AUGMENTED REALITY WEB APPLICATION USINGREACT JS FOR E-COMMERCE

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Abstract

Augmented reality is a relatively new technology, and its integration with the e-commerce sector is an area that has not been extensively explored yet. Presently, e-commerce websites are not capable of providing a virtual experience to their customers. However, with the help of augmented reality, this problem can be addressed, and the user experience can be significantly enhanced. Augmented reality has the potential to revolutionize the e-commerce sector as customers seek personalized shopping experiences. By providing such an experience, augmented reality can meet the expectations of modern shoppers. To explore the impact of augmented reality on the ecommerce sector, we have developed an e-commerce web application with augmented reality features. This web application can augment 3D models of products available on the website with real-time environments, thereby creating a unique user experience. React Native is an application framework that offers a wide range of features, instant updates, and cross-platform development capabilities. Therefore, building an AR application with React Native provides new possibilities without compromising on any of the latest technological advancements

Key Words: Augmented Rea lity, React JS, React Three js, Ecommerce, Web Application.

1. INTRODUCTION

Augmented Reality (AR) is a useful technology that allows for computer-generated graphics to be overlaid onto the real world. It can be applied to many different applications and combines visual processing with other technologies. AR can also be used to visualize concepts or events that are otherwise invisible by superimposing virtual objects. E-commerce is a popular method of buying and selling products using websites or online shopping applications. As more and more brands enter the e-commerce space, competition becomes increasingly fierce. To stand out in this competitive market, innovations must be made to enhance the customer experience. Many customers have expressed dissatisfaction with products they have purchased online, citing issues such as design, color, or fit. To address this problem, an AR application can be developed using React Native technology to provide customers with a more immersive shopping experience.

2. LITERATURE REVIEW

It has the potential to completely transform e-commerce, with the car sector being the first to use augmented reality in advertising. Customers want to preview items using augmented reality technology to see their color, size, style, and distinctions, according to 77% of consumers. A key idea in marketing and advertising is augmented reality, which involves fusing digital information or objects into how a subject sees the physical environment in order to highlight the advantages for customers and advance business objectives. In 2015, augmented reality was valued at $640.4 million on the market, and by 2020, it is expected to create $120 billion. Manufacturing, communication, health, retail, navigation, the military, education, gaming, and e-commerce are just a few of the sectors that heavily use augmented reality. This article emphasizes the usage of augmented reality in ecommerce while also recognising its enormous potential to mimic an in-store purchasing experience. Customers benefit from the ease of online shopping thanks to augmented reality technology, which allows consumers to engage with digital items in a variety of settings. A number of businesses, like Converse and IKEA, are embracing augmented reality to let consumers use smartphone apps to see household items in their homes in real time. Customers' perceptions of the advantages and satisfying experiences with AR apps are probably to blame for their rapid acceptance. Over a billion consumers used e-commerce websites to make purchases in 2013, which highlights the industry's tremendous growth. Retail e-commerce sales reached $1.85 trillion in 2016, and it is predicted that by 2021, they will reach $4.50 trillion.

3.Types of Augmented Reality

Four different categories of augmented reality (AR) exist: marker-based, marker-less, location based, and superimposition.

Marker-based AR includes triggering the augmented experience using a marker or static picture in the real world. Once a marker has been detected, developers may insert digital material over or next to it.

On the other hand, marker-less AR depends on scanning the surroundings and lets users choose where to position virtual items. It makes advantage of the hardware of the smartphone, including the digital compass, GPS, and camera.

Location-based AR determines the user's location and position using the device's GPS and digital compass. When the user's position coincides with a specified point, virtual items are shown on the screen. Pokémon Go is a prime example of this kind of AR.

Superimposition AR recognizes an item in the actual world and modifies the view of that object partly or entirely.

