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Senior Design Project

Adorsholipi – A Augmented Reality Based Educational Mobile Application

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DECLARATION

This is to certify that this Project is our original work. No part of this work has been submitted elsewhere partially or fully for the award of any other degree or diploma. Any material reproduced in this project has been properly acknowledged.

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ABSTRACT

This report presents the design, implementation and documentation of an augmented reality based educational mobile phone application. It can be categorized as mobile software application which is the representation of Bengali book. It uses a very efficient and enjoyable tactic to educate our children through mobile application in this current age. All Bengali letters and related word with appropriate writing animation, voice and image stored in the application. By using the system camera and with real-time image detecting system in the application, Bengali vowels can be identified from the book. The system has been designed in such a manner that takes care of children phycology and it can provide easy and effective information related to the education.

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CHAPTER 1

Introduction

1.1 Overview

“Adorsholipi” is a mobile application which use image recognition tactic to understand words from Bengali vowels book in augmented reality and deliver information by graphical representation in real time. In our current age mobile applications are playing vital roles in the various sectors of the technology and the social service systems. There are very few system or application in our society which related to providing education. So, keeping that in mind we think about an application which operate by children of our society and in a friendly environment by an augmented way they can learn various information about the surrounding environment. To establish the idea, we develop an application with a physical Bengali vowel containing book. Through the application using mobile phone camera in the augmented space Bengali vowels can be recognized and for learning purpose we develop augmented video animation in the application which can be operate by the children.

1.2 Project Details

There are few modules in the application system:

1. Recognition

In augmented space to recognize any object to the system we must need a device to detect the object. For detection we are using phone camera which can be understandable by the application framework. For recognition purpose we trained the system all vowels of Bengali language. In an image form we capture and resize all the image configuration. Generating a database file for the system with the Vuforia engine web is the first step of the application. More details are explained in the technical section of the documentation.

2. Project Development

To develop the system architecture, we studied various types of environment system software. For applying augmentation in a system and compile it as an application we select Unity Engine software to build the architecture with all necessary requirements. Developing an Android or

IOS application in Unity is challenging but for augmentation and recognition purpose Unity can be suitable application development environment system software.

3. System Interface

System backend and frontend interface design for user interaction with the application was the important part of the project. First, we find out the important module of the object and made them interactive with the help of C# scripts which was the backend part of the application. Second, we made the application user friendly with known interaction interfaces which was the frontend part of the application.

4. Project Simulation

From the beginning to end of the whole project simulation step by step shown below:

