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Virtual Dressing Room for Low-End Smartphones

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Abstract — *A Virtual Dressing Room for Low-End Smartphones is presented here. The proposed system uses Euclidian distance measurement algorithm. It involves capturing image of the subject or the person who wishes to try out the apparel. Systems similar to this have are in use in the West. They involve the use of Augmented Reality. They are available in for countries like US, UK, France, etc. But considering the PPP, GDP, etc. pricing factors of India, it is more expensive to deploy similar systems here. Hence to overcome this problem we came up with the solution that will enable everyone who owns at least a smartphone to benefit from the system. Basic idea is user will take their own photograph. Give the measurement of the reference object and place the points on their shoulder/height in image taken by smart phone camera. Our system will calculate the appropriate length and suggest garments accordingly which the users want to try out. Users can place an order at the same time via the following system.*

Keywords- *Client-Server, Distributed Applications, Distributed Database, Data-Mining, Security, E-Commerce, Image-Processing.*

I. INTRODUCTION

Virtual Dressing Rooms proposed or which are being used currently require the use of high end hardware. Considering some of the Start-Ups like Zugara, FitNect, FitYour, Fitiquette, Abof, etc. The study of these Start-Ups is elaborated here.

A. Zugara

Zugara, an American company, with headquarters in LA, California, develops Augumented Reality products for Apparel Brands. They also create Naturak U.I. experience for them. They also optimize their products for E-commerce platforms. They mainly employ the use of Kinect, Zenfone A.R kits.

Fig. 1. A customer trying out an Apparel on E-Commerce Platform

Fig. 2. Customer trying out apparels in Brand Store.

B. FitNect

FitNect provides full customization, powerful, and efficient-easy reality 3D fitting room system. Their technology allows a customer to virtually try-out various apparels. The Start-Up is based in Hungary. They use Microsoft's Kinect system. Their system is more innovative considerng the market. They provide festures like, more customer activity(increased sale), Real time statistics, Remote management, tools to customize. Their features of fitting room inlcude the following, models which are real 3D products, supports 2D modelling, a wide range of apparels irrespective of gender, provision to put-on multiple clothes concurrently, 36 viewing, change the backgroud, etc.
The general working of the product is explained in the following image.

