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Fabric To Virtual Dress

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Abstract: ***The "Fabric to Virtual Dress" project presents a web-based application designed to revolutionize the traditional garment selection process by enabling users to visualize how a fabric will appear on a chosen dress model. By integrating computer vision and AI techniques—specifically Stable Diffusion for image generation—the system allows users to upload fabric images and preview their appearance on customized outfit styles in real time. This virtual try-on experience enhances the shopping and tailoring process by reducing reliance on physical samples and minimizing fabric waste. The application supports personalization, offers greater convenience, and helps users make informed fashion decisions. Built with a modern tech stack including HTML, CSS, JavaScript, Flask, and MongoDB, the system provides a scalable and user-friendly platform suitable for both individual consumers and fashion retailers.***

Keywords: Fabric Visualization, AI in Fashion, Stable Diffusion, Computer Vision, Outfit Customization, Digital Fashion Preview, Fabric-to-Dress Mapping, Real-Time Visualization, Image Generation, Flask Web Development, MongoDB

I. INTRODUCTION

Fabric selection plays a pivotal role in garment design, yet customers and designers often struggle to visualize how a fabric will appear once tailored into a specific dress style. Traditional processes rely on physical swatches, sketches, or sample garments, which can be time-consuming, costly, and prone to misjudgement . To bridge this gap, we present a web-based **Fabric to Virtual Dress** visualization System that allows users to upload fabric images and preview how the fabric would look on a digital dress model. Unlike virtual try-on systems that focus on fitting garments to human models, our solution emphasizes the aesthetic translation of fabric onto predefined dress silhouettes. By leveraging artificial intelligence—specifically the Stable Diffusion model for image generation—our system blends fabric textures seamlessly onto selected dress templates, producing realistic and visually compelling outputs. The platform features an intuitive user interface built with HTML, CSS, and JavaScript, while the backend utilizes Flask, Python, and MongoDB for efficient processing and data management. This tool enhances creativity, improves decision-making, and reduces fabric waste. It is suitable for consumers, tailors, and fashion designers seeking an accessible, real-time preview of fabric-to-garment outcomes, marking a significant advancement in digital fashion technology.

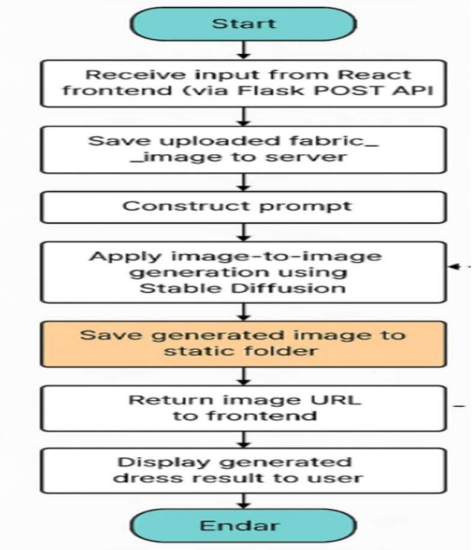
II. LITERATURE SURVEY

The evolution of technology in the fashion industry has led to the development of various digital tools aimed at improving garment visualization and customer engagement. Traditional fabric selection relies on physical swatches and hand-drawn sketches, which offer limited insight into how a fabric will appear when tailored into a specific dress design. This process is time-consuming, subjective, and often leads to poor decision-making and

material waste. To overcome such limitations, virtual try-on systems have emerged, with notable examples like VITON (Virtual Try-On Network) focusing on overlaying pre-designed clothing onto human models using deep learning. However, these systems primarily serve e-commerce applications and emphasize garment fitting rather than visualizing raw fabric on garment designs. 3D clothing simulation tools such as CLO3D and Marvelous Designer offer high-fidelity visualizations but require advanced modeling skills and are not accessible to general users. These platforms assume that garment styles already exist, lacking support for dynamically mapping user-provided fabric images onto various dress templates. Despite progress in virtual fashion, there is a clear gap in systems that allow real-time, automated visualization of how a selected fabric will look on a specific dress design. Our proposed system addresses this by enabling accessible, AI-driven fabric-to-dress rendering through a user-friendly web interface.

