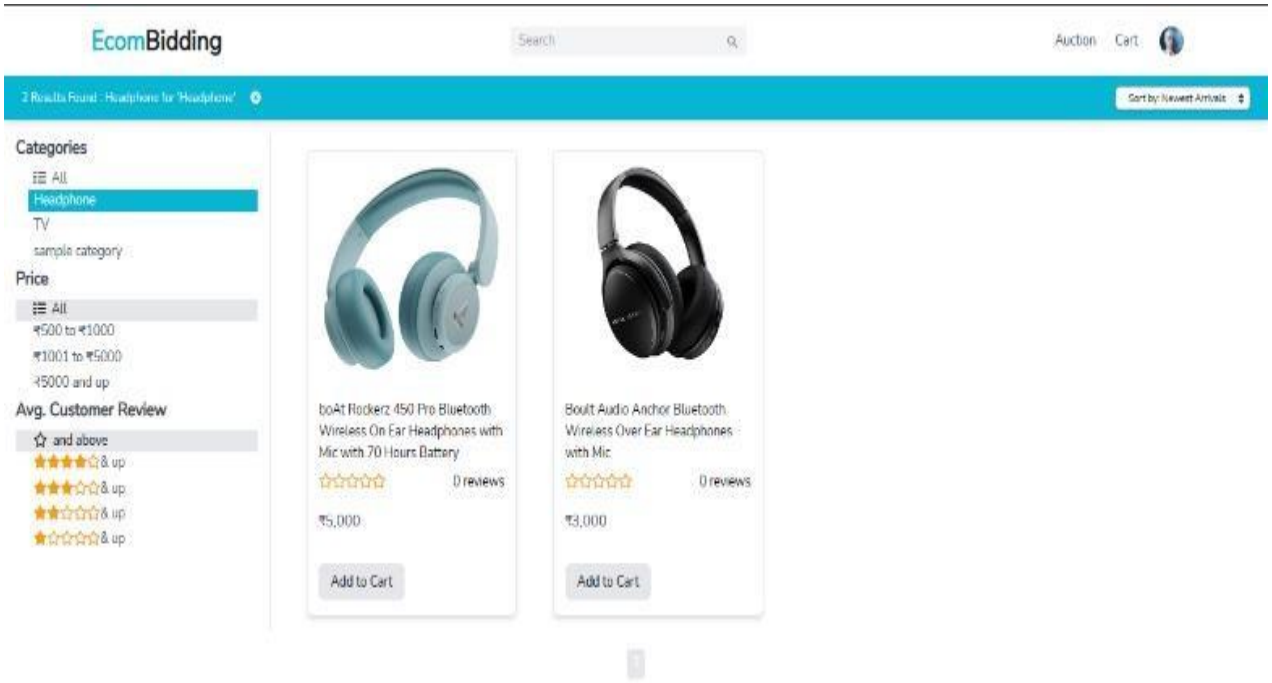
Search and Filter Page



This is a Search and Filter page that retrieves data from an API, applies filters to it, and displays the results.

Product Detail

After clicking on product from Landing page, user will be rendered to that product detail page which consist of product title, image, description, price, stock status and add to cart button.

