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Survey on Virtual Dressing Room

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ABSTRACT

A Virtual Trial Room application utilizing Augmented Reality which enables a client to undertake on virtual garments. The client posture and profundity is followed utilizing the Microsoft Kinect sensor and virtual garments are lined up with the followed client. the clothes moves and adjusts practically and therefore the lighting force of the fabric render is adjusted to coordinate surrounding lighting conditions. The exhibited application enhances related increased reality application by including full client posture following and by utilizing 3D dress models joined with fabric recreation instead of 2D pictures.

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I. INTRODUCTION

Looking for garments may be a typically increasing movement both in-store and on the web sites. An in-store customer more often tries on some selected garments and inspects how well they fit. While a web customer more often than not checks how well the clothes fit the models within the online pictures. Firstly, during a physical store, with a selected end goal to try on some selected clothes, a typical practice is to line up and alternate the clothes utilizing the changing rooms. Because of the few number of in-store changing rooms, customers usually need to spend most of their shopping time on lining up and check out on the clothes physically and through online shopping the garment might not fit the customer thanks to size variation of various brands and also the lighting effect may mislead the first color of fabric which results in return of the clothing for exchange which increases the transportation losses and also in many cases these garments are sold available sales which decreases the profit. Both in store and internet shopping having unavoidable constraints which results in clients' unsatisfied shopping encounters and in addition the retailers' misfortune of potential sells. To avoid this problem observed, an idea called "Virtual Trial Room" is put forward. Clients would have choice to see the visual picture of how they appear like by attempting on garments basically with the goal that they will effectively shift through a couple of choices without using the fitting rooms and trying it.

II. RELATED WORK

Srinivasan K. and Vivek S. (2017), in this paper, Growth in online shopping and the wish of people to have to enjoy its maximum utilization on purchase of dress with complete satisfaction of personal realization justifies the need to develop an algorithm which virtually dresses people with the selected dress. Human silhouette with variable background and noisier environment. Which is the more challenging task in still image using image processing [1].

Ari Kusumaningsih and EkoMulyantoYuniarno (2017), proposed a virtual dressing room for Madura batik dress has been successfully developed. The proposed system has a purpose tom make dressing room specialized for Madura batik clothes supposed to create attention from customer and should contributes in improving sales performance and promote Madura's heritages as also. Efficient and fast computation methods needed to process numerous 3D models. So that, we don't have to use high performing computer for implementing this virtual dressing room [2].

Ting Liu and LingZhi Li (2017), proposed work which uses user extraction from Kinect video stream and avatar system for skeletal tracking to align the clothes' models with users. And a virtual dressing software prototype is developed allowing clothes' 3D models to overlay users and were convenient to view in front, side and back perspectives. Furthermore, improving clothes modeling approaches that achieve rapid reconstruction based on real clothes is also of great use [3].

Stephen Karungaru and Kenji Terada (2017), in this Project, they propose a method to acquire human body length / perimeter easily using Kinect. Experimental results confirmed that human data can be acquired from Kinect sensor. We also confirmed problems in case of error in acquired data. Future issues include improving the accuracy of acquisition of person's data and the CG [4].

Dr. Anthony L. Brooks and Dr. EvaPetersson Brooks (2014) , the open-structured surveys received wide-ranging input from the public attending the live demonstrations at Malls and Messe events.13 wheelchair-bound individuals gave direct input as well as others who were either friends or associated with a wheelchair-bound person that they considered would benefit from a dedicated adaptation of the product. Yet that distance had to be close enough to allow the person an operable view of the interface control detail [5].

Reizo NAKAMURA and Masaki IZUTSU (2013), this paper show processes that estimate of body suites size. First, person recognition be got by Kinect. And, person area in the image be extracted using person recognition data. Next, user's mark points are extracted using contour tracing. The size of the body suites was presumed using it [6].

Poonpong Boonbrahma and Charlee Kaewrat (2015), Using the physical parameter from our experiment, the appearance of the fabrics under simulation can be predicted. The simulation results can tell the difference among customers wearing jean, satin, silk or cotton, which will be very useful for setting up the virtual fitting room [7].

