**Chapter 2: Literature Survey**

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**2.1. Introduction**

The proposed project, "3D Outfit Customizer: Design your own Custom Outfits Online," represents a novel approach to online fashion shopping that leverages cutting-edge technology to offer users an immersive and highly personalized experience. To better understand the project's context and the existing landscape of similar technologies, it is essential to conduct a comprehensive literature survey. This survey will explore the state of the art in virtual fashion design platforms, 3D modeling and rendering, AI-driven fashion customization, and user interaction within the fashion industry.

The literature survey will delve into the history and evolution of online fashion shopping, emphasizing the limitations of traditional approaches in enabling users to fully express their unique style. We will examine existing 3D virtual design studios and AI-powered fashion platforms to gain insights into the techniques and technologies that have been employed in similar contexts. This survey will provide a foundation for identifying best practices, potential challenges, and opportunities for innovation in the "3D Outfit Customizer" project, ensuring that it builds upon and surpasses the current state of the art in the field.

**2.2. Research Papers**

**Paper Title 1:** Dual-Mode User Interfaces for Web-Based Interactive 3D Virtual Environments Using Three.js

**Author:** Matthew Stanton, Thomas Hartley, Fernando Loizides, and Adam Worrallo

**Published in:** 2017

**Abstract:** Dual-mode user interface (2D+3D) enables faster information retrieval and higher user satisfaction than 3D websites alone. 2D interface has the best UI quality, 3D interface is the most aesthetically pleasing. 3D interface has worse text presentation than 2D and dual-mode interfaces. Dual-mode interface lacks a content search function, which could slow down data retrieval for users used to Ctrl+F. Dual-mode user interfaces have potential to enhance user interaction in 3D virtual environments. Future work should integrate 3D and 2D views more closely and expand the scope of the study.

**DOI:** <https://doi.org/10.1007/978-3-319-68059-0_47>

**Paper Title 2:** React JS – An Emerging Frontend JavaScript Library

**Author:** Pratik Sharad Maratkar and Pratibha Adkar

**Published in:** 2021

**Abstract:** React JS is an emerging and popular frontend JavaScript library known for its fully component-based architecture. It simplifies the development of rich UIs by using reusable components. Facebook, Instagram, and other organizations back React JS and use it in their web applications. React JS offers tools for easy debugging, including Chrome extensions.React primarily deals with the View part in MVC, so other tools are needed for backend development. Some developers may find JSX programming challenging during the learning phase. React's environment evolves rapidly, requiring developers to stay updated with its changes.The paper provides a comparison between React JS and Angular JS, highlighting their differences in terms of development, performance, and usage. It discusses React JS's architecture, including React Virtual DOM, one-way data flow, React components, and JSX syntax

**DOI:** <https://www.irejournals.com/paper-details/1702778>

**Paper Title 3:** Frontend Development with React**.**js

**Author:** Anjali Rananavare

**Published in:** 2022

**Abstract:** React.js is a popular choice for building UIs with a virtual DOM, one-way data flow, and component-based architecture. It is lighter weight, faster, and easier to use than other frameworks. It requires importing libraries for state and model management and moves away from class-based modules, but it simplifies frontend development and is popular in the industry.

**DOI:** https://www.irjet.net/archives/V7/i6/IRJET-V7I61149.pdf

**Paper Title 4:** React Apps with Server-Side Rendering: Next.js

**Authors:** Harish A Jartarghar, Girish Rao Salanke, Ashok Kumar A.R, Sharvani G.S, Shivakumar Dalali

**Published in:** 2022

**Abstract:** The paper discusses the use of React.js and Next.js to develop web applications with a focus on server-side rendering. It highlights the problem of client-side rendering causing slow page loading and proposes the use of Next.js, a lightweight React framework, to address this issue. Next.js leverages server-side rendering, which allows the server to process web pages, fetch user-specific data, and send it to the browser over the internet. The paper also emphasizes Next.js' benefits for Search Engine Optimization (SEO) and its automatic routing system using the "pages" directory.Next.js is a lightweight React framework that uses server-side rendering to improve page loading speed and performance. It also has benefits for Search Engine Optimization (SEO) and an automatic routing system. Next.js is a good solution for developing web applications where fast page loading and SEO are important considerations.

