"Glares On 3D-ized Face"

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Abstract:

With the influx of online shopping, purchasing glasses online has increased tremendously. Now-a-days, people usually buy accessories like glasses, jewelry, etc. at store trying on pair after pair in a mirror. This problem if eliminated will save time, money and also the tedious task of trying so many things and selecting one. Augmented Reality applications have become popular because they allow users to experience themselves wearing different accessories without the effort of changing them physically. However, they involve a precise and perfect position of the camera and moving freely becomes a little uncomfortable for the user. There is a need to propose a system wherein trying and shopping becomes optimal and equally convenient.

The Glares on 3D-ized face application will merge advancements of information and technology in 3D modeling and reconstruction to eliminate this problem. Using Android platform, we would like to make trying glasses and shopping easier. This is an application that creates a 3D, photo perfect model of customer's head and lets him try on thousands of different colors and styles of glasses.

Keywords: **3D Modeling, Image Processing, Augmented Reality.**

1. Introduction:

In today's busy world, there is a need to provide solutions saving both, time and money and simultaneously providing quality service. Generally, when people want to buy glasses or glares, they have to be accompanied by their friends or relatives. This way, people have to try pair after pair and each time check the way they are looking with those glares. In this traditional approach, time and money consumption is more which needs advancement.

Glares on 3D-ized face is an android application which allows users to see themselves with the glasses on. This android-based application helps you to try on a huge collection of sunglasses without commuting to a store. This application captures your face picture by taking a series of photos. The application uses 3D graphics acceleration of the mobile device to render a perfect 3D model of the face and then superimpose glasses on it. The user will be able to view all the sides of his face using touch-screen operations. The application will show all the glasses available, and how they would look on the user. This way, a lot of time and money will be saved by being home or at one's workplace and checking out the glasses on your 3D-ized face.

The Glares on 3D-ized face application will function as a simple android platform application. 3D modeling in android will involve the library Open GL ES which will be used for 3D graphics programming. OpenGL[1] is the graphics standard that allows an application to use a device's 3D Graphics processor to render an image. The real time face 3D model will be rendered to further superimpose it with glasses.

2. Existing Systems:

Existing applications in this field are as follows:

2.1TryOn:[7]

Try on is an iOS app for virtual try-on of eyewear.

WORKING:

Initially, the app enables a user to select, if he wants to capture a new photo or, wants to use existing images. After selecting the model, user can try the frames stored in frame database and apply on either the user face or existing model face.

The app gives a facility to use an existing model image that is, either a male face model or a female face model based on user selection. While applying the frames on the face, user can either adjust the size of the frame with respect to face size or he can adjust the face with respect to size of the frame. The app provides frames of different sizes and different brands .The user can share his picture with frames on social networking sites like Facebook, Twitter or he can email the picture .Also, he can save his new picture to the phone gallery.

2.2 LensKart.com:[6]

This is a desktop application.

WORKING:

In the first step, users are required to enter their personal details & select time of appointment at the user's home place.

Then, a Certified Optometrist arrives at the time of appointment and does the complete eye check up on high end equipment at customer's doorstep. Further, the Optical specialist will provide to the users all of their eyeglasses at home place and allow the user to select their choice of glasses.

Now, users will see how they fit and also, review them from their family & friends to get a second opinion. Lastly, the Optical specialist will suggest users the best lenses as per their prescription.

The Optical specialist will place the user's order online.

2.3 Rayban.com: [5]

This is a desktop application to try on several glares on the user's face and buy them online.

WORKING:

In the first step, users are required to enable the web camera connection. It is essential since, for desktop applications web camera is the source for capturing images of the users.

Now, in the second step there are two approaches:

For the first approach, users capture their images through the web-camera and after taking the pictures users are required to click on few points on the screen(which appears like mirror) to try on glasses on their own face.

In the second approach, users can use one of the models present on the site and try their selected glasses on the models.

In the end, after selecting one of the two approaches, users can try on ray ban glasses or glares on the virtual mirror.

