Augmented Reality with responsive web for body organ flash

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ABSTRACT – This study is about the modern technology which is Augmented Reality (AR) being applied in the education sector as new teaching materials. This technology is capable to display virtual object in reality via application. For example, a student is able to view the entire angle of an organ through AR compared only 2d image or picture on the textbook. This creates a new way where a class or lesson can be conducted more interesting. Responsive website acts as a platform to cover the information which do not included in the application. Users able to interact with the application through direct input or touch screen to zoom and rotate. Also via button, users can view or hide the information or the label based on their preference.

1. INTRODUCTION

Biology is a natural science concerned with the study of life and living organisms, including their structure, function, growth, evolution, distribution, identification and taxonomy. Augmented reality is a new technology where an existing reality was being stop by using computer-generated enhancements to make it more interesting by its ability to interact with [3]. According to K.Mehmet (2012), a composite view where combination of the real scene viewed by the user and computer generated virtual scenes is provided to users and most of the time AR is developed into an application or system which been used on mobile phone or devices to bring to virtual components into the real world. This is able to engaging a space, place or even a thing which is an augmentation of real world [1].

Augmented reality not only acts as a new technology in this computerized world, but it also bring a lots of benefits like enrich content and provide interactivity. This can be happened when augmented reality provide more data or information in real time in a specific environment and condition. For example, AR able to provided 3d controllable body organ model for learners to see through the entire angle. An interesting and convenience application that provided the users with 3d body organ model which help to conduct lesson and deliver information easier. This application is believe can draw attention from learner by the 3d model and animation. It also include the details in the textbook as it contents.

A. Objectives

This project embarks on the following objectives:

- To develop an augmented reality of respiration system based on secondary school Form 4's Biology chapter 7.
- To apply responsive web and flash card to the teaching materials for Form 4's Biology.
- To compare between traditional teaching materials and augmented reality teaching application.

B. Problem Statements

- **The available teaching materials less attractive to learners**
  Many teaching materials such as text book or reference book consist only picture and text provided less attractive toward learners.
- **Less interaction between learners and teachers during lesson**
  Most of the time learners passively listened and copy from the board in the learning and teaching process.
- **Learners more interesting on video compared to picture and text**
  Many learners prefer video compared to textbook when conduct lesson because video is more interesting that picture and text.

2. PROJECT METHODOLOGY

Agile methodology is applied in this system development. It development cycle divided into 6 phases with shown in the table below:

Table 1: Agile Methodology

Phase	Activity
Requirement	In this phase, the problem which trying to be solved was defines. Tools like software and hardware were determined in order to produce the output which is the augmented reality of body organ.
Plan	During planning phase, the objectives of this project were determined to solve the problem statements. The needed tools such as software were tested to

	ensure the development process is conducted without any error.
Design	The flowchart of the system is created in this phase. Some sketches related to the augmented reality project were produced. A prototype of the responsive web is produced to allow improvement on it after analyzed.
Develop	During development, the activity of modeling 3D body organ models are started and thus undergoes texturing and animation processes. The contents were uploading and stored into the responsive web and the augmented reality application is created.
Release	The augmented reality project is produced when all the requirements were meet. The deliverable is ready to be release at the end.
Track & Monitor	Comparison and verifying deliverables against the project plan and the requirements is happened in this phase when the augmented reality application is being checked whether it meet with the all requirements and able to solve problems. Feedbacks from the users are collected to perform improvement to the project.

3. RESULTS AND DISCUSSION

Android is the main platform which involved in this system development. This project is focus on Android smartphone or tablet by applying the Augmented Reality (AR) technology in the system. Therefore, two types of SDK to develop the mobile application were used which are Android SDK and Vuforia SDK. Vuforia SDK is used to create the AR environment in smartphone together with the Unity. Vuforia SDK is chosen in this project because it is popular, free source and the amount of online resources is huge which able to assists beginner to develop AR application.

Besides that, a responsive website was used to cover that information which is unable to include in the AR application. A set of flash card acts as the image target since this project is marker based Augmented Reality where the process of using this application is assists by smartphone camera. Users are required to scan the flash card in order to display the 3d models on the smartphone screen.
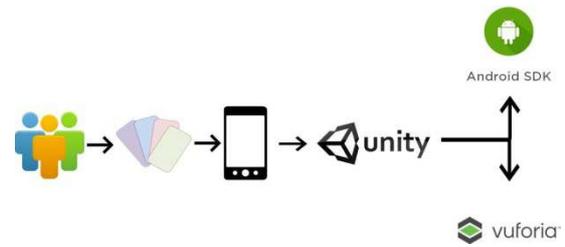

Figure 1: System Architecture

4. CONCLUSIONS

A survey done by UTM which related to the Biology education in Malaysia stated that the application of AR able to enhances the attractiveness and effectiveness of learning environment in classroom. According to Ng (2016), "augmented reality technology gives a better means for students learning in an interactive environment and it allows students to interact each other while enabling social communication" [2]. This is because AR offers a type of automated application which allow student to promote reflection of metacognitive process.

It is found that some of the applications give controls to permit the users to tweak the filters utilized as a part of the picture processing. This instantiation is a one-time setting when start opening the application, however it can be altered later by the users. In this mobile application, the interactivity included the button with display some organ information on the smartphone screen and it allow users such as students to explore more with the entire angle of certain 3d organs which able to see through the whole organ.

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