Meta Commerce – Shopping in Metaverse

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Abstract—

3-D visualizations have fundamentally changed the way brands and consumers interact and eliminate any boundary between physical and digital objects we have in the present. It applies immersive technology such as augmented reality and virtual reality into-commerce to shift consumer perception. In this project, we present a Meta commerce platform which can be used to buy and sell products in metaverse with the support of new technology. The traditional two-dimensional E-Commerce websites are designed to provide simple, browser- based interfaces to allow users to access available products and services. Whilst virtual representations are an essential consideration in establishing trust, most virtual representation sites fall short in mimicking real-life human representation. This paper aims to focus on three-dimensional (3D) E-Commerce technology that presents how virtual reality (VR) and augmented reality (AR) can help deal with limitations and improve E-Commerce operations. It is built as an internet-only tool, a person-centered shopping assistant created following user-centered design principles to be used on various computing platforms, including desktop and mobile devices. The paper shows how VR and AR can offer more precise product information in 3D E-Commerce environments. The virtual store experience is also enhanced by an AR assistant that helps the users by giving them all the required information in audio form or using its avatar. Design/ methodology/approach. Implementation of VR and AR in ECommerce will increase customer satisfaction. Sub hypothesis – to study the implementation of VR in E-Commerce. To study the implementation of AR in E-Commerce. To study the inclusion of E-Commerce sites in an open world game. To study the customer satisfaction of users using VR stores.

Keywords*—Augmented reality, Virtual Reality, Metaverse, Metacommerce, E-Commerce*

I. INTRODUCTION

The Computer Science innovations have become an integral part of everyday life. These innovations have revolutionized human interaction, communication, and social transactions. Over the past few decades, we have witnessed three major technological innovation waves - the introduction of personal computers, the Internet, and mobile devices. These waves have transformed the way we live, work, and interact with one another. However, the next wave of

computing innovation is currently unfolding, and it is centered around spatial, immersive technologies such as Virtual Reality (VR) and Augmented Reality (AR). This new wave of innovation is expected to create the next ubiquitous computing paradigm that has the potential to transform (online) education, business, remote work, and entertainment. This new paradigm is called the Metaverse. The Metaverse is a closed compound word consisting of two components: Meta (Greek prefix meaning post, after, or beyond) and the universe. In simple terms, the Metaverse is a post-reality universe, a perpetual and persistent multi-user environment that merges physical reality with digital virtuality. It is a world where people can interact with one another in a virtual space that is fully immersive and interactive. One of the most exciting potential applications of the Metaverse is in the field of online education. The Metaverse has the potential to remedy the fundamental limitations of web-based 2D e- learning tools. With the Metaverse, students can learn in a fully immersive, interactive environment that mimics the real world. This type of learning environment has the potential to revolutionize online education and make it more engaging, effective, and personalized. In addition to education, the Metaverse also has the potential to transform e-commerce. E- commerce has become an integral part of our lives, as more and more people choose to shop online. However, traditional e-commerce platforms have their limitations. Customers often want to see and touch products before making a purchase, and they also want a wide variety of choices and convenience. This is where 3D e-commerce comes in. 3D e-commerce has become increasingly popular in recent years, as it allows customers to view products in a virtual environment that is fully immersive and interactive. Customers can see products from all angles and get a better sense of what they are buying. This type of shopping experience is more engaging and entertaining than traditional e-commerce, and it also allows customers to feel more connected to the brand. The project aims to enhance the customer experience through better service design, encouraging customer participation, and providing detailed product information. Additionally, the project seeks to create a robust and flexible financial ecosystem that enables users to seamlessly connect between the physical and virtual worlds, thereby improving the overall E-commerce experience.

II. LITERATURE REVIEW

LIMITATION OF EXISTING SYSTEM

This paper [1] describes that the offline store & 2D E– Commerce websites has been a traditional way of buying the products where customers don't have much options in the today's world. the pandemic has forced retailers to shift to online sales, and how the limitations of traditional e-commerce have led to the development of 3D e-commerce. The paper highlights the benefits of 3D e-commerce, including the ability to provide a more immersive shopping experience and the potential to reduce returns and improve customer satisfaction. It provides valuable insights into the current state and future prospects of 3D e- commerce and highlights the importance of this technology in the current retail landscape.

The paper [2] describes that the traditional models of service quality are insufficient for the metaverse, as it involves a unique set of challenges and opportunities for retailers. The paper presents a new framework that considers the factors such as virtual ambiance, virtual service quality, and virtual interaction quality. The proposed framework can help retailers to assess and improve their service quality in the metaverse, providing a better shopping experience for customers.

The paper [3] describes discusses the use of 3D virtual environments for online shopping. The authors argue that traditional e-commerce websites are limited in their ability to provide a rich shopping experience, and that 3D virtual environments can help to overcome these limitations. The paper presents a case study of a 3D virtual shopping mall, which was designed to simulate a real-world shopping experience. The authors evaluate the usability and user experience of the virtual shopping mall and find that it can provide a more engaging and immersive shopping experience for consumers. insight into methods that result in less repetition and a more concentrated summary.

The paper [4] explores the limitations of traditional e-commerce and argues that VR can provide a more immersive and engaging shopping experience for consumers. The author presents a case study of a VR shopping experience, which was designed to simulate a physical retail store. The study evaluates the usability and user experience of the VR shopping experience and finds that it can improve consumer engagement and satisfaction.

