3D Jersey Design with ThreeJS and Generative AI

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ACM Reference Format:
Mahmudul Hassan, Abu Sayed, Shariful Islam, Rezwan Aziz Prince, and Annajiat Alim Rasel. 2024. 3D Jersey Design with ThreeJS and Generative AI . 1, 1 (May 2024), 4 pages. https://doi.org/XXXXXXX.XXXXXXX

1 ABSTRACT

The 3D Jersey Design Project offers a new creative design tool based on React JS, Three JS, Node JS and Valtio technologies. The tool allows users to create unique sports jerseys with 3D visualisation. The research is the technology the platform uses and how it affects users engagement and creativity. Utilizing generative artificial intelligence, the project proposes custom-made design options, elevating users creativity and engagement. The platform leads to democratization of design process and allows any user from diverse level of experience to participate. The objective of this document is to discuss the effects of these technologies on the creative industries and personal expression, taking into consideration user feedback and the engagements metrics.

2 INTRODUCTION

As the environment of digital technology keeps on changing with the time, the adoption of interactive tools and artificial intelligence plays a pivotal role in the area of custom apparel design. The 3D Jersey Design Project reaps the benefits of this technological progress through a platform which enables the users to design their personalized sports jerseys in a three-dimensional space. This project uses a combination of React JS, Three JS, Node JS and Valtio to develop a beautiful design interface that is similar to the ease of sketching on the paper but with the sophistication of the real-time display of the 3D design.

The conventional way of designing jersey has been restrictive to the designers with high graphic design skills and textile knowledge, thus limiting access to only the pros or those who may have specialized training. As a result of the advancement of intuitive and easy to use platforms like the 3D Jersey Design Project, the process becomes democratic;

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Manuscript submitted to ACM

thus, people who do not have any formal design training can participate effectively in the creation of their personalized apparel. This affordability covers involvement with broader creative expression and design.

One of the most notable parts of this project is the utilization of generative artificial intelligence, which supplies users with creative prompts and options. This AI-driven feature aims to make the creative process more fruitful and innovative by providing authentic and bespoke design items that users can apply to their jerseys. The AI system acclimatises to the user interactions, growing into offering more purposeful and pertinent tips, consequently augmenting the user experience and promoting innovation and creativity.

This paper will describe the technical details of the 3d Jersey design platform, detailing both the moving parts that add up to the overall video and the user experience of the platform. Besides, the paper will trace the importance of generative AI in enhancing creativity and what are the transformative aspects of it when it comes to the way the user interacts with digital designing tools. Through data analysis of the user feedback and engagement metrics, the research is going to untangle the phenomenon of the online platform appearance, in which design of the sports apparel is becoming the means of expression and interaction within the wider community.

Considering all, it would be manifest enough that advanced digital technologies and AI could be effectively employed in creative business areas, if in addition to the above mentioned goals, they will look to bridging the gap and thus creating construction platforms that are more accessible and educating for the public less educated on design sciences. This project represents a big step in the revolution of how media art has the power to touch the soul and it can contribute to bonding communities on the web.

3 LITERATURE REVIEW

3.1 An Approach for Systems Identification using Artificial Intelligence

The paper evaluates a piece of writing that talks about how genetical algorithms (GAs) are being applied to medicine and business with stunning success. This is where the difference between how GA turns around the subject is shown. Apart from the pros, this paper also introduces some of the challenges seen with GAs, among others being difficulties when dealing with big data and processes that might quit early. In spite of above mentioned obstacles, the report displays how GAs can move further, for example, in digital marketing and design, stressing the potency of information and increasing the effectiveness. The paper argues that including more information about GAs' firm and feeble facets and making similarities to other AI techniques, the readers will be able to understand easily and to see the possibility for further development and use.

3.2 A 3D Process Design Kit Generator based on Customizable 3D Layout Design Environment

This paper focuses on connecting computer chips in three dimensions. For the process of design kit it introduced a toolkit that helps designers to create these connections quickly and efficiently. This is a very user-friendly toolkit and designers can customize and design easily. For implementation of the design, it involves creating a toolkit with all the necessary parts and customize it for specific needs. In the end, the paper suggests adding more tools and following industry standards to make the process even better.