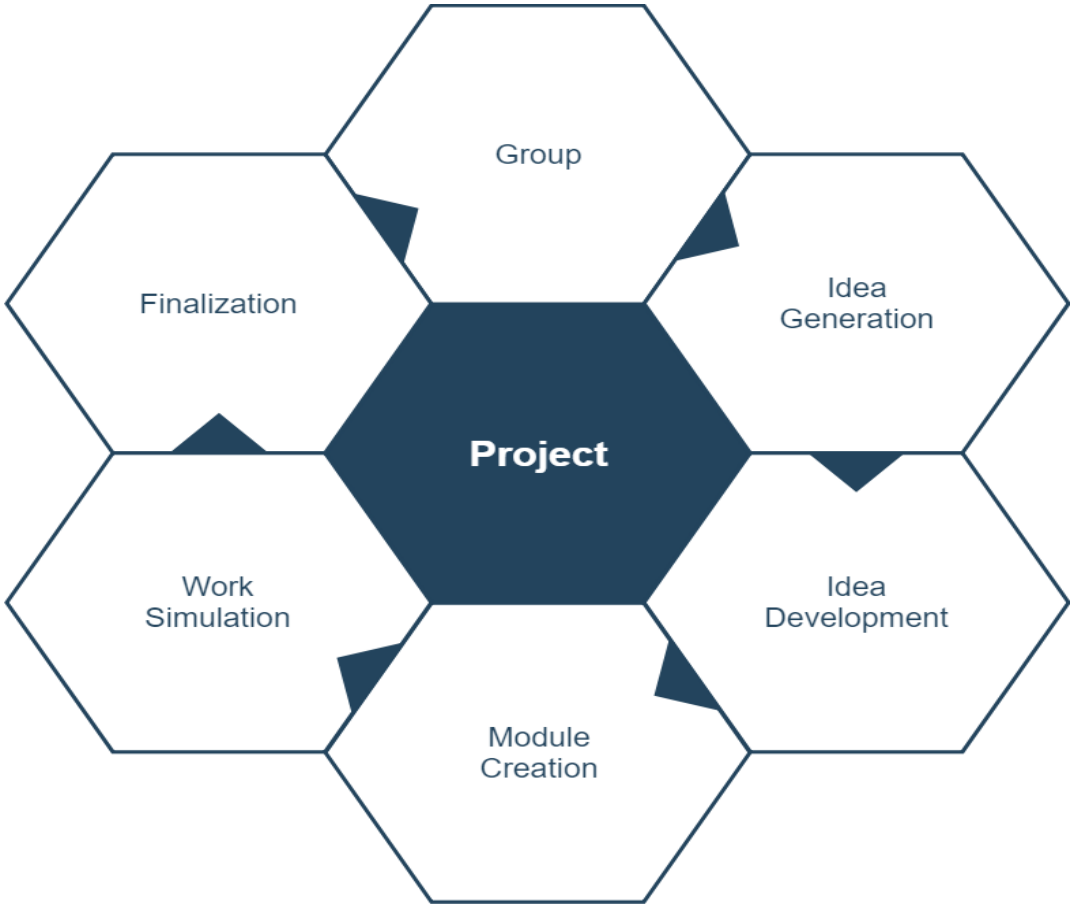

Fig1.1: Project Simulation

1.3 Project Goals

There are three major goals that we want to focus on with our project. They are as follows:

i. **Develop an Educational Application:** To spread the education in a technical and cost-efficient way. Augmented application for various purpose of information collection.

ii. **Information Understanding:** To understand and learn information in a very easy way is augmented reality.

iii. **Advance the Generation**: Knowing the information in an advance application without any cost.

CHAPTER 2

Motivation and Related Works

2.1 Motivation

In 1962, Mortor Hayrlage first created Sensor Rama. Which is called the first 3D matchine. Which is the first concept of VR.

In recent 30th March, 2016 Microsoft launch Hololens which become more popular day by day. Apple first say they don't think about VR/AR, but see Microsoft Hololens they decide to work on this.

To see our country paspective hololense as not popular as it service but it increase its popularity in our country also. AR is that platfrom where we can easily connect with mobile or PC. Smrat Phnone are available every where so its very easy to access this apps for students study. In example of AR base app we can see amazone AR apps.

2.2 Related Works

There are some related or similar sown bellow:

i. **Augment:** Augment allows its user to see their products in 3D in a real-life environment and in real-time through tablets or smartphones to drive sales and improve user engagement.