The paper [5] proposes a framework for evaluating retail service quality in the Metaverse, a virtual 3D internet space. The paper argues that the traditional models of service quality are not adequate for the metaverse and presents a new framework that considers factors such as virtual ambience, virtual service quality, and virtual interaction quality. The proposed framework can help retailers to assess and improve their service quality in the metaverse, providing a better shopping experience for customers. The paper offers valuable insights for businesses operating in the virtual world of the metaverse.

III. PROBLEM STATEMENT

One of the primary advantages of Metaverse is its high level of immersion. Metaverse Retailing improve the customer experience, including co-creation of experience, better design of services and helps in increasing human traffic. So, we are developing an E-Commerce platform which is based on metaverse (an emerging technology) which will be used by customers to buy products from the store in 3D environment (An environment in which user will feel his/her own virtual presence).It will provide virtual representation of products in a store which can help users to understand better about products information in detail.

IV. METHODOLOGY

The proposed methodology for creating and designing 3D objects using Decentraland SDK and Blender, integrating with TypeScript for rendering in a web browser, and using MyWebAR and Builder Decentraland for creating and viewing 3D environments would involve several steps. First, the team would need to gather requirements and specifications for the project, including the types of 3D objects to be created and the functionality needed. Then, they would use Decentraland SDK and Blender to create and design the 3D objects. TypeScript would be used to integrate the 3D objects with the web browser for rendering. MyWebAR and Builder Decentraland would be utilized for creating and viewing the 3D environment. For the backend, NodeJs and Express would be used for creating APIs, and MongoDB would be used as the database for storing information. Finally, ReactJs would be used for designing the frontend to provide a user-friendly interface. Testing and debugging would be performed throughout the development process to ensure the project meets all requirements and functions properly.

V. PROPOSED SYSTEM

An E-Commerce web application platform which is based on metaverse and will be used by customers to buy products from the store in 3D environment (An environment in which user will feel his/her own virtual presence).It will provide virtual representation of products in a store which can help users to understand better about products information in detail.

VI. DESIGN

A. Data Flow Chart (Application)

As shown in Fig.3 This flowchart diagram outlines the basic user flow for an e-commerce application, starting with the landing page and ending with the order placement process.When the user first opens the application, they are directed to the landing page where all products are displayed. However, in order to buy products, the user must sign in to the platform. If the user is a new customer, they can create an account, providing their personal details to complete the registration process. Once the user has logged in or created their account, they are redirected to their profile page where they can update their personal information, view their order history, and perform other actions related to their account. From this page, the user can browse products and add items to their cart. If the user is an existing customer of the platform, they can directly place an order without any additional steps. However, if the user is a new customer, they will need to enter their shipping and payment information to complete the checkout process. Overall, this flowchart diagram provides a high-level view of the user flow for an ecommerce application, highlighting the key steps involved in the registration, login, and order placement processes. By visualizing these steps, stakeholders and team members can better understand the user experience and identify potential areas for improvement.

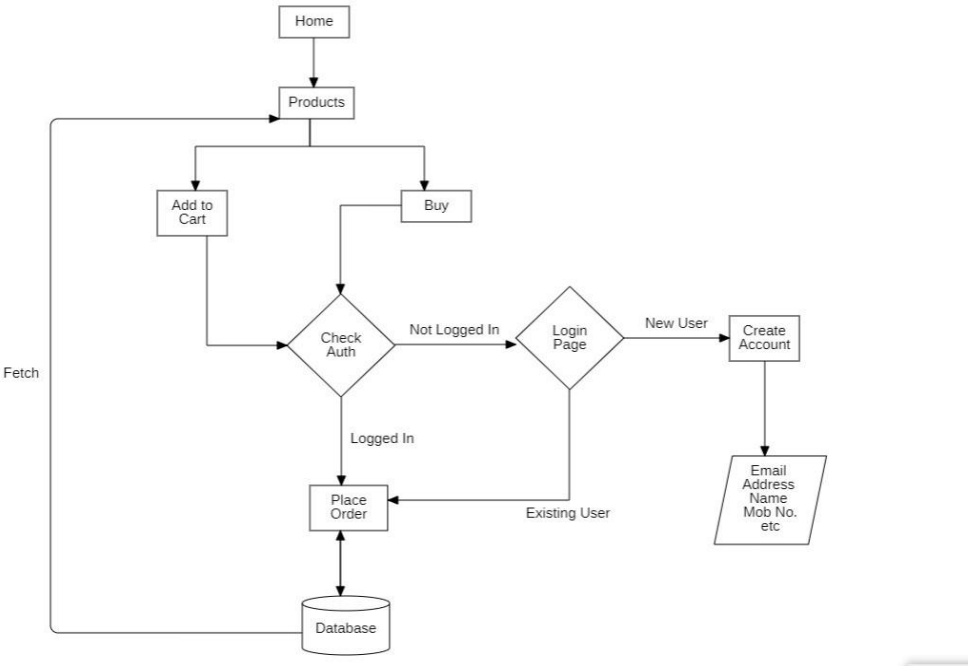


Fig. 1. Flow Chart (Application).