**DOI:** https://www.researchgate.net/publication/347242422\_Diving\_into\_Threejs

**Paper Title 5:** React JS (Open Source JavaScript Library)

**Authors:** Alok Kumar Srivastava, Vaishnavi Laxmi, Payal Singh, Km Pratima, Vibha Kirti

**Published in:** 2022

**Abstract:** The paper discusses React JS, an open-source JavaScript library for building user interfaces. React JS is used for handling the view layer in single-page applications and mobile application development. It highlights some of the key features of React JS, such as JSX, stateful components, and the Virtual Document Object Model (Virtual DOM). The paper also explains how React JS can be integrated into various types of applications, both simple and complex. The paper discusses the benefits of using React JS for front-end web application development. It emphasizes React's ability to create large and complex web applications that can update data without requiring page refreshes. React JS is a popular and powerful JavaScript library for front-end web development. It has a wide range of features and benefits, making it a good choice for developing both simple and complex web applications.

**DOI:** https://ijirt.org/master/publishedpaper/IJIRT153854\_PAPER.pdf

**Paper Title 6:** Modern Web-Development using React.js

**Authors:** Bhupati Venkat Sai Indla and Yogeshch

**Published in:** 2018

**Abstract:** ReactJS: JavaScript library for building modular UIs with virtual DOM, unidirectional data flow, and easy learning curve. Limitations: Primarily handles View entity in MVC, inline templates and JSX may be complex, failures at compile time. Overall: Modern and efficient approach to web development, especially for dynamic and interactive user interfaces. The development process, offers high performance through virtual DOM, and encourages unidirectional data flow. The paper emphasizes ReactJS's potential to impact the way web applications are developed and its ability to meet the demands of modern web development trends."

**DOI:** https://iarjset.com/wp-content/uploads/2021/03/IARJSET.2021.8229.pdf

**Paper Title 7: Review on React JS**

**Author: Dimpy Bansal**

**Published in: 2020**

**Abstract:** React JS is an open-source JavaScript library for building user interfaces. It is one of the most popular front-end development frameworks and is used by companies like Facebook, Instagram, and Airbnb. React JS has a number of key features that make it a popular choice for developers. It is declarative, meaning that developers can describe the desired state of the UI and React will efficiently update the DOM to match that state. React JS also uses a component-based architecture, which makes it easy to create reusable and maintainable code. Additionally, React JS has a virtual DOM, which improves performance by only updating the parts of the DOM that have changed. React JS can be used to build a variety of web applications, including single-page applications (SPAs), mobile apps using React Native, and e-commerce websites.

**DOI:** <https://www.ijcrt.org/papers/IJCRT2004607.pdf>

**Paper Title 8:** Role of Node.js in Modern Web Application Development

**Authors:** Ghansham Jadhav and Flavia Gonsalves

**Published in:** 2020

**Abstract:** The paper discusses the role of Node.js in modern web application development. It explains Node.js's modularity, its built-in package manager (Node Package Manager or NPM), and its working architecture. The key features of Node.js, including event-driven I/O, single-threaded, and asynchronous programming, are discussed with examples to provide insights into Node.js's working architecture. "Node.js is a JavaScript runtime environment built on Chrome's V8 JavaScript engine, designed for server-side applications. It focuses on low memory consumption and performance, making it suitable for building scalable and lightweight applications. Node.js allows developers to use JavaScript for both client and server-side scripting. It uses event-driven, non-blocking, and asynchronous approaches, enabling it to handle concurrent requests efficiently.

**DOI:** <https://www.scribd.com/document/597752129/RESEARCH-PAPER-Node-js>

**Paper Title 9:** Comprehensive Analysis of React-Redux Hybrid App Development Framework

**Authors:** Shravan G V, Prof. Anitha Sandeep

**Published in:** 2020

**Abstract:** The research paper explores the use of the React-Redux framework for developing hybrid web applications that can run on both Windows and iOS platforms. React-Redux is a framework that allows developers to create applications for multiple native platforms using a single codebase written in JavaScript ES6. The framework utilizes Redux for state management in React Native applications and incorporates various dependencies developed by other React Native developers, such as database and user interface components. The research aims to judge the user experience of web applications developed using the React-Redux framework as satisfactory. The paper suggests that creating user interfaces with React-Redux is easier compared to other platforms. React-Redux is capable of generating both simple and complex applications for cross-platform use, with a focus on high data fetching without caching.

