AUGMENTED REALITY

Watch Virtual Try On

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- **Project GitHub URL -** Repository URL

PROJECT REPORT

1. Introduction

Augmented Reality (AR) is a technology that superimposes computer generated images and graphics onto visualizations of real world environments. It enhances the user's perception of reality by combining real and virtual elements.

We are in the process of developing a web application that allows users to augment their wrist and try out watches without having to visit the outlets. The main idea behind this application is to render virtual watches realistically on the human wrist in real-time on a live video feed captured on a web application. It uses wrist detection and tracking techniques and render watch virtually in estimating the final output.

2. Objectives

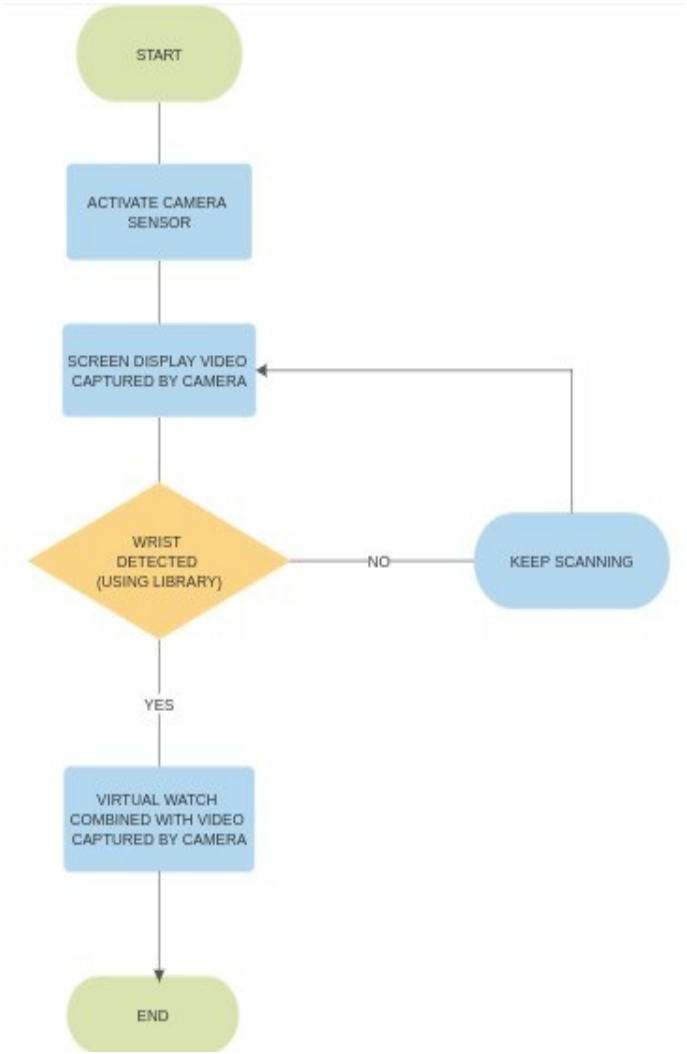
The objective of the proposed web application being developed lies in the fact that it primarily targets the e-commerce and retail industries. Its lightweight design and technical simplicity makes it possible to be run smoothly on a device while maintaining its robustness at the same time. This application has the potential to make a remarkable impact on the business sector by bringing in novel means of interaction with the customers using AR.

3. Methodology

The virtual wrist detection and tracking component acts as the main component of the application and performs the core wrist detection and ultimately position the virtual watch as object to be rendered on the human wrist.
The application is designed mainly using Python for backend and Javascript for frontend and integrated using flask API. MediaPipe library is used for wrist detection.

Google MediaPipe is a framework for building perception pipelines that contain machine learning algorithms and models for a lot of cool applications such as the face or hand tracking. It is built on top of TensorFlow and basically a C++ library that provides wrappers for other languages with limited functionality.

4. System Design



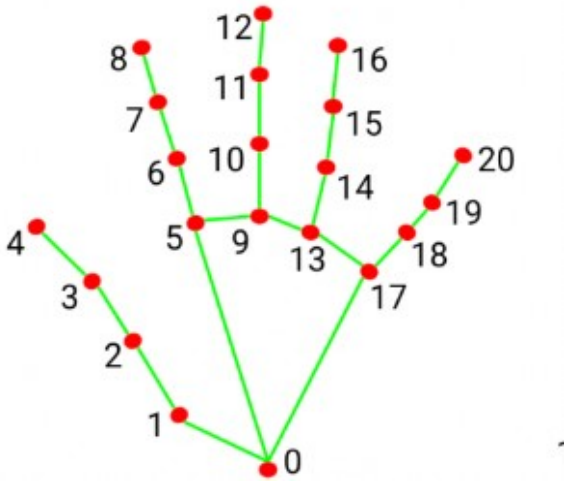
Above figure shows an abstract system workflow of the project. The system activates the camera sensor on cliking the button and screen will be displayed and started detection of wrist as soon as wrist get captured by camera with using python library if wrist is succcessfully detected then virtual watch will be rendered on correct position on the wrist.