B. Use Case Diagram

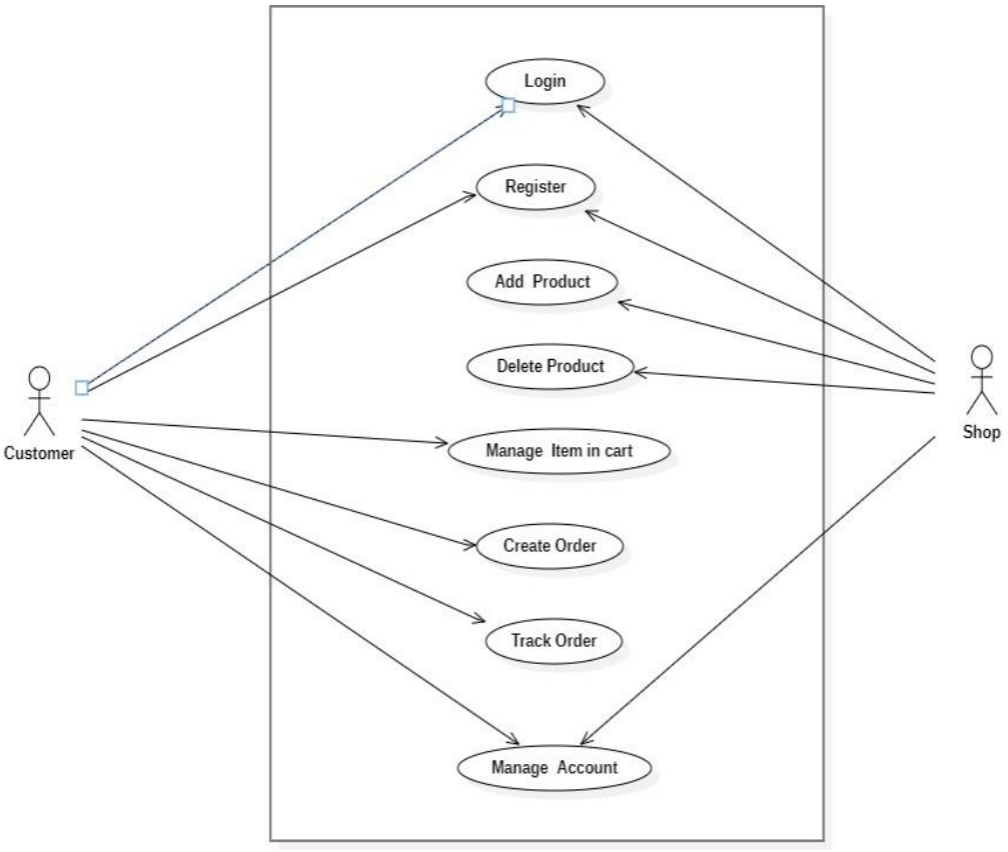


Fig. 2. Use Case Diagram

As shown in Fig.4 , there are two main actors: the customer and the shop. The customer actor has several activities that they can perform, including logging in to the system, registering a new account, managing items in their shopping cart, creating an order, tracking their order, and managing their account information. The shop actor also has several activities that they can perform, including logging in to the system, registering a new account, adding new products to the system, deleting existing products from the system, and managing their account information. In this use case diagram, the interactions between the actors and the system are represented by arrows that connect the actor to the corresponding use case (activity). For example, the customer actor is connected to the "login" and "register" use cases, indicating that they can perform these activities in the system. Similarly, the shop actor is connected to the "add product" and "delete product" use cases, indicating that they can add or remove products from the system. Overall, this use case diagram provides a high-level view of the system's functionality and the actors that interact with it.

C. Data Flow Diagram Level 0

As shown in Fig.5, It provides a high-level view of the simple application, which includes only two main entities: the customer and the shop. The customer can view their own information, such as their name and contact details, as well as the products that are available in the shop. This level of the diagram is focused on the basic functionality of the application, providing a simple and clear representation of the core entities and their interactions. It serves as a starting point for the more detailed Level 1 and Level 2 diagrams, which provide a deeper understanding of the system's functionality and services. .

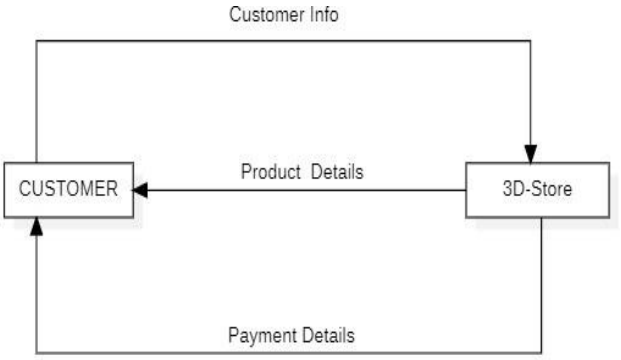


Fig. 3. Data Flow Diagram Level 0

D. Data Flow Diagram Level 1

The first level of the flow diagram is focused on the basic services that the system provides. This level includes user validation services, which ensure that only authenticated users with proper authorization can access specific features such as payment and product management in the shopping cart. Additionally, it includes services related to adding and deleting products, user information management, and product information management.

