

Augmented Reality Based Solution Walk-Through's For Digital Screens

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Abstract- *The aim of this project is to minimize the work of finding and solving problems or errors on a computer screen. This is augmented reality (AR) based mobile application used for detecting and solving computer problems faced by the user on their screen by showing appropriate walkthroughs visually on mobile screen.*

Keywords- Augmented Reality, Walkthroughs, Image Tracking, Object Rendering.

I. INTRODUCTION

Today when the user faces any problems on the computer, the user firstly visits Google or YouTube to fetch the related solution for particular problems. While we go to solve using YouTube or Google we need more data as well more time to switch between tasks like one hand watching solution and other hand solving it. To overcome this problem we use the concept of Augmented Reality to show solution walkthroughs for the problem visually on the mobile application. This mobile application provides smart and interactive platform to the user to solve error as well as give him augmented walkthroughs to solve any problems on computer screen. This application changes the vision of solving the computer problems and improves the experiences of users with that problem. This application connected with internet to store and retrieve desired solution data related with the problem. This application based frameworks like ARCore, Vuforia developed using Unity3D IDE. The AR technology creates a straight and interactive connection between the real-world object with the human. It provides an easy and rapid user interface to overlay visual objects and enhanced physical world. AR provides a simpler way to enhance the real-world object without using a fully virtual environment, in a virtual environment we totally dip in a virtual world and can't see the real world, hence the AR technology reduces the designing cost of a fully virtual world.

II. SYSTEM OVERVIEW

This system has mainly two components first is mobile with good Camera and second is a computer screen. Mobile camera is used to capture the frames from the computer screen and our application detects the target image from the computer screen and Show AR walkthroughs for a particular problem on a mobile screen.

Example: You have a computer or laptop with Windows 10 operating system installed on it, and you have a problem how to start an application or how to change any setting on that OS. This application is used to solve that problem using AR concept to overlay the virtual objects on the target image on computer screen, here the computer screen is work as a input and mobile screen is work as output for this application. This system or application can play the most important role in many organization's or companies to reduce their employee's workload and time. It is very time consuming and mind stressing condition when we solve computer problem using videos walkthroughs or textual guidelines separately with switching many tasks on a computer, you just need search query for particular solution and take mobile in front of computer screen with proper angle and distance, the application detects the target images related with that solution using pattern matching methods and track that image with showing AR walkthrough to help user to solve the problem easily.



Figure 1 Augmented Reality Walkthroughs

III. CONCEPT AND DESIGN

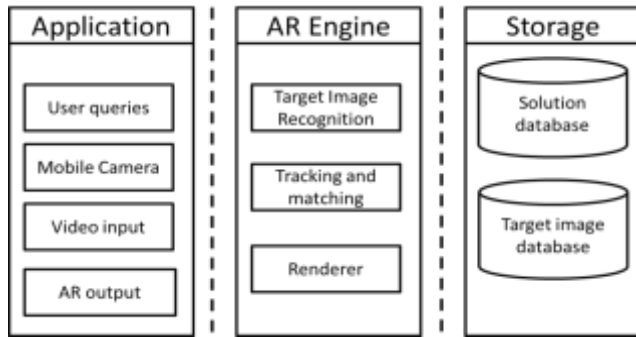


Figure 2 System architecture

The system architecture comprises of three layers as follows:

1. Application
2. Augmented reality Engine
3. Storage

1. Application-

Application layer is provide smart interface between the user and the computer screen, it provide the desired features and functions to user that easily interact with this application. This layer has four components as follows:

- User queries
- Mobile Camera
- Video input
- AR output

User queries are problems of the user which is given as an input to the application, the searching technique is used to match related solution from the solution database and related solution walkthroughs are thereby displayed on his mobile application.

Mobile camera should have good capturing quality with minimum 8 mega pixels, camera should have high definition resolution (HDR) and Autofocus for a particular area on the screen to show walkthroughs clearly.

Video input is the real-world scene continuously searching for target image from the computer screen and thereby displaying the solution walkthroughs on the user's mobile screen.

Augmented reality output is an actual solution walkthroughs, which graphically guides the user to solve the on-screen computer problems.

2. Augmented Reality (AR) Engine-

AR engine is actually software development toolkit or a framework to recognize, track and rendering the target images from the computer screen. The AR engine is actually converting captured frames from camera as well as target image from storage and matching both the converted patterns and find out matching area from it, and track that matched area and render the related graphics on it.

3. Storage-

It stores the solution walkthroughs for the target image and text data in NoSQL database. This is third layer of the architecture used to store and retrieve data. In this system we use NoSQL database because we want to store lot of images and graphics related with any solution, hence NoSQL is support any structured as well as unstructured database and retrieve data very fastly.

In application we use SQLite DB to store user data as well as solution data (input quires).

IV. IMPLEMENTATION

Following specifications are required to run and test this application on mobile.

- Device: Good mobile with following specifications.
- Camera: 6 megapixels
- Display: 8.9" (800x1080 pixel)
- CPU: ARM Cortex-A53 2000MHz, Cores: 4
- GPU: Qualcomm Adreno 506, 650 MHz
- RAM: 2 GB min.
- Storage: 2 GB min.
- OS: Android 4.0+
- Sensors: Accelerometer, Gyroscope.

V. OTHER SPECIFICATIONS

A) Advantage-

- You do not need any video walkthroughs to solve any problems.
- It is lightweight graphics instruction no needs to watch large video instructions.
- It is equally good in terms of recognizing flat convex and volumetric objects.
- Based on a cloud, all data is on the cloud not in your local storage that is memory efficient.
- It is portable and platform independent.

- It is live camera walkthrough to the user with real-time problem-solving.
- It is easy and simple to use a user can get the solutions in minimum time to solve a particular problem.
- It is the user-friendly and high-performance system.
- Using AR technology it visually demonstrably helps to user to solve the problem.
- It helps us with detecting and tracking a target from Mobile or PC screen and showing related solution walkthroughs for specific problems rather than watching solution videos(videos are consumed large data).
- It can detect very small pixel images pattern.
- It is Lightweight graphics libraries to detect and visualize walkthroughs on-screen objects easily.

B) Limitation-

- Image quality should be clear in order to get the relevant pattern from the image also the size of the image should be proper. Object is must be visible and non-transparent.
- The image cannot be scanned in the closer view of the digital screen; some of the features will not be recognized.
- The image scanning should not exceed the boundary limit of the digital screen If it exceeds it will be difficult to recognize the image.
- The angle of image detection using smartphone camera: the user must detect the image from the front of the screen to capture the correct pattern from the targeted image.

C) Applications-

- It is useful for many employees as a self-guiding assistant.
- It can be used for education purpose to show solution walkthroughs for particular problem.
- It can be used by any users that uses mobile or PC's to learn OS, Software and solving errors from computers.

VI. CONCLUSION AND FUTURE WORK

As the normal solution for a problem faced by the user on computer Screen involves continuous task switching between various tabs which confuse the user and thereby increases the fetching time to solution, So an Augmented Reality based Solution walkthrough provides quick response to the user in terms of visual steps to the solution with accuracy.

Augmented Reality could prove to be of great help with integrated support of Vuforia framework for pattern matching. Besides with User/Customers feedback for new

query the administrator can add the respective Solution walkthroughs in the database which will further prove to a great application for most of the problem a user faces on digital screen. Using machine learning and artificial intelligence technology we made this application fully automated, it can take self-decision to solve problem.

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