4.React JS

An open-source JavaScript package called React JS, usually referred to as React, is used to create user interfaces. One of the most widely used frontend frameworks for building dynamic, high-performance online apps was created by Facebook. React is extremely modular, reusable, and simple to maintain since it is built using a component-based design. React's virtual DOM, a compact version of the real DOM that enables quick updates and component rendering, is one of its main advantages. Additionally, React makes use of JSX, an XML-like vocabulary that allows programmers to write HTML-like code inside of JavaScript files, simplifying the creation of UI components and state management. Developers may declare how they want the user interface to appear by using React's declarative programming model and React will take care of the implementation details. This makes it possible to have a codebase that is cleaner, shorter, and easier to maintain. Developers may easily add functionality and design components to their apps without having to start from scratch thanks to React's modular structure and large library of third-party components, such Material UI and React Bootstrap. Additionally, React has a sizable and vibrant developer community that offers assistance, resources, and tools. React's interoperability with various frameworks and technologies, like Next.js for server-side rendering, React Native for creating mobile apps, and Redux for state management, is a key benefit. In conclusion, React JS is a strong and well-liked frontend library for creating responsive and dynamic user experiences. Complex applications may be created and

maintained with ease because to its declarative programming style, virtual DOM, and component-based design. React is a fantastic option for creating contemporary online apps because to its large library of components, vibrant community, and interoperability with other technologies.

5. React Three.js

Developers may use React Three.js, a JavaScript package, to build 3D visuals for online apps. React Three.js was created to make it simple to use the well-known 3D library three.js into a React application. React Three.js makes it simpler to use three.js in React applications by providing React components that cover three.js objects like cameras, lights, and meshes. Additionally, the library offers a collection of hooks that let programmers connect with three.js objects and update them in accordance with React state and properties. Declarative animation utilizing React's integrated animation system is supported by React Three.js as well. As a result, programmers can easily design intricate animations using React's well-known API and incorporate them into three.js scenarios. One advantage of utilizing React Three.js is that it enables programmers to create intricate 3D scenarios by using the strength of React's component design. In order to build more complicated scenarios, developers may design reusable components that contain three.js objects. Redux and React Router are two more React packages and technologies that React Three.js integrates with. This makes using React with React Three.js to create complicated, large-scale apps simple. In general, React Three.js offers an effective collection of tools for developing 3D graphics in online apps. It is a fantastic option for developers wanting to create elaborate 3D scenarios in their React apps due to its connection with three.js and React's component design

6.PROPOSED SYSTEM

This application is built using React JS. Before using React Three js, the user has to make sure that the library is installed. After the installation, Import React Three.js components
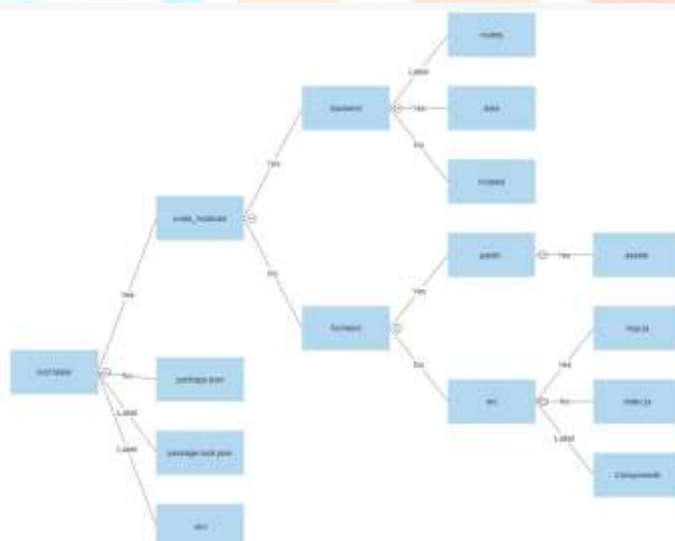
A basic React JS project structure is shown in figure 1. It includes an App.js which is the main Javascript file containing the logic for the application. A miscellaneous React js property file is also included i.e; app.json. bin directory contains various scripts which supports the project. index.js is the entry file that points to the main application in App.js. node_modules directory contains all the node modules as specified by the package.json file. Metro.config.js.