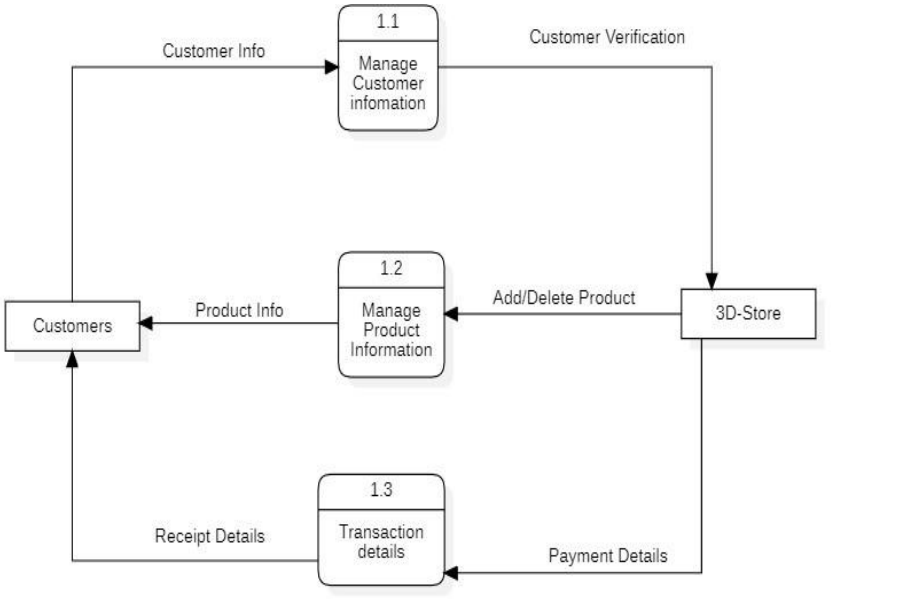


Fig. 4. Data Flow Diagram Level 1

E. Data Flow Diagram Level 2

The second level of a flow diagram typically provides a more detailed view of the system's functionality, and in this case, it includes several key services related to order management and user validation. One of the main services in this level is the order details service, which provides a display of all the orders that have been placed. This service can be useful for both customers and shop owners, as it provides a centralized view of all order information in the system. Another important service in this level is cart management, which allows customers to increase the quantity of products in their shopping cart. This service is critical for e- commerce systems, as it enables customers to make changes to their orders before they are finalized. The level 2 flow diagram also includes several user validation services, which are designed to ensure that users have proper authorization to access specific features of the system. For example, users who have proper authorization can access payment and product management features in their shopping cart, and they can also add or delete products from the system. The flow diagram also includes services related to user and product information, which are essential for maintaining the integrity of the system. These services enable users to manage their account information, view product details, and make informed purchasingdecisions.

