Augmented Reality Based Application for 3D Interface

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ABSTRACT

In this paper, we present a 3D augmented reality system by combining real world image and an augmented reality technique. Compared with real world image system, our proposed system has two advantages: It provides three dimensional augmented display capabilities. It has a compact design. To validate the feasibility of our proposed method, we experimented with a 3D scene and used two computer-generated objects for augmented reality. By combining the captured 2D images of the 3D object and the computer generated virtual objects, we reconstruct 3D images for the augmented reality system. The proposed 3D system has potential to be applied to AR system due to its small form factor. In our system we are implementing application level interface as well as 3D display of Chemistry information of Molecules and Molecular Structure as well as their respective images in 3D.

Keywords— 3D Modeling, interactive learning, augmented reality, AR marker

I. INTRODUCTION

Augmented Reality domain is becoming vast day by day. The advancement in augmented reality is increasing. This domain is used various fields like industry, construction, education, commerce, medical, etc. Augmented Reality can be used for education purposes for making studies more interactive and easy to learn. Using Augmented Reality for studying chemical structures is one of its uses.

Application for learning Chemistry using three Dimensional modelling and augmented reality will let studying molecular structure and reactions. The complex subject like Chemistry is studied very easily using 3D modelling. Application comprises of 3D modelling with Augmented Reality.

II. PROBLEM DEFINITION

Augmented Reality is a increasing area in virtual reality research. The world environment around us provides a lot of information that is not easy to replicate in the system. Either these worlds are very simple such as the environments created for entertainment and games, or the system that can create a more real world environment such as flight simulators. An augmented reality system generates a composite view for the user. The process of superimposing digitally generated images onto our real-world image giving a sense of an illusion or virtual reality.

III. EXISTING SYSTEM

Existing system uses Augmented Reality Markers in application. We have to download application by purchasing it from Google store or apple store. The purchasing of app is costly. Free

of cost applications are more preferred by students. Hence this is the limitation of the existing system.

IV. PROPOSED SYSTEM

Proposed system is being developed to make chemistry subject more interesting and interactive. In this paper, we propose a system that will develop three dimensional molecular structures of chemistry and reactions between them. This system will show reaction between reactants and products. Also proposed system will be able to provide information regarding the chemicals.

V. LITERATURE SURVEY

Live metric 3d reconstruction on mobile phones:- In this paper, we propose a complete system for 3D reconstruction pipeline for mobile devices, which generates three dimensional models with absolute scale while simultaneously supplying the user with real-time interactive feedback. In existing systems, the developed framework offers multiple innovative solutions. Moreover, we propose an efficient and accurate scheme for dense stereo matching which allows reducing the processing time to interactive speed.

Semi-dense visual odometry for a monocular camera:-We propose for a monocular camera to estimate change in position. It allows benefiting from the simplicity and accuracy of dense tracking - which does not depend on visual features - while running in real-time on a CPU. The key idea is to continuously estimate a semi-dense inverse depth map for the current frame, which in turn is used to track the motion of the camera using dense image alignment. More specifically, we estimate the depth of all pixels which have a non-negligible image gradient. In terms of tracking accuracy and computational speed, the proposed method compares favourably to both state-of-the-art dense and feature-based visual odometry and SLAM algorithms.

A case study of Augmented Reality simulation system application in a chemistry course: - To Understand micro-worlds is the challenge of chemistry learning. As a result, they are not able to visualize microstructures correctly during the beginning stage of chemistry learning. This study targeted the

Composition of substances segment of junior high school chemistry classes and, furthermore, involved the design and development of a set of inquiry-based Augmented Reality learning tools. Students could control, combine and interact with a 3D model of micro-particles using markers and conduct a series of inquiry-based experiments. The AR tool was tested in practice at a junior high school in Shenzhen, China. Through data analysis and discussion, we conclude that (a) the AR tool has a significant supplementary learning effect as a computer-assisted learning tool; (b) the AR tool is more effective for low-achieving students than high-achieving ones; (c) students generally have positive attitudes toward this software and (d) students learning attitudes are positively correlated with their evaluation of the software.

Augmented Chemical Reactions: 3D Interaction Methods for Chemistry:-Supporting chemistry students in learning and researchers in developing and understanding new chemical molecules is a task that is not that easy.

Computer applications try to support the users by Visualizing chemical properties and spatial relations. Thus far, there mostly exist applications that are controlled by using ordinary input devices as mice and keyboards. But these input devices have one problem: they always try to map a lower degree of freedom to 6-dimensional movements for the location and the orientation of the virtual molecules. Augmented Chemical Reactions is an application that uses Augmented Reality to visualize and interact with the virtual molecules in a direct way.

