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An Augmented Reality Trainer System For Fitness

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Abstract

Augmented Reality is a trend technology which enables users to experience the real world virtual objects added. By using AR a virtual gym trainer can be created. Users won't get time to go gym because of some hectic schedule and it is difficult to work out without a trainer. Hence to overcome this problem an android app will create. Instead of looking for workout videos and reading boring instructions on an app, users can project a virtual personal trainer in the gym or any other workout space. The holographic trainer is probably one of the most attractive ways to exercise. User can walk around the coach to see the way muscles work and work alongside him or her. A gym trainer has various workout regimes for weight gain and weight loss. On entering the weight gain trainer it asks for user's body weight and height. Depending on that it calculates your body mass index. Then it shows user workout schedule. Similarly the weight-loss trainer trains and monitors users workout and provides appropriate training and results. This will be achieved with the help of an android app. The app will be developed in android studio and the models showing the exercises will be developed in Maya or Unity3D. The app shows an AR model to show how the exercise is done which will help the user exercise and get in better shape and stay healthy.

Keywords— Unity 3D, proposes Effect, Virtual Agent

I. INTRODUCTION

Augmented reality (AR) is a type of interactive, reality-based display environment that takes the capabilities of computer generated display, sound, text and effects to enhance the user's real-world experience. Augmented reality combines real and computer-based scenes and images to deliver a unified but enhanced view of the world. Augmented Reality turns the environment around you into a digital interface by placing virtual objects in the real world, in real-time. Augmented Reality fits into a variety of business needs if you need to improve the efficiency. Use of augmented reality (AR) technology during workouts is starting to gain traction in fitness. With an AR app, fitness enthusiasts can improve their workout experience even when the weather prevents them from exercising outside. In the system augmented reality is integrated into fitness. An android app is built to provide a more interactive way of exercising. An augmented reality based trainer which will show demo exercises. Our augmented trainer can be viewed by user in 360 degree angle. Instead of looking for workout videos or reading boring instructions on an app, users can project a virtual personal.

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II. MOTIVATION

For Fitness lover it is difficult to go gym daily and do exercise without trainer. While watching videos and reading instructions may distract the user.
To overcome the given problem an android app will be created which creates AR based character will show demo of exercise which can be viewed by user in 360 degree angle.

III.RELATED WORK

An augmented reality magic mirror for teaching anatomy. The system uses a depth camera to track the pose of a user standing in front of a large display. A volume visualization of a CT dataset is augmented onto the user, creating the illusion that the user can look into his body. Using gestures, different slices from the CT and a photographic dataset can be selected for visualization. In addition, the system can show 3D models of organs, text information and images about anatomy.[1] For interaction with this data we present a new interaction metaphor that makes use of the depth camera. The visibility of hands and body is modified based on the distance to a virtual interaction plane. This helps the user to understand the spatial relations between his body and the virtual interaction plane.

Tzu Yang Wang et.al[2] proposes an Effect of Full Body Avatar in Remote Collaboration. In this paper, author compared three different types of avatar design (”Body”, “Hand + Arm”, and “Hand only”) for the augmented reality remote instruction system in terms of usability. The result of this paper showed that the usability of the remote instruction system with full body avatar has a higher usability. However, since the instructions could be much more complicate in the real world, so author haven't mentioned the effect of full body avatar with more complicate jobs, such as assembly tasks.

The idea proposed by author Christian Zimmermann et.al[3] is to learn 3D hand pose estimation from images. This approach consists of three deep network that cover important subtasks. The first network provides a hand segmentation to localize hand in image. Based on output, the second network localizes had key points in 2D key points. To train network a large dataset is needed. Dataset provides RGB images and 3D pose annotations. Since there is no such dataset with sufficiently variability to overcome this challenge, use open source software Blender to render the images

Using Augmented Reality to improve the set-up time the workflow of creating and running an indoor navigation scenario. It helps to create 3D visual models from 2D floor plans. This does so with the help of FOV Path which was introduced as an add-on for Unity 3D. In paper proposed by Georg Gerstweiler [4] it It helped to guide people through malls and airports with the help of 3D guidelines. The paper helps to develop a guiding system for our workout project. The system will help to know how exactly the person should do the exercise. This will make the process of exercising better and more enjoyable and reduce the risk of injuries that happen during the period of exercise.

Author Seiji Tsunezaki At et.al[5] has proposed a method for creating augmented objects of Real objects using Mobile Augmented Reality. The objects are taken photo of by Microsoft Kinect. The Kinect helps to generate the AR models of the real objects. The objects are placed on the turntable and taken photos of. Thus, getting all the angles of the object and depth of it. This technology will help project to create the AR models required for our trainer. The Kinect will help with easily creating the models with the help of real human movements. Project can then use these models to integrate with the app and user can view the models in 360 view using the fitness app.