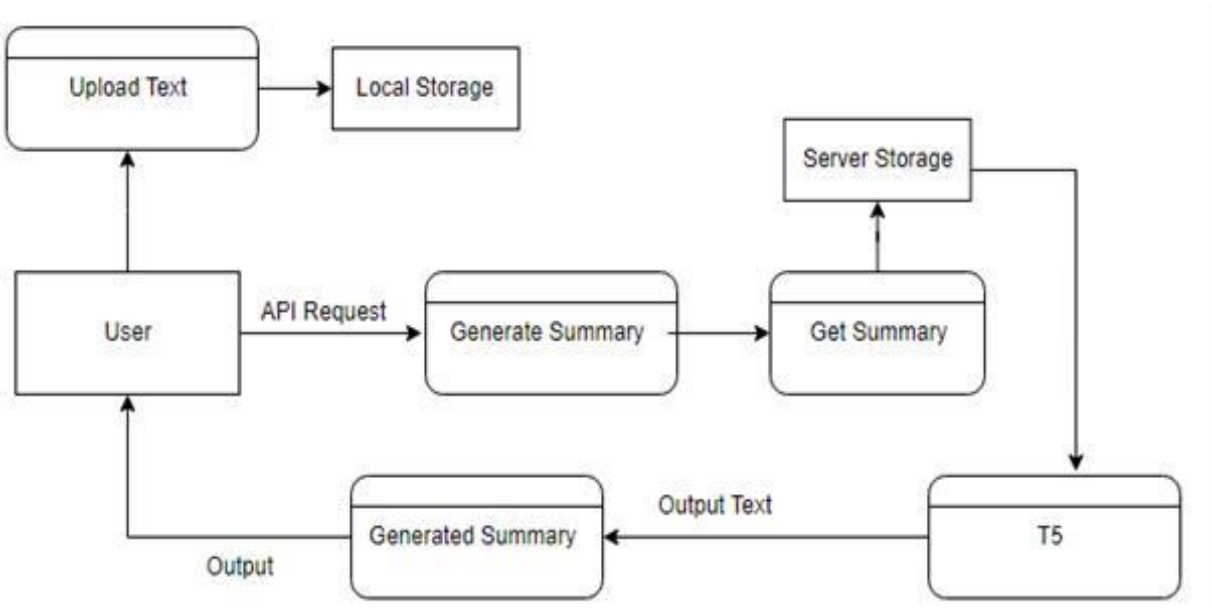


Fig. 5. Data Flow Diagram Level 2

F. Gantt Chart

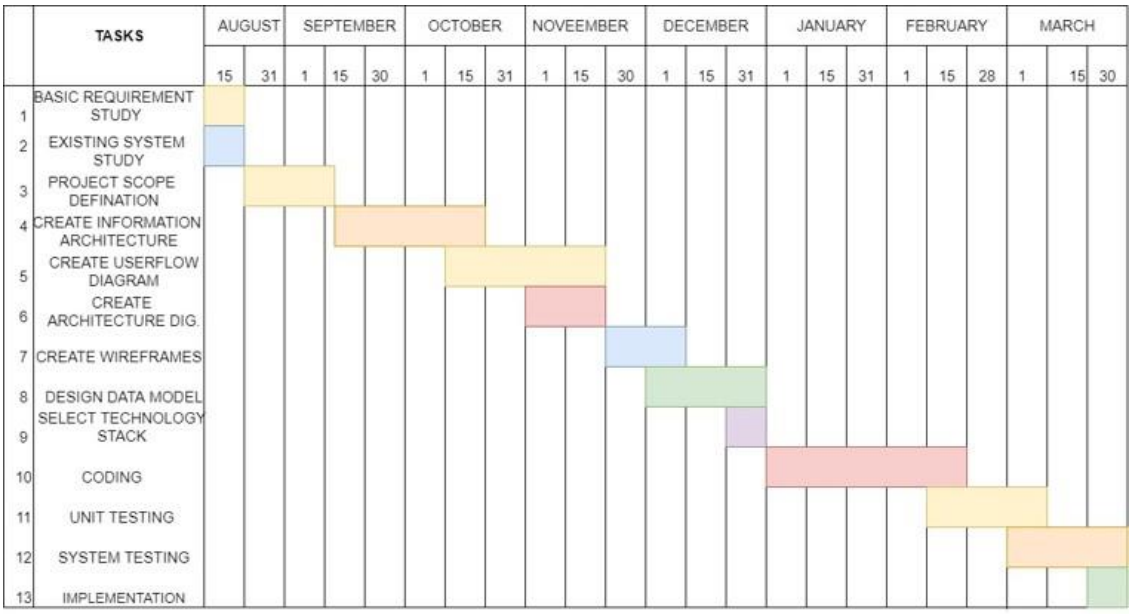


Fig. 6. Gantt Chart

This diagram shows the project timeline horizontally, with each task or activity represented as a horizontal bar on the chart. The length of each bar corresponds to the estimated duration of the task, while the position of the bar along the timeline indicates the start and end dates of the task. We have started basic requirement study during the month of august and finally finished the project in march.

G. System Architecture

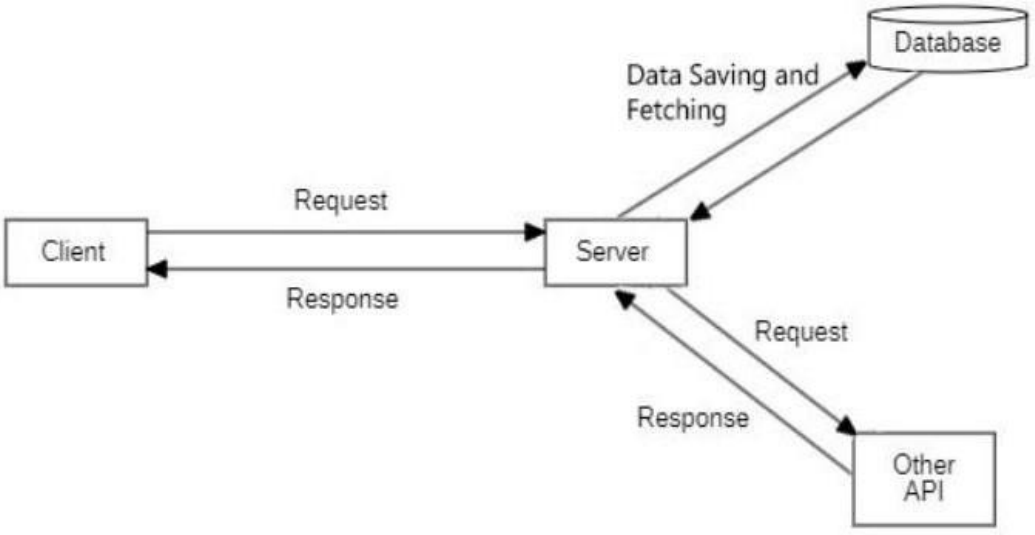


Fig. 7. System Architecture

The System Architecture consist of three components

1) Client Side – Client side is basically the frontend of the application from where user will interact with the application.

2) Server – the request from frontend goes to the backend, the backend of the application is build using NodeJS, it handles the request and perform the operation such as Authentication of user, Authorisations , etc.

3) MongoDB – The application uses the mongodb database to store the user credentials and its purchasing data.

VII. RESULTS

A. Home Page

Upon launching the application, users are directed to this page where they can visually navigate a 3D environment of the store and explore its products. This page serves as the initial landing page and provides an immersive experience for the user to browse the store's offerings. Users can interact with the environment and interact with the products to view their features, pricing, and other details. This feature-rich page is designed to enhance the user experience, provide product information, and help users make informed decisions whenshopping within the application.