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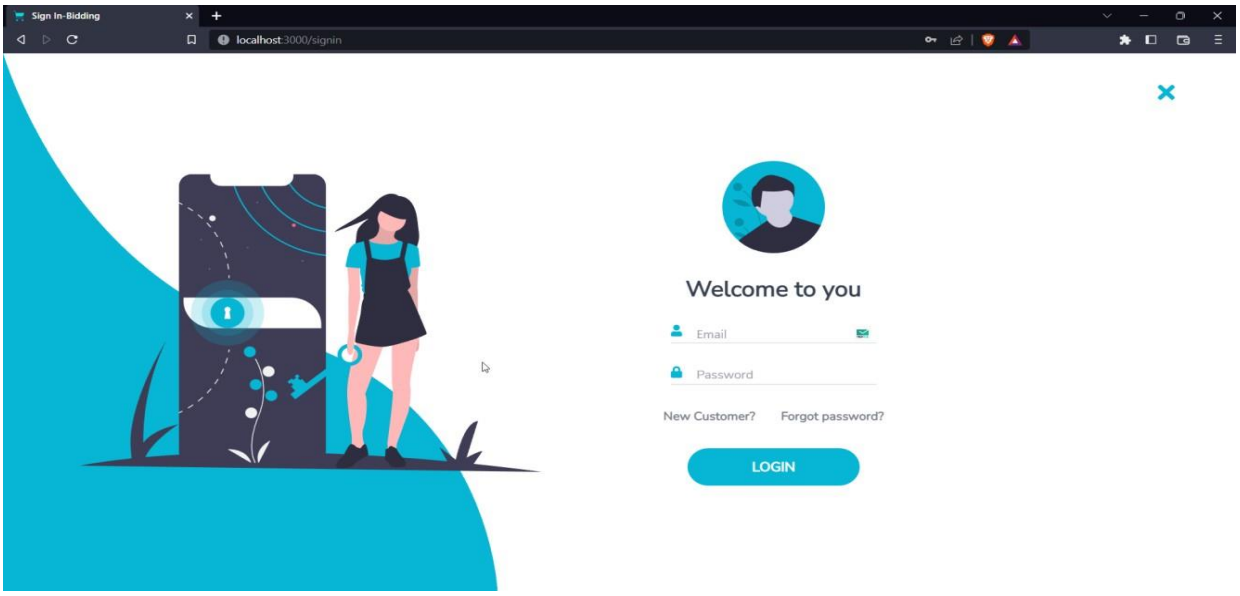
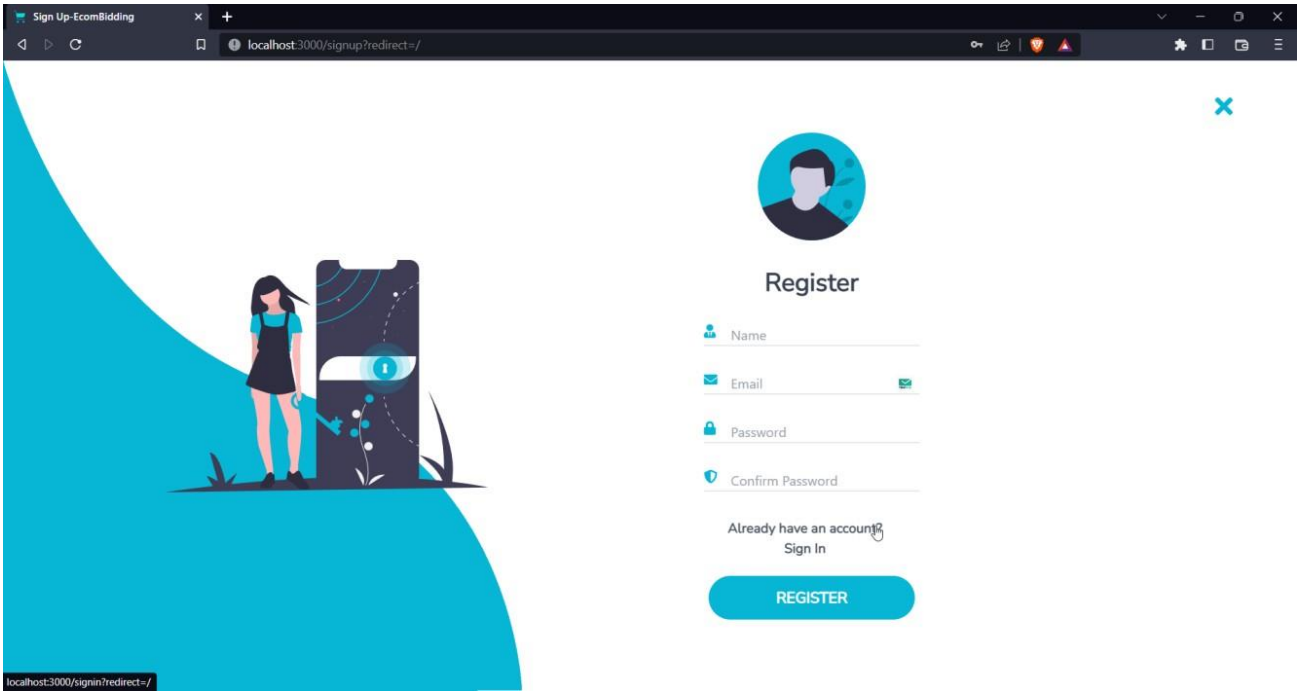
Sign In / Login Page



To purchase product from Website or to take part in auction, User have to login to website. For login in website, user need to sign in on website by filling required detail such as User name, Gmail and password.

Sign Up Page



Sign Up Page allow user to create account on our website which allows user to purchase product and take part in auction.