VI.ARCHITECURE

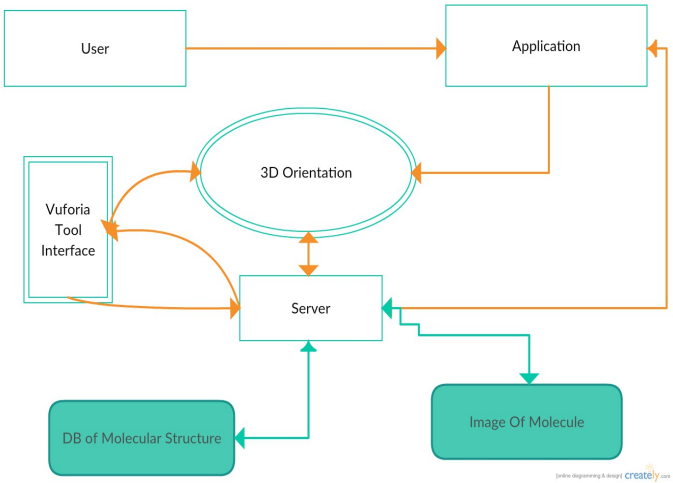


Fig : System Architecture

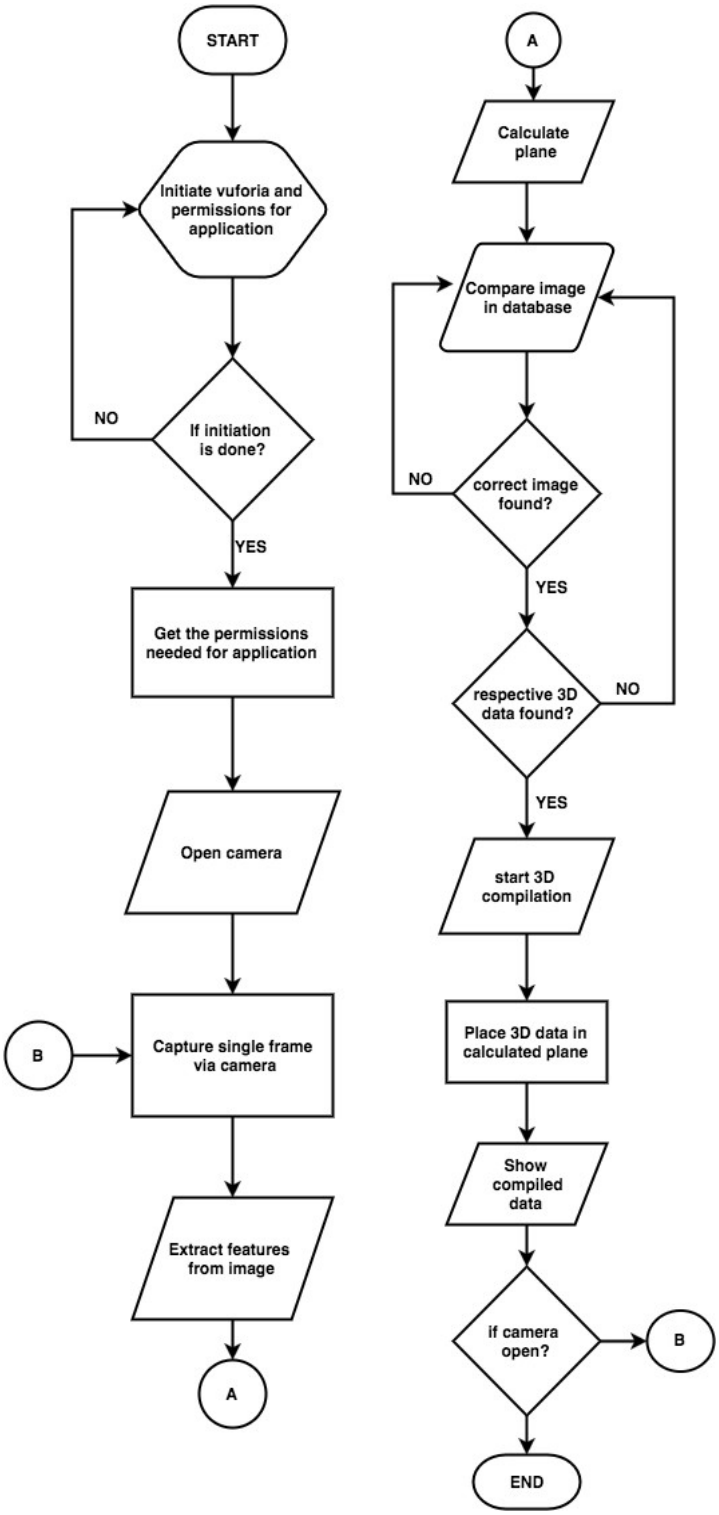
Above figure illustrates architecture of the proposed system. The proposed system has Vuforia tool interface, database, and server. Vuforia supports 3D recognition of image. Vuforia is used in proposed system as it scans real objects. For application generate license key from Vuforia website. Initiate Vuforia and permissions required for the application. After acquiring the permissions from Vuforia open Camera of device. When Camera will open capture single frame from device Camera. An image will be captured. Extract features of the image. After feature extraction plane detection is performed on the image. Image in database is compared. If image is not compared again perform plane detection. If image is found in database then we can say that it is correct image. A 3D data is found. If 3D data is not found then compare image in database. But, if 3D data is found in database then we will carry 3D compilation. The 3D data that we found in database will be placed on the calculated plane. After compilation show the compiled data. Here we have performed feature extraction, image plane detection, and 3D data compilation. If camera is open we can capture next frame and perform the procedure again.

