

Teaching Kindergarten Student using Augmented Reality

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Abstract: Augmented Reality (AR) is a technology that augments the real physical world with computer-generated 3D virtual objects such that the users can interact with them using the screen of their mobile devices. In current traditional childhood teaching there are difficulties in inspiring children's learning interest, lack of teaching situations and low study efficiency. We are going to develop an AR mobile application prototype to teach kindergarten students in an interactive and attractive way. It allows kindergarten students to learn using a mobile device. This project uses natural feature detection algorithm with some improvements. OpenCV also include some feature detection algorithms. This algorithm is good for capturing and detecting images with greater accuracy and speed. With that, some parents were complaining about over usage of the mobiles will affect children's health. For the solution monitoring function is added which monitors the individual activities and usage time. With help of this ability, we can control usage, monitor and analyse students learning. This project will help students learn in effective way and with greater efficiency.

Keywords: Augmented Reality, OpenCV, Kindergarten Education, Human Computer Interaction, Natural feature detection algorithms.

I. INTRODUCTION

Augmented Reality (AR) is an innovation that increases the genuine physical world with PC produced 3D virtual objects, which the clients can cooperate with on the screen of gadgets like cell phone/tablet with a camera [2]. In today's education system we still use the old methods to teach kindergarten students like lectures or books. We have to make teaching more interesting and smart. Using augmented reality, we use digital technology in education and increase the interest of students in education. By presenting 3D objects of actual physical situation or objects will increase understanding easy for students, we can also use it in higher education where we use AR to show complex things virtually for example crystal structure of Elements in periodic table. Indeed, AR is bit expensive but it has benefits that worth that price. Augmented reality technology is currently improving and will be cheap in future. Big IT giants like Apple, Google also taking interest in AR, Recently Google launched Tango Devices with AR technology and Apple launched first AR multiplayer game in iPhone X. According to recent research AR will worth 62 Billion USD by 2023. AR and VR combined called Mixed reality will worth 108 Billion by 2021. In short, AR is new improving technology with amazing features which will help us to teach students in new interesting way.

A. Kindergarten Education:

In India people still uses traditional learning methods of teaching. Student don't get chance to interact with new technology and tools [4]. Also, old methods are little less effective as they are mostly verbal and will little pictures, physical objects etc [3]. But those methods are not powerful enough to increase the understanding level of the kindergarten student faster [4].

B. Augmented Reality:

Augmented Reality is a view of the physical, real world environment that is augmented by synthetic, computer-generated elements. Augmented reality is defined as "an enhanced version of reality created by the use of technology to add digital information on an image of something". AR is used in apps for smartphones and tablets. Augmented reality applications use your mobile phone's camera to show a view of the real world in front of you, then adds a layer of information with text and/or images, with that view. Some applications use Augmented Reality for fun also, such as the game Pokémon GO, or they can use it for information like the app Layer. The Layer app can show you interesting information about places you visit, using augmented reality. Open the app when you are visiting a site and read information that appears in a layer over your view. You can also find money machines, see real estate for sale, find restaurants, and more using the AR feature of the app. You may even discover new sites you did not know existed.

II. PROBLEM DEFINITION

"To develop Augmented Reality application for Teaching kindergarten students using natural feature detection and tracking algorithm."



III. EXISTING SYSTEM

The traditional approach is to teach students using verbally, using books and pictures [1]. There are some applications also come these days which provides some exiting games and drawing like quiz for teaching students [2]. In United States and some other country has developed similar approaches are designed the augmented reality applications for students. This application has effectively student's enthusiasm and initiative [1]. However, research and implementations in India is still at beginning stage.

