Fashion Accessories using Virtual Mirror

A project report stage I submitted in partial fulfillment of the requirements for the degree of Bachelor of Engineering in Computer Engineering

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CERTIFICATE

This is to certify that the project entitled

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is successfully completed for the degree of Bachelor of Engineering as prescribed by University of Mumbai.

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Abstract

This report presents a virtual trial room using virtual reality which allows user to try different apparels. The project purpose is to enhance user's shopping experience by using the system, so that they can less time on queuing for Fitting rooms. This application is implemented in two-stages: creation of human 2D model based on sizing of user and superimposition of clothing over the human model. The depth-map algorithm creates the 2D model of the human body, which is in proportion to the size and shape of the person trying the virtual apparels.

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Chapter 1

Introduction

Virtual Reality has attracted a lot of interest of people in last few years. One of the broad concepts in virtual reality is virtual mirror. Virtual Mirror is a computerized generated mirror that acts like a real mirror which allows a person to see himself/herself for various application. The application "Fashion Accessories Using Virtual Mirror" is a online shopping website which we will be implementing as our project. Our project is restricted to face related fashion accessories like eyeglasses, earrings, caps/hats etc. Thus the system will be the visualization of fashion accessories for the face that a person can try and watch in front of a mirror although they do not exist in reality. This is achieved by using webcam of the user's laptop. The user when enters the field of the view of the camera(CAM), there the camera captures the user. It starts detecting and tracking the movements of the user. When the user selects a particular item to try on, that particular item automatically pops onto that relevant body part and hence the user can try out various brands and decide whether that particular item suits him/her or not by them experience like manual shopping. When all the algorithms correctly implemented with real-time constraints, the customer will be able move freely and watch himself/herself with the new item that have been wore just few moments earlier. The system mainly consists of a single camera and a display showing the output of the virtual mirror. The images of various items are stored in the database. Also the information of the users is stored in the database. Whenever the user buys an item, it is reflected in the column of the add/delete cart in the user info table and the final amount of the bought items is calculated and shown to the user. Virtual Mirror is also defined as a device that displays an individual's reflection open standing in front of it. Several retailers have deployed Virtual Mirror technology in the trial and dressing rooms of their outlets in order to provide buyers a next-level experience. The process is simple: a buyer needs to bring

the apparel in front of the mirror so that it can be scanned. Once the scanning process of apparel is completed, the mirror superimposes it over the image of the individual's body. Hence, the individual can his/her body with the selected clothes and evaluate it suits him/her or not The retailer can also store items in it which are yet to arrive. They can also send a reminder on the buyer's phone as to when it will be up for sale. It is fairly evident from the past few years that clothes are one of the items that people tend to try before buying. This is the biggest hurdle in online apparel sales but with Virtual Mirror technology, it has been reduced to a great extent as now the buyers can visualize particular apparel before ordering and buying it eventually. In this technology, the intuitive gesture-controlled user interface captures the motion of the user through the virtual mirror. Face recognition being a biometric technique implies determination if the image of the face of any particular person matches any of the face images that are stored in a database. This difficulty is tough to resolve automatically because of the changes that several factors, like facial expression, aging and even lighting can affect the image. Facial recognition among the various biometric techniques may not be the most authentic but it has various advantages over the others. Face recognition is natural, feasible and does not require assistance. The expected system engages the face recognition approach for the automating the attendance procedure of students or employees without their involvement. A web cam is used for capturing the images of users . The faces in the captured images are detected and compared with the images in database and the attendance is marked. With the growth of computer vision into an advanced and promising branch of computer science, face detection and recognition has upstaged from an obscure to a well explored area. Face recognition is now one of the best and successful applications of image analysis and related applications. Because of growing interest in the area, researches are going on in this field and any advancement can hopefully aid other related applications. These face detection and recognition techniques can be used in image analysis and are taken advantage of to make the crime investigation process easier. A face recognition problem (in computer vision) can be generalized as follows: given photos of a scene, check whether the persons of interest were in it with the help of some database of faces. Facial recognition generally involves two stages: Face Detection in which a photo is searched for a face, then the image is cropped to extract the person's face for making recognition easier. Face Recognition where that detected and processed face is compared to a database of faces that are known, to decide who that person is. The application that is developed uses OpenCV, an open source computer vision and machine learning software library for the recognition and related tasks. It does

allows the user to choose the search image, an unknown folder and another folder which can be used to store the result. Once the known image is compared with the unknown images the matching images are placed into a result folder selected by the user Face is the crucial part of the human body that uniquely identifies a person. Using the face characteristics as biometric, the face recognition system can be implemented. The most demanding task in any organization is attendance marking. In traditional attendance system, the students are called out by the teachers and their presence or absence is marked accordingly. However, these traditional techniques are time consuming and tedious. In this project, the Open CV based face recognition approach has been proposed. This model integrates a camera that captures an input image, an algorithm for detecting face from an input image, encoding and identifying the face, marking the attendance in a spreadsheet and converting it into PDF file. The training database is created by training the system with the faces of the authorized students. The cropped images are then stored as a database with respective labels. The features are extracted using LBPH algorithm. Harnessing the Augmented Reality to its fullest, the Virtual Reality Mirror technology is gradually making its way to several places in the Indian market as well. Besides clothes, even sunglasses, lipsticks and makeup products can be visualized through this revolutionary technology. There are many options to allow you to try clothes virtually by simple wave swipe gestures. While checking the clothing virtually image of the shoppers can be superimposed onto the mirror. The virtual mirror gives the user an opportunity to make better decisions.