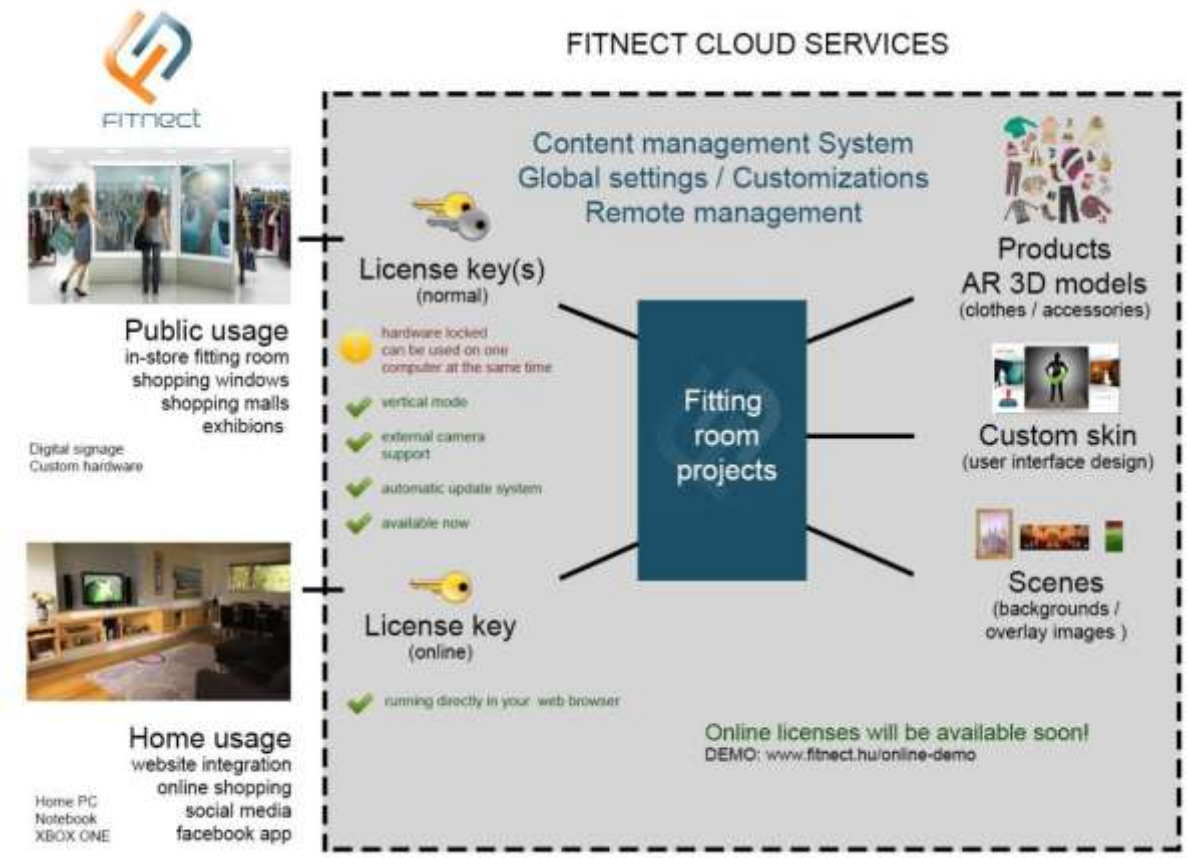

Fig. 3. FitNect Cloud Services.

C. FitYour:

Easily able to style, change fonts, colors, sizes in few clicks. They provide a Web based service, a Retail based service, and a Mobile based service. Web based services allow users to share the captured images on Social Media, it requires only a Webcam. Retail based services employ the use of Kinect Camera (it reads human gesture). Maximum garments can be tried-on in less time. Mobile based services work through their App which is currently available only for iOS. First select the category of garment then select the cloths to be tried virtually. Then garment is positioned according to body size. Then the photo is captured in real-time, and it can be shared on social media.