III. PROPOSED METHODOLOGY

The proposed methodology involves developing a web-based system that allows users to visualize how a given fabric will appear on a predefined dress model. Users begin by uploading a fabric image and selecting design parameters such as dress style, neckline, and sleeve type. These inputs are processed by a Flask-based backend that constructs a descriptive prompt incorporating the user's selections. This prompt, along with the fabric image, is fed into a Stable Diffusion model, which performs image-to-image generation to synthesize a realistic rendering of the fabric applied to the chosen dress design. The generated image is saved and returned to the frontend, developed using HTML, CSS, and JavaScript, for user preview. MongoDB is employed for managing user data and metadata associated with fabric inputs. This approach enables real-time, automated fabric-to-dress visualization, providing users with an intuitive and interactive interface for exploring garment aesthetics without relying on physical prototypes.



IV. IMPLEMENTATION

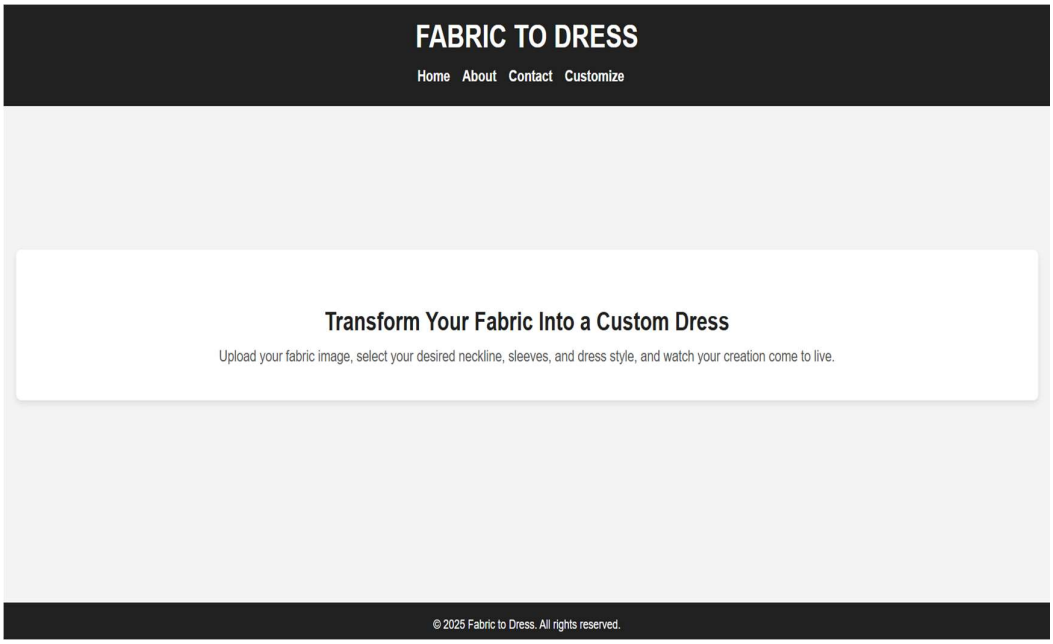
A) Technologies Used

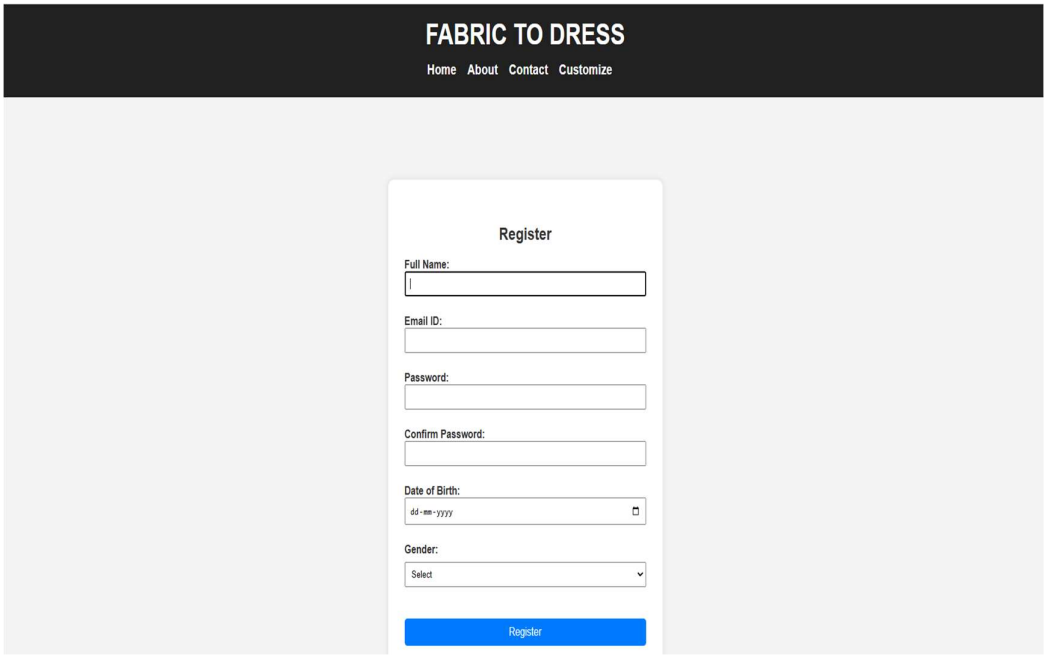
The system is implemented as a web-based application utilizing both frontend and backend technologies. The frontend is developed using HTML5, CSS3, and JavaScript to ensure a responsive and interactive user experience. The backend is built using Flask (Python), which handles user inputs, image processing, and integration with the AI model. MongoDB is used as the database to manage user data and fabric metadata efficiently. The application is deployed on a system with a minimum configuration of Intel i5 processor, 8GB RAM, and 256GB storage, ensuring smooth performance during model execution and image rendering.

B) Algorithms

The core of the system's functionality is powered by the Stable Diffusion algorithm, a generative AI model used for image-to-image transformation. Upon receiving the fabric image and user-selected design parameters, the backend constructs a text prompt describing the desired dress style. This prompt, along with the fabric image, guides the Stable Diffusion model to generate a realistic dress visualization. The model operates in two phases: a forward diffusion process that adds noise to images, and a reverse denoising process that reconstructs the final image. This enables accurate and high-quality blending of fabric textures onto virtual dress designs in real time.