1.1 Background

Trying apparels in the store is a time consuming activity. The motivation here is to increase the time efficiency and provide a real-like experience of dressing by creating a virtual trial room environment. The problem is simply the alignment of the 2D model and sample apparels with accurate position and scale. First step is to detect the user's body parts. This report provides a method for body part detection. This can be easily achieved by means of simple software like OpenCV and Visual Studio. Once the 2D model is created, apparels' samples are superimposed on the model in the virtual environment. Thus the user can see a virtual image of themselves in the clothing of their preference. The camera makes it more easy on the cost. The implementation by OpenCV makes it platform in-dependent. The rise in technology has made it possible to create a system like a virtual dressing room for customers to try on clothes on the Inter-

net (Volino and Magnenat-Thalmann 2005). The idea provides customers to see how well the clothes can actually fit before making a purchase decision. The virtual try-on scenario can help customers to speed up the process for trying on various clothing styles. Generally, customers choose clothes based on their personal sizes and preferences. Many factors including culture, fashion, style, body figure, and experience would influence the preference of clothing selections (Huang 2011). People who preferred tight fit clothing were usually satisfied with their weight, while people who were dissatisfied with their body shapes preferred baggy clothing (Alexander et al. 2005). Actually, improper cloth sizes distort the clothing fit because bigger clothing size tends to cause extra space between clothes and human body. The problem caused by poorly fitted clothing shows the wrinkles and unattractive clothing folds on the human body. Traditional method used the image-based analysis to evaluate the contour shape of clothes (Huang 2011). Research staff trained with experiences collected customers' opinions by questionnaire survey to provide assessment for clothing fit observations (Lee et al. 2007). However, it is observed that most of the clothes do not fit well for individuals, especially the human back shape along the spine area with varied shape curves (Yu et al. 2011). Since the virtual dressed model can be used to evaluate the quality of fit (Liu et al. 2010), the 2D model is used to set the body proportion similar to the customer's body shape (Xu and Zhong 2003; Chen et al. 2008). Based on the 2D model, the user built a virtual self to experiment with various clothes. Recent sur- vey discussed the fitting satisfaction to make the customer have sufficient ease to easily move (Huang et al. 2012). In addition, some research applied the pressure evaluation to test wear comfort of clothes (Au and Ma 2010). Phoebe and Rose (2007) proposed methods to evaluate the fit of virtual clothes by using the key dimensions selected from the chest and waist areas. Lee et al. (2007) and Loker et al. (2005) analyzed the differences in the slice areas between body and clothes for ease allowance. The ease allowance was evaluated to fulfill the functional requirements among different clothes and to provide acceptable fitting criteria (Huang et al. 2012). The realistic representation of virtual try-on requires suitable clothes to fit to human body. Due to the variety of body shapes involved in individuals, it costs a lot for manufactur- ers to make the sufficient clothing sizes to meet every individual's preference with desired fit. Thus, it is important to evaluate how different-sized clothes can actually fit on the human body. The objective of this study aims to evaluate the clothing fit on human body by dressing virtual clothes on 2D human model. The method starts in designing clothing patterns and the sewing patterns are subsequently fitted to human body according to different body

shape. Based on the clothing simulation, the human body dressed in different clothing sizes are tested for assuring a satisfactory fit. Finally, the clothing fit evaluation can provide useful information for clothing products in apparel industry. Mirrors have more and more applications as technology advances, and some of the most fascinating applications are those implemented by the advertising and computer industries. The Japanese auto-maker Nissan used large wall to ceiling sized mirrors to project full size presentations in front ofthe observer. The mirrors were interactive and the observer could push buttons just by holding up the hand without actually touching the button image. Adidas are known for their virtual mirror which allows the observer to view how different shoes would appear on the observers foot without he or her actually putting them on.In the Nanette Lepore department at Bloomingdale's on Manhattan a prototype mirror doubling as a high-resolution digital screen allow customers to view themselves in mirror with different clothes on without actually trying them on.[1] Tortoise Blonde Eyewear, an online shopping website is the coupling of design, quality, precision, and customer service, with the creativity and vigor of today's tastemakers.

Three generations deep in evolving their business, Tortoise Blonde is dedicated to providing the most convenient optical shopping experience, offering home try on, virtual try on and hassle free returns on all products. Their Virtual Try On is as simple as sittinginfront ofyour computer and takinga picture. If you don't have a webcamuse one of their models to test out your new look

1.2 Motivation

Users commonly try on many items and spend lots of time for them to purchase jewels. In Stores, many mirrors are located to help users for making their decision to buy accessories looking well. Sometimes, it is very inconvenient for them to try accessories carefully each time and put on whenever they find attracting of them and also for sales person who has responsibility to take care of these accessories.Due to security reasons, there is also a restriction on the number of accessories that can be taken at time for trial.

Virtual Fitting Room yield out the solution to this problem. Based on Augment Reality this virtual mirror room empowers e-commerce by satisfying users with Virtual experience. The virtual trial room permits the client to forecast their rate of sale with the engagement of user that results in improved profits with better marketing strategies and tactics.With the introduction

of virtual Mirror Application, the amount of damage to the inventory is reduced as the usage of a trial room is also reduced. The queue of the customer is now engaged with the introduction of the Virtual mirror in the many outlets. Due to that users are experiencing better time management while shopping via virtual mirror with better management.

1.3 Problem Statement

Trying different clothes in shops and finally selecting the right one is a time consuming and tedious task.In shopping malls due to crowd, there is also a restriction on the number of garments that can be taken at one instance of time for trial.

1.4 Project Scope

1.4.1 For Users

- Automatic body measurements and body shape identification.
- Fast and easy virtual accessories try-on.
- It gives better satisfaction and experience to buyers and sales person.
- Automatic accessories alignment and scaling.
- Quick preview and virtual try-on of new accessories.
- Getting fashion advice and recommendations.
- Shopping is made fun and social by shoppers capturing photos of themselves in different virtual environment with accessories and sharing with friends and family via photo sharing through social networks

1.4.2 For Retailers

- Increase sales and conversionrates byenabling shoppers to easily try on different new accessories online.
- Increase store visits and walk-ins by providing fun and differentiated shopping experience.
- With Web and Mobile versions, maximise sales by displaying all available garments and minimise returns by allowing the customer to order the correct sizes.
- Quickly display the latest ranges of outfits across stores and Online and even before the stock arrives in-store Display Catwalk and Advertising in screen saver mode for maximum use of the Virtual Mirror real-estate
- The Web and Mobile versions can easily be connected to the client's eCommerce and inventory systems with simple API.
- All data captured can be accessed on the central CMS dashboard providing invaluable customer insights for the Marketing and Buying teams.