7.MVC (Model View Controller)

The Model-View-Controller (MVC) software design pattern splits the programme into three interrelated sections, each of which is responsible for certain responsibilities. It is often used for developing user interfaces.

The Model handles data storage, retrieval, and manipulation while representing the data and application logic. It is in charge of keeping the application state up to date and reacting to information requests from the View or Controller.

The View is the application's user interface and is in charge of showing data to the user and taking input from them. To obtain data and adjust the user interface, it communicates with the Model.

The Controller serves as a conduit between the Model and View, taking user input and turning it into instructions for the Model or View. It is in charge of updating both the View and the Model in response to user input and model changes.

The MVC pattern makes complicated applications simpler to manage and maintain by dividing the programmed into these three different sections. Because they may work individually on various components of the programmed without interfering with one another's efforts, it enables more effective development.
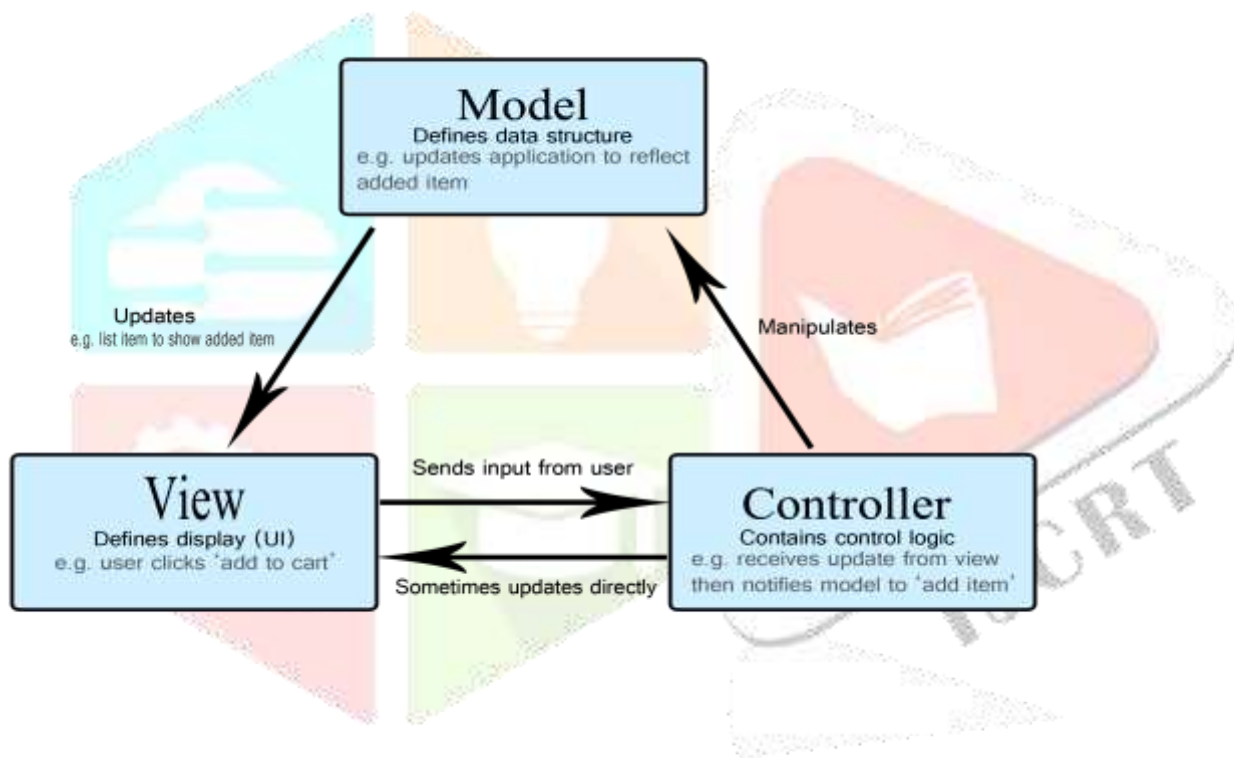
8.IMPLEMENTATION:

There are some structural parallels between 3D sceneries and web user interfaces (UIs), but there are also significant distinctions. While UIs are often created using HTML and CSS, 3D sceneries are created utilizing geometry, materials, and lighting.

