Augmented Reality With Engineering Graphics

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ABSTRACT

Engineering graphics (EG) is the subject of transferring information from design into manufacture. Developing ability to create and read graphical representation of engineering structure is essential for individual. Therefore, training engineers able to use the graphical language to communicate is vital in every engineering college. However, in the classroom, where lecture time is limited, it is hard for the instructors to illustrate clearly the relationship between the 3D geometry and their 2D projection using only one kind of presenting technique. This work gives a brief insight into the potential and challenges of using Augmented Reality (AR) in Engineering Graphics Education.[1] An AR-based system specially designed for EG instruction were studied and developed. The system aims at improving the spatial awareness and interest of learning.

Keyword : *Geometry Applications, Engineering Graphics, Operating System, Processing, Marker, Augmented Reality.*

1. INTRODUCTION

Augmented Reality in Engineering Graphics System allows users to view a 3 dimensional structure of any 2 dimensional view by using Augmented Reality to display the output 3D model on to the screen using simple techniques. The study shows that humans are more comfortable to study things which they can see with their eyes rather than hearing and imagining, therefore applying this concept to learn engineering graphics our system helps the user to actually see what they are supposed to do. The main objective of augmented reality in Engineering Graphics System is to enhance the ability of a student to understand and implement the concepts of engineering graphics. Students can turn the pages of these books, look at the problem inside the book, and finish their assignment much the way they are reading and writing on an ordinary sheet. However, if they focus a camera on the marker, a 3D virtual models pop-up in the computer screen over the real pages. The virtual models super imposed upon the real page will serve as the tip for imagining the relationship between the 3D geometry and their 2D projection.

1.1 Research

The current education system which is being followed is very bookish and no extra knowledge can be gained using it. Students as well as teachers do not enjoy learning and teaching using this system. There is no provision for self-learning as books fail in developing interest. When students want to grasp important point about topic in a small span of time, they fail to do so as the books available have huge amount of data. Teachers fail to bring clarity to the topics they teach as there is no visualization available.

2. LITERATURE SARVEY

"Mr. Raviraj S. Patkar, Mr. S. Pratap Singh, Ms. Swati V. Birje", describes the development and integration of augmented reality contents with traditional Engineering graphics and presents the results for preliminary study for Engineering students. The method such as augmented reality was used which was developed on the mobile devices having the Android operating system. The features such as various predefined markers, spatial skills, augmented reality and the mobile devices were used to be developed on.

"Jorge Dorribo Camba and Manuel Contero", describes about the comparative study between the Mobile devices and the Desktop devices for engineering education. The paper describes about the study of three different approaches used to deliver the contents in a 3D engineering Design Graphics tools by us AR such as Desktop AR, Mobile AR and an Interactive 3D viewer.

"Gustavo Salvador-Herranz", describes about the Augmented Reality which is emerging technology in the real-time environment is enhanced by just imposing the computer generated information such as text, graphical content, audio and video contents as well as their objects on the displaying screen. The proposed application in this paper was mobile device which was android operating system based. This paper also gives the detailed difference between the two major types of augmented reality i.e. Marker based and Marker less.

3. SPECIFICATION

3.1 Proposed System

The proposed system makes the learning process using augmented reality all the way easier. It will add extra features to our existing System. It will remove the drawbacks of the existing system as time. This system examines the potential of an augmented reality system as an educational tool in an engineering graphics course. The students of that course will be able to observe 3D objects on the computer screen in a real-world environment captured from a webcam, with a special AR marker on a traditional 2D engineering drawing. The developed AR interface can display different 3D models and help engineering graphics students better understand drawings, geometric features and projection views. In addition, the AR interface can increase the students' interest and awareness in engineering graphics class assignments.

3.2 System Architecture

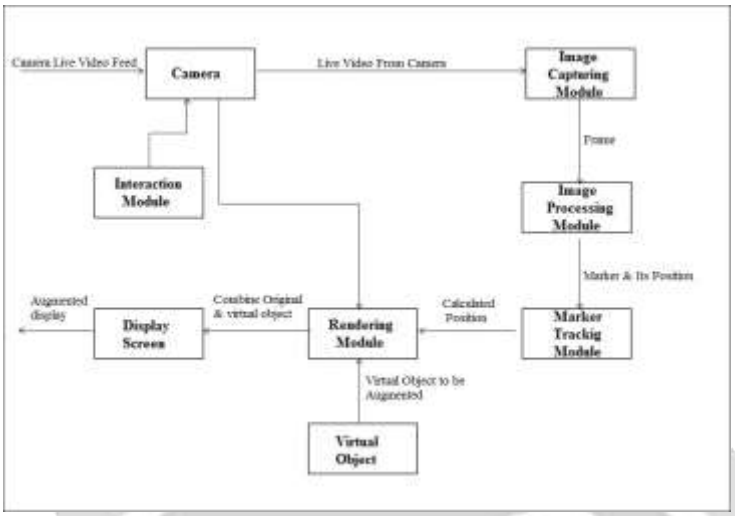

Fig-1 Architecture of System

The proposed system is marker based system and its architecture contains following modules :

1. Camera: A real-world live video is feed as an input from Android camera to Image Capturing Module. Displaying this live feed from Android camera is the reality in augmented reality.
2. Image Capturing Module: This module analyze the camera feed, by analyzing each frame in the video. This module generates binary images which has only two possible values for each pixel. These binary images are provided as an input to Image Processing Module.
3. Image Processing Module: The binary images obtained are processed using an image processing technique to detect the AR Marker. Once the AR Marker is detected, its location is provided as an input to Marker Tracking Module.
4. Marker Tracking Module: It calculates the relative position of the camera in real time which is further provided as an input to Rendering Module.
5. Rendering Module: This module combines original image and virtual components using calculated position and renders augmented image on display screen.
6. Interaction Module: In this module, user will be able to interact with the virtual object by touching it.

4. REQUIREMENT ANALYSIS

4.1 Functional Requirement

- Detecting the marker.

  The marker printed on the drawing sheet is detected using the mobile camera.

- Searching for the predefined Marker-to-object association.

  The marker detected previously is searched and matched at the back end and the respective object is associated.

- Augmenting the object.

The object associated in the previous step is the augmented over the marker.

- Tracing marker orientation for transforming the augmented object.

  Once the object is mounted over the marker the augmented object can be transformed by hovering the camera in different perspectives to obtain different views.

5. CONCLUSION

In this paper the concept of Augmented Reality has a bright future as it promises better interaction with real and virtual world in ways which has previously been unimaginable. It is a new way of interaction with User Interface. We plan to make informative augmentable content which matches the teaching pattern andsyllabus of institutes. With its use the teachers and the educational institutions can sustain the student's attention and interest to the course while in the same time facilitates the learning process. This application helps the teacher to present the objects in space with adequate visualization. This application is only a showcase presenting a mode of use in technical education, but its customization to other educational areas is very easy, like its use in medicine or design is also very attractive. We propose to add a module which allows interaction with augmented objects. With Augmented Reality in Education.

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