iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 14 **Issue:** V **Month of publication:** May 2026

DOI: https://doi.org/10.22214/ijraset.2026.82643

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue V May 2026- Available at www.ijraset.com

Vastra: A Fashion E-Commerce Website

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Abstract: ***Vastra is a fashion and clothing-based e-commerce platform developed using the MERN stack to provide users with a modern and interactive online shopping experience. The platform supports multiple clothing categories such as men's wear, women's wear, ethnic wear, casual wear, and accessories. Unlike traditional e-commerce systems, Vastra integrates GSAP animations and Blender based 3D product visualization for improved frontend interaction and product presentation. The system allows users to browse products, apply filters, manage Wishlist and carts, and complete secure transactions through a responsive interface. MongoDB Atlas is used for scalable inventory management, while JWT authentication ensures secure user access. An admin dashboard supports product management, order tracking, and inventory handling. Experimental testing confirmed smooth UI rendering, responsive performance, and efficient product management across multiple devices.***
Keywords: Fashion E-Commerce, MERN Stack, GSAP, Blender, 3D Product Visualization, React.js, Online Shopping.

I. INTRODUCTION

In today's digital era, fashion e-commerce platforms have become essential for improving online shopping accessibility and customer engagement. This research presents "Vastra," a MERN stack-based fashion e-commerce platform developed for modern clothing retail businesses. The system supports multiple clothing categories including men's wear, women's wear, kids' wear, ethnic wear, casual wear, and accessories. The platform is developed using MongoDB, Express.js, React.js, and Node.js to provide a scalable and responsive web solution. It also integrates GSAP animations and Blender-generated 3D product assets for immersive frontend interaction and enhanced product visualization. Unlike traditional e-commerce systems, Vastra focuses on interactive user experience, responsive UI rendering, category-based product filtering, and modern fashion presentation techniques. The system includes secure authentication, wishlist and cart management, order handling, and admin dashboard functionality while providing flexibility for future scalability and advanced digital fashion retail operations.

II. RELATED WORK

Existing e-commerce platforms mainly focus on standard online shopping workflows and static product presentation. Most systems provide features such as product categorization, cart management, and payment integration, but offer limited support for immersive frontend interaction and advanced product visualization. Several MERN stack-based applications have demonstrated efficient frontend and backend integration for online shopping systems. However, many fashion platforms still depend on traditional UI designs and static product images, which reduce customer interaction and product engagement. To address these limitations, Vastra was developed as a modern fashion e-commerce platform integrating GSAP-powered animations and Blender-based 3D product assets for enhanced user interaction and responsive shopping experiences. The platform combines scalable MERN stack architecture with responsive design, centralized inventory management, and interactive frontend functionality.