In order to construct an item in a 3D environment, you must first define a geometry that characterizes its form. This might be something simple like a cube or sphere or more intricate like a 3D model of a vehicle or structure. This is comparable to how HTML is used to specify a web page's structure.

You may apply a Material to your geometry after it has been established. This regulates the object's appearance and feel, including its color, texture, and reflectivity. This is comparable to how CSS is used to style a web page's content.

A Mesh, which is the 3D counterpart of an HTML element, is produced by the combination of geometry and material. Similar to how an HTML element may be positioned on a web page, the Mesh can be positioned in a 3D environment.

You must add some Lights in order to view your 3D scene. Similar to how lighting influences how we view items in the actual world, they brighten the scene and provide shadows and highlights.

The whole scene is then produced by a renderer, which produces a picture that seems to have been taken by a camera. This is comparable to how a web browser shows a web page on a screen after rendering it

## 8.1. Placing a 3DAnimatingObject/Model to the AR Scene

There are a few steps you may take when using React Three.js to insert a 3D animated object or model into an AR scenario. Use React Three.js to define the 3D object or model first. To do this, a Geometry must be created to specify the form of the item, and a Material must be used to manage its look. The next step is to add any required animations to the 3D model or object. The animation mechanism in React Three.js may be used to generate animations for the Mesh. Once the model or object has been specified and animated, you can use a framework like AR.js or React AR to build an AR scene. A camera and all other components required to depict the scene should be present in the scenario. After creating the AR scene, you can utilize the AR library to choose a marker or real-world picture that will serve as the scene's anchor.

Once the marker has been located, the Mesh may be properly positioned inside the AR environment using the position and rotation data provided by the AR library. The 3D model or item may now begin to animate within the AR scenario. When an item or model is introduced to an AR scene, the animation system may be used to start the animations. By utilizing React Three.js to integrate a 3D animated object or model into an AR environment, you may create an interesting AR experience.

8.2. Placing Objects in Real-World:

React Three.js is used to create the 3D model or object. This entails applying a Material to decide the object's appearance and specifying a Geometry to describe the object's form. The Geometry and Material may then be combined to form a Mesh. Utilize an AR library, such as AR.js or React AR, to create an AR scene. The scene should have a camera and all other components required to render the scene. Utilize the device's camera to use the AR library to find a marker or picture in the actual world. Use the position and rotation data from the AR library to place the Mesh in the actual world once the marker or image has been identified. The size of the Mesh may also be changed to suit the scene. Add the Mesh to the AR scene after it has been placed. You may also make the Mesh interactive by enabling users to click or touch on it to initiate a process.