Chapter 2

Literature Survey

In recent past, a lot of algorithms were designed to solve face recognition problems, for example, those found in [4][5]. Savvides et al. [6] is one of the works that we could associate with this subject. To create quantifiers with discriminative ability, several facial regions are analyzed here. The method of kernel correlation filters was used to reduce image dimensionality and for extraction of features based on gray scale images. They then used Vector Machines (SVM) support to discriminate between different facial features. They dealt with three major facial areas, including the head, nose, and mouth, in their study. They said the results of their experiments suggest a higher verification rate for the eye region compared to the mouth and nose regions [7]. In a comparable fashion, [8] presented a procedure known as the Dynamic Feature Matching (DFM) for incomplete face recognition. Their examination depended on a blend of fully convolutional networks (FCN) [9], and sparse representations. The motivation behind FCN is to separate a component map of pictures which has the ability to cater for progressively discriminative features. The core of their work is the use of VGG-Face model [10] from which these features was moved to the FCN. This strategy seems to have created great arrangement precision contrasted with other existing strategies. Long et al. [11] proposed Subclass Pooling for Classification (SCP) to tackle the twofold impediment issue by utilizing constrained information in a training set. They utilized a fuzzy max pooling technique and normal pooling plans. Their outcomes indicated that an astounding edge of execution can be accomplished. Yang et al. [12] of recent, proposed a structure called the Optimized Symmetric Partial Face graph (OSPE) for face recognition under various situations [13]. For instance, impeded face, facial appearance and variety of lighting are a portion of the signals they use in their research. Once more, their experimental outcomes have demonstrated that a few enhancements in recognition rates

can be accomplished by presenting imperfect facial information or data. C. G. Martin and E. Oruklu, “”Human Friendly Interface Design for Virtual Fitting Room Applications on Android Based Mobile Devices,””Journal of Signal and Information Process- ing, p. 10, 2012. -Virtual fitting rooms have been a research subject for more than a decade. Protopsaltou et al. developed an Internet-based approach for virtual tting rooms, although it was not real time and required marker-based motion capture systems for animation. Zhang et al. used a multi-camera system utilizing shell tting space (SFS) techniques to build a real time intelligent tting room. Ad-vances in time-of- ight technology made depth sensors available at consumer-level prices with better performance. This prompted a wave of research based on depth sensors in various elds, such as rehabilitation, indoor modelling, and medicine. Another topic that attracted signi cant atten-tion from both researchers and com-panies is real-time virtual tting rooms. D. N.Pughazendi, G.Madankumar, R.Rajkumar and R.Ramsuraj,“”Design and Implementa- tion of Interactive Augmented Trial Room,” ”SSRG International Journal of Computer Sci- ence and Engineering (SSRG-IJCSE), vol. 2, no. 3, p. 5, 2015. -Giovanni et al. developed a virtual try-on sys-tem utilizing a calibrated set of Kinect and high de nition cameras, while comparing the two state-of-the-art depth sensing software development kits (SDKs)-OpenNI and Kinect for Win-dows SDK. While most frameworks utilize garment meshes with physics simulation, an-other intriguing approach is using a pre-recorded apparel image database from which the images are superpositioned onto the RGB video of the user. One prob-lem with depth sensors is the feeble quality and noisiness of the depth stream. This problem is analyzed in depth by Khoshelham and Elberink , who con-cluded that the standard deviation reaches 2 cm in a measuring distance of 3 m.Z. shaobin, L. yunting, X. Yihua and Z. lixin, “”Research and Im-plementation of 2D Mod- elling Algorithm Based on Image”, ”International Conference on Signal Processing Sys-tems, p. 4, 2009. -Matyunin et al. attempted to improve the quality by ltering with addi-tional information from the attached RGB camera. To increase the quality of the models produced using depth data from a Kinect camera, Tong et al. describe a scanning system for capturing 2D full human models utilizing multiple Kinects to be used by virtual try-on applications. A key purpose of both virtual and real tting rooms is giving the user the look and feel of clothing of a specific size on the user, so the user can choose the appropriate size for him. Embedding the feature of matching clothing sizes with users requires capturing the users’ body dimensions. More ad- vanced frameworks even construct virtual avatars with input from only one depth sensor .On the other hand, although these works provide higher detail avatars and more precise

measurements, which might be more suitable for a made-to-measure type of framework, these processes require too much time to work with a real-time ' xed-size try-on' virtual tting room application, and we suggest that simple height and shoulder width measurements are su cient. These applications require a faster approach along with a specialized garment design framework . S. Kamani, N. Vasa and K. Srivastava, ""VIRTUAL TRIAL ROOM USING AUGMENTED REALITY", "International Jour-nal of Advanced Computer Technology (IJACT) , vol. 3, no. 6, p. 5. - There are also notable studies for made-to-measure technologies for online clothing stores , shape control techniques for automatic resizing of apparel prod-ucts, modelling a 2D garment on a 2D human model by 2D sketches, and garment pattern design using 2D body scan data. Guan et al. describe DRAPE, which is a learned model of clothing that facilitates dressing of 2D virtual humans of di erent dimensions with di erent postures.Their algorithm is composed of three stages: shape and pose training, learning apparel deformation model, and virtual tting. Brouet et al. present a fully automatic technique to transfer gar-ments between characters with di erent dimensions in a design-preserving fashion. They formulate garment transfer as a con-strained optimization problem and solve it using iterative quadratic minimization.

2.1 Analysis of Review

We mainly focus on designing the real time virtual dressing room. virtual dressing room is used in shops, malls any shopping centre. Trying clothes in shopping centre is actually a time consuming activity. Besides, it might not even be possible to try on clothes in such cases as online shopping.Our motivation is to increase time efficiency and improve the accessibility of clothes try on by creating virtual dressing room environment. And also build an interactive and highly realistic virtual machine on which the user can try clothes without wearing it actually. This is the major reason why less number of apparels is being shopped online. Hence, a virtual dressing room which would make people knows how cloths personally fit in would be a great luxury for the online sellers which could give a wide choice for customers.