III. METHODOLOGY AND SYSTEM DESIGN

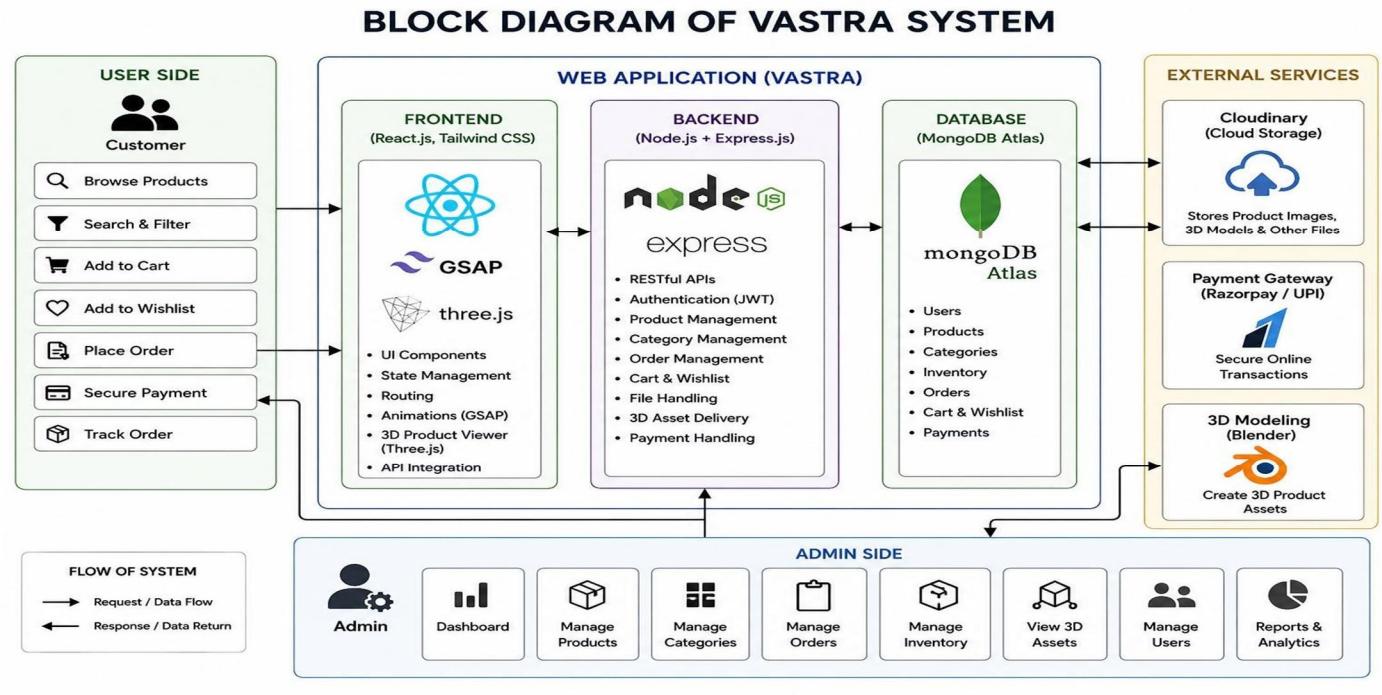
The proposed Vastra platform is designed to support efficient fashion product management and responsive online shopping through MERN stack architecture. The workflow begins when users register and browse clothing categories such as men's wear, women's wear, casual wear, and accessories. Customers can search products, apply filters, add items to the wishlist or cart, and place orders through the platform. The frontend of the system is developed using React.js and Tailwind CSS to provide responsive and user-friendly interfaces. GSAP animations are integrated for smooth transitions and interactive frontend effects, while Blender generated 3D assets improve product visualization and presentation. Node.js and Express.js are used in the backend to manage APIs, authentication, product operations, and order management workflows. MongoDB Atlas is integrated for storing user, product, inventory, and order-related data. JWT authentication ensures secure user access and account handling. An admin dashboard is provided for centralized product management, inventory tracking, order monitoring, and sales management. The overall workflow of the proposed system is illustrated through the system architecture and workflow diagrams included in this paper.

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Tools and Technologies

Tools	Technologies
Frontend	React + Vite, Tailwind CSS
Backend	Node JS , Express JS
Database	MongoDB Atlas
Animation	GSAP
Authentication	JWT
3D Modeling	Blender