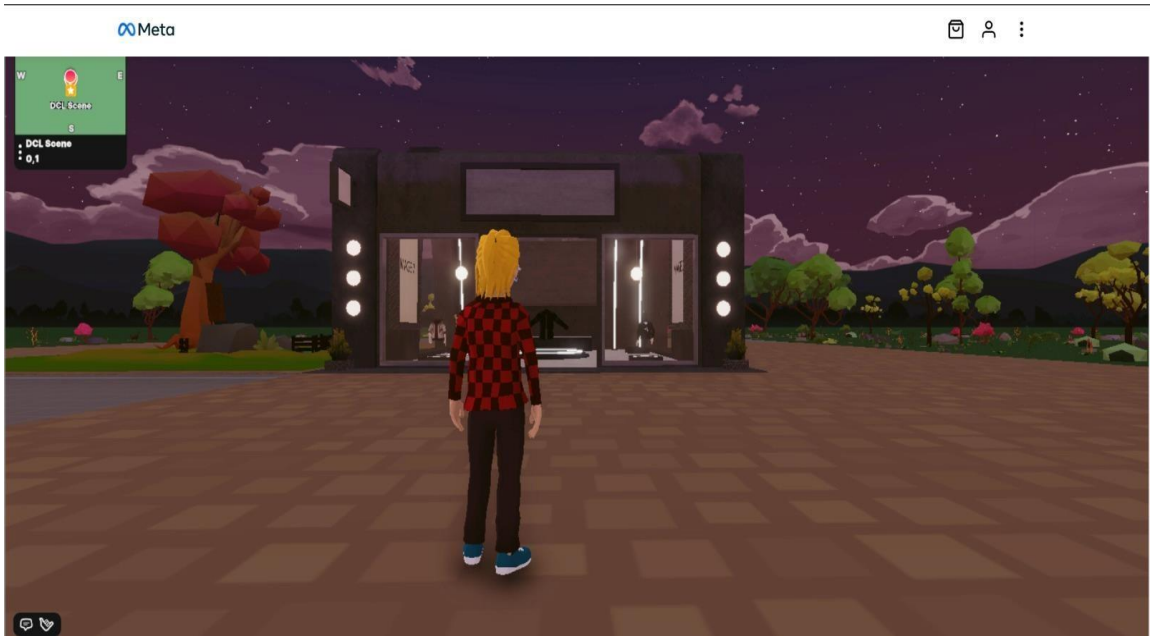


Fig. 8. Home Page

B. Signup Page

This Modal is used for sign up if the user is visiting the platform for the first time .It is used to collect the user's information and create an account. The modal typically includes a form with fields for the user's name, email address, and password. The user can submit the form to create an account, and the modal will disappear. This modal is a crucial part of the user registration process and ensures that the application collects the necessary information to provide a personalized experience for the user. It also helps to prevent unauthorized access to the application's features and data.

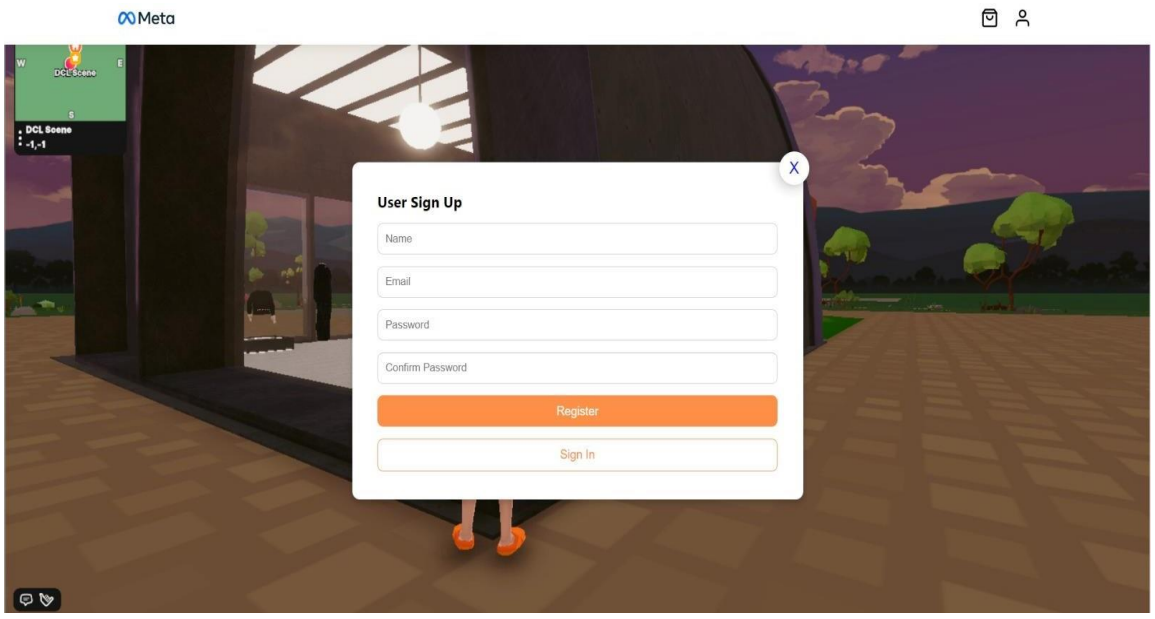


Fig. 9. Signup Page

C. SignIn Page

The sign-in modal is a pop-up window that appears when an existing user of the application attempts to access its features or content. The modal typically includes a form with fields for the user's email address and password. Once the user enters their credentials and clicks the "sign in" button, the modal will disappear, and the user will have access to their account's features and information. This modal is a crucial part of the authentication process and ensures that only authorized users can access the application's data and functionalities. It helps to secure the user's account information and protect the application from unauthorized access.