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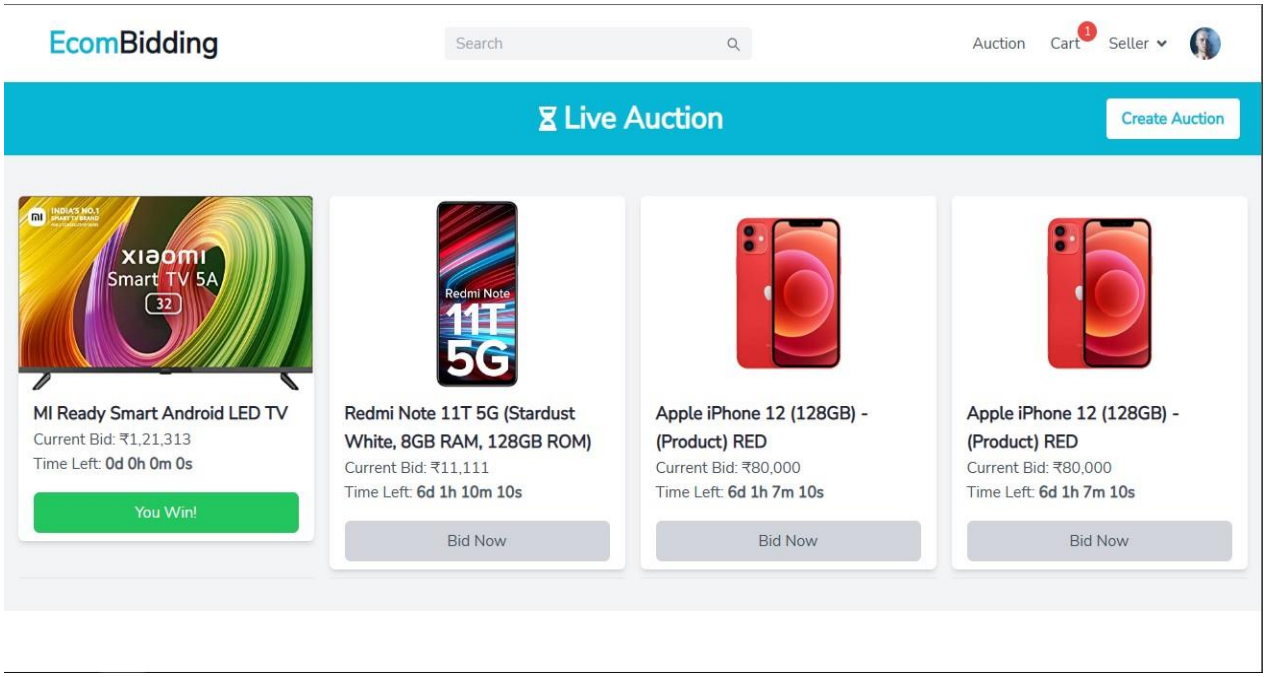
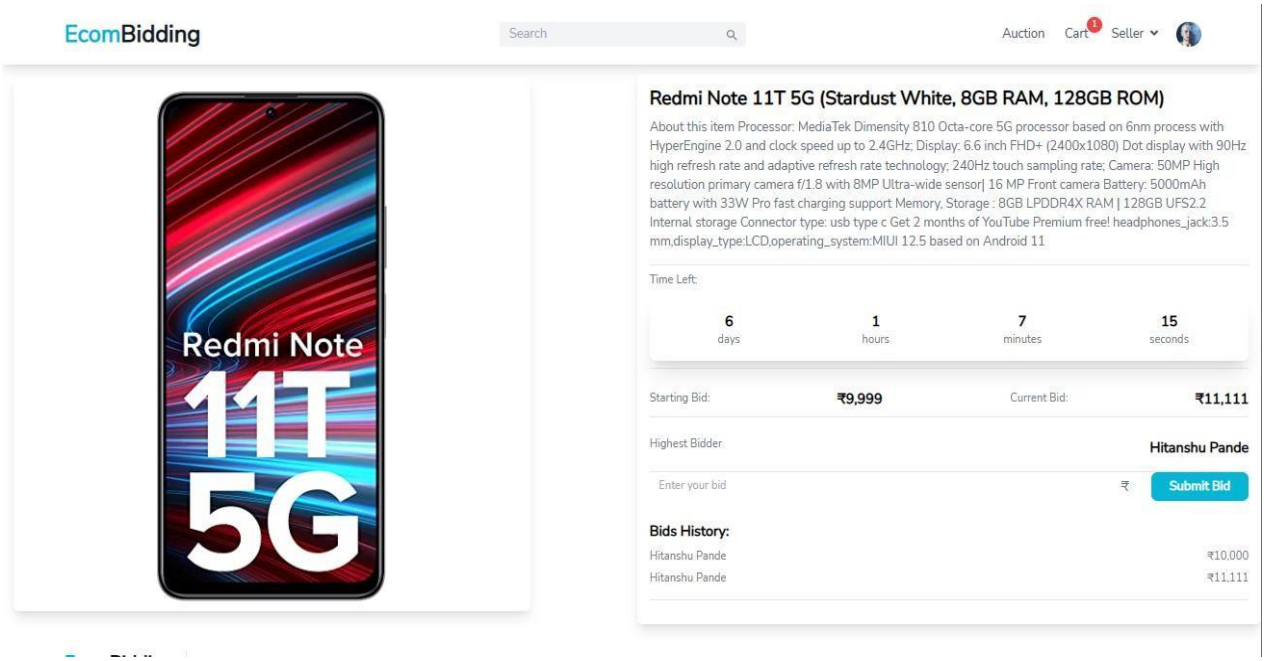
Auction Page