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IV. PROPOSED SYSTEM

The system architecture is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system. For Fitness lover it is difficult to go gym daily and do exercise without trainer. While watching videos and reading instructions may distract the user. To overcome the given problem an android app will be created which creates AR based character will show demo of exercise which can be viewed by user in 360 degree angle.[6] The application uses two platform, Android studio and Unity game engine. The android studio is used to develop an android app which is used as an interface for the user. Unity is software tool which is used to develop for 3D model. In this system user provides personal information which is stored in the database. Depending upon user's input like height and weight, BMI is calculated .According to BMI, plan is suggested to the user. In Unity different windows are used like scene, project, inspector to create 3D model. Scripts are written for the movement of 3D model. Different features are applied on the assets. Virtual trainer is ready to perform different exercise and instruct the user. Unity is a cross-platform game engine with a built-in IDE developed by Unity Technologies. It is used to develop video games for web plugins, desktop platforms, consoles and mobile devices. Unity is programmed using c#. All development is done using your choice of C#, Boo, or a dialect of JavaScript. Unity Free is free for any individual to use, regardless of income. It is also free for any company or incorporated entity to use as long as their annual turnover is less than $100K per year.

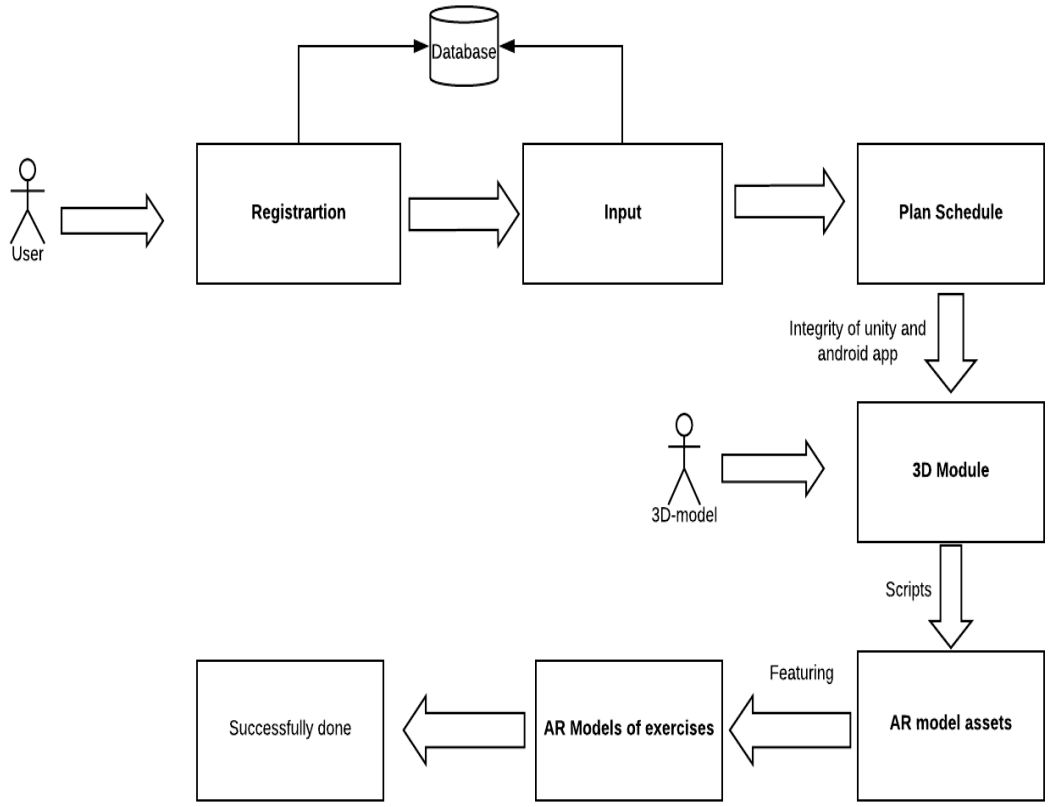

Figure 1. System Architecture

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V. IMPLEMENTATION

The entire project is divided into 3 parts depending on the objectives. The first task is to develop different 3D modules. The 3D trainer is designed to perform exercise. To develop 3D model of trainer we create new project in unity for creating the character. Customize the layout as per need then save scene under asset and set up the build. After that create 3D structure from Unity Store as per the requirement. Finally build script for different movements of trainer.
The second task is to develop an android application to provide a user-friendly interface. The app provides user login. After login height and weight is taken as input to calculate BMI and suggest exercise. Different set of diets and exercise plans are suggested by application to user.
The final task is to integrate both the separately built units. The last objective of rendering android application and 3D model is performed by importing the models in application.

VI. RESULT

Figure 6.1 Login page

To access the system user login is necessary. User enters into application providing its valid login credentials. The user should already be registered before login so that its username and password is present in database

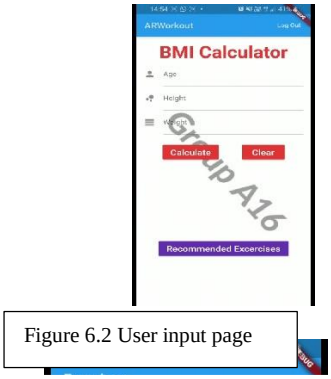

Figure 6.2 User input page

User provides its age, weight and height as input to application. The application then Calculates the BMI of user.