Table 2.1: Literature Analysis

Literature Survey		
References	Working	Accessories
JCPTeen	Virtual Fitting Room Implementation gets an image of user and using Adobe flash player displays the clothing items. At Beginning it shows a shadow on the screen where the user has to fit themselves and after that the cloth is displayed.	Used for Clothing
Zugara	Zugara offers a Virtual Fitting Room that is similar to JCPTeen.It is based on Augmented Reality and uses a fixed templete.	Used for Clothing
Styku	It presents a bodyscanner that creates a complete 3D model of the user.This 3D Model is used in other webpages to try the clothing items on. This model can be rotated and customized.	Used for Clothing
RayBan	RayBan Website is a Eyewear website which is similar to that of lenskart it allows the user to tryout eye wears in three different directions.	Eyewear

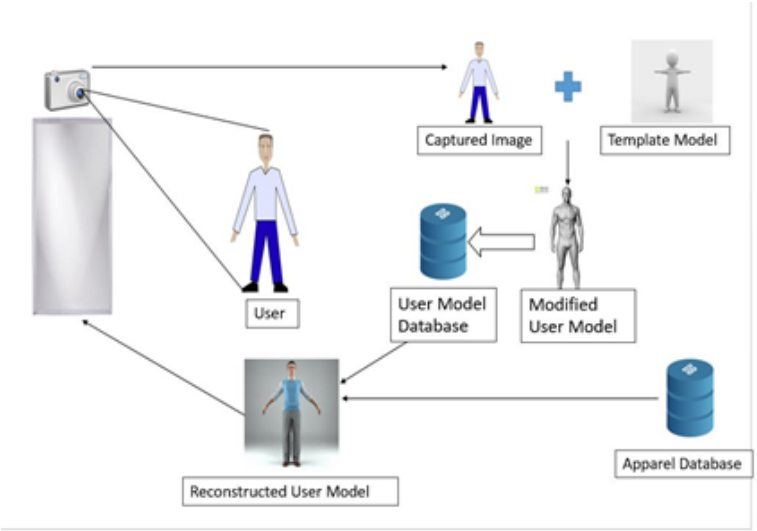

Figure 2.1: Architecture.

2.2 Previous work

Previous work

In the existing system there is an only image processing is done.That mean we can take only the front and back view of the object and store it.

2.3 Proposed work

Proposed work

In order to evaluate the clothing fit for virtual try-on, six subjects with different body shapes were recruited to the fitting evaluation. For fit evaluation, every subject was scanned by putting on the fitted size of shirt at the beginning, and then changed the shirt sizes to a bigger one and a smaller one. In order to have a comparison with virtual and human fit trials, the virtual clothes made by the proposed method are dressed on the individual body of every subject. For effective results, the virtual mirror is a better way to manage a store. Trying maximum dresses virtually in lesser time this is the major part of the Virtual mirror. The photo-accurate helps consumers to try virtually various attires and fittings without any hassle The virtual try-on clothes are considered to be simulated with the same textile material property as the real shirt. For fit evaluation, subjects tried different cloth sizes in making contrast to meet the fit requirement. Each subject chose one of the cloth sizes better fit than the others and considered as the well fitted clothes,

and changed the cloth sizes into a bigger one and a smaller one. The foremost advantage of Virtual Mirror technology is that all the movements made in the real world by the buyer are reflected in the mirror with the set of new clothes. Furthermore, the light setting can also be adjusted as per the convenience of the individual and different times of a day. Thus, the VR Mirror technology gives the user a brief regarding how the outfit will look on his/her body without physically wearing it. As for the retailers, it helps them immensely in multiplying their sales and income as a result of hassle-free engagement with the buyer. Mirror is possibly the most common optical device in our everyday life. Rendering a virtual mirror using a joint camera-display system has a wide range of applications from cosmetics to medicine. Existing works focus primarily on simple modification of the mirror images of body parts and provide no or limited range of viewpoint dependent rendering. In this paper, we propose a framework for rendering mirror images from a virtual mirror based on 3D point clouds and color texture captured from a network of structured-light RGB-D cameras. We validate our models by comparing the results with a real mirror. Commodity structured-light cameras often have missing and erroneous depth data which directly affect the quality of the rendering. We address this problem via a novel probabilistic model that accurately separates foreground objects from background scene before correcting the erroneous depth data. We experimentally demonstrate that our depth correction algorithm outperforms other state-of-the-art techniques.Shopping online for clothing and accessories can be annoying sometimes for users. And of course, many of us have experienced it. After ordering an item if user finds out that it doesn't fit. This kind of situation can be maddening and remorseful. This common experience is not only a hard from consumer's point of view but it is one of the major obstacles hindering online fashion retail. When it comes about outfits the fact is people like trying them. Our project is limited to accessories In order to extend our application for complete body accessories, we need to incorporate gesture-based devices

Mirrors have more and more applications as technology advances, and some of the most fascinating applications are those implemented by the advertising and computer industries. The Japanese auto-maker Nissan used large wall to ceiling sized mirrors to project full size presentations in front ofthe observer. The mirrors were interactive and the observer could push buttons just by holding up the hand without actually touching the button image. Adidas are known for their virtual mirror which allows the observer to view how different shoes would appear on the observers foot without he or her actually putting them on.

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doubling as a high-resolution digital screen allow customers to view themselves in mirror with different clothes on without actually trying them on.[1] Tortoise Blonde Eyewear, an online shopping website is the coupling of design, quality, precision, and customer service, with the creativity and vigor of today's tastemakers.

Their Virtual Try On is as simple as sittinginfront of your computer and takinga picture. If you don't have a webcamuse one of their models to test out your new look. to reduce and probably eliminate the want for the user to make time for each day morning or night routine to check their PC, tablets, or cellphone for the facts they need. The mirror will offer the records with little to no effort from the person with the purpose of now not being a burden that he or she have to preserve. The mirror wouldnt be every other activity, alternatively an enhancement to the already common use of mirrors in maximum modern-day bathrooms. The mirror will do the thinking for the person. First, it will turn on and off by itself. Then, it will update with the users calendar agenda, to-do lists, Twitter, news, weather and other services. The data wouldnt be displayed on the users reflection but rather would be displayed on the edges of the mirror to still allow use of the actual mirror. The mirror provides common data that majority of the people check on their smartphones or tablets which includes weather, news, Twitter and other services. This allows the users to read, think, and plan their day while getting ready in the morning or night.