In Auction Page, All product which is listed for auction by sellers will be appear in form of card showing product image, title. Countdown and bid now button. Admin and Seller have option to add new auction to the page.

Auction Detail



After clicking on Auction product from auction page, user will be rendered to that product detail page which consist of product title, image, description, Time left countdown timer , starting bid price , current bid price , highest bidder , bid history and option to bid to that product. If user win the auction by placing higher bid then add to cart option will appear for user to purchase product.

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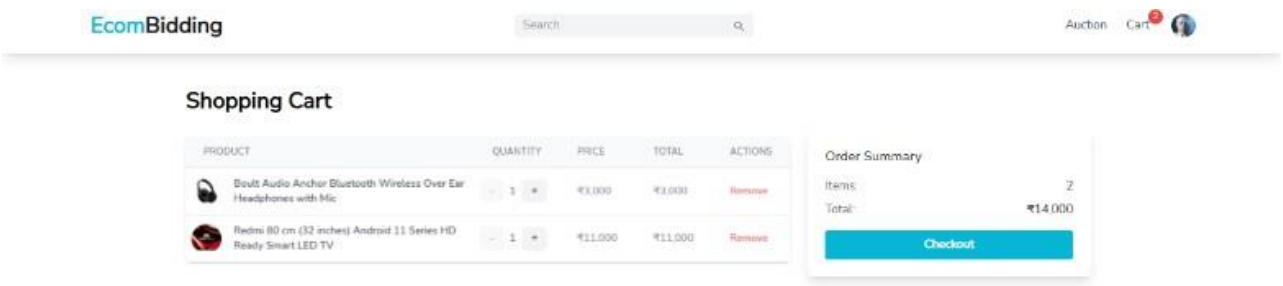
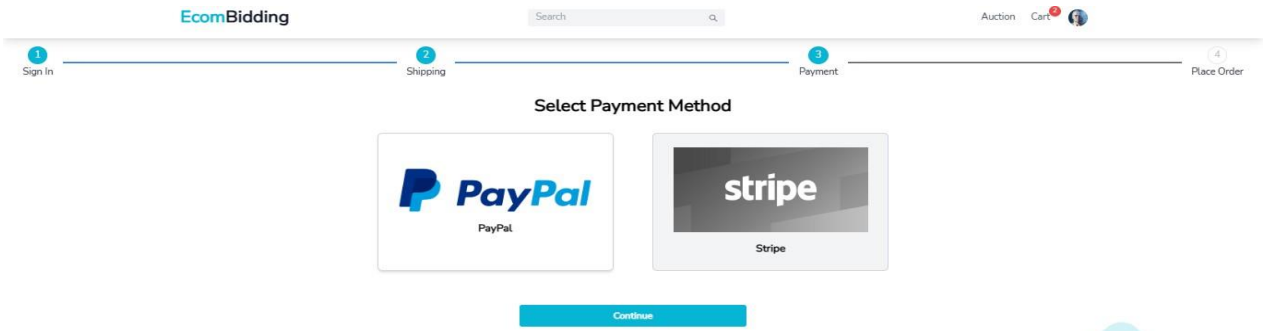
Cart Page