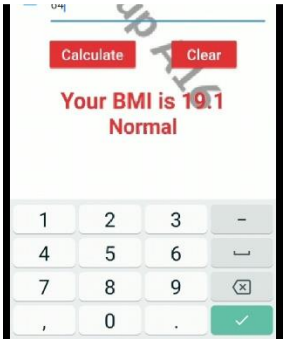

Figure 6.3 BMI calculator

BMI of user is calculated and exercises are suggested

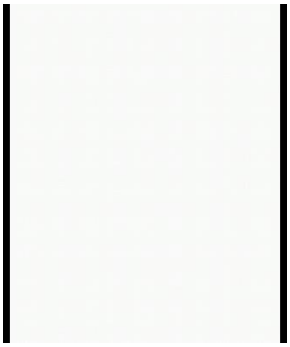

Figure 6.4 Exercise list

Based on users BMI different exercises are suggested to the user. The user can select a plan among the suggested plans.

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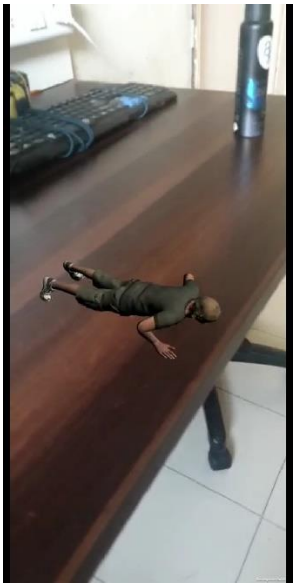

Figure 6.5 AR model

Finally, a 3-dimension trainer performs the exercise selected by user. Here the trainer is Augmented and performs the exercise in the

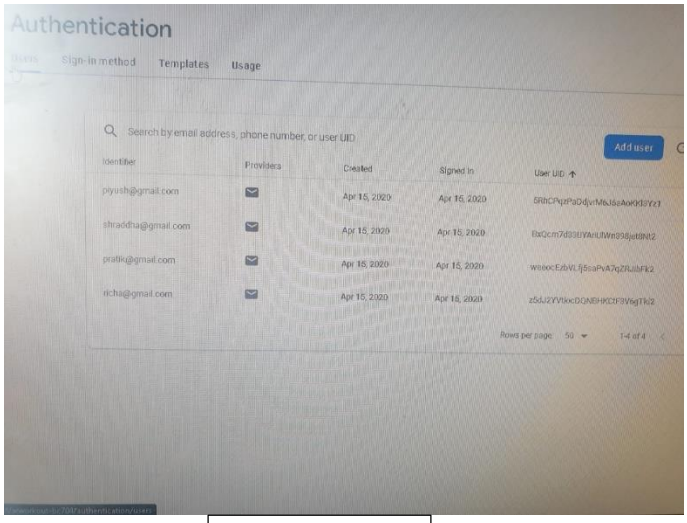

Figure 6.6 Database

VII. CONCLUSIONS

This paper covers all the technology required to develop an AR based fitness application. The app thus provides everything a user would need to do the exercises. The app shows how a particular exercise has to be done with a fitness model or trainer. It also tracks the BMI of user to recommend exercises and diet based on the BMI. The trainer also provides with notifications to remind the users of their health and time to exercise daily with motivational messages. The model also can be project on a flat surface to see how the exercise is exactly done thus making it easier for the user to do the same exercise.

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REFERENCES

[1] An Augmented reality magic system for anatomy education,Tobias Blum,valerie Kleeberger,Nassir Navab IEEE International Conference on Computer Vision [2017]
[2] Effect of Full Body Avatar in Augmented Reality Remote Collaboration, Tzu Yang Wang, Yuji Sato, Mai Otsuki, Hideaki Kuzuoka, Tusuke Suzuki 2017 IEEE International Conference on Computer Vision [2019] .
[3] Learning to Estimate 3D Hand Pose from Single RGB Images Christian Zimmermann, Thomas Brox 2017 IEEE International Conference on Computer Vision [2017] .
[4] Guiding People in Complex Indoor Environments Georg Gerstweiler 2017 IEEE International Conference on Computer Vision [2017]
[5] Reproducing Material Appearance of Real Objects using Mobile Augmented Reality Seiji Tsunezaki, Ryota Nomura, Takashi Komuro IEEE International Symposium on Mixed and Augmented Reality Adjunct [2017]
[6] G. Papandreou, T. Zhu, N. Kanazawa, A. Toshev, J. Tompson, C. Bregler, and K. Murphy. Towards accurate multi-person pose estimation in the wild. arXiv preprint arXiv:1701.01779, 2017.

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