Fig. 4. FitYour Web based service

Fig. 5. Retail Based Service

Fig. 6. Mobile based Service

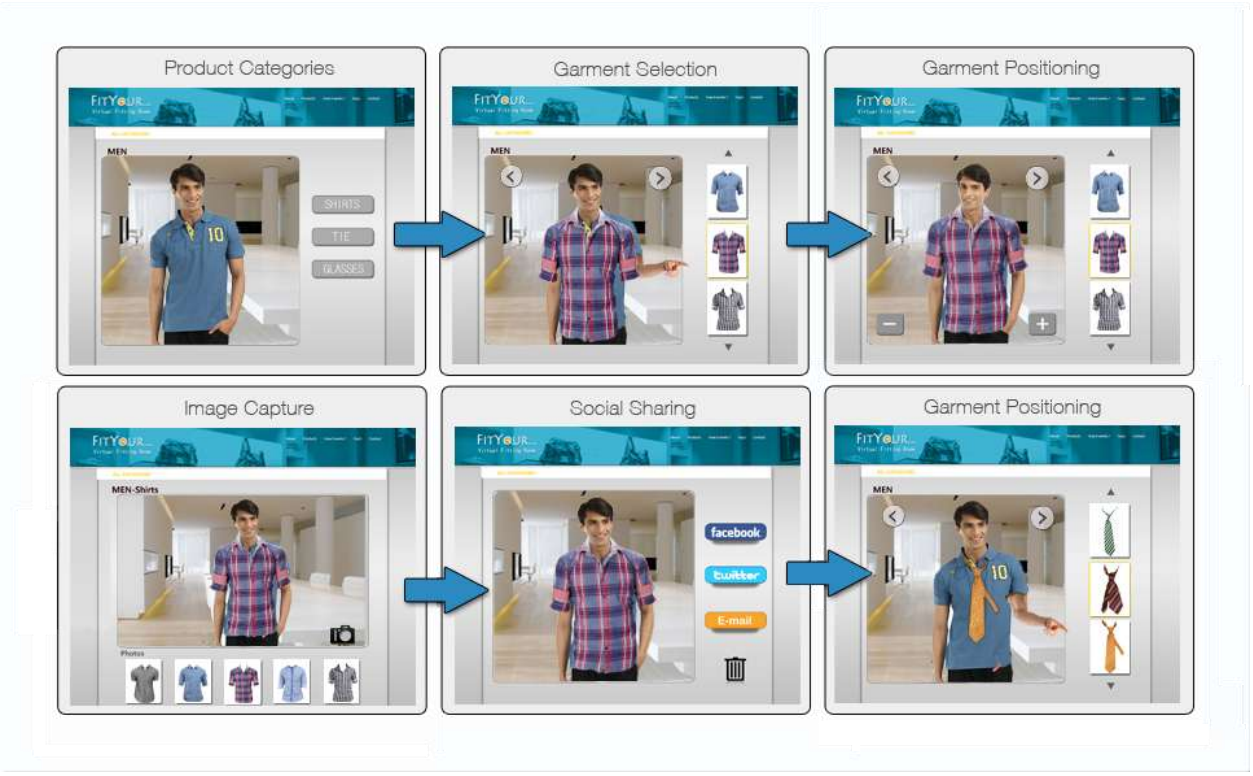

Fig. 7. Working of FitYour

D. Fitiquette

This Start-up is equipped with a virtual dressing room for customers which creates a virtual impression of them, so as to enable them to try-out garments online. The Start-Up has been bought by Myntra in 2014. User needs to start with a virtual model, customize it according to user specific areas like hips, bust, height, etc. These are then used to suggest apparels which would fit the shape of the body. The results can be seen in an animated, 3D simulator. Their forthcoming proposals include creating life-like looks using photographs and video, option of mixing and matching the garments together.

Fig. 8. Fitiquette

II. LITERATURE SURVEY

A. The survey of papers which have researched on this domain is included here with.

Sr. No.	Name of Paper	Year	Publication	Advantage	Disadvantage	Remark
1.	Implementation of Virtual Fitting Room using Image Processing. [1]	2017	IEEE International Conference on computer, Communication and signal processing	The algorithm in such a way that everything works reliably Without the aid of external light adjuster or 3-D viewing or fixed camera, which is usually needed for the present algorithms creating the limitations of its own use, has been developed to reach out to all people.	This algorithm uses MATLAB.	The algorithm is planned to be modified to find the Human silhouette with variable background and noisier environment Which is the more challenging task in still image using image processing.
2.	Towards an Inclusive Dressing Room for Wheelchair-Bound Customers. [2]	2014	IEEE	Body measurement without discomfort for wheelchair bound patients.	Virtual reality and Augmented reality are relatively expensive.	Body measurement and dimension analysis with accuracy.
3.	Web Log Session Analyzer: Integrating Parsing and Logic Programming Into a Data Mart Architecture. [3]	2005	IEEE/WIC/ACM International Conference on Web Intelligence (WI'05)	They show an approach to the analysis of complex log data based on a parallel stream processing architecture and the use of specialized languages, namely a grammatical parser and a logic programming module that offers an efficient, flexible, and powerful solution.	No use until the basic framework is ready	This is usable in increasing responsiveness of the backend and frontend when this is deployed.

Fig.9 (a).Survey Content s

4	Image-Based Clothes Transfer. [5]	2011	IEEE International Symposium on Mixed and Augmented Reality 2011 Science and Technology Proceedings	Virtually clothes customers instead of rendering static pictures of clothes onto users which looks unsatisfactory.	It has high initial cost and complex setup for 3D images.	Future work on the subject should primarily focus on increasing the output quality systematically

Fig 9(b). Survey Contents

5	A More Practical Automatic Dressing Method for Clothes Animation. [6]	2016	IEEE 8th International Conference on Intelligent Human-Machine Systems and Cybernetics	The dressing process takes only a few assumptions and manual intervention for various styles of clothes, making it is possible for dressing in virtual dressing room for clothes e-commerce applications.	The product may not be able to provide a range of options for the user.	The dressing process takes only a few assumptions and manual intervention for various styles of clothes, making it is possible for dressing in virtual dressing room for clothes e-commerce applications.
6	Discovering Dressing Knowledge for an Intelligent Dressing Advising System. [7]	2007	IEEE Fourth International Conference on Fuzzy Systems and Knowledge Discovery	Discovering dressing knowledge for an intelligent dressing advising system applied well-known techniques of neural network and fuzzy logics to extract dressing tips for women.	The system will be complex, for it to be personalized private data may be required to be shared, which people might not want.	In the future, a module for age classification which employs different Categories and match rules for different age will be added.
7	Estimation Method of Clothes Size for Virtual Fitting Room with Kinect Sensor. [8]	2013	IEEE International Conference on Systems, Man, and Cybernetics	The system will provide precision, leading to better customer satisfaction, leading to increased revenue, leading to growth in the economy.	The system will be complex, and requires the use of more hardware, which will make maintenance costly.	Minimize the use of hardware.