VII. HARDWARE AND SOFTWARE REQUIREMENTS

Operating System: Windows 8
Coding Language: Csharp
Front End: Vuforia toolkit
Data Base: Vuforia
System : Windows, 7, 8, above
Hard Disk: 40 GB
Monitor: 14 Colour Monitor
Mouse : Optical Mouse
Ram: 1 GB

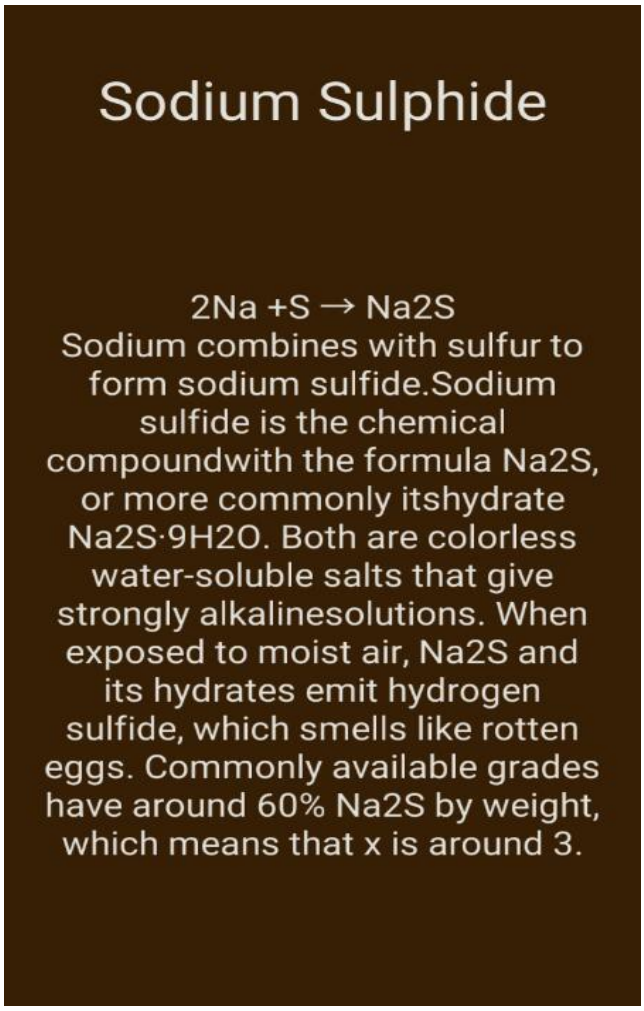
VIII. FLOWCHART

The flowchart given below illustrates the procedure to generate chemistry related structures.



XI.RESULTS

The proposed system gives information, 3D reaction and plays audio. Different chemical reactions are studied by students. The below screenshot shows actual android application user interface.



XI. CONCLUSION

Proposed system guides students to learn chemistry in an interactive way will be developed. Application will help students to learn chemistry and chemical reactions and information about it. The explosive reaction can be studied by students using proposed application. This application is online as well as offline. Offline access does not require markers. Thus, application is not costly.

XII.FUTURE SCOPE

In future we can extend the application by differentiating acid and bases in chemistry laboratories.

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