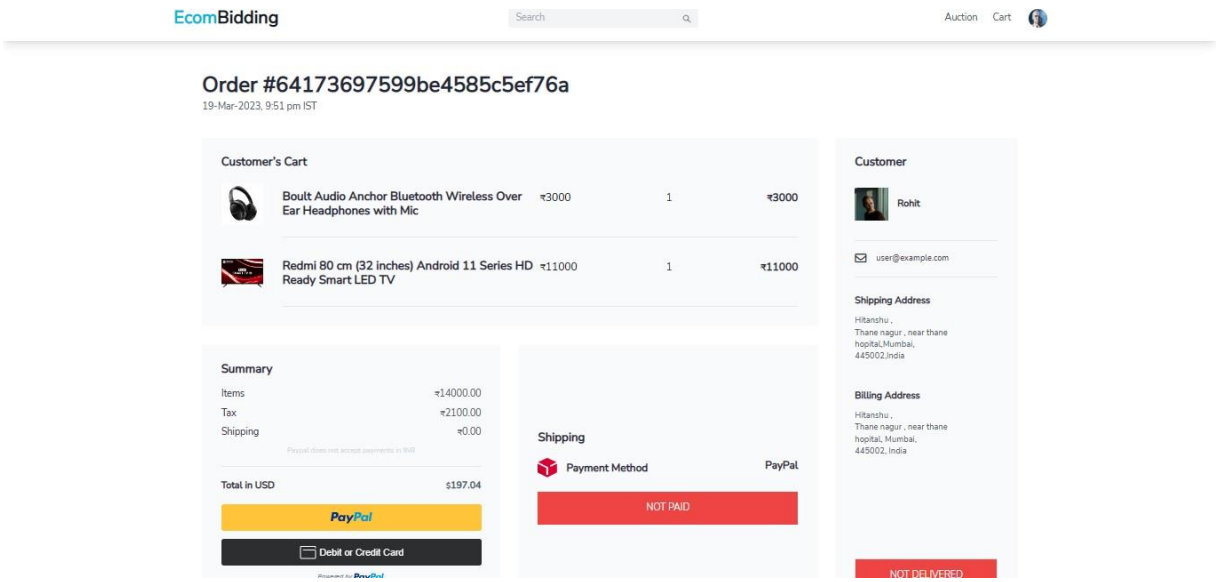
When user click on add to cart button of any product then that product goes to cart page where user can see all product that he choose to buy in one place. User then can procced to purchase product by filling required detail such as payment method and user address. All information and payment goes to seller of that product.

Payment Methods



User will get option to select between two payment option for purchasing product from website.

Order detail page



After filling out all the required detail, User will be redirected to order detail page where all user filled information will be shown. From here, user have to pay for product.

