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Virtual Reality Technology for Enhancing the Online Shopping Experience for Clothing

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ABSTRACT: This paper proposes a virtual reality algorithm for furnishing applicable dress sizes using 3D modelling and machine literacy ways. The virtual representation of the client's body is created using body dimension data attained through colourful ways, similar as photogrammetry or body scanning. The machine literacy model is trained on a large dataset of body measures and corresponding apparel sizes, and uses this data to give individualized recommendations for the client. The proposed algorithm can significantly enhance the online shopping experience for apparel by furnishing guests with an immersive virtual pass-on experience, reducing the need for physical pass-on and implicit returns due to incorrect sizing. Unborn exploration can explore the eventuality of this algorithm in other areas of fashion, similar as footwear and accessories, as well as exploring the feasibility of incorporating other technologies similar to stoked reality to enhance the virtual pass-on experience.

KEYWORDS: 3D MODELLING, MACHINE LITERACY, PHOTO GRAMMETRY, APPAREL, VIRTUAL PASS-ON

I. INTRODUCTION

Online shopping has revolutionized the way individuals purchase dresses, but one of the greatest challenges confronting online retailers is measuring. When shopping for clothing online, clients regularly battle to discover the proper measure and fit, coming about in high return rates and low client fulfilment. This whitepaper proposes an arrangement for this issue by leveraging virtual reality technology and machine learning calculations to form an immersive virtual shopping involvement. The proposed calculation employments 3D modelling and machine learning to make virtual representations of clothing [1,2] and the customer's body. Body estimation information is collected by strategies such as photogrammetry and body scanning, and calculations utilize this information to prescribe fitting sizes and fit for clothing. A machine learning model is prepared on a huge dataset of body estimations and comparing clothing sizes to supply customized proposals to clients.

The proposed calculation altogether upgrades the online attire shopping involvement by giving an immersive virtual pass-on encounter, killing the requirement for physical pass-on and implicit returns due to dishonourable measuring can be reduced. Online clothing retail stages can coordinate this virtual reality innovation to supply clients with an educated shopping encounter and decrease costs related to physical travel [3]. Although, the utilization of virtual reality

innovation within the design industry is still in its earliest stages, this proposed calculation has the potential to revolutionize the way individuals purchase a dress online. We may investigate the possibility of coordinating other innovations such as reality to improve the customer's virtual steering encounter. Besides, the proposed calculation, it can be extended to other mould regions such as footwear and accessories, to provide a comprehensive virtual shopping experience.

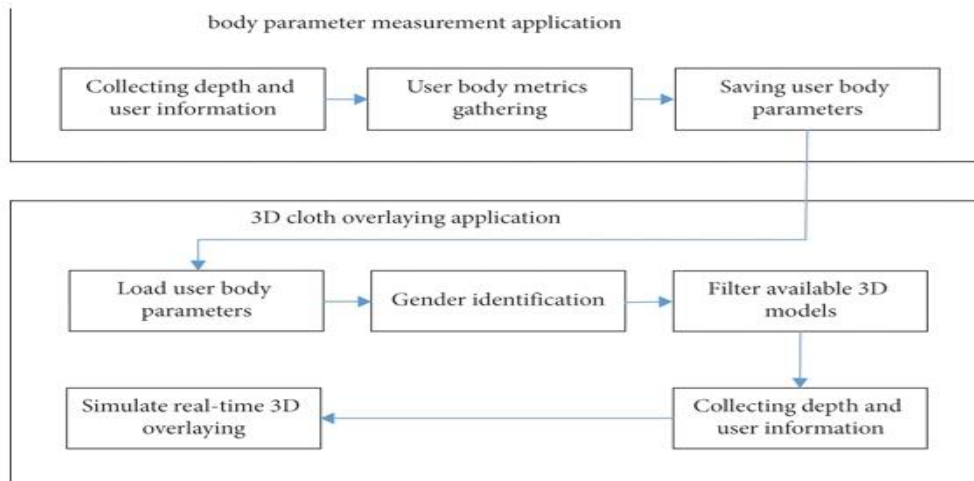
II. RELATED WORK

Several technologies have been proposed for implementing virtual dressing rooms using webcams, camera arrays and depth sensors. In 2006, Ehara and Saito [4] used a web camera to overlay user selected texture on surfaces on T-shirts, virtually. The proposed method was implemented with image-based systems incorporating prelearned algorithms and matching them with the captured image of a user standing in front of a blue screen. Protosaltou et al. [5] have revealed an Internet-based virtual fitting room that makes use of standard body measurements to create virtual 3D bodies and markers for motion capturing. The major drawback of the above techniques is the inability to do real-time simulations. A virtual fitting room based on Android mobile devices was proposed by Garcia Martin and Oruklu in 2012 [6]. A mobile phone camera was used as the main sensor and no other equipment needed for the proposed work. Since a mobile device is equipped with limited storage and processing power, the ability to process real-time 3D simulations is not possible yet up to a satisfactory level. Hauswiesner et al. implemented a virtual dressing room using several cameras [7] where a user is not required to be in a specific viewpoint or a pose to interact with the system. This was not possible with a single camera implementation. Graphical Processing Unit-(GPU-) based efficient algorithms were used to develop this system, allowing real-time 3D processing.

