

SOFTWARE REQUIREMENT SPECIFICATION

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1. Introduction

With augmented reality reaching common platforms such as smartphones and tablets, the market is ripe for an AR development explosion across every conceivable application niche. One such application is the use of this technology in the world of jewellery.

a. Purpose

We propose an AR-based system that provides an environment for users to place 2D/3D versions of jewellery into the real world through the use of AR markers. The proposed system allows users to decide where to place the object in real world. Once the object has been placed in the scene, it will be displayed accurately according to the aspects in the original scene. The proposed system solves the problem of viewpoint tracking and virtual object communication.

b. Scope

The system mainly consists of a single camera, for example, the webcam of a user's laptop, and a display showing the output of the virtual mirror. It will decide the appropriate accessories for the particular body part of the user in front of the camera. The system will also detect and track the movements of the user.

c. Intended Audience

This research is available to anyone with an interest in the field of virtual reality and augmented reality and intend to work in the same.

2. System Overview:

The following interfaces and modules will be integrated into the system to create an augmented reality application.

a. Hardware interfaces:

A high-end computing device is required for the development of the proposed system. The system also consists of a camera to stream and render the live video feed to the device.

b. Software interfaces:

- i. An open-source CV library, OpenCV.
- ii. An open-source computer tracking library, ARToolKit.
- iii. A simulation engine, Unity.

- iv. For implementation of overall product, Python/MATLAB.

c. Modules:

The proposed system can be divided into five modules:

- i. **Camera:**

A real world live video is streamed as input from camera to the device. It provides an input to the image capture module.

- ii. **Image Capture Module:**

The live video feed from the camera is sent to the image capture module for analysis, by analyzing each frame in the video. It generates binary images that are provided as input to the image processing module.

- iii. **Image Processing Module:**

The binary images are processed using an image processing technique to detect the AR marker. Detection of AR marker is essential to determine where to place the virtual object. Once the marker is detected, its location is provided as an input to the tracking module.

- iv. **Tracking Module:**

This module calculates the relative posture (position and orientation) of the camera in real time.

- v. **Rendering Module:**

There are two inputs to this module: the calculate posed from the tracking module, and the virtual object. It combines the original image and the virtual components using the calculated pose and renders the augmented image on the display screen of the device.

d. User characteristics:

Anyone with minimal knowledge of virtual or augmented reality and even a slight understanding of software systems will be able to use the product.

3. Non-functional requirements:

a. Responsiveness

The responsiveness of the system will depend on the availability of a high-end CPU, the integration of individual hardware components

b. Effectiveness

The system will be more effective if the size of the set of jewellery items available increases, providing more varied options to the user.

c. Quality

Optimization of hardware systems and the algorithms used will result in a high quality product.

d. Cost

The cost of incorporating all the functionality and hardware for the system is high.

e. Usability

The product should not pose difficulty of usage to users with limited understanding of augmented reality and software systems.

4. Conclusion:

Therefore, the software requirements specification document is intended for the development of an AR-based system providing an environment for users to place 2D/3D versions of jewellery into the real world through the use of AR markers and displaying it accurately according to the aspects in the original scene, while also solving the problem of viewpoint tracking and virtual object communication.

REFERENCES

1. Revati Mukesh Raspayle and Kavita Kelkar, "Towards a Development of Augmented Reality for Jewellery App", International Journal of Computer Science and Mobile Computing.