8.3. RESULTS AND DISCUSSIONS

Before making a purchase, buyers may examine goods or services in a realistic environment thanks to the usage of augmented reality in ecommerce. Implementing the ideas in this article may result in a cutting-edge marketing strategy that grabs consumers' attention and shapes their attitudes and behaviors. Customers will be given the chance to profit directly from such qualities, which may raise brand recognition. Customers may test out products in addition to shopping for them online. Retailers may get beyond physical restrictions and provide users access to all product features, which will eventually attract more customers and boost conversion rates.
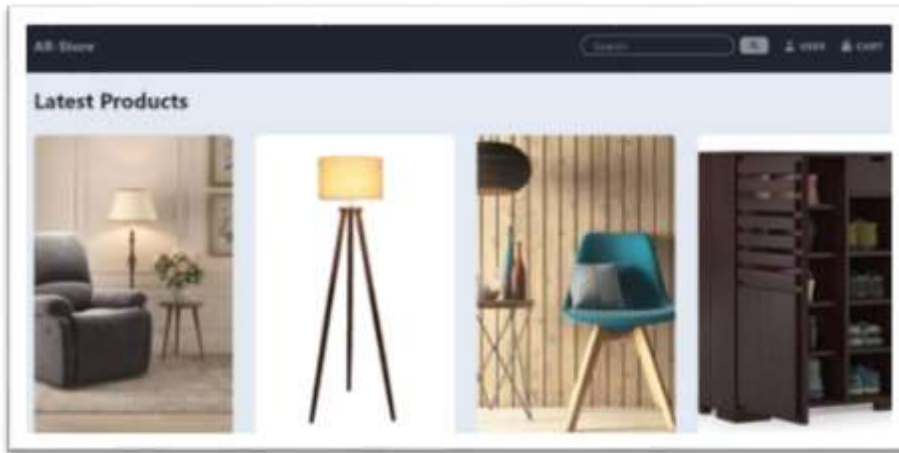
9.FUTURE WORKS THAT CAN BE INCORPORATED:

Virtual try-ons: With the use of augmented reality technology, users may explore wearing clothes, jewelry, and other items virtually. Customers don't need to physically try the merchandise on since they can use their cellphones to see how it appears on them. Product visualization: Before making a purchase, shoppers may use augmented reality to visualize how things might appear in their homes or businesses. Customers may use augmented reality to, for instance, see how a piece of furniture will appear in their living room or how a new TV will mount on their wall. Demonstrations of interactive items are possible using augmented reality, allowing consumers to observe how things function and are utilized. This is especially helpful for complicated items that need extensive explanation.

10.ACKNOWLEDGEMENT

11.CONCLUSION:

Using React for AR-based applications is unique because React js on-the-go save and repeat procedure makes the project easy to manage. The React Three.js library reduces storage requirements as it relies primarily on lines of code rather than bulky software. Furthermore, incorporating VR into the project in the future becomes more manageable due to the library's ability to render both AR and VR using the same API. This application is beneficial to online shoppers who purchase products without trying them on and later discover that they do not fit properly.

REFERENCE

[1]. Azuma, R. T. (1997). A survey of augmented reality. Presence: Teleoperators and Virtual Environments, 6(4), 355-385.

[2]. Chen, M. Y., & Liang, T. P. (2018). Augmented reality shopping: A conceptual framework and research agenda. Journal of Business Research, 85, 698-702.

[3]. Choi, J., & Kim, J. (2019). Consumer behavior in augmented reality-based online shopping: A review and research agenda. Telematics and Informatics, 39, 105-118.

[4]. Guo, X., & Barnes, S. J. (2021). The effects of augmented reality on consumers' purchase intentions: A meta-analysis. Computers in Human Behavior, 115, 106582.

[5]. Hong, J. C., Lin, Y. C., & Chen, Y. C. (2019). Enhancing purchase intention in mobile shopping through augmented reality: A conceptual framework. Journal of Business Research, 102, 223-233.

[6]. Huang, Z., Benyoucef, M., & Righi, C. (2019). Augmented reality in online retail: A review and future research directions. Journal of Retailing and Consumer Services, 49, 17-

[7]. Pappas, I. O., Apostolou, A., Mentzas, G., & Kourouthanassis, P. (2016). Augmented reality applications in e-commerce. Journal of Theoretical and Applied Electronic Commerce Research, 11(1), 20-38.

[8]. Wang, D., Liang, T. P., & Huang, J. (2021). The effects of augmented reality on online consumer purchase decision-making: A meta-analysis. Electronic Commerce Research and Applications, 47, 101124.

[9]. Xu, X., Chen, Y., & Shen, J. (2021). The effects of augmented reality on consumers' online shopping experience and purchase intention: An empirical study. International Journal of Information Management, 57, 102309.

[10]. Yoon, J., & Kim, D. J. (2019). Augmented reality shopping malls: A new way of creating customer value and enhancing customer experience. International Journal of Information Management, 48, 97-107.