a Kinect sensor was used in KinectShop and Fitnect applications where a user can try-on a 3D cloth model in real-time. Eight PrimeSense depth sensors were used in the Bodymetrics application for 3D cloth simulation according to the movement of the user. In 2014, UmutGültepe and GÜdükbay proposed a real-time 3D cloth simulation on a virtual avatar in which the necessary heights and widths for scaling the avatar and the cloth were obtained using depth map and skeleton joints [8] obtained from depth sensors. Miri Kim and Kim Cheeyong proposed a “Magic Mirror” system which makes use of a depth sensor to obtain real-time user body parameters and compose the 3D outfits accordingly. Apart from cloth simulation, this system facilitates hair and make-up functions [9].

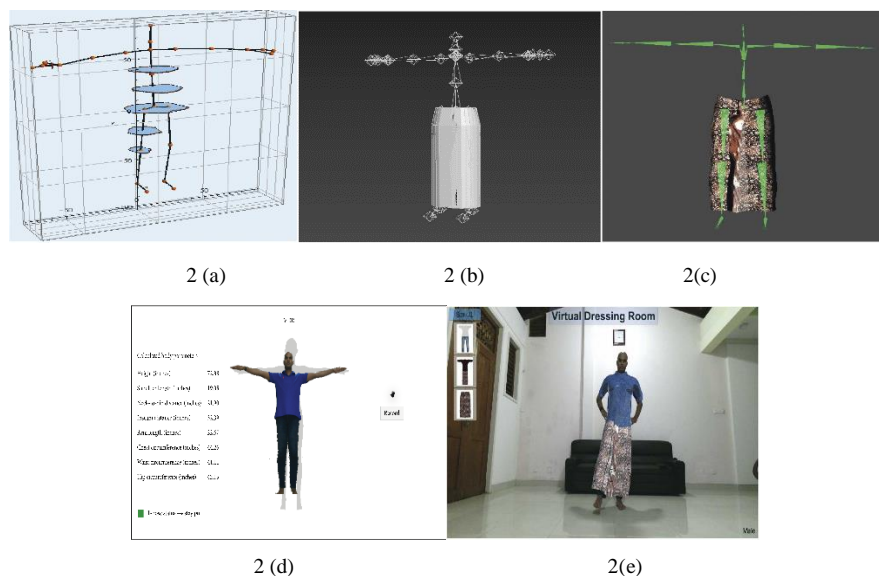
III. METHODOLOGY

The developed virtual reality-based virtual fitting room has two main processing stages: noncontact user body parameter measurements and overlaying three-dimensional (3D) cloths on the user in real time. Microsoft Kinect V2 depth sensor was used to gather necessary user body parameters. Unity3D game engine was incorporated for overlaying the 3D cloth models on the user. The overview of the proposed system is shown in Figure 1. The gender identification feature is included in the proposed work to filter the 3D cloth models available for a particular customer, which suits the body parameters. The gesture recognition capability built into the system enables virtual try-on of different clothes.



IV. EXPERIMENTAL RESULTS

Figures 2a,2b, 2c, 2d and 2e depict that the application was developed to obtain noncontact body parameter measurements. This application gathers the necessary body parameters of the user who stand in front of the Kinect sensor device. In this proposed work, the 3D complex parameters such as perimeters of chest, waist, hip, thigh, and knee were considered for selecting the apparel size category and rigging the 3D model into the user body in real-time. Hence, the application guides the user to maintain a T-pose facing towards and away from the sensor for 5 seconds each in order to capture the necessary depth information. Finally, the overlaying application is launched with all measure parameters to filter the 3D cloth models based on gender.



The output of the developed system is presented in Figure 2e. Here, the user can select and virtually try on the apparel available in the retail shop, filtered according to his or her body parameters. The items on the population list can be selected using the gesture identification features integrated into the solution.



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VI. CONCLUSION

We used a single Kinect sensor to obtain user body parameter measurements including 3D measurements such as perimeters of chest, waist, hip, thigh, and knee to develop an virtual reality virtual dressing room. The developed application successfully appends the physics animation to the dress, according to the physical movements made by the user, providing a realistic fitting experience. The performance evaluation reveals that a single depth sensor is applicable in real-time 3D cloth simulation with less than 10% of average measurement error.

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