V. RESULT

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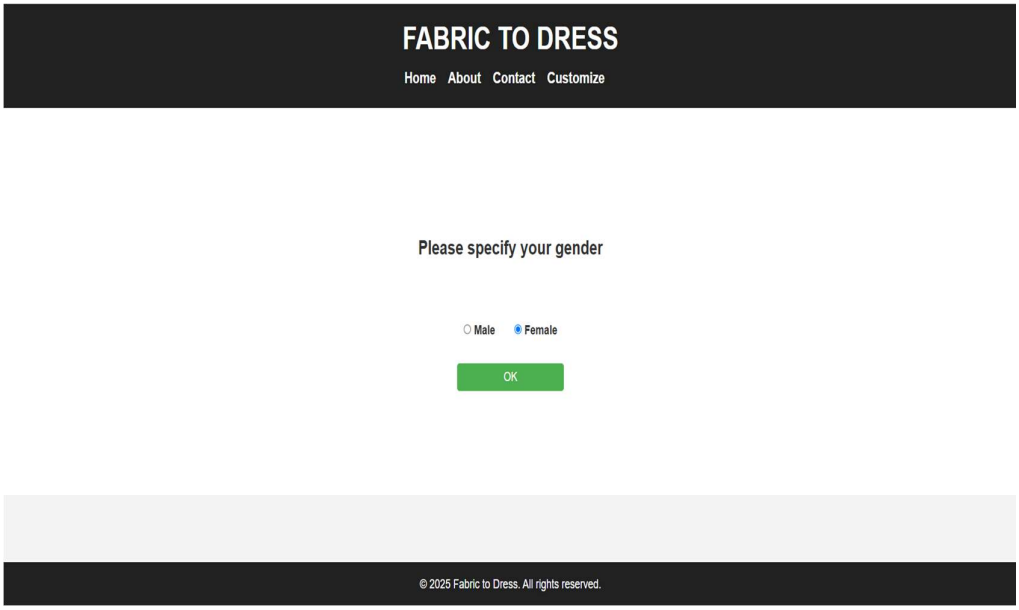
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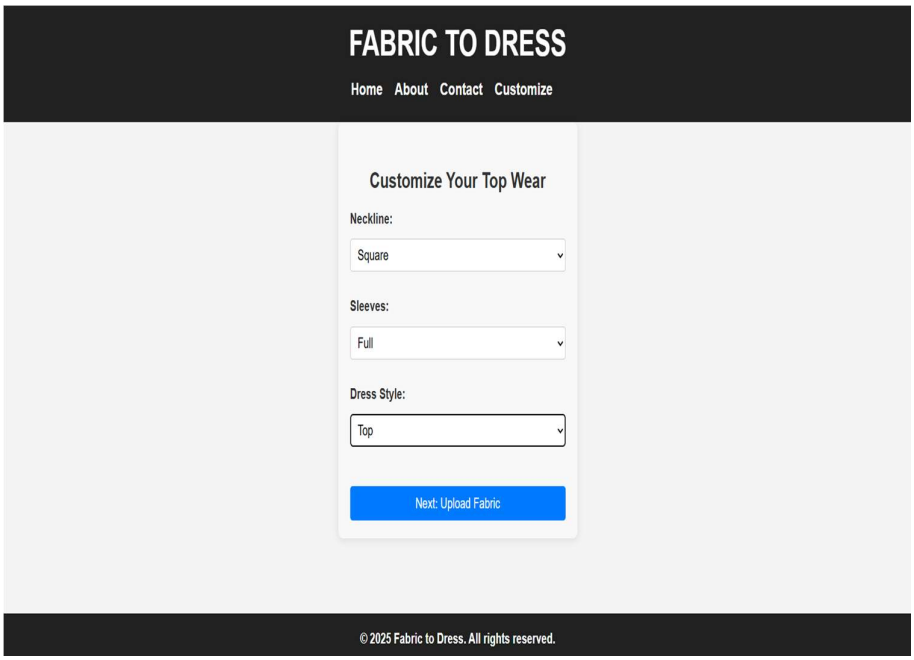
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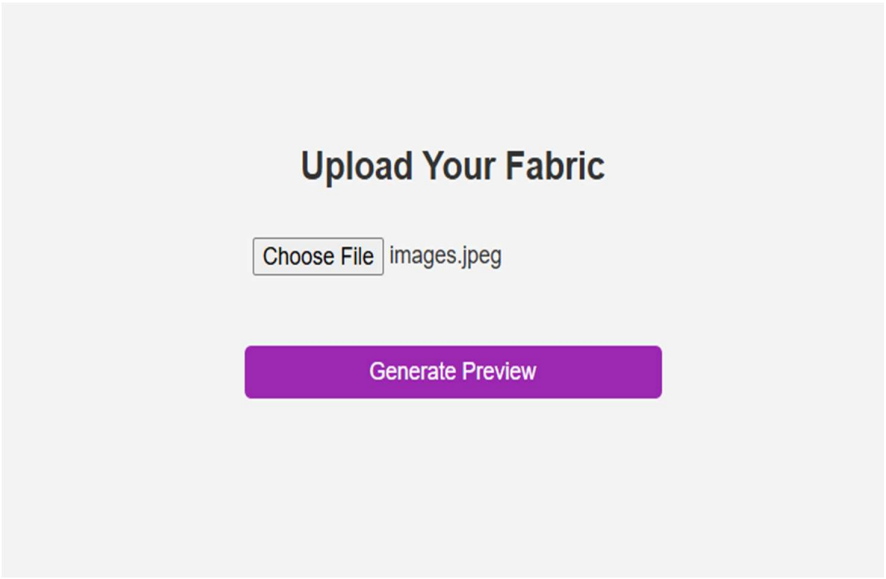
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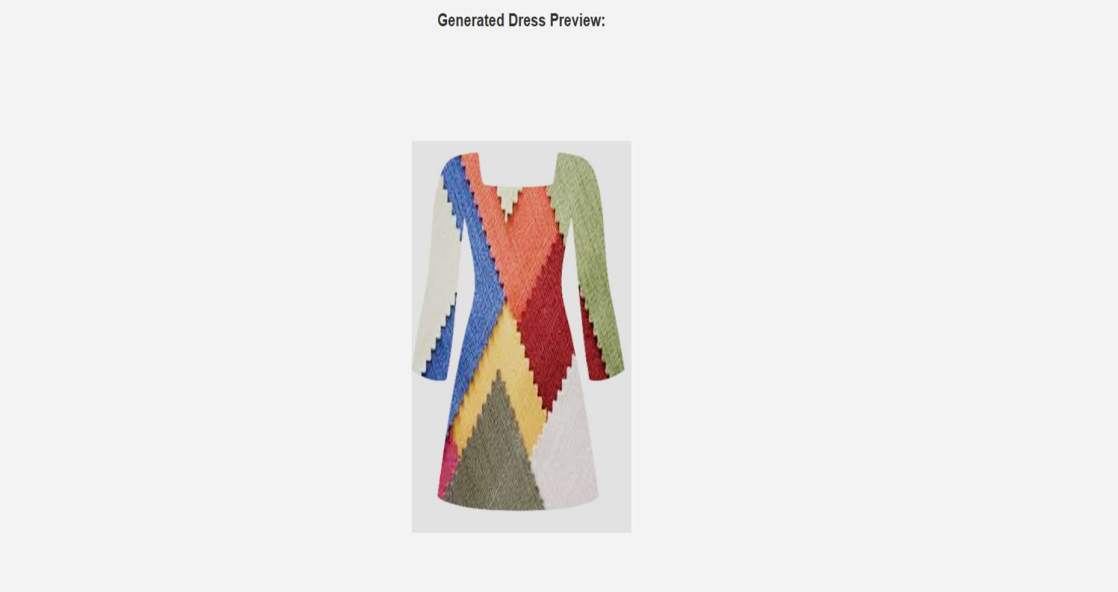

VI. CONCLUSION

The Fabric to Virtual Dress Visualization System presents an innovative solution to a longstanding challenge in the fashion and textile industry—visualizing how a fabric will appear when tailored into a specific garment design. Unlike traditional methods that rely on physical sampling or basic sketches, this system offers a realistic, real-time preview of fabric-to-dress outcomes through the integration of artificial intelligence and web technologies. By leveraging Stable Diffusion, a powerful generative AI model, the system is capable of accurately rendering fabric textures onto various dress styles, allowing users to make more informed and creative design decisions. The user-friendly web interface, supported by a robust backend architecture using Flask and MongoDB, ensures accessibility and efficiency for both consumers and fashion professionals. This approach reduces the need for physical trials, minimizes fabric waste, and enhances overall user satisfaction. The system not only modernizes the design process but also introduces a scalable platform for digital innovation in fashion. In future work, the model can be expanded to support 3D garment visualization, body personalization, or integration into e-commerce platforms. Overall, the project demonstrates the practical impact of AI-driven tools in enhancing the intersection of technology, design, and user experience in the fashion domain.

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