**DOI:** <https://hpi.de/fileadmin/user_upload/fachgebiete/doellner/publications/2012/DHK2012/paper.pdf>

**Paper Title 10:** Survey And Analysis Of Rendering Realtime 3D Object On Cross-Browser & Cross-Platform Using WebGL

**Authors:** Yogiraj Patil, Kirti Wanjale

**Published in:** 2020

**Abstract:** The paper focuses on rendering real-time 3D objects using WebGL, a Web Graphics Library, and JavaScript. It discusses the challenges of rendering 3D objects in real-time, considering factors like varying screen sizes and processing power of different devices. It discusses the use of JavaScript frameworks for developing 3D web applications. The paper explores various rendering approaches and techniques for complex 3D objects in real-time using web browsers and WebGL. It emphasizes the importance of optimized rendering for web-based 3D applications. The paper mentions the use of glTF (GL Transmission Format) for efficient 3D model representation in WebGL.The paper acknowledges the challenges of rendering 3D objects in real-time on various devices and screen sizes. It highlights the role of JavaScript frameworks and WebGL in enabling 3D web applications. The paper mentions the importance of efficient data representation using technologies like glTF.

**DOI:** <https://www.jetir.org/papers/JETIR2105815.pdf>

**Paper Title 11:** Robust Real-Time Shadows for Dynamic 3D Scenes on the Web

**Authors:** Tim Nicolas Eicke, Yvonne Jung, and Arjan Kuijper

**Published in:** 2014

**Abstract:** The paper addresses the challenge of rendering high-quality shadows in 3D scenes on the web using the open-source JavaScript framework X3DOM, which integrates declarative 3D into HTML5. The authors examine existing shadow mapping techniques and develop a concept for enhancing shadow display in X3DOM. They implement Variance Shadow Maps and Parallel Split Shadow Maps (PSSM) to improve shadow quality and discuss the limitations of WebGL, the graphics library on which X3DOM is based, in comparison to other 3D frameworks like Three.js. The research focuses on improving the quality of real-time shadows in web-based 3D scenes.

**DOI:** <https://doi.org/10.1007/978-3-319-07857-1_101>.

**Paper Title 12:** Movie Data Visualization Based on WebGL

**Authors:** Min Li, Chunfang Li

**Published in:** 2020**1**

**Abstract:** The paper uses WebGL, a technology that allows for the rendering of interactive 3D graphics on web pages without using plugins. It utilizes the open-source framework Three.js to create complex 3D scenes. The research implements five types of 3D data visualization charts: histograms, pie charts, maps, earth representations, and force-directed graphs. These visualizations are used to display film-related data. The paper mentions that 3D data visualization charts are rarely involved in current data visualization practices, but it does not elaborate on the specific limitations or disadvantages of 3D data visualization compared to 2D visualization.

**DOI:** 10.1109/SNPDWinter52325.2021.00023.

**Paper Title 13:** Comprehensive Analysis of React-Redux Development Framework

**Authors:** Shravan G V and Prof. Anitha Sandeep

**Published in:** 2020

**Abstract:** The research paper discusses the utilization of the React-Redux framework for developing hybrid applications compatible with both Windows and iOS platforms. The framework leverages JavaScript ES6 for implementation. React-Redux is a combination of React, developed by Facebook, and Redux for state management in React Native. The paper also mentions the use of other dependencies developed by React Native developers, such as databases and user interfaces. "The research work aims to judge the user experience of web applications created using the React-Redux framework as satisfactory. It examines whether user interface creation is easier compared to other platforms. It differentiates between the generation of simple and complex applications using React-Redux.

**DOI:** <https://core.ac.uk/download/pdf/301384737.pdf>

**Paper Title 14:** Server-Based Rendering of Large 3D Scenes for Mobile Devices Using G-Buffer Cube Maps

**Authors:** Juergen Doellne, Benjamin Hagedorn

**Published in:** 2020

**Abstract:** The paper introduces a server-client approach for rendering large 3D scenes on mobile devices. Instead of streaming 3D scene data to clients, the approach splits 3D rendering into two processes: a server process for real-time rendering of virtual panoramas represented by G-buffer cube maps and a client process for reconstructing the 3D scene and enabling user interaction. The paper demonstrates that this server-based rendering approach is effective in rendering large 3D scenes on mobile devices. It decouples the complexity of the 3D scene from data transmission complexity, allows for advanced 3D rendering on the server, and provides a high degree of protection for 3D content while supporting interactive user experiences on clients. The paper does not explicitly mention any disadvantages or gaps in the research. Different types of 3D visualizations are implemented for film-related data, such as histograms, pie charts, maps, and force-directed graphs.

