

3D Virtual E-Commerce Platform for T-Shirt Shopping: Design, Development and Performance Analysis

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ABSTRACT

This research paper presents a 3D virtual e-commerce platform designed to improve online t-shirt shopping experience. The system uses modern web technologies such as WebGL and Three.js to provide interactive product visualization. The platform enhances user engagement, improves product understanding, and supports better decision-making compared to traditional 2D systems.

Keywords

3D E-commerce, WebGL, Three.js, Virtual Shopping, User Experience, Online Retail

1. INTRODUCTION

E-commerce platforms have significantly transformed the retail industry by enabling users to shop online. However, most traditional platforms rely on static images, which limit the ability of users to fully understand products. This research introduces a 3D-based system that allows users to interact with products dynamically. The objective is to improve visualization and enhance user experience.

2. LITERATURE REVIEW

Previous studies highlight the importance of user experience in online shopping. Technologies such as augmented reality and virtual reality have been explored to improve visualization. WebGL and Three.js allow rendering 3D models directly in browsers. However, many systems lack performance optimization and accessibility, which this research aims to address.

3. SYSTEM ARCHITECTURE

The system consists of frontend, 3D rendering engine, backend server, and database. The frontend provides user interaction, while the 3D engine renders models. The backend handles requests and the database stores user and product information. This layered architecture ensures scalability and efficiency.

4. METHODOLOGY

The development process includes designing 3D models, integrating them into a web application, and enabling user interaction. The system follows a modular approach, ensuring easy maintenance and scalability. Testing is performed to evaluate performance and usability.

5. IMPLEMENTATION

The system is implemented using React.js for frontend, Node.js for backend, and Three.js for 3D rendering. MongoDB is used for database management. The platform is deployed on a cloud environment to ensure availability and scalability.

6. RESULTS AND DISCUSSION

The proposed system demonstrates improved visualization and user engagement. Users can interact with products more effectively, leading to better decision-making. Performance analysis shows that the system performs efficiently on modern devices.

7. CONCLUSION

The research successfully demonstrates a 3D e-commerce platform that enhances online shopping experience. The system improves visualization, engagement, and usability. It represents a step toward the future of digital retail.

8. FUTURE SCOPE

Future improvements include adding AR features, AI-based recommendations, and mobile application support to further enhance the system.

REFERENCES

- [1] WebGL Documentation
- [2] Three.js Documentation
- [3] React.js Documentation
- [4] Research on E-commerce Systems