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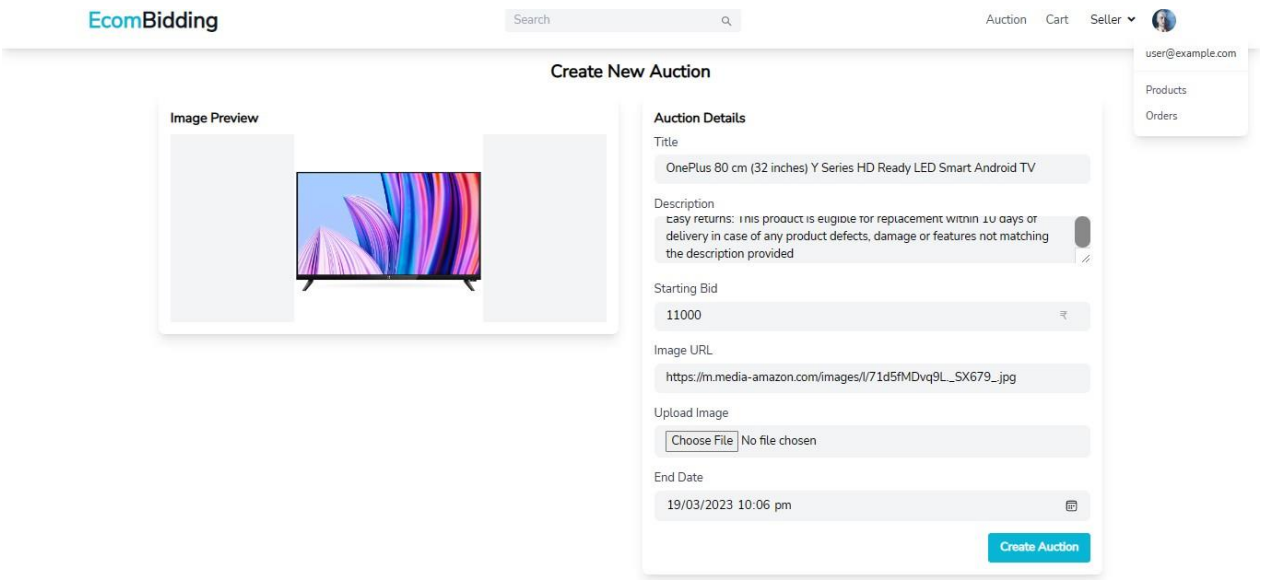
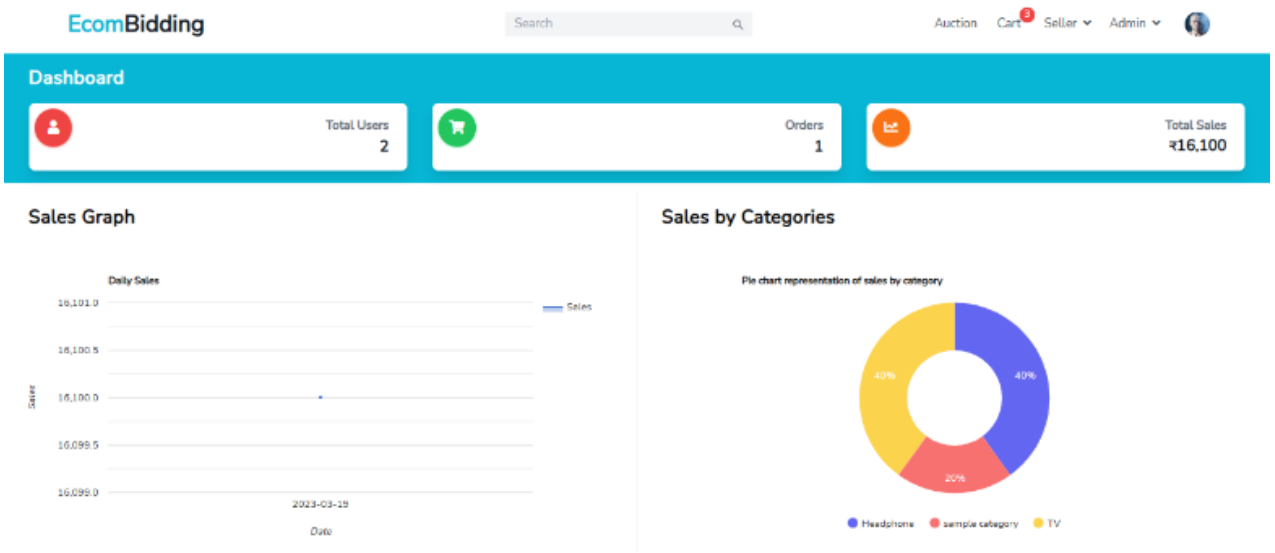
Seller Panel



Seller can use add product feature to list product on website by filling out required detail of that product such product title, image, description and price. Seller can also use add auction feature to list product for auction in auction page of website by filling out required detail of that product such as product title, image , description, starting bid price and countdown timer . seller can monitor product which is purchased by user and have ability to edit and delete product.

Admin Panel



Admin panel monitor all content of website. Admin panel can remove inappropriate product from Website and auction page which is posted by any seller on website. Admin have all ability of Seller with more power. Admin has the ability to make any user, seller and admin.

VIII. CONCLUSION

In this research paper, we presented the development and evaluation of an Ecommerce with Auction platform created using the MERN stack, which offers a range of features and functionalities aimed at improving the online shopping and auction experience. Our evaluation of the platform has demonstrated that it is a more efficient, secure, and user-friendly solution than existing standalone Ecommerce and Auction platforms. The integration of MongoDB, Express, React, and Node.js has allowed for faster development and deployment of the platform, while the use of industry-standard security practices has ensured that the platform is secure for users.

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The platform's real-time bidding system and personalized user profiles provide a more engaging and personalized experience for buyers, while the integrated payment processing system streamlines the purchasing process. Overall, our research suggests that the Ecommerce with Auction platform created using the MERN stack has the potential to revolutionize the online shopping and auction experience, providing a more efficient, secure, and user-friendly solution for buyers and sellers. Future research could explore additional features, such as machine learning and artificial intelligence, to further enhance the platform's functionality and user experience.

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