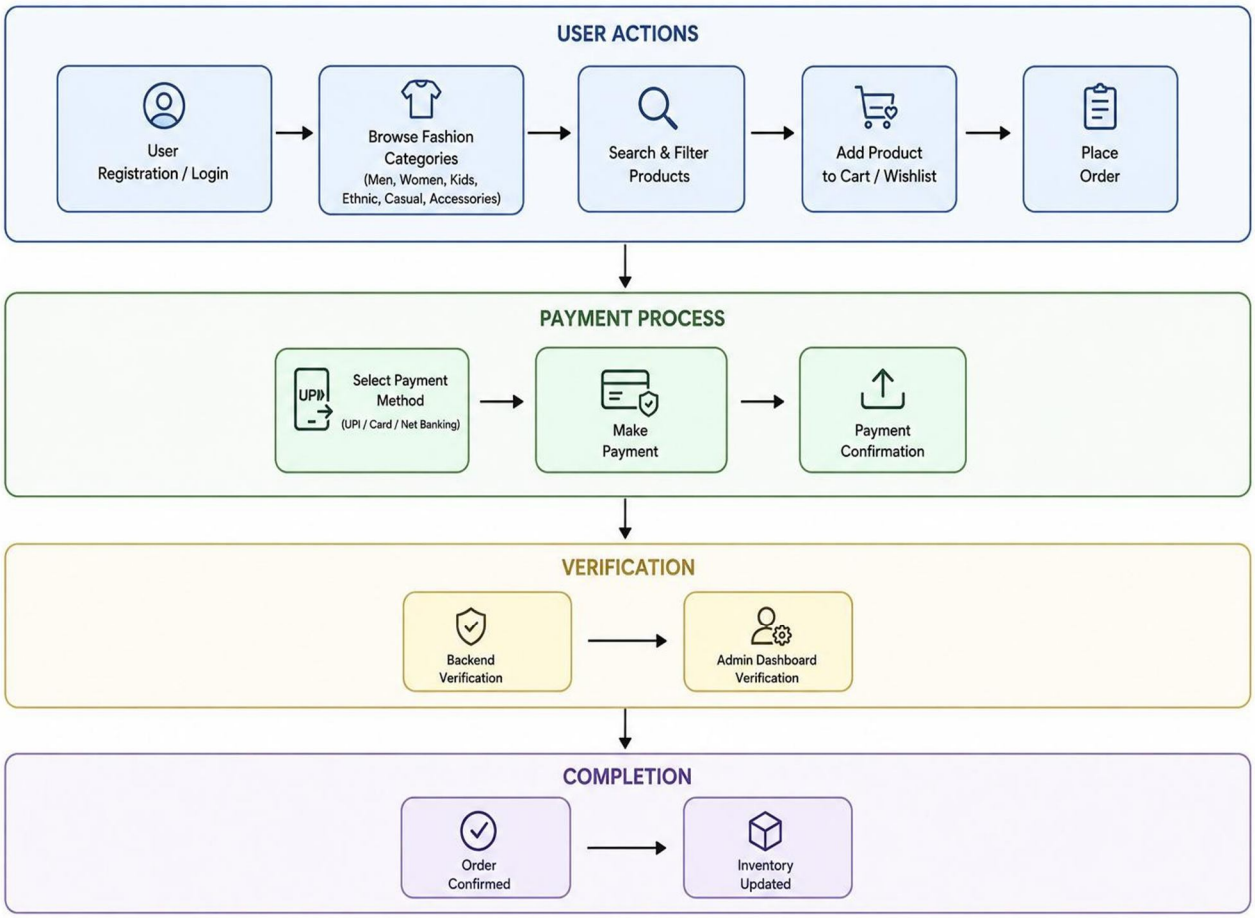
Figure 1: Block diagram of the System



IV. IMPLEMENTATION AND EXPERIMENTAL RESULTS

The implementation of Vastra focused on frontend development, backend API integration, database configuration, and interactive product visualization. React.js was used to create dynamic user interfaces for product browsing, category filtering, cart handling, and Wishlist management. Node.js and Express.js handled authentication, product management, and order processing operations, while MongoDB Atlas was used for storing user, product, and order information. One major challenge during implementation was integrating Blender-generated 3D product assets while maintaining responsive rendering performance across multiple devices. This issue was resolved through optimized asset rendering and efficient frontend integration. GSAP animations were also implemented to improve frontend responsiveness through smooth transitions, hover effects, and interactive motion-based UI components. Testing was performed on user authentication, product browsing, cart operations, responsive UI handling, and 3D asset rendering. The platform successfully supported smooth animation rendering, secure product management, responsive product visualization, and efficient order handling operations. Initial workflow testing confirmed successful category management, secure authentication, interactive frontend functionality, and centralized inventory management through the admin dashboard.

Figure2.- Payment verification and Order Processing Workflow



V. DISCUSSIONS

The development of Vastra highlighted several practical challenges involved in building modern fashion e-commerce platforms. The proposed Vastra platform demonstrates the effectiveness of a MERN-stack architecture for developing scalable and interactive fashion e-commerce applications. The project also demonstrated the advantages of MERN stack architecture for scalable fashion e-commerce development. React.js provided responsive frontend interfaces, while Node.js and MongoDB enabled flexible backend processing and efficient inventory management. The integration of interactive animations and 3D product assets improved product presentation and created a premium shopping experience for users.

VI. CONCLUSION AND FUTURE SCOPE

Vastra successfully provides a practical MERN stack-based fashion e-commerce solution for modern clothing retail businesses. The platform supports responsive product browsing, centralized order handling, wishlist management, GSAP-powered frontend animations, and Blender-generated 3D product visualization for enhanced shopping experiences. The system improved product presentation, simplified inventory management, and enhanced online customer engagement through interactive frontend functionality and scalable backend architecture.