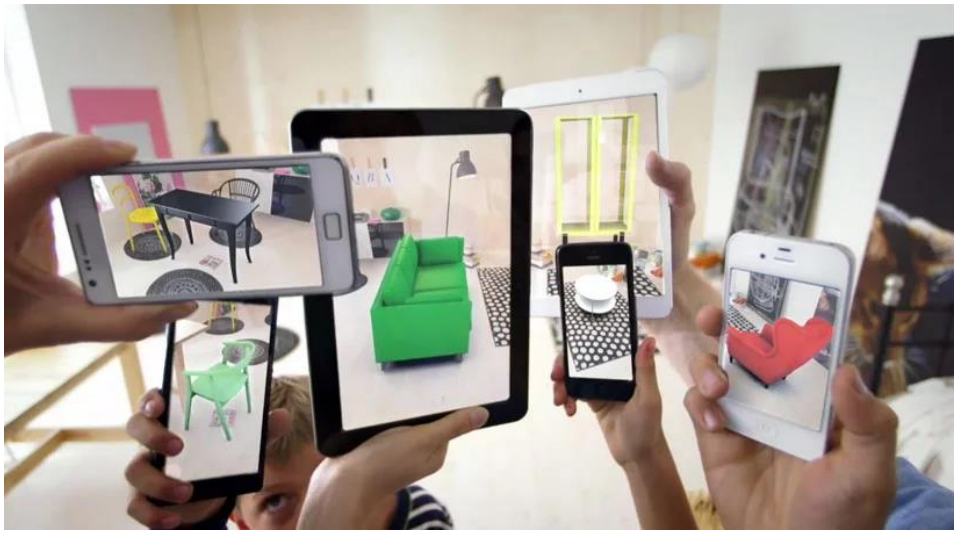

Fig2.1: Augment Application

ii. **Architectural Plan Viewer:** The AR application can enhance users' camera display with contextual information. For example, when you point your smartphone at an architectural plan, you can see 3D model.

Fig2.2: Plan Viewer application

CHAPTER 3

Technical Details

3.1 System Database

Compiling the application with image recognizer we must need a system supportable database which can import into the application for data recognition. So before generating a database file we must train the data we want to recognize by the application or the system.

After collecting the all required data, we create a Vuforia development dashboard in the web. In the training we upload all the required data into the Vuforia Engine Developer portal then create a target manager for identified the accurate data by the target ratio of the image defects.

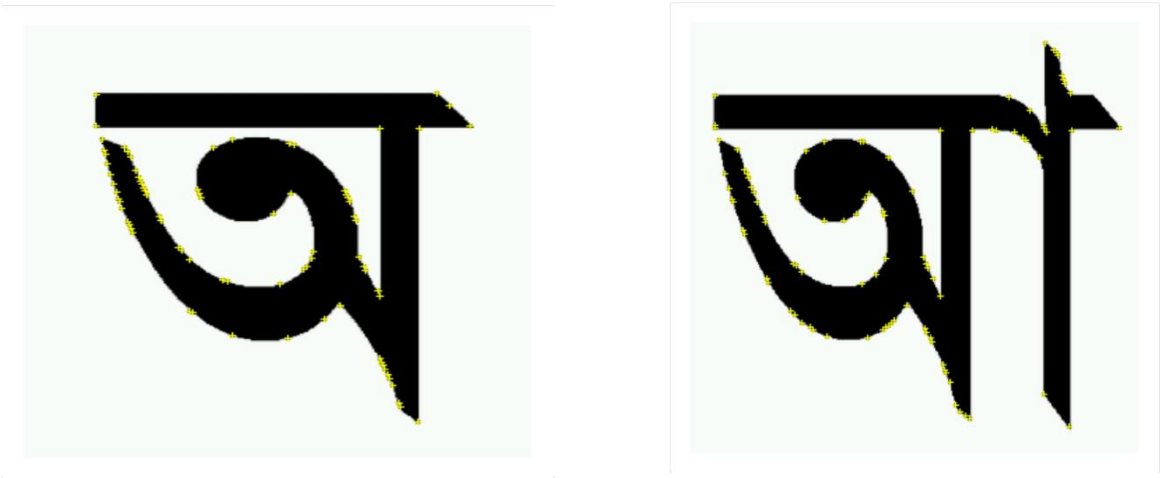

Fig3.1: Defects Ratio

In one target manager system we test almost 50 plus data as image extension and select best ratios data for compiling the set as a database file. After web compilation we generate a license key for use that database file in Unity Engine so that the database secured with its identification and system security.

Later we import the database in our system environment and select application database of the project file.

3.2 System Compilation

Compiling the application with image recognizer we used Unity Engine Studio. In the studio we create our object with application setup. Object and its child inherited the system architecture with data.