2.3.1 Face Recognition Algorithm

OpenCV has the advantage of being a multi-platform framework; it supports both Windows and Linux, and more recently, Mac OS X. OpenCV has so many capabilities it can seem overwhelming at first. A good understanding of how these methods work is the key to getting good results when using OpenCV. Fortunately, only a select few need to be known beforehand to get started. OpenCV's functionality that will be used for facial recognition is contained within several modules. Open CV (Open Source Computer Vision Library) is a open source computer vision software library for the purpose of machine learning. Open CV was developed to serve the purpose of computer vision applications and to stimulate the usage of machine perception in the commercially viable products. Open CV is a BSD- licensed product which is easy for the utilization and modification of the code. The library contains more than 2500 advanced algorithms including an extensive set of both typical and state-of-the-art computer vision and machine learning algorithms. These algorithms can be employed for the detection and recog-

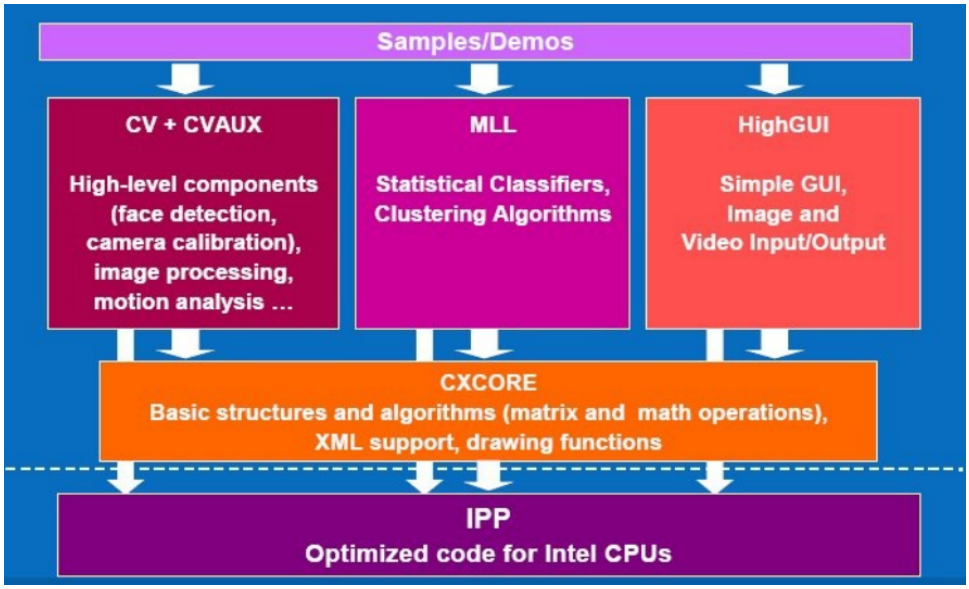

Figure 2.2: OpenCV Architecture

nition of faces, identification of objects, extraction of 3 D models of objects, production of 3 D point clouds from stereo cameras, stitching images together for production of a high resolution image of an entire scene, finding similar images from an image database, removing red eyes from images taken using flash, following eye movements, recognition of scenery and establishing markers to overlay it with intensified reality etc. It includes C++, Python, Java and MATLAB interfaces and supports Windows, Linux, Android and Mac OS. Open CV mainly involves real-time vision applications taking advantage of MMX and SSE instructions when available. A full-featured CUDA and Open CL interfaces are being progressively developed.

OpenCV is a popular computer vision library started by Intel in 1999. The cross-platform library sets its focus on real-time image processing and includes patent-free implementations of the latest computer vision algorithms. In 2008 Willow Garage took over support and OpenCV now comes with a programming interface to C, C++, Python and Android. OpenCV is released under a BSD license so it is used in academic projects and commercial products. OpenCV 2.4 now comes with the very new Face- Recognizer class for face recognition, so you can start experimenting with face recognition right away. The currently available algorithms are:

- Eigenfaces (see createEigenFaceRecognizer())
- Fisherfaces (see createFisherFaceRecognizer())
- LBHS (see createLBPHFaceRecognizer())

A. Eigen Faces

This method is a statistical plan. The characteristic which influences the images is derived by this algorithm. The whole recognition method will depend on the training database that will be provided. The images from two different classes are not treated individually.

B. Fisher Faces

Fisher faces algorithm also follows a progressive approach just like the Eigen faces. This method is a alteration of Eigen faces so it uses the same principal Components Analysis. The major conversion is that the fisher faces considers the classes. As mentioned previously, the Eigen faces does not differentiate between the two pictures from two differed classes while training. The total average affects each picture. A Fisher face users Linear Discriminant Analysis for distinguishing between pictures from a different class.

C. Local binary patterns histograms

This method needs the gray scale pictures for dealing with the training part. This algorithm in comparison to other algorithms is not a holistic approach.

LBPH uses the following parameters:

- Radius

  Generally 1 is set as a radius for the circular local binary pattern which denotes the radius around the central pixel.

- Neighbours

  The number of sample points surrounding the central pixel which is generally 8.The computational cost will increase with increase in number of sample points.

- Grid X: The number of cells along the horizontal direction is represented as Grid X. With the increase in number of cells the grid becomes finer which results in increase of dimensional feature vector.

- Grid Y:

  The number of cells along the vertical direction is represented as Grid Y. With the increase in number of cells the grid becomes finer which results in increase of dimensional feature vector.

with the reference of above table we are decide to use LBPH Algorithm for detection.

Hence the result of this method is the ID of the image which has the nearest histogram. It

ACE	FACE	
Confidence factor based on output is 2,000-3,000.	It is 100-400.	
Threshold value is 4,000.	Threshold value is 400	Threshold value is 7.
Principle of dataset generation is component based.	It is component based.	It is pixel based.
Basic principle is PCA.	Basic principle is LDA.	Basic principle is Histogram.
Background noise is maximum.	Background noise is medium.	Background noise is minimum.
Efficiency is minimum.	Efficiency is greater than Eigen face.	Efficiency is maximum.