Existing system used different algorithm which detect and shows the augmented output. They map the markers with the objects. For that they designed some situations and use then to run augmented reality applications. Some different classifications are made based on real world situation and natural situations. Natural situations refer to the natural scenery and natural landscape and its generally used to describe the outdoor scenes of natural world [1]. Life situations refers to daily life and is used to describe the scene of human life. Those situations that reflect the material world of human life can be obtained directly by photography, video and other methods. Knowledge, multimedia materials, interaction and feedback in learning resources can be presented by expression of situation [1]. Also, existing system uses interaction design and feedback design. But, they have some drawbacks. Those systems are leads to failure in some cases. Capturing and detecting the markers is a complicated task and when many different scenarios comes those systems are perform poor [2]. Some parents were also complaining about the mobile usage will affect the health of their children [5].

IV. PROPOSED SYSTEM

We are proposing augmented reality based learning application for kindergarten student. Which will help those students to improve their knowledge and performance. We will use different scenarios, scenes, videos, audios, quiz, games for much better learning. Students understand things fast if they see them and that's point we are going to hit using augmented reality. Augmented reality applications mainly work on mobile phones. Nowadays, most of the population using smartphones and they are cheaper now.

We are using natural feature detection algorithms. Feature detection includes methods for computing abstractions of image information and making local decisions at every image point whether there is an image feature of a given type at that point or not. Those points help us detecting images very faster with great accuracy. Figure 1 shows the system architecture of our learning application using augmented reality.

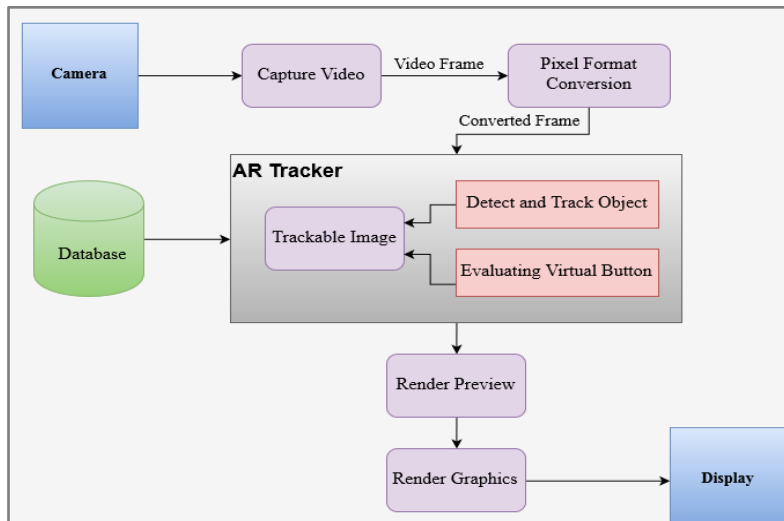


Fig 1. System Architecture

As shown is fig 1, system requires camera for taking input from the real world as image frames. Later, those frames are converted to grey scale formats using pixel format conversion. Augmented reality tracker is connected to a database which contains some target markers and object to display, also some other information for AR processing. This block will detect the trackable objects from image frames and give associated objects. And after rendering output as a 3D object, virtual buttons etc will display on the screen. This is just a basic flow of marker based system. Some other function will also be there like marker-less and GPS based augmented reality as per the use in application.

Some parents were complaining about the augmented reality applications. According to them, if their child is using app for long time it might affect their health, and it is true that, over usage of mobile might affect on the human eyes. As a solution for this problem we are going to add monitoring system. Teachers and students have to register on the application before use and application will monitor the usage of every register students and also keep their progress. System will give report to teacher or parents about their daily usage so they can control them.



Following figure shows the flow of our application.