**DOI:** https://ijcrt.org/papers/IJCRT2205332.pdf

**Paper Title 15: The Research and Design Of 3D Web Guide System Based On WebGL**

**Authors:** Cui Peng

**Published in:** 2021

**Abstract:** The paper presents a 3D Web guide system based on WebGL and three.js. It involves the use of HTML5 and Canvas for rendering, three.js for scene creation and rendering, NodeJS for server-side implementation, Socket.IO for WebSocket communication, and A\* algorithm for shortest path search. The research paper describes the development of a 3D Web guide system that allows users to navigate unfamiliar environments using their mobile phones. It employs WebGL, three.js, and various web technologies to create interactive 3D scenes and calculate optimal paths between scenes. The system is designed for use in large amusement parks and shopping malls, serving as a form of advertising and a new type of 3D web application.

**DOI:** https://www.ijtsrd.com/papers/ijtsrd42490.pdf

**Paper Title 16: Performance Optimization using MERN stack on Web Application**

**Authors:** Sourabh Mahadev Malewade, Archana Ekbot

**Published in:** 2021

**Abstract:** The research project focuses on the development of an e-commerce web application using the MERN stack, which includes React.js, MongoDB, Node.js, and Express.js. The authors discuss the methodologies and technologies used to create and implement the web application. The use of React.js, MongoDB, Node.js, and Express.js in building the web application. The advantages of using Node.js for asynchronous, event-driven programming. The role of Express.js in simplifying back-end code and providing middleware support. The benefits of React.js in building user interfaces with components.

**DOI:** http://ijrra.net/Vol5issue1/IJRRA-05-01-27.pdf

**Paper Title 17:** Efficient visualization of 3D models by web browser

**Authors:** Bartosz Sawicki and Bartosz Chaber

**Published in:** 2013

**Abstract:** The paper presents a software module designed for efficient and convenient visualization of 3D models inside a web browser environment. It is written purely in JavaScript and takes advantage of the new HTML5 standard. The authors focus on mobile devices, emphasizing efficiency and low network usage. They propose a solution based on progressive mesh streaming and compare it with server-side rendering approaches. The findings of the paper include the successful development of a JavaScript-based web component for 3D model visualization in web browsers.

**DOI:** https://www.jetir.org/papers/JETIR2105815.pdf

**Paper Title 18:** 3D Rubik's Cube - Online 3D Modeling System Based on WebGL

**Authors:** Buyun Sheng, Feiyu Zhao, Chenglei Zhang, Xiyan Yin, Yao Shu

**Published in:** 2017

**Abstract:** The paper introduces an online 3D modeling system called "3D Rubik's Cube" based on WebGL and Three.js. It achieves online 3D modeling through web front-end technologies and the establishment of a web server using Node.js. The system enriches 3D modeling functionality and enhances rendering effects through an improved Phong reflection model, Constructive Solid Geometry (CSG) tree, and triangular patches intersection testing and division algorithms. The paper demonstrates the development of an online 3D modeling system that allows cloud-based 3D model design. It leverages WebGL for 3D rendering and provides a range of 3D modeling functions.

**The paper provides a DOI: 10.1109/ITNEC.2017.8284798.**

**Paper Title 19:** WEBAPP SERVICE FOR BOOKING

**Authors:** Saundariya K, Prabakaran D

**Published in:** 2021

**Abstract:** The paper describes the development of a web application for booking handyman services. The system is built using the MERN stack, which includes MongoDB for the database, Express JS for the server, React JS for the front-end, and Node JS for the back-end. The system uses technologies like Axios for HTTP requests, JWT for data security and authentication, React-Redux for global state management, and Node-Mailer for sending notifications through email. The research presents a user-friendly website that allows users to easily book handyman services online. It offers various services like cleaning, COVID-sanitization, furniture maintenance, electrical works, appliance repair, house painting, and plumbing. Users can select services, view available professionals based on location and cost, and book them. Handyman professionals can showcase their skills and accept or decline tasks.

**DOI:** https://books.google.com/books?hl=en&lr=&id=Xja9BwAAQBAJ&oi=fnd&pg=PP1&dq=three.js&ots=Rs3arD1d3b&sig=docKcu1uqZPFerJwohOOfpd-BZE

**Paper Title 20:** HANDYMAN USING MONGO DB, EXPRESS JS, REACT JS, NODE JS

**Authors:** Abirami M, Srimathi B, Senthil Kumaran R, Nagarajan G (IEEE Member)

**Published in:** 2021

**Abstract:** The paper describes the development of a web application for booking handyman services. The system is built using the MERN stack, which includes MongoDB for the database, Express JS for the server, React JS for the front-end, and Node JS for the back-end. The system uses technologies like Axios for HTTP requests, JWT for data security and authentication, React-Redux for global state management, and Node-Mailer for sending notifications through email. The research presents a user-friendly website that allows users to easily book handyman services online. It offers various services like cleaning, COVID-sanitization, furniture maintenance, electrical works, appliance repair, house painting, and plumbing. Users can select services, view available professionals based on location and cost, and book them. Handyman professionals can showcase their skills and accept or decline tasks. The system aims to provide a convenient and cost-effective solution for connecting users with professional workers.