Figure 2.3: Comparison of LBPH with other algorithms

should return the distance calculated in the form of 'confidence'. Then the threshold and the 'confidence' can be used to automatically evaluate if the image is correctly recognized. If the confidence is less than the given threshold value, it implies that the image has been well recognized by the algorithm The data of the trained faces are stored and the detected faces are compared to the IDs of the students and recognized. The recording of faces is done in real time to guarantee the accuracy of the system. This system is precisely dependant on the camera's condition.The training process starts with traversing of the training data directory. Each image in the training date is converted into gray scale. A part of the image is taken as center and threshold its neighbours against it. If the intensity of the middle part is more or equal than its neighbour then denote it with 1 and 0 if not. After this the images are resized. Then the images are converted into a numpy array which is the central data structure of the numpy library. Each face in the image is detected. Creation of separate lists of each face is done and the faces are appended into them along with their respective IDs. The faces are then trained with their respective IDs. **ADVANTAGES OF USING LBPH ALGORITHM**

- It is one of the simplest algorithms for face recognition.

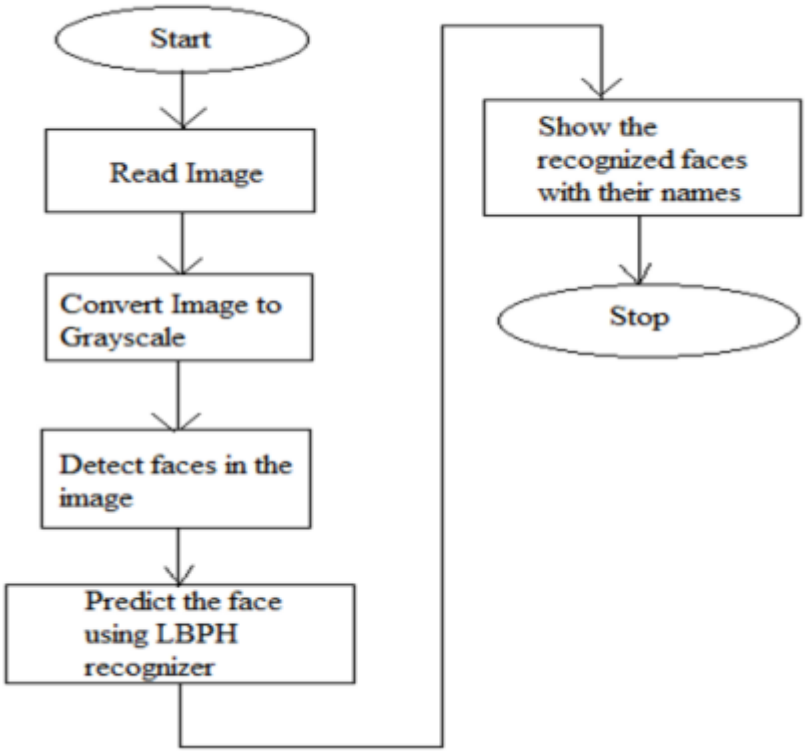

Figure 2.4: Flow-chart of the methodology used for Face Detection and Recognition

- The local features of the images can be characterized by this algorithm.
- Using this algorithm, considerable results can be obtained.
- Open CV library is used to implement LBPH algorithm.

The training process starts with traversing of the training data directory. Each image in the training date is converted into gray scale. A part of the image is taken as center and threshold its neighbours against it. If the intensity of the middle part is more or equal than its neighbour then denote it with 1 and 0 if not. After this the images are resized. Then the images are converted into a numpy array which is the central data structure of the numpy library. Each face in the image is detected. Creation of separate lists of each face is done and the faces are appended into them along with their respective IDs. The faces are then trained with their respective IDs. The input image is read by the web camera of the system. After the image is read it is converted into gray scale. The faces in the image are detected using the Haar Cascade frontal face module. Using the LBPH algorithm, the faces in the image are predicted. After the images are predicted, the recognized faces are shown in a green box along with their names. The images are saved in

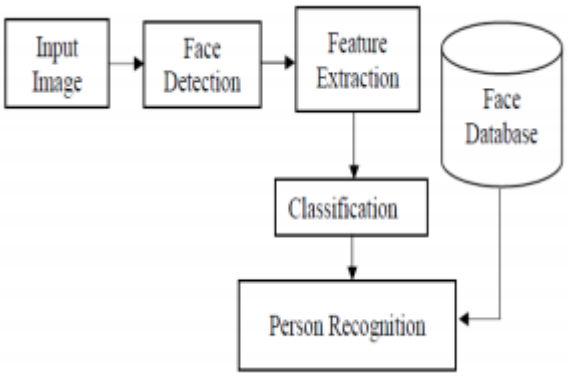

Figure 2.5: Block Diagram Recognition

gray scale after being recorded by a camera. The LBPH recognizer is employed to coach these faces because the coaching sets the resolution and therefore the recognized face resolutions are completely variant. A part of the image is taken as the centre and the neighbours are thresholded against it. If the intensity of the centre part is greater or equal than it neighbour then it is denoted as 1 and 0 if not. This will result in binary patterns generally known as LBP codes. The application takes advantage of the image processing capability of python. user friendly GUI is provided where the user can import photos from different locations. Both the image to be searched as well as the folder on which we need to find the image should be manually given by the user. The result folder also can be specified by the user. The general flow of the system according to the approach as shown in figure 2. As soon as the search image, the search folder and the result folder are submitted by the user the analysis process is formed. The search image undergoes detection phase and encoding of the face thus detected is generated. Meanwhile the application traverses through all the subdirectories of the search folder selected by the user, generating encodings of each of the image file. These encodings are compared with that of the search image using the Euclidean distance. A suitable tolerance parameter is used to improve the accuracy.

Chapter 3

Results Analysis

It is designed especially for people who spend much time in front of Mirror without wasting any time they can do the productive work such as having a glance on emails and read the news by using our system. Software working includes the installation of openCV with the algorithm which will first detect the images and learn them. The database will be created containing different images.

Software Design: The project's goal is to create an open development platform, and all software components must fit that goal. The software is designed to run on multiple platforms and fit many types of displays.