Inner connection and control object behavior we generated C# scripts in Microsoft Visual Studio. For system environment setup we import JDK and Android SDK into the Unity platform. While the database file is imported into the Unity must need to compile the license key form the Vuforia target manager system. After all corrections and compilation, we tested every word detection through computer web camera with printed copy of the images.

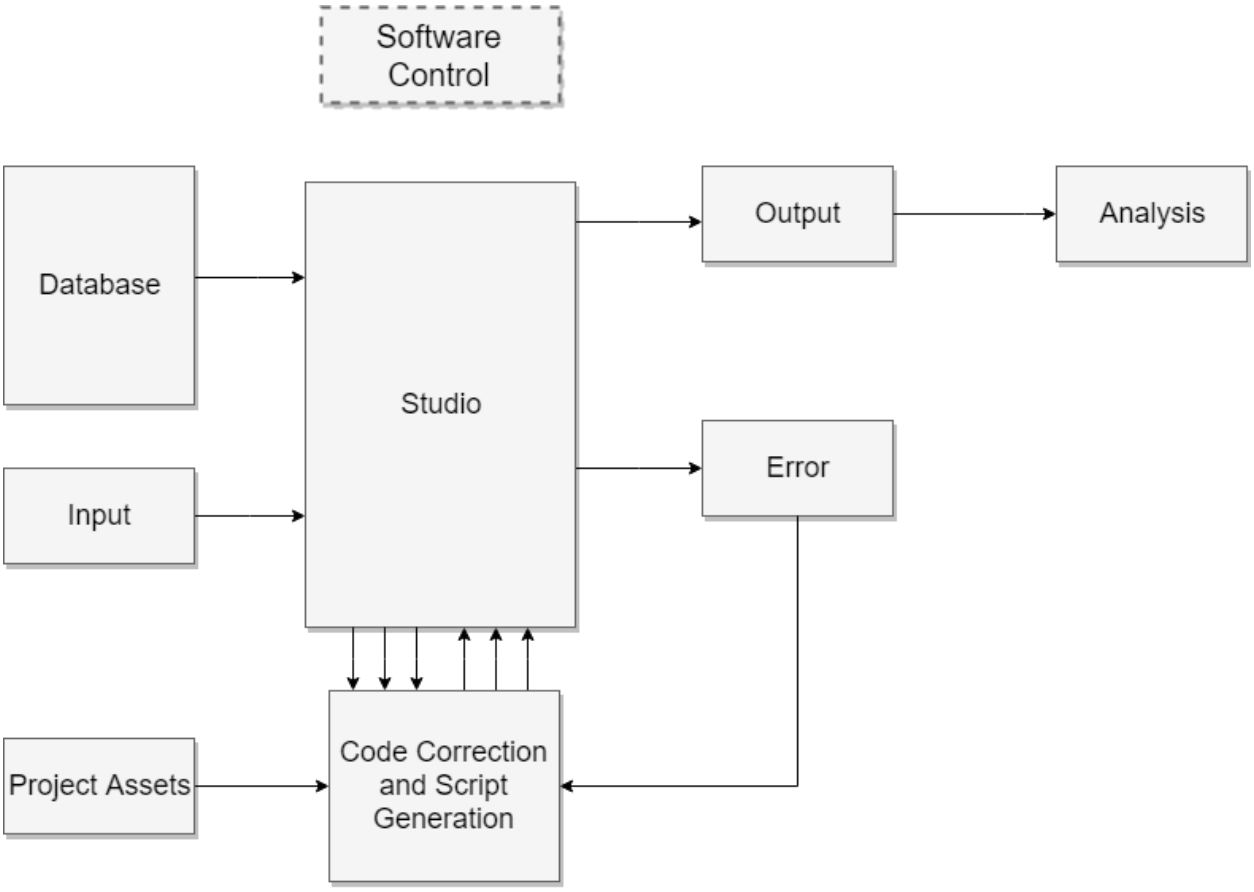

Fig3.2: System Simulation

3.3 Export Environment

Unity is compatible with Android, IOS, WebGL and Windows. Before project exportation must import the system environment into the project setup. Our target platform was Android, so we used updated Android SDK for avoiding run time environmental error. Application size must need to consider for device battery savior. Before

3.4 Application Test and Assets

After exportation we tested the application in Android mobile phone for defects correction. While the image detection rate is low, recognition can fail by the application. The database and the training must need to high rated before it exported into the project. We used various types of assets for proper functional speed.