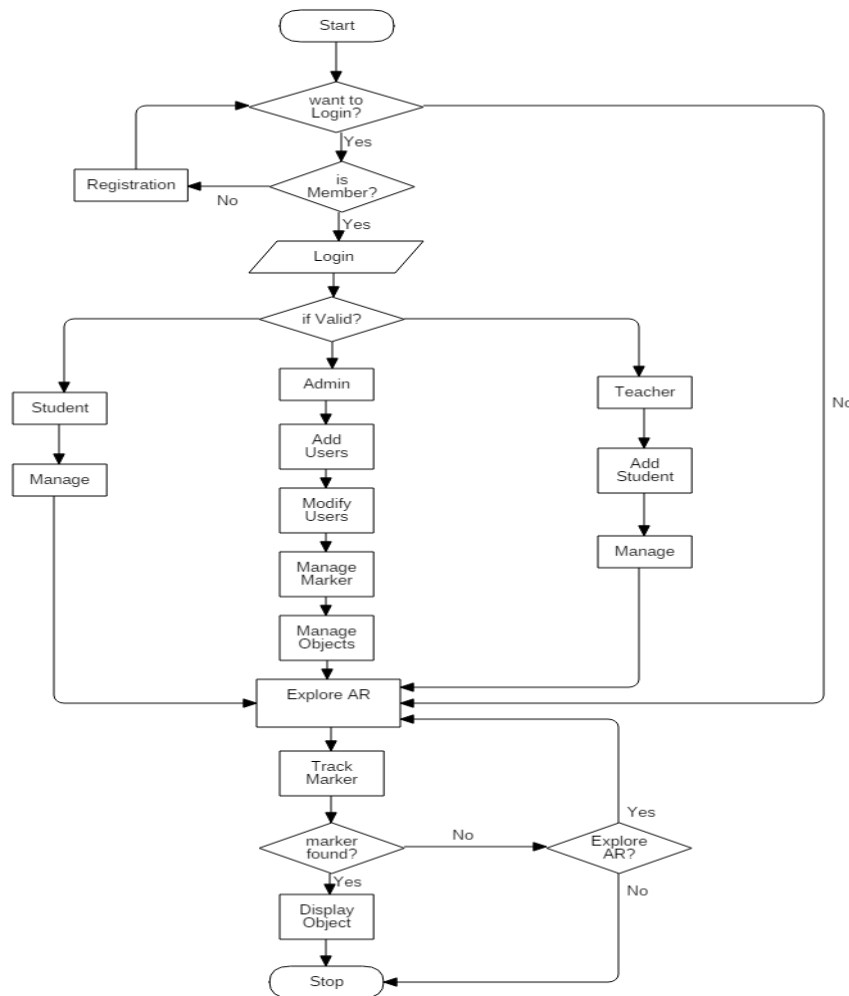


Fig. 2. Flow of System

The application model can be keep running on a cell phone utilizing Android 4.4 above, as the working framework and outfitted with a camera, a mouthpiece and no less than 2 GB RAM of memory. The observing framework requires arrange access to completely work.

V. CONCLUSION

Augmented Reality is a view of the physical, real world environment that is augmented by synthetic, computer-generated elements. It is emerging technology and very helpful in visual learning. Kindergarten learning is base for children's future education. We use augmented reality to generating interest of kindergarten students in learning. For tracking and detecting images we are using natural feature detection algorithms with some improvements for better working. This application will definitely help kindergarten student to learn in new way and generate interest in learning.

REFERENCES

- [1] Application of Augmented Reality for Early Childhood English Teaching, 2017, Lap-Kei Lee, Cheuk-Him Chau, Chun-Hin Chau, Chun-Tim Ng School of Science & Technology The Open University of Hong Kong Ho Man Tin, Kowloon, Hong Kong.
- [2] Mobile Augmented Reality for Learning Z. Mobile Learning Seminar. 2011, T. Roffmann, T. Friese.
- [3] Educational Magic Toys Developed with Augmented Reality Technology for Early Childhood Education J. Computers in Human Behavior, R.M Yilmaz.
- [4] R. N. Chai, H. L. Fu, A Study on Current Situations and Patterns of Kids English Teaching J. Journal of Tongren University. Vo 1.15, pp.103-105, 2013.
- [5] Chiang, T.H.C., S.J.H. Yang and G. Hwang, An Augmented Reality-based Mobile Learning System to Improve Students Learning Achievements and Motivations in Natural Science Inquiry Activities J. Journal of Educational Technology Society. pp. 352-365, 2014.