Umut Gültepe and Uğur Güdükbay (2014), we propose a novel virtual fitting room using depth sensor data. The framework yields a realistic fitting experience for standard body types with customized motion filters, body measurement and physical simulation. The proposed scaling method adjusts the avatar's body size parameters and determines a suitable apparel size, and prepares the collision mesh and the physics simulation. In future work, we would like to improve the quality of the measurements and visual scaling by using data from an RGB sensor as well, because it provides additional data. We would like to increase the number of collision spheres for better collision detection [8].

Ayushi Gahlot and Purvi Agarwal (2016), this paper covers the aspects of action recognition using Kinect technology by human skeletal tracking. Microsoft Kinect is one of the latest advancements in Computer Vision based HCI (Human Computer Interaction). The paper is focused on how the Kinect sensor captures the 3D information of a scene and recognizes the action being performed by the human body by retrieving the depth image information and real- time skeletal tracking. The Kinect technology has revolutionized the way humans interact with the machines. It has a wide range of applications areas. The paper also covers one of the proposed approaches to skeletal based action recognition using Kinect [9].

Aladdin Masri, Muhannad Al-Jabi (2019), in this work, Author introduces a virtual dressing room application using Microsoft Kinect sensor. The proposed approach is mainly based on extraction of the user from the video stream, alignment of models and skin color detection. Author use the modules for locations of the joints for positioning, scaling and rotation in order to align the 2D cloth models with the user. Then, we apply skin color detection on video to handle the unwanted occlusions of the user and the model. Finally, the model is superimposed on the user in real time. The problem is simply the alignment of the user and the cloth models with accurate position, scale, rotation and ordering. First, detection of the user and the body parts is one of the main steps of the problem. In literature, several approaches are proposed for body part detection, skeletal tracking and posture estimation, and superimposing it onto a virtual environment in the user interface. The project is implemented in C# programming environment for real time, Kinect hacking application. Kinect driver's middleware are used for various fundamental functions and for the tracking process in combination with Microsoft Kinect [10].

Chai Joon Lip, Kamarulzaman Kamarudin, Syed Muhammad Mamduh (2018), This paper proposes a method to identify human based on the 3D model of the body and the depth data from the Kinect. The system firstly utilizes the coordinate points from the 3D model to calculate the selected anthropometry features of human body. Then, the features are compared with real time Kinect's depth acquisition to perform pose recognition and human identification. Eight candidates were involved in the reliability test of the system with each of them performed 6 trials, making a total of 48 trials. The overall reliability of the system in identifying the correct candidate was found to be 79.167% [11].

Dan song, ruofeng tong, jiang du, yun zhang, and yao jin (2018), Author propose an efficient data-driven approach and develop an android application for 3-D body customization. Users stand naturally and their photos are taken from front and side views with a handy phone camera. They can wear casual clothes like a short-sleeved/long-sleeved shirt and short/long pants. First, Author develops a user-friendly interface to semi-automatically segment the human body from photos. Then, the segmented human contours are scaled and translated to the ones under their virtual camera configurations. Through this way, Author only need one camera to take photos of human in two views and do not need to calibrate the camera, which satisfy the convenience requirement. Finally, Author learns body parameters that determine the

3-D body from dressed-human silhouettes with cascaded regressors. The regressors are trained using a database containing 3-D naked and dressed body pairs. Body parameters regression only costs 1.26 s on an android phone, which ensures the efficiency of their method. Author invited 12 volunteers for tests, and the mean absolute estimation error for chest/waist/hip size is 2.89/1.93/2.22 centimeters. Authors additionally use 637 synthetic data to evaluate the main procedures of their approach [12].