**DOI:** https://link.springer.com/chapter/10.1007/978-1-4302-3997-0\_7

**Paper Title 21:** Immersive 3D Modeling with Blender and Off-the-Shelf Hardware

**Authors:** Matthew Stanton, Thomas Hartley, Fernando Loizides, and Adam Worrallo

**Published in:** 2021

**Abstract:** The 3D modeling application was implemented in a short time frame using readily available hardware and software. The hardware used included a standard desktop computer, a 3D display (Panasonic TV), PlayStation Move controllers for user input, and a head-mounted PS Move controller for head tracking. The application combined 3D modeling tools with logical mappings to controller buttons, making it more intuitive for users.

**DOI:** 10.1109/3dui.2013.6550243

**Paper Title 22:** A Framework for Browser-based Multiplayer Online Games using WebGL and WebSocket

**Authors:** Bijin Chen, Zhiqi Xu

**Published in: 2**011

**Abstract:** The paper introduces a framework for creating browser-based multiplayer online games using HTML5, WebGL, and WebSocket technologies. It discusses the background of these technologies, such as HTML5's support for multimedia and graphics, WebGL for 3D graphics, and WebSocket for real-time communication. The authors implement a framework for a multiplayer online game (MOG) using Three.js for 3D rendering and jWebSocket for communication. The architecture of the framework involves clients, web servers, and game servers, with web workers optimizing communication between servers and clients.

**DOI:** [10.1109/ICMT.2011.6001673](https://doi.org/10.1109/ICMT.2011.6001673).

**Paper Title 23:** Investigating Web3D topics on StackOverflow: a preliminary study of WebGL and Three.js

**Authors:** Farag Almansou ry, Sègla Kpodjedo, and Ghizlane El Boussaidi

**Published in:** 2020

**Abstract:** The paper investigates the attention and support received by WebGL and Three.js, two important Web3D technologies, on Stack Overflow. The authors focused on questions tagged with either WebGL or Three.js and extracted information from these questions, including the number of questions, cumulative views, and average views for each tag. They also analyzed the community support by looking at the failure rate (percentage of questions without accepted answers) and the median wait time for satisfactory answers.

**DOI:** [0.1145/3424616.3424726](https://doi.org/10.1145/3424616.3424726).

**Paper Title 24:** Web 2.0 and Virtual World Technologies: A Growing Impact on IS Education

**Authors:** Albert L. Harris and Alan Rea

**Published in:** 2009

**Abstract:** The paper discusses the use of Web 2.0 technologies and virtual world technologies in information systems (IS) education. It explores various Web 2.0 technologies, including wikis, blogs, podcasts, social networks, and virtual worlds. The authors examine how these technologies are being incorporated into IS education and discuss their potential advantages and disadvantages.

**DOI:** https://link.springer.com/chapter/10.1007/978-1-4302-3997-0\_7

**Paper Title 25:** Research and Application of Web3D Exhibition Based on WebGL and Html5

**Authors:** M.J. Bian, J. Gao, H.H. Gao, J.P. Xu

**Published in:** 2015

**Abstract:** The paper presents a solution for creating Web3D exhibitions by combining WebGL and HTML5. It introduces the Web3D Exhibition Building System (Web3D-EBS), which is designed to build Web3D exhibitions in web applications. This system aims to improve compatibility and efficiency in Web3D exhibition applications, eliminating the need for plugins and relying on GPU rendering.

**DOI:** <https://link.springer.com/content/pdf/10.1007/s00607-012-0275>

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**2.4. Conclusion**

In conclusion, the "3D Outfit Customizer" project aims to transform the online fashion shopping experience by providing a 3D virtual platform for users to design and customize their outfits. By addressing the limitations of traditional online shopping, this project has the potential to revolutionize the fashion industry and empower users to express their unique style while enjoying an immersive and interactive shopping experience. Despite potential challenges and limitations, the project's advantages in personalization and creativity make it a promising endeavor for modern fashion enthusiasts.