Fig 9(c). Survey Contents

8	Implementation of Virtual Dressing Room using Newton's Mechanics. [9]	2017	International Journal of Advanced Research in Computer Science and Software Engineering	This method to produce a Virtual room that realistically reflects the looks and also the behavior of garment. It should further adapt to specific bodies of different persons depending on their body measurements.	The system will be expensive. The virtual try-on may lead to more window shopping.	It would allow a virtual try-on of clothes before people are buying it online, taking a closer look at the garment and even conveying the actual behavior of the real cloth.

Fig 9(d). Survey Contents

B. A survey of methods that can be used to find distance is summarized herewith.

Sr. No.	Name of Paper	Year	Publication	Advantages	Disadvantage	Remarks
1	Distance Measurement Utilizing Image-Based Triangulation. [12]	2013	IEEE SENSORS JOURNAL, VOL. 13, NO. 1	CMOS detectors have the advantage of speed, addressing individual pixels, low cost and simplicity.	The update rate has not been optimized in this sensor. The range of distance is limited to 10 meters because only visible lasers are used.	Can also work in a dynamic environment if target is within 4 metres and moving slower than 3.6 m/s.

Fig. 10(a) Methods Survey

2	Distance Measurement Using Stereo Vision. [4]	2017	International Journal of Innovative Science, Engineering & Technology,	Accurate distance measurement using stereo image capturing measuring the angular deviation of camera and hence calculation the distance	Accuracy is not yet important for the project.	Accuracy will be important during the testing phase.
3	Algorithms of Distance, colour & Shape Detection for 2-D Images. [11]	2016	International Journal on Recent and Innovation Trends in Computing and Communication	This method is also useful for shape and colour detection, apart from distance measurement.	It is much more mathematically involved than the other methods.	It has been assumed that the object is always perpendicular to the optical axis of the camera.

Fig. 10(b) Methods Survey

4	Single-Image Distance Measurement By a Smart Mobile Device. [10]	2016	IEEE Transactions on Cybernetics	Requires minimal resources (any smartphone with inbuilt accelerometer) and minimal parameters (just one known distance)	Very rudimentary method hence abysmal in accuracy.	This uses MATLAB but we are to use python libraries. This has less accuracy but is more deployable.

Fig. 10(c) Methods Survey

IV. PROPOSED SYSTEM

Here, in the paper we propose a system for Virtual Dressing Room for low-end smart phones. It employs mainly the use of a smart phone, Android smart phone. All the operations will be performed on the client side, this is so that the data can be saved, and it takes lesser time when compared to server side operation performance plus sending data plus retrieving back the data. A basic minimum set of apparels will be used to create this application. A website will also be made to compliment the app, though the website will not have dressing room facilities in it. A database of the apparels will be maintained on Cloud. Using Cloud has its benefits which need not be mentioned here, but the main reason, that the system will be scalable.

When the user launches the App, they first have to select the category of garment. After selection, the user needs to take a photograph of themselves. The user in the photograph must be standing, a reference object whose length is known must be present in the image. The user now must select the reference points (end points). Example, if there is a credit card in the image, its size is universal or at least known beforehand, 85.60 mm × 53.98 mm, the end points of the

length/breadth/diagonal need to be selected, and then the length between the end points need to be entered. A line is drawn so that user can verify that they have selected as per their requirement. A Bresenham's line drawing algorithm will be used. The unit can be selected as per convenience. Variable points need to selected, which vary according to the kind of apparel selected. If Skirt is selected, the height from waist down needs to selected, similarly for pants, for apparels like say Kurta, full height needs to be selected. This length will be calculated using a distance measurement algorithm, Euclidian Distance measurement method will be used for the same. This calculated dimension will be used to suggest apparel from selected apparel.