S.Priyadharsun, S.Lakshigan, S.S Baheerathan, S.Rajasooriyar, U.U.S.K. Rajapaksha, S.M.Buddika Harshanath (2018), The interest in fashion can vary according to the country, region, culture, age, seasons, climates, places visited, attitude, personal interests etc. Some of them, however, have difficulties finding out about suitable dressing styles for them. Meeting this need is the purpose of this application. On the other hand, social networks are an easy way to interact with the teenagers. In this new age social network site, users create a profile and enter their body measurements to create a virtual model of the particular user. They can also upload their photos to create a complete virtual model which includes face as well. It was necessary to add business value to the application along with the usual entertainment factors. Adding business value to entertainment factors is the main attraction in Fashion Fit to suit a new age of social networking [13].

Bhalekar Sourabh, Chitte Darshan, Dhamal Hemant, Ganeshwade Priyanka, Rankhambe J.P. (2015), The system will be entirely equipped with sensors like motion sensor, light sensor, camera which is also hardware of the system which control by Graphical User Interface Software. The controllers will be managed by an operating system which will communicate with the user interactive software. The system will provide smart interface to retailer and end user customers. This smart system can increase the level of marketing than the current scenario. This system will realize smart solution for dressing and efficiently solve the issue related to retailers and end user customer. Number of interactive and effective operation supported by the system are as follows :- 1) 3D mannequin is adjusted automatically according to the shopper's body measurement. 2) Virtual trial of variety of cloths after selecting them. 3) Real time simulation of movement of cloths according to mannequin with online resizing/fitting of cloths on it. It is our ultimate goal to develop and integrate different key technologies into interactive virtual clothing store, distributed, where user can select cloths and try on clone that are adjusted to their body measurements. Author can overcome the problem of return items and risk in buying process [14].

Adjeisah Michael, Zhao Chen, Guohua Liu, Yang Yi (2017), in this paper, Author introduces an innovative approach for effective of body movement tracking using Kinect Xbox 360 with a limited tracking system. A relatively scaled hand cursor mechanism is used for this system of interaction. Instead of tracking the whole body of the participant in the Kinect Depth space which produces 20 joints, Author limits the tracking to only 2 joint (left and right hand) for the same action. Further, Author have engaged Extended Kalman Filter to improve skeleton joint estimation which smoothes the joint coordinates, placing the Z axis in a high level of calibration in order to make it work with X and Y coordinates simultaneously with a relatively high accuracy [15].

Hanwen Li, Zilong Liu, Wenting Wang (2016), With its more realistic simulation effects, the dynamic-based three dimensional clothes animation technique has very broad applications in e-commerce, virtual reality. As an essential part of clothes animation, the dressing process also has important impact to the overall system performance and applicability. Especially in the virtual network dressing room of clothes e-commerce system, it is still a problem how to dress various clothes more simply and efficiently. By reusing the collision detection module in our clothes animation system, this paper proposes an automatic dressing method, which greatly reduces the workload of programming. More importantly, compared with other existing dressing technologies, this proposed method is easier to implement, operate, and can meet the needs of network virtual fitting for common consumers more practically [16].

Nikita Deshmukh, Ishani Patil, Sudehi Patwari, Aarati Deshmukh, Pradnya Mehta (2016), Real time virtual dressing room is used in shops, mall and any shopping center. Trying cloths in shopping center is actually a time consuming activity. Besides, it might not even be possible to try on clothes in such cases as online shopping. Author's motivation is to increase time efficiency and improve the accessibility of clothes try on by creating virtual dressing room environment. Our aim is to build an interactive and highly realistic virtual machine on which the user can try cloths without wearing it actually [17].

Dardan Maraj, Arianit Maraj, Adhurim Hajzeraj (2016), in this paper, Author have developed an application interface to recognize human body gestures and reflect these gestures through Kinect sensor to Lego robot. The main contribution of this paper is implementation process of the system and development of application interface. Visual Studio 2013 in c# will be used to control a Lego Robot gestures detected through API Kinect. At the end we will test the system and we will represent the results graphically [18].