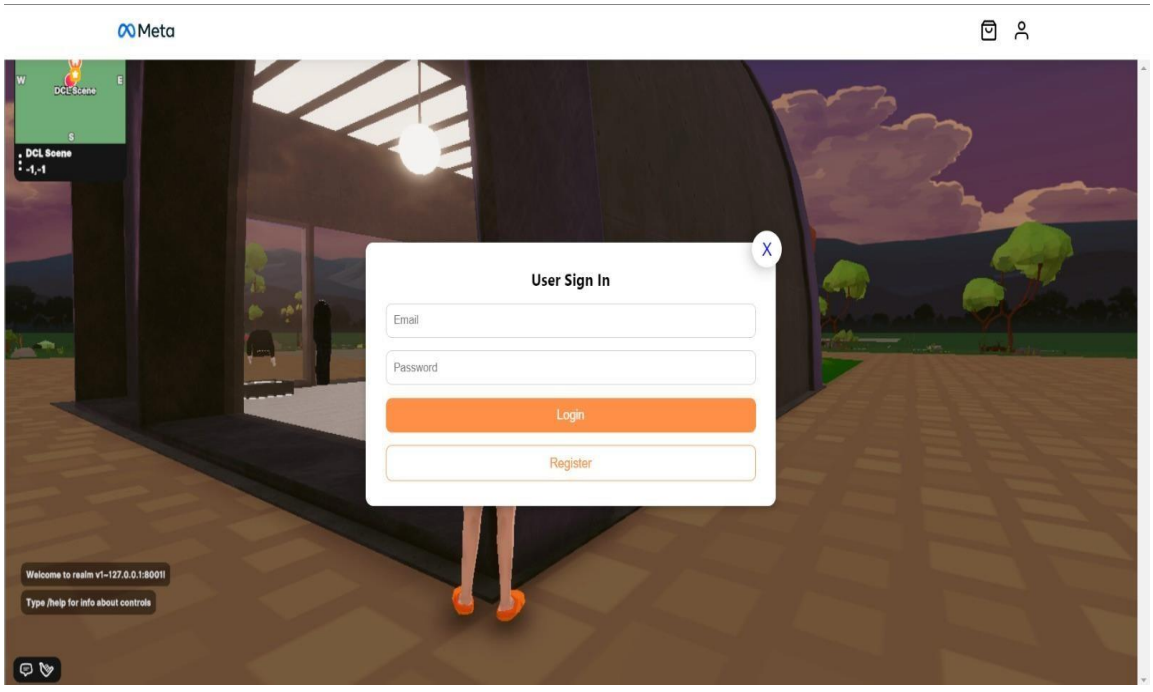
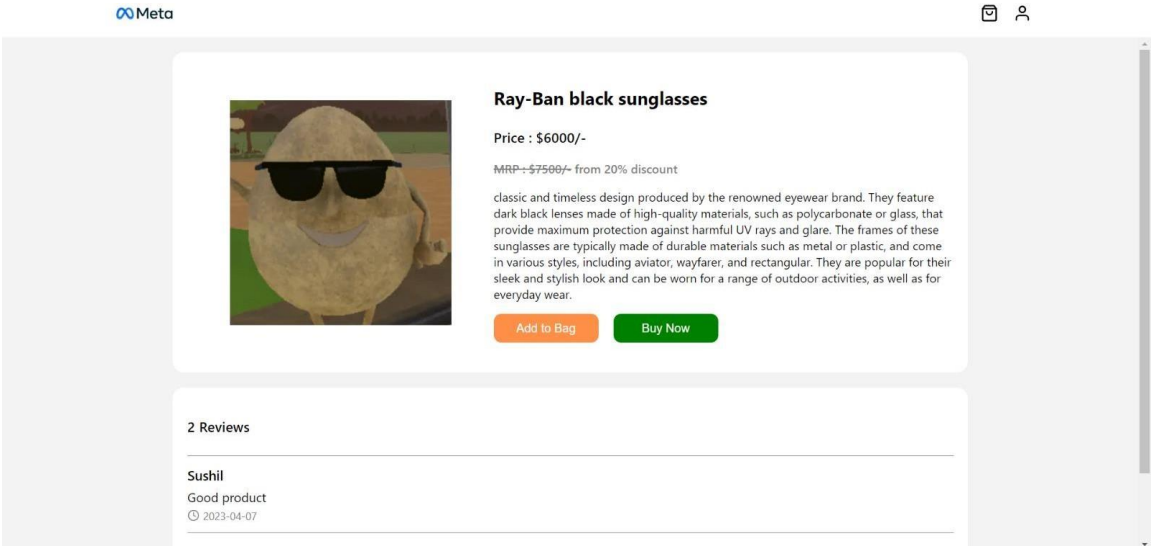


Fig. 10. SignIn Page

D. Product Page

The product details page is used for adding products to the cart. It displays information about the product such as the name, description, image, price, and ratings. Additionally, it provides a section for reviews and ratings given by other users who have purchased the product earlier. The user can add the product to their cart by clicking on the "Add to Cart" button on this page.

Fig. 11. Add To Cart Page



E. Cart Management Page

This page is the cart management page which allows the user to manage and purchase the products they have added to the cart. It displays all the products added to the cart and their details. The user can increase or decrease the quantity of a particular product from this page before proceeding to checkout. The page also shows the total cost of all the products in the cart. Once the user is satisfied with the products and their quantities, they can proceed to checkout from this page to place an order.