We hope that maybe more work and more effort can be added in the future, either by us or others, to improve our platform further. we were comparing all the various technologies used by the various e-business companies like rayban and lenskart etc. and then coming to the result which one is making better use of the virtual mirror technology and is giving the customer better user interface and interactive environment for their shopping experience.in lenskart The Virtual Mirror is custommade for their subscribers to provide the most fulfilling and doubt free shopping experience and to give the services as fast and efficient as possible and the payment gateway is processed by the CCAvenue Gateway which is secure. Ray- Ban is the driving force behind this digital revolution which will dramatically change the optical industry that is the main difference between all the e-business companies and rayban the ideas with which they are working they have found an innovative way to track the users head movement without the use of argumented reality tracking marker which helps inmoving the sunglasses in real-time and it actually replicates the idea of trying the pair of sunglasses in a store or on their site which is brownie point for them.

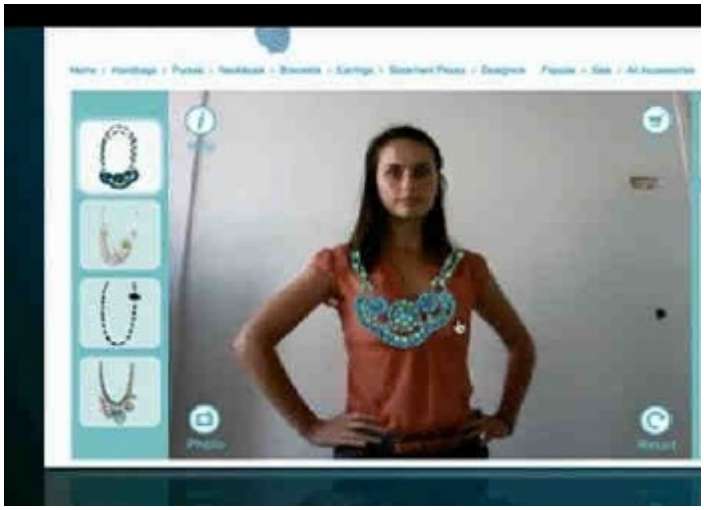

Figure 3.1: Face detection and reorganisation With OpenCv

A cool application, Fashionista is created by Zugara that allows user to have a virtual dressing room via their laptop. The user can actually take a picture of his/her in this potential new attire and even get second opinions from his/her friends by uploading the images to Facebook. By using an AR marker to clearly mark the location for each garment location, the user can easily navigate the app with a simple click. Boutique Accessories, a popular jewelry site, created this "virtual mirror, the user just has to visit its site and follow the instructions provided by the video the virtual mirror does not need customers to print out markers to hold in front of the webcam in order to activate the application.

The virtual mirror automatically detects the user through the webcam image and, using key points on the face and neck, maps the jewellery onto the user in the correct position which was unique thing done by this site as it was not making the use of virtual mirror for tracking. The EZface Virtual Mirror Application(VMA) is a turnkey software solution that provides photorealistic simulation of makeup, hair color and eyewear products applied to the customer's own photo . Users can try on any combination of products with realistic accuracy on their own photo.an image processing system that can support the crime analysis process greatly. The face recognition and clustering process performed For improving the performance small features can be improved and used. well except for those images in which the faces are poorly illuminated or partially visible. These issues can be addressed in the future by employing various alignment correctors. Even though intended primarily to aid the inquiry process through slight changes it can be extended to meet other similar applications. In future, the advancements in technology can add more advanced features to the model and to broaden its application range.