Muhammed Kotan and Cemil (2015), This study proposes a real time 3D virtual model controll and a virtual dressing room application to enable users to try virtual garments and shoes on in front of a virtual mirror. A virtual representation of the user appears in a virtual changing room and the user's hand motions select the clothes from a list on the screen. Afterwards, the selected virtual clothes appear on a humanoid model in the virtual mirror. For the purpose of aligning the 3D garments and shoes with the model, 3D locations of the joints are used for positioning, scaling and rotating. By using our developed algorithm, small, medium, large or x large garment size is selected automatically and this information is shown on the screen. Then, we apply skin color detection to handle the unwanted occlusions between the user and the model. To create a more realistic effect, the

system takes into account different images of the clothes according to different human poses and movements. Optional mirror selection buttons make it possible to have multiple viewing angles on the model. Additionally, we developed an algorithm for matching up all motions between the model and garments. In this study, Author benefit from the Microsoft Kinect SDK (software development kit) in order to follow the user's movements, coordinate the suitable clothe try-ones and provide depth sort effect to the human body and clothes. In order to use the rapid calculation attributes of game engines, Author used unity 3D game engine[19].

Mingliang Chen, Weiyao Lin*, Bing Zhou (2015), in this paper, Author focus on virtual dressing, which is a newly heated application of human-computer interaction, and develop a novel framework for real-time virtual dressing. Author made three major contributions in our framework: 1) Author introduce an effective algorithm to pre-process and improve the skeleton data from an RGB-D camera; 2) Author develop a strategy to measure the skeleton motion parameters (scaling, translation and rotation) and apply a two-step deforming scheme specific to create dress deformation results. 3) Author introduce hand-integration module to integrate the clothing models and user arms, so as to guarantee user arms being properly displayed in the visual dressing result. Experimental results show that our proposed virtual dressing system achieves satisfactory visual dressing results [20].

Hesham Alabbasi, Alex Gradinaru, Florica Moldoveanu, Alin Moldoveanu (2015), Microsoft Kinect V2 sensor is a motion sensing device that provides to the users a facility to interact with computers and game consoles through many ways like natural movement, gestures or spoken commands. This technology allowed many researchers and companies to develop real-time applications in various fields like healthcare, sports training, facial emotion detection, gaming, security, 3D reconstruction, motion recognition and many others. In this paper, Author presented an approach to handle the problem of human body motion skeletal tracking with application in medical rehabilitation and sports training by using capabilities of the latest version of the Microsoft Kinect sensor [21].

Jungsu Shin, Kyeong-Ri Ko, and Sung Bum Pan (2015), A motion capture system requires a collection of human body model data which reflect body features of a user. The existing motion capture systems utilize human body model data with fixed body proportions; or require manual input of human body model data, which is unwieldy. This paper proposes how to measure the length of body joints using the Kinect's depth sensor, and how to put the measured value into a motion capture system automatically. Experiments during the study have shown that human body model data drawn out from the method proposed in this paper is almost matching to actual body length [22].

Jaychand Upadhyay, Divya Shukla, Nidhi Patel, Sheetal Nangare (2015), Now-a-days everyone wants to look fashionable. But, it is difficult for ordinary users to make a wonderful makeup and hairstyles. Moreover, when you are in nude look and want to share better look with your friends, the fastest and easiest way is virtual makeup. However, current existing makeup software needs many user inputs to adjust face landmarks, which influence the user experience. And, it cannot remove the flaws on skin as good as the real cosmetic makeup. Hence, we have introduced such system that allows you to do almost all the makeup work. The system would be platform independent and made up of all the free-source development tools so that if taken commercially later we will keep the cost as low as possible. This will make it accessible in small time running beauty parlors [23].

Flavio Minos Pineda-L´opez., Marco J. Flores C (2015), This article describes the development of a human motion analysis system, designed to study the gait cycle, and to catch up the information in a continuous and uninterrupted manner, in real time. So that, this system can be used by health professionals related to the diagnosis of walking problems. This device is comprised of hardware and a software to capture, store, process and visualize the body signals. The hardware has been built using a weight platform and a Kinect sensor, to capture the information. To store the signals body, it uses a database system which collects the information of the skeleton model given by the Kinect. After that, a gait cycle model has been developed to analyze the patient walk. Finally, the results can be viewed in n interactive and graphical interface, presenting information of each body joints. This gives facilities to work with different body parts and to develop other experiments [24].