A. Future Enhancements

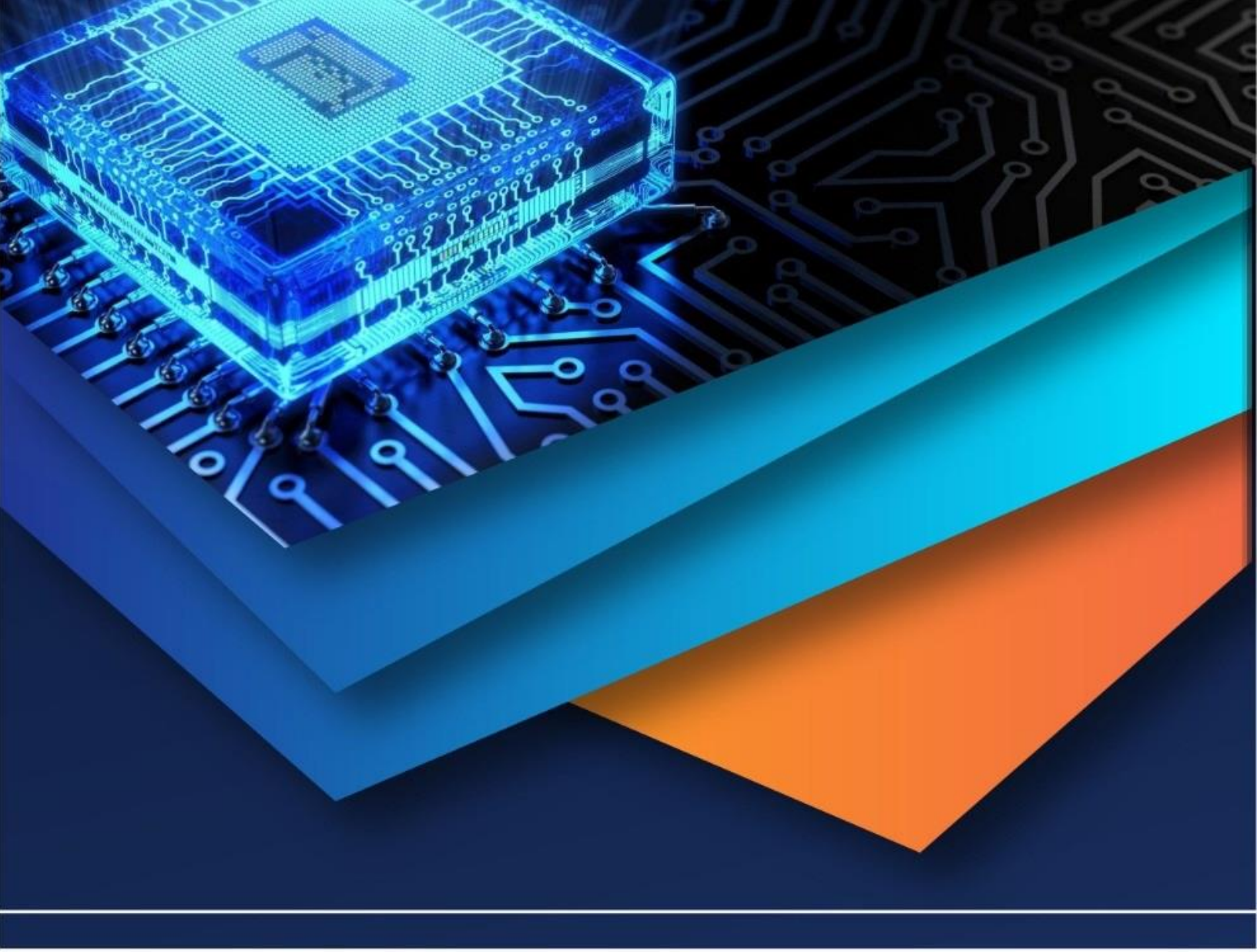
Future enhancements may include AI-based fashion recommendations, virtual try-on systems, augmented reality clothing previews, personalized shopping feeds, and mobile application support to improve scalability and customer experience. Additional analytics and recommendation systems may also be integrated for better inventory and customer management.

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