3.3 Strategies for Web Application Development Methodologies

In this paper methodology involves an extensive review and evaluation of several web applications-specific improvement approaches and methodologies. Object-Oriented, UML-based, Agile and others are included. The fundamentals, methods

and effectiveness of each methodology for developing web applications are evaluated. However, If we talk about the result of this paper, the analysis's output suggests various web applications and various kinds of development for web applications approaches that are accessible. Every strategy has unique advantages and factors including CORBA-based methods to Agile methods like Extreme Programming and AWDWF. Moreover, UML-based methods offer organized platforms for developing and managing web applications. According to the analysis, it is clear that Agile approaches, such AWDWF and Extreme Programming, prioritize quick prototyping, rapid development, and interaction with customers. These methods work particularly well in dynamic web scenarios where requirements shift frequently.

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3.5 Codes Reviewed

3.5.1 Three JS implementations from github. We looked at several github repositories for our project implementation. First we used React Js for our frontend. We watched youtube tutorials for this part. Implementation of three js was discovered from a github repository.

3.5.2 Generative AI from github. For the instant reply from AI for suggestions on jersey or any other query we used gemini pro chatbot from the github repository.

4 DATASET ANALYSIS

For 3D representation of the jersey we used a glb jersey image. Due to the limitations of glb files we only can work with one glb file. We would like to extend our areas by collecting more glb files of pants/shirts or even punjabi. Enhancing versatility for users to customize their designs according to their preferences. For logo and full texture incorporation, we currently accept png/jpg files with plans to extend compatibility to include pdf/word files. Besides adjustments to shadows and lighting parameters, a dataset was created by us. Such as temporal settings, frame rates, and spatial attributes, yield notable visual enhancements. We developed a dynamic and user-friendly interface for our frontend using React JS. To provide depth and visual appeal, we then used Three JS which is a package well-known for its capacity to enable 3D animations on the web. One of our best-known models was a jersey called "shirt baked.glb" which we embellished with textures, patterns, and logos in popular image formats like PNG and JPG. We used Tailwind CSS for styling to make sure everything looked perfect, which helped us stay efficient and consistent throughout the design process. We focused especially on the shadows in order to create a more realistic 3D environment. For a realistic effect we tinkered with transparency levels and altered settings like temporal shadows which update at a smooth 60 frames per second. In order to create the ideal environment, we also carefully placed four light sources and adjusted their ambient lighting and brightness. These minor elements came together to provide a frontend that not only looks fantastic but also gives consumers a compelling, immersive experience.

5 METHODOLOGY

We used React JS, Node JS, Three JS, Generative AI. React.js for the frontend or website. Things like buttons and menus were a part of that. Node.js helped with the authentication. Gemini Pro for generative artificial intelligence help. For thel 3D animations, we used Three.js. It made our gemstones look real, with shadows and light effects. By putting all these things together, we made a fun website where people can design their own jersey in 3D.

5.1 ReactJS

5.2 ThreeJS

5.3 Responsive 3D model and Texture

5.4 Color Picker

5.5 Logo Picker

5.6 Generative AI

6 VISUALIZATION

7 RESULT ANALYSIS

8 CHALLENGES

9 FUTURE WORK

For future work, we would like to add more research on the algorithms that may be required to improve both the accuracy and the efficiency of the AI-powered design extraction function. This means improving the tool's ability to handle various forms of web material and ensuring that it is effective while getting complex designs from several sources. Several clothing options may be added to provide consumers even more creative choices. Adding more GLB files of shirts/ pants or even panjabi can be implemented through this project. The latest version of natural language processing models like GPT-4 may be used to upgrade the AI system and significantly increase the depth and quality of AI replies. With the help of this advanced model, consumers may receive better guidance and design suggestions in response to queries that are more accurate and contextually relevant. Customers can provide feedback on the concepts and designs that the AI provides by creating a user feedback system. Through this feedback loop, the AI algorithms would be improved over time, allowing the system to constantly adjust to the preferences and needs of its users. Implementing capabilities for collaboration allows multiple people to collaborate in real time on design projects. This could involve interactive things like commenting, sharing, and co-editing. We would like to work on some hugging face models to implement face or body textures and how it collaborates with the designed item. It will certainly add a new dimension to this project. People will get to know that the specific jersey designed fit for them or not. As it is 3D and color combination will give us proper output hopefully.

10 CONCLUSION

11 REFERENCES