Tiago Ogioni Costalonga, Lucas Mendes Ávila, Luís Muniz and Alexandre Santos Brandão (2014), this paper presents an intuitive way to control the position of a quad rotor, through a human-machine interface (HMI), based on a motion sensor, which uses the movements of the body to command the mobile platform (in such case, an aerial vehicle). The experimental results were obtained by using the Microsoft Kinect Sensor (for detection and tracking of the user), and after acquiring the data, the control commands are sent to the quadrotor ArDrone Parrot to guide it [25].

Tongyang Liu, Yang Song, Yu Gu, Ao Li (2013), In this article, Author presents a new method of recognizing human actions by using Microsoft Kinect sensor, k-means clustering and Hidden Markov Models (HMMs). Kinect is able to generate human skeleton information from depth images; in addition, features representing specific body parts are generated from the skeleton information and are used for recording actions. Then k-means clustering assigns the features into clusters and HMMs analyze the relationship between these clusters. By doing this, Author achieved action learning and recognition. According to their experimental results, the average accuracy was 91.4 % [26].

Furkan Isikdogan and Gokcehan Kara (2012), in this work we introduce a virtual dressing room application using the Microsoft Kinect sensor. The proposed approach is mainly based on extraction of the user from the video stream, alignment of models and skin color detection. Author use the 3D locations of the joints for positioning,

scaling and rotation in order to align the 2D cloth models with the user. Then, Author applies skin color detection on video to handle the unwanted occlusions of the user and the model. Finally the model is superimposed on the user in real time. Author defines a performance measure as the rate of the overlapping area and our experiments have resulted with 83.97% overall performance [27].

Rong Li, Kun Zou, Xiang Xu, Yueqiao Li and Zan Li (2011), In this paper, Author discussed the interactive 3D virtual fitting room system on web environment. It integrates several key techniques involved, including 3D modeling, collision dictation, real-time rendering. And Author proposed a framework of the virtual Try-On system. It leads the progress of virtual fitting that forms the basis of a realistic, three dimensional simulations and visualization of garments on virtual counterparts of real customers. The system is more flexible to enable garments designing, body modeling and clothing animation etc. Users can view the clothing animation on the various angles, and moreover can change actor's hairstyle, accessories, etc. And the system can evaluate costumer's match in order to guide them choose suitable cloths [28].

Natsuha Araki, Yoichi Muraoka (2008), The existing virtual try-on systems enable changes of decoration and color, but they tend to be non real- time, have limitations on the types of clothes, or use 3D character trial fitters, instead of real shoppers. Many shoppers find trying on clothes to be a time consuming chore that negatively impacts their buying intention. There is no doubt that undressing / dressing is a troublesome task, and this timewaster is the biggest adverse aspect of trial fittings. We've designed a novel real-time dressing system that gets rid of the cumbersome task of putting on-and-off clothes, dealing clothes with any design and color. The shopper can see herself on the display dressed in the cloth she's chosen to "try on" when the shopper stands in front of the system's display, which behaves like a mirror. The virtual garment worn by her "reflected" image moves in real time smoothly according to her motions such as arm flexes [29].

Ching-I Cheng and Damon Shing-Min Liu (2003), research aims to develop a system to help women choose correct attire for attending a specific occasion using all of what have already been in their closets. Many different computer theories and techniques are gathered in the project. Category learning with supervised neural networking is applied to cluster garments into different impression groups. Fuzzy theories are applied for gathering fashion match rules. In addition, modeling and virtual dressing techniques are used for representing matched garments pair in digital show room. User can simply submit her queries to the system on the occasions when the user has trouble finding an outfit for a special event. After enquiries are received, the core is following fuzzy logic rules to search good matches in the garment database and showing the matched results in the show room. This paper focuses on how garment classification and matching rules retrieved from fashion stylists.

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