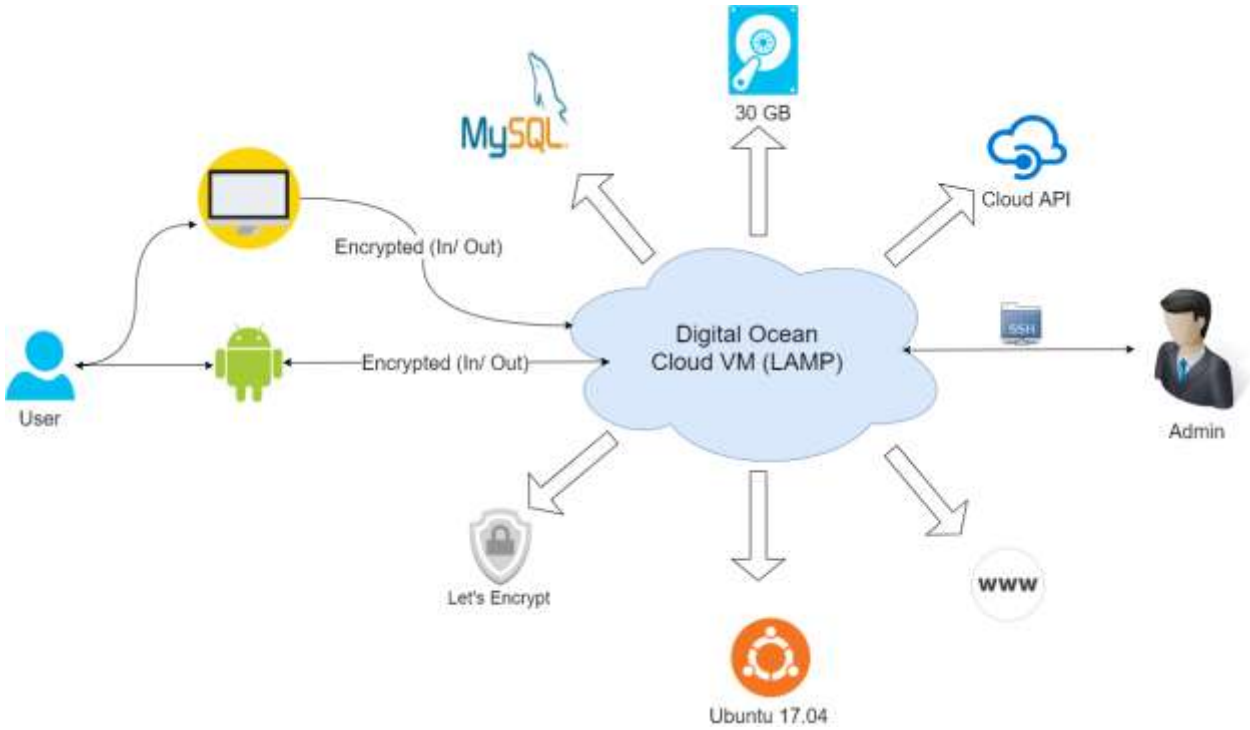

Fig. System Architecture.

The calculated dimension will be used to query the database of apparels, which will display list of apparels which match the constraint. The selected apparel will be displayed to the user over themselves. They can resize the apparel to be able to see how it looks. Resizing for now only includes zooming in and out. Image caching algorithms will be required for this purpose, we propose to use last recently used for the same. The user can proceed to make payment if they like the product or else try out some other product. If none matches the constraints, user can look for some other apparel
Encryption will be required to send and receive the data from the database. We propose to use Elliptic Curve 4096 bits for encryption.

V. CONCLUSION

The survey of products leads us to the inference that such a kind of product is not available in the Indian subcontinent's market. One of the reason for such a product not being developed in India is the deficiency of funding and expertise, and the lack of faith in such a Domain. Although the domain seems slack currently, it will pick up pace in a few years. The advent of modern technology and the reach of smart phones. Although it'll be an arduous task to bring customised systems in India, a Generic system with a responsive feedback system will work well under ideal conditions. The proposed system tries to develop a generic method. It does not require very high end resources/devices. It will soon penetrate in the different levels of the society. The system if backed by better funding, and expert guidance can be turned into a Multi-Million Dollar Business. When it turns successful in India, the team can also reach out developed countries and help them to bring a more generic way of online shopping.

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