3. Proposed System:

On start-up, a naive user registers into the system with a unique username and password. Using these credentials, the user then, logs in to the application. After logging in, the application starts the camera of the device which helps to capture images of the user's head from all the directions. These images are then sent to the server for further processing. Feature points will be extracted and rendered to create a perfect 3D model of the face. The model then gets displayed on the user's device, which will enable user to try on various glasses over it. The user can operate on the model to get all the looks of the glares on the face. This application will also provide an option to upload a screenshot of user's face over social networking sites via the Internet.

The application will boost online shopping to a greater extent wherein people can first try, and then choose the best one to buy. In case of glasses, there also lies a problem where size varies from individual to individual. The system will provide a solution for the same to view those glares on 3D-ized face. Unlike existing systems, the proposed system enables a hands-on experience to its users saving an enormous amount of time.

4. Scope:

The proposed system is for all the users who wish to shop glasses online. Traditional methods of buying glasses aren't realistic enough for customers to get a clear idea of what frames would actually look like on their face. They are quite time consuming and sometimes, not sufficient to decide on which glasses to shop. Smart phones are now widely accepted due to their robust nature and ability to perform multiple tasks on a single touch. So here we are combining smart phone's grandeur with facial recognition to create a realistic virtual try-on experience.

Glares On 3D-ized Face uses a smart phone's graphics ability to render a 3D model on the screen of the user.

The GUI on the user front has mainly these facilities:

Initially, on startup of the application user will get two options, either to click images for rendering a 3D model or to view already created models. Suppose the user is loading the application for the first time, he chooses the option to click images of the head. On selecting this option, the application starts the Camera application of the Android Operating system which will enable him to capture pictures. After clicking images from all the angles, the user selects the "Make my model" Option. This option will start the rendering process processing all the images captured by the user. Soon, the 3D model of the user's head will be displayed on the screen. The user can now try any number of glasses from the menu available on the screen, pair after pair. The screen now shows the selected glasses on the model. Further the user can also avail a screenshot of the model and can upload it on Facebook via Internet connection. Or the user can directly make an order online for the selected glasses.

Features:

- This application will provide an entirely new experience to its users to try glasses.
- It will enable the users to see thousands of frames rendered on their face instantly in 3D.
- It would facilitate the user to interact with the head to see frames in detail from any angle.
- The interface is aesthetically pleasing, easy-to-use and easily understandable by a novice user.

Goals and objectives:

- To automate the process of shopping glasses completely by trying glasses sitting at home.
- Save a considerable amount of user's time in an incredibly busy world by providing a feature to try glasses on a 3D model of head.
- Provide an "All-in-one" application for glasses - from selecting a frame to placing an order.
- Provide a hands-on experience to users with less commuting.

Benefits:

Time Saving: In earlier days, people had to waste lot of time and energy in buying the products like glasses by trying them pair by pair, travelling to stores..This app will save a tremendous amount of time by not physically going to the shops, but trying them virtually on the 3D model created by the app.

Money Saving: Using this app it would be possible for the customers to know which brand is having offer. And according to that he can decide to buy. Customers need not commute to different stores hence saving both time and money.

Boost to Online Shopping: This app will act as a boost to online shopping not only for glasses particularly, but also can be extended for many other products in future.

Future Scope:
- Jewelry, accessories superimposition on 3D models of human face.
- Also, building a complete 3D world could be a trend in future for viewing, experiencing and superimposing more 3D objects over it as if it were a real world.
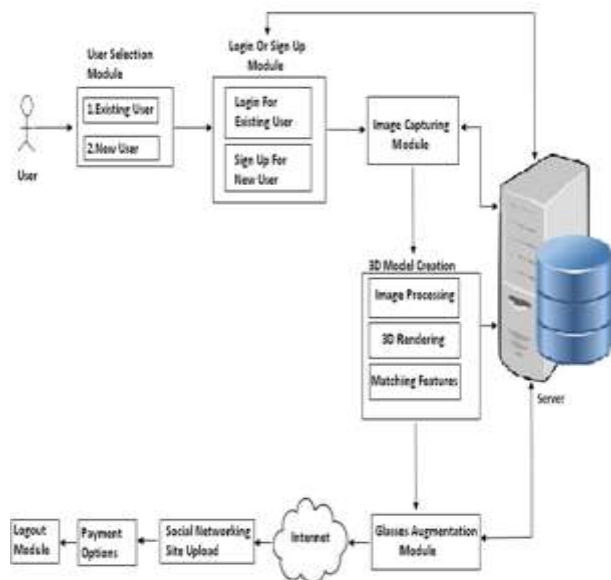
5. System Design:

