"EDUSCIENZA"-Smart Learning using Augmented Reality

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Abstract: -- Augmented reality (AR) is precisely a direct or an indirect real-world view of an environment whose components are augmented by computer-generated information, ideally across multiple sensory modalities. Augmented reality is a reality in which is enhanced digitally with the help of virtual objects that appear to be in our field of vision. The primary task of augmented reality is that it brings components of the digital world into a person's imagination of the real world and does so not as a simple display of data, but through the integration of immersive sensations that are perceived as natural parts of an environment. In our project, AR has been used to guarantee a standard curriculum using Text, Graphics, Video, and Audio which is superimposed into a student's real-time environment. Almost anything can be done with augmented reality, one can create the application that helps students do practical experiments all at one place. The application will be mainly used for students in the learning process at any place with the app installed on their phone that makes students learn efficiently and practically. Students can learn by carrying out interaction through virtual objects and learning materials and help students actively interact in the lab performing different experiments to increase their understanding and to make them learn rather than reading.

Index Terms: Augmented reality, virtual objects, experiments.

I. INTRODUCTION

Augmented reality is a reality in which is enhanced digitally with the help of virtual objects that appear to be in our field of vision. It means to seamlessly integrate our digital content in our vision wherever we go.. In our project, AR has been used to guarantee a standard curriculum using Text, Graphics, Video, and Audio which is superimposed into a student's real-time environment. Almost anything can be done with augmented reality, one can create application that help students do practical experiments all at one place. In our project we are developing an application which is very much useful for the students in learning especially in doing of the practical experiments. We are using a new technology known as augmented reality in which students or application users experience the practical sessions through virtual environment. Once the application is installed in the mobile phones students can use it anywhere and anytime with the repeated number of trials or practice. We create practical experiments and build them in our application and students can visualize them Virtually. The application will be mainly useful for students in learning process at any place with the app installed in their phone that makes students learn efficiently and practically. Students can learn by carrying out interaction through virtual objects and learning materials and help students actively interact in lab performing different experiments to increase their understanding and TO make them learn rather than reading. The project shows the students different material and components in 3D, and to allow the students to move and manipulate them. The goal is for them to gain a spatial intuition of the structures, a key skill for the students to understand and solve their problems.

II. RELATED WORK

I. Astronomy
Astronomy students can learn about the solar system and how it works by physical engagement with the objects within. They can move planets, see around stars and track the progress of a comet. This also enables them to see how abstract concepts work in a three dimensional environment which makes them easier to understand and retain.

II. Medical
Virtual reality can be used to develop surgery simulations three dimensional images of the human body which the students can explore. This has been used in medical schools both in the UK and abroad.

III. DESIGN

Augmented reality is a technology that superimposes a computer-generated image on a user's view of world, it

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provides a composite view. The primary task of augmented reality is that it brings components of the digital world into a person's imagination of the real world, and does so not as a simple display of data, but through the integration of immersive sensations that are perceived as natural parts of an environment.Augmented reality is used to enhance the natural environments or situations and offer perceptually enriched experiences. This application can be implemented mainly for educational purposes. This application will be mainly useful for the students in learning process at any place with the application installed in their phone that makes student learn effectively and practically. It requires VR headset, .Bluetooth controller, optic glove, headphones, power bank. Phone will be connected via Wi-Fi for the login process, screen can be viewed with VR headset via phones camera, the control of popups is done with the Bluetooth remote controller which is connected via phone's Bluetooth, audio outputheadphones, hand glove for motion control and gesture recognition. Power bank is used to power up Raspberry pi. Fully charged 3000mah power bank can powerup Raspberry Pi for more than 24 hours