The wrist detection and rotation is done using MediaPipe library of python where the model accurately detects the points on hand by which we are able to track wrist movement and once the wrist is detected correctly the 2-D watch image render the watch virtually on appropriate position on wrist and Flask API is used to display whatever is captured by camera sensor.
HTML,CSS and Javascript and its frameworks are used for developing the user interface which is responsive and contain several tabs having different information necessary for user and contain several categories for different watches to try.

5. Implementation

5.1 Backend

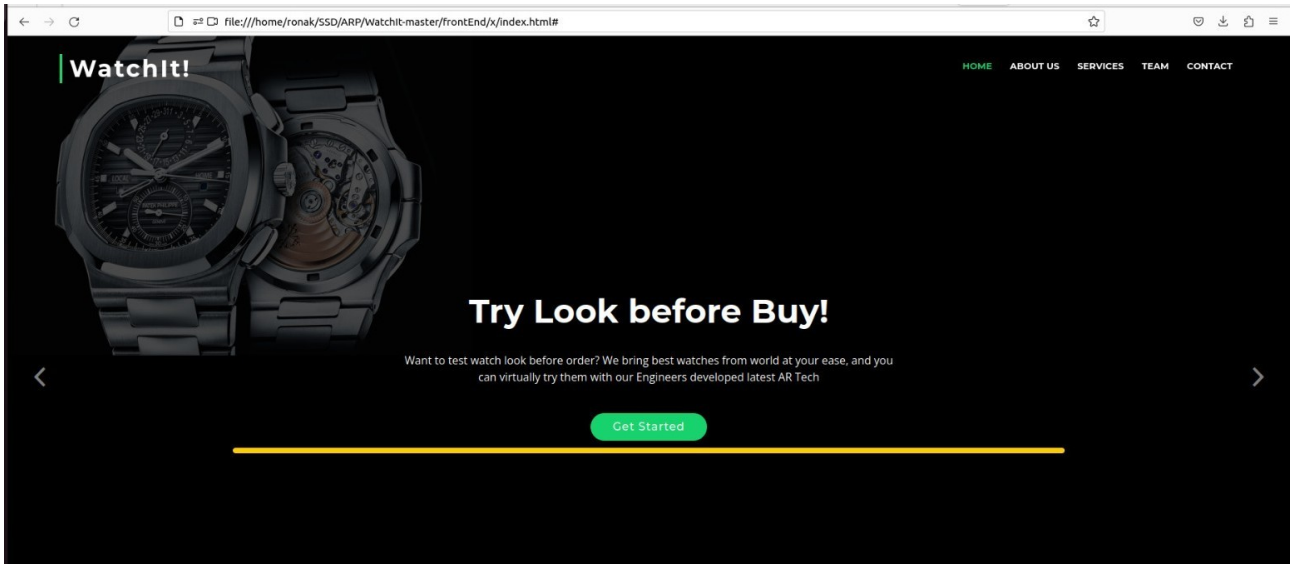
Sample Output



Hand Landmarks (Reference)

As soon as we click the “try button” on UI, the camera sensor starts capturing continous frames and sending the frames through flak API and then the wrist detection process starts using MediaPipe with the help of hand landmarks already defined in model.
For capturing correct orientation of wrist we are capturing and extracting points 5,9 and camera point, by this we are able to detect the wrist rotation, rotation here are of two types first one by keeping hand still only wrist is rotating i.e rotation about wrist only and second rotation about elbow in both case are taken care. The 2-D image of watch is used by masking it to remove bakground and the image is to be placed on point 0 for correct placement. Image is also changing with respect to wrist orientation by using rotation matrix.

5.2 User Interface



Above figure shows the tentative user interface of the application where the available models of watches are shown and the selected model is rendered in the correct location and correct orientation over the user's wrist. We have used HTML, CSS and JavaScript for developing the user interface of the appliccation and Flask API is used for communication with the backend python code. On clicking the chosen watch model event listener is triggered which open camera sensor and starts detection of the wirst and the captured frames are sent as request to the backend for image processing and the response from the backend is displayed in a window.

6. Conclusion

In this report we discussed about an augmented reality application which uses wrist detection, wrist tracking to augment the virtual watch to be realistically placed on a human wrist in real-time. This application would enhance the online shopping experience of customers as they can virtually try out models of wristwear before actually purchasing them.
Currently the application augments the 2D image of watch on the wrist. In future this can be enhanced to use 3D models of watch and further can be extended for mobile application. It can be used for enhancing the experience of online shopping and can be used by other companies for customer friendly experience.