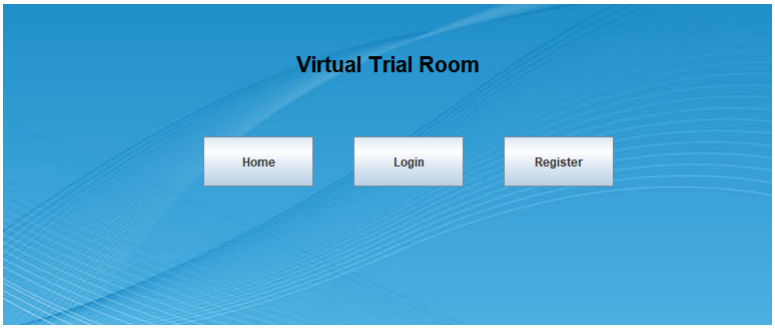

Figure 3.2: Home Page

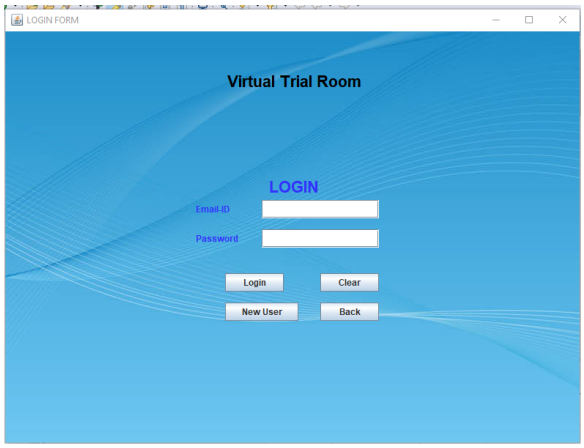

Figure 3.3: User Authentication Page

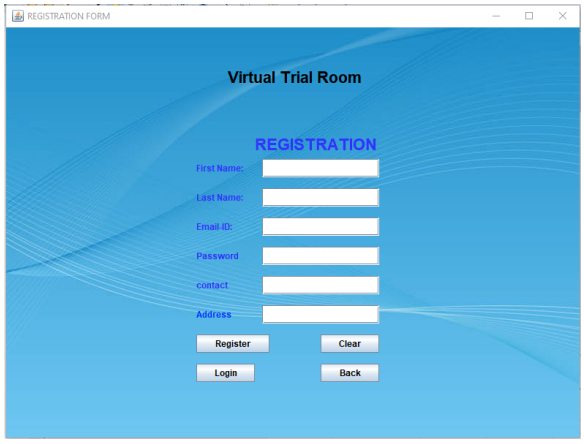

Figure 3.4: User Registration Page

Figure 3.5: UI to Capture User Images to Process Further

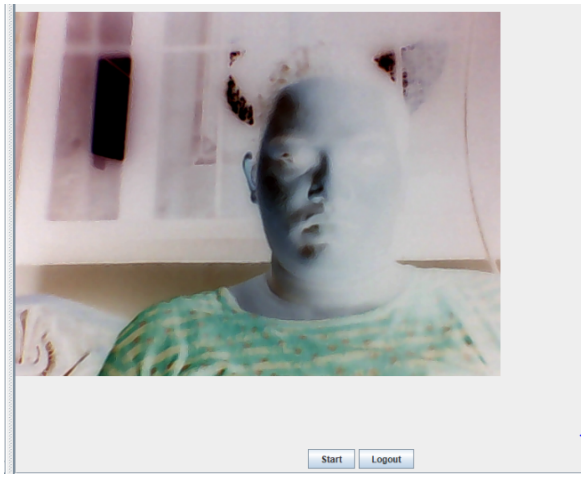

Figure 3.6: Face Reading Process

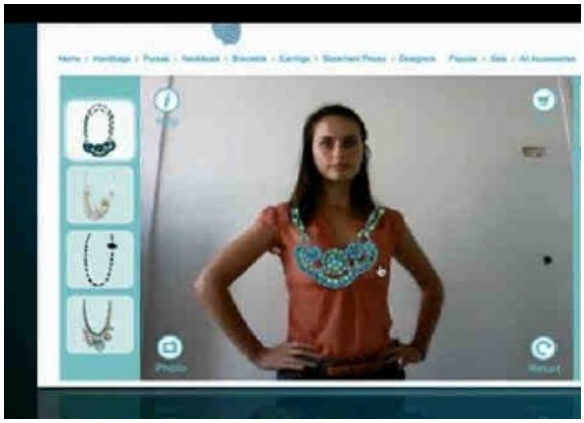

Figure 3.7: Face Detection Process and Apply jewellery to face Virtually

Chapter 4

Development Tools

4.1 Hardware Requirement

- **Processor:Intel i3**
- **RAM:4GB**
- **Key Board:Standard Windows Keyboard**
- **Mouse:Two or Three Button Mouse**
- **Monitor/LCD:SVGA/LED**

4.2 Software Requirement:

- **Operating System:Windows**
- **Database:My SQL 5.0**
- **IDE:Eclipse Oxygen**
- **Coding Language:Java 1.8**

Bibliography

[1] C. G. Martin and E. Oruklu, "Human Friendly Interface Design for Virtual Fitting Room Applications on Android Based Mobile Devices," Journal of Signal and Informa-tion Processing, p. 10, 2012.

[2] D. N.Pughazendi, G.Madankumar, R.Rajkumar and R.Ramsuraj, "Design and Implementation of Interactive Augmented Trial Room," SSRG International Journal of Computer Science and Engineering (SSRG-IJCSE), vol. 2, no. 3, p. 5, 2015.

[3] Z. shaobin, L. yunting, X. Yihua and Z. lixin, "Research and Im-plementation of 2D Modelling Algorithm Based on Image," In-ternational Conference on Signal Processing Systems, p. 4, 2009.

[4] S. Kamani, N. Vasa and K. Srivastava, "VIRTUAL TRIAL ROOM USING AUGMENTED REALITY," International Jour-nal of Advanced Computer Technology (IJACT), vol. 3, no. 6, p. 5.

[5] J. Upadhyay, D. Shukla, N. Patel and S. Nangare, "Virtual Makeover and Virtual Trial Dressing," International Journal of Innovative Research in Computer and Communication Engineer-ing , vol. 3, no. 3, p. 5, 2015.

[6] X.-D. LUAN, Y.-X. XIE, L. YING and L.-D. WU, "Research and Development of 2D Modeling," IJCSNS International Journal of Computer Science and Network Security, vol. 8, no. 1, p. 5, 2008.

[7] Mujahid, " Modeling Virtual Apparel to Display Realistic Shape and Force Based on Physical Data," Transactions of the Institute of Systems Control and Information Engineers, vol. 16, no. 4, p. 5, 2003.

[8] A. Albin-Clark and T. Howard, "Automatically Generating Vir-tual Humans using Evolutionary Algorithms," Theory and Prac-tice of Computer Graphics, 2009.[9] M. Popa, "Hand Gesture Recognition Based on Acceler- ome-ter Sensors," Inter-national Conference on Networked Computing and Advanced Information Management,pp. 115-

120, 2011.

[10] T. Hanusch, ”A NEW TEXTURE MAPPING ALGORITHM FOR PHOTO-REALISTIC RECONSTRUCTION OF 2D OB-JECTS,” The International Archives Of Photogrammetry, Re-mote Sensing And Spatial Information Sciences, vol. 37, no. 5, p. 8, 2008.

[11] Protopsaltou D., Luible C., Arevalo-Poizat M., Magnenat-Thalmann N., ”A body and garment creation method for an internet-based virtual tting room,” Proceedings of computer graphics international (CGI ’02). Berlin: Springer, p. 10522, 2002.

[12] Zhang W., Matsumoto T., Liu J., Chu M., Begole B., ”An in-telligent tting room using multi-camera perception,” Proceedings of the 13th international conference on in-telligent user interfaces (IUI ’08), New York, NY, USA: ACM, p. 609, 2008.

[13] Matyunin S., Vatolin D., Berdnikov Y., Smirnov M., ”Temporal ltering for depth maps generated by kinect depth camera”, Pro-ceedings of the 2DTV conference: the true visioncapture, trans-mission and display of 2D video (2DTV-CON), p. 14, 2011.

[14] Giovanni S., Choi Y.C., Huang J., Tat K.E., Yin K., ”Virtual try-on using kinect and HD camera,” Proceedings of the fth in-ternational conference on motion in games (MIG’12), Lecture notes in computer science, Berlin: Springer, vol. 7660, p. 5565, 2012.

[15] Tong J., Zhou J., Liu L., Pan Z., Yan H., ”Scanning 2D full human bodies us-ingKinects,” IEEE Trans Vis Comput Graph, vol. 18, no. 4, p. 643-650, 2012.

[16] Yasseen Z., Nasri A., Boukaram W., Volino P., Magnenat-Thalmann N., ”Sketch-based garment design with quad meshes,” Comput Aid Des, vol. 45, no. 2, p. 562-567,2013.

[17] Khoshelham K., Elberink S.O., ”Accuracy and resolution of kinect depth data for indoor mapping application,” Sensors, vol. 12, p. 1437-1454, 2012.

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Date: _____