Fig1: Block Diagram

Bluetooth controller is conneted to phone via bluetooth, headphones is used for audio output, android phone is placed on the VR headset for viewing purpose, hand glove is used for motion and gesture recogniton.we have used optical glove where LED at one end and LDR are placed at the other ends.The intensity of the LED the detected by the LDR. Optical data is sent to MCP3008 and then both gyro and optical data are sent to Raspberry pi. Phone is coonected

to the server via Wi-Fi for downloading the chosen package
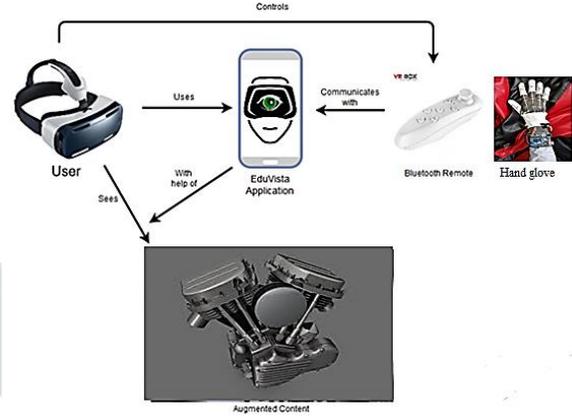
IV.WORKING PRINCIPLE & MODEL

Fig2: Working Model

We use mainly two software blender and unity. For preparing models of experiment components and materials we use blender and for integrating with software code and simulating them we use unity. It is also used for interaction of remote parts of different components in the experiment.it can do things which we experience only in the industries. The application also includes an animated video related to the experiment and also explanation of the each and individual parts of the experiment running in the application.We read the input values of experiments written in code C# and will be getting an approximate accurate output values. We use VR headset in which we keep our mobile and run the application, this headset which is usually used for watching virtual videos or animations. We also use a Bluetooth controller which is connected to mobile and help in movement of the components in the experiment running in the application. This project does not need any physical equipment's for conducting experiments, virtually student can practice as many time he desire to do and also it is self-explanatory and self-learning experience for the students. It helps students learn independently with repetition of experiments many times.Phone is connected to server via Wi-Fi, once the login process is successful phone is placed on the VR headset, application communicates with Bluetooth controller or optical glove for handling menus. Once the phone's camera access the target code, the feature points will be detected and the augmented content will appear on the display.
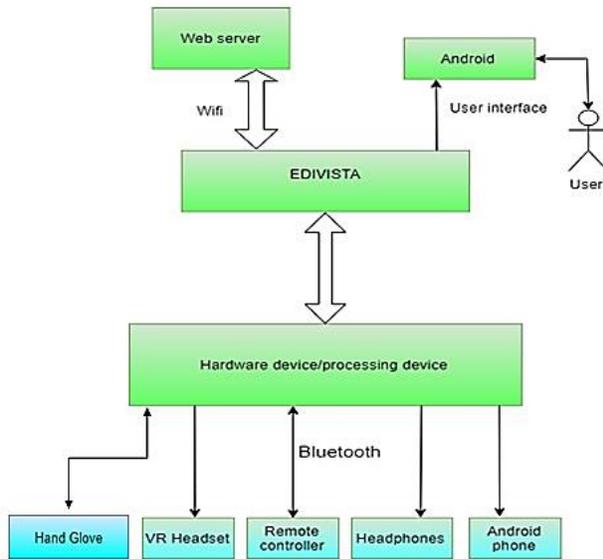
V. RESULTS

Fig3: Augmented Content

The above diagram shows the representation of the augmented content which appears when the phone camera accesses the feature point of the target image. When the augmented content appears, the user can perform the experiments.

VI. COST ANALYSIS

Sl.No	Description	Cost (in Rs)
1.	VR headset	1200
2.	Hand glove	200
3.	Flex Sensors	1850
4.	Arduino Nano	300
5.	Raspberry PI	3000
6.	MPU 6050 Gyro	300
7.	Bluetooth Module	500
8.	Serial Data Converter	400
9.	Notation Stand	850
10.	Headphones	600
11.	Connecting wires	100
12.	Target markers	100
	Total	9500

VII. CONCLUSION

Practically doing of experiments is difficult for the students in real time but in this application students can do frequently with different trials.It is innovative since we can use this application anywhere instead of doing it in only labs.Students and learners can gain more experience and knowledge from this application since they practice many times in virtual environment.This application enables the users to visualize the object virtually therefore it will be more interactive.

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