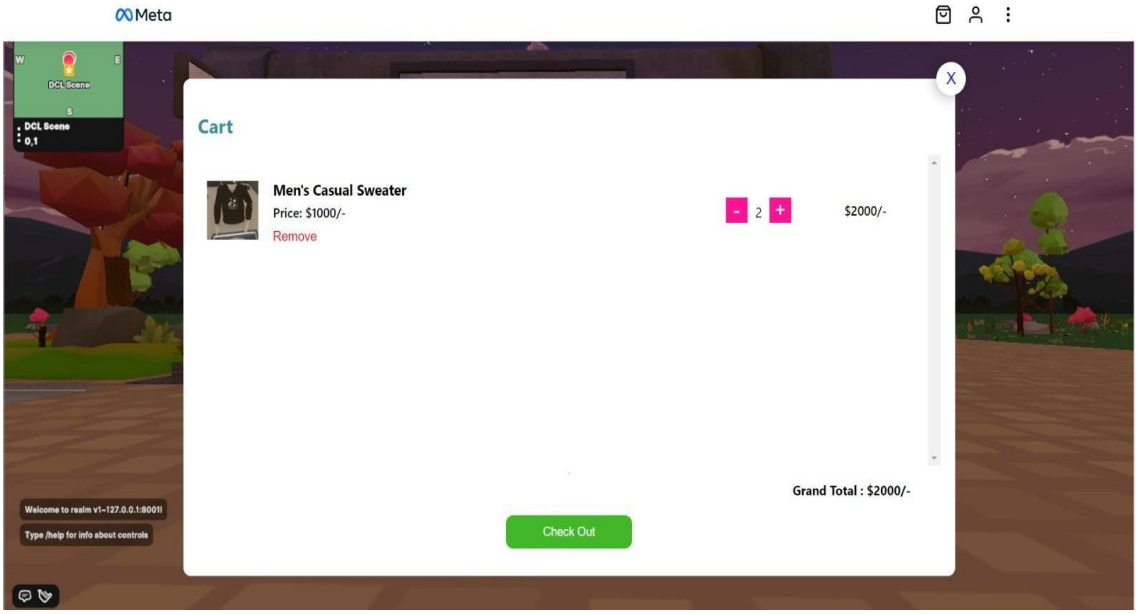


Fig. 12. Cart Management Page

F. Order History Page

This page is the order history page which displays the list of items ordered by a particular user. It provides the current status of each item in the order, such as shipped, delivered or cancelled. Users can cancel a specific item from this page or write a review for each delivered item. The page also shows the order details, including the order date, delivery address, and payment method. The order history page helps users keep track of their previous orders and provides them with the necessary information about their purchases.

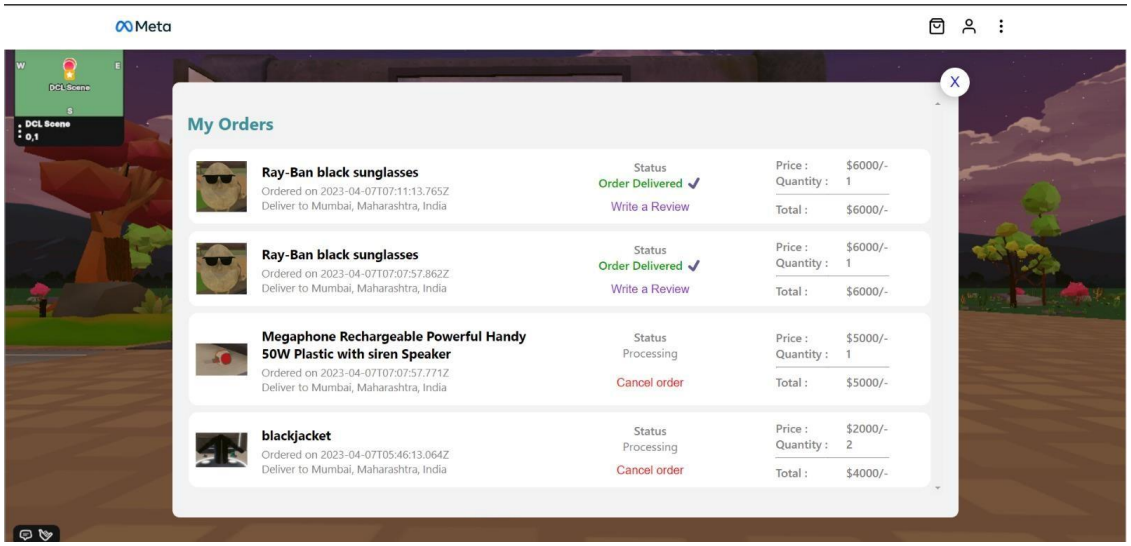


Fig. 13. Order History Page

VIII. CONCLUSION

We have developed an ECommerce platform which is based on virtual reality and can be used by customers for purchasing the products online. Our application provides users with an immersive and interactive shopping experience, which is likely to be the future of online shopping. We have successfully incorporated various front-end and back-end technologies into our application, allowing us to build a scalable and robust platform. During the development process, we have learned a lot about the latest technologies used in full-stack web development, as well as meta verse technology. We have also gained valuable experience in project management, team collaboration, and problem-solving skills. We believe that this project will help us in our future endeavors and also contribute to the e-commerce industry by providing a better platform for both customers and business owners. Overall, we are grateful for the opportunity to work on this project and look forward to applying the knowledge wehave gained in our future endeavors.

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