Fig.3.1 Block Diagram Of Glares On 3D-ized Face

Referring to the block diagram in Fig. 3.1, initially, user selection module and login module will provide user a choice to register as a novice and/or login as an existing user.

After logging into the system, user will be able to capture a minimum of 4-5 images of his face .These images will be taken using the magnetometer alignment in android which will help the user to capture linear images. These will be stored on the centralized server. These images can be retrieved if further models are to be created.

From the images captured by the user, 3D model creation module will be executed. Creation of 3D model will involve steps - Image Processing, 3D Rendering and Matching features:

- Image processing will include noise removal and blur removal required in the captured images.

- Face point-feature matching will be used to construct a 3D model from all the series of images captured. These features include head , eye ,nose ,lip points to be mapped from every image captured.

- 3D rendering[3] includes graphics processing of converting real scenes to 2D images and further, combine with 3D photorealistic effects to create a 3D photo perfect model.

Lastly, the task is to augment glasses on the model. Various glasses are stored in the centralized database as 3D objects and those are augmented on the model using feature matching. And user can select the one which suits perfect for him/her.

After augmenting the glasses on the 3D model, user may upload his/her image with glasses augmented on it, on any of social networking sites like Facebook. Also, further payment options will be at the user's service in the application.

6. System Requirements:

6.1 HARDWARE REQUIREMENTS[4]:
6.1.1   Rear-Facing Camera

- MUST have a resolution of at least 2 megapixels
- SHOULD have either hardware auto-focus, or software auto-focus implemented in the camera driver (transparent to application software)
- MAY have fixed-focus or EDOF (extended depth of field) hardware

6.1.2   Screen Configurations

- Screens MUST be at least 2.5 inches in physical diagonal size
- Density MUST be at least 100 dpi
- The display technology used consists of square pixels.

6.1.3   3D Graphics Acceleration
- Device implementations MUST support OpenGL ES 1.0[1], as required by the Android 2.3 APIs. For devices that lack 3D acceleration hardware, a software implementation of OpenGL ES 1.0 is provided by the upstream Android Open-Source Project.
- SHOULD support OpenGL ES 2.0.

- Implementations MAY omit Open GL ES 2.0 support; however if support is omitted, device implementations MUST NOT report as supporting OpenGL ES 2.0. Specifically, if a device implementations lacks OpenGL ES 2.0 support:
- The managed APIs (such as via the GLES10.getString() method) MUST NOT report support for OpenGL ES 2.0
- The native C/C++ OpenGL APIs (that is, those available to apps via libGLES_v1CM.so, libGLES_v2.so, or libEGL.so) MUST NOT report support for OpenGL ES 2.0.
- Conversely, if a device implementation does support OpenGL ES 2.0, it MUST accurately report that support via the routes just listed.

6.1.4   Magnetometer
- MUST be able to deliver events at 10 Hz or greater.
- MUST comply with the Android sensor coordinate system as detailed in the Android APIs

6.2 SOFTWARE REQUIREMENTS:

6.2.1   Minimum Android O.S. Version 2.3 & more.
6.2.2   3G Internet connectivity.

7. Conclusion:

Glares on 3D-ized face application is a convenient, time & money saving and will soon replace over the conventional online shopping and augmented reality systems. Customers will have an unique and spell bounding experience in viewing the 3D model and shopping glasses of their choice making easier and simple.

8. References:

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