3.5 UI Design

User Interface plays an important role in the application. Without user interface its difficult to control the application. We design a user friendly and child operative interface for the application. We create all interface object and made them reactive with C# script. With proper canvas simulation in the application user can easily understand how to hover or use the application.

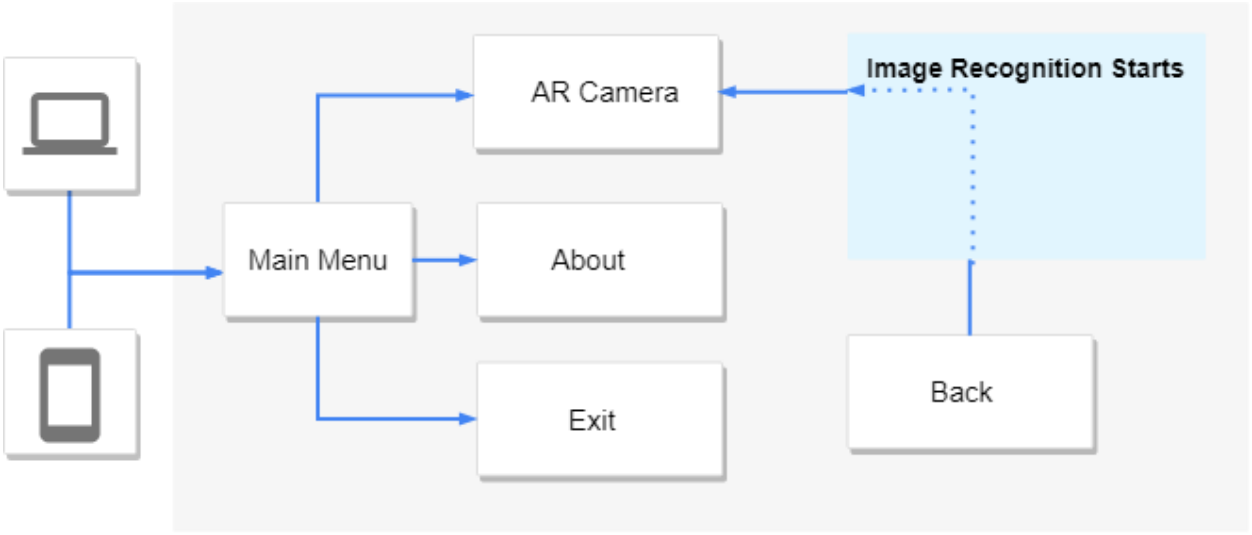

Fig3.3: Use case diagram

3.6 System UI

While the application recognizes the identified image, it shows graphical animation in the augmented reality. We also think about the user interaction with the augmented animation output. We compile some C# script for play and pause interaction system for the animation. While user using the application, user can play and pause the animation in real time augmentation through the device camera screen.

CHAPTER 4

FUTURE WORK

4.1 Air or Augmented Writing

This is the concept which we like to develop in future. We would like to develop a mobile application which use hand jesture recognition system for detect air writing. We already started to develop the jesture recognition system for the future application.

4.2 System Updates

The main objective of developing this system is to provide a basic platform for startup application technology. The system can be more improved than the current form. In the context of securing this system further work can be done by including firewalls and other means of securing this system. Additionally, the interface of the system can be a work in progress to look more user-friendly. The menu section can be updated by including the popular social media sites. When a user wants to sign up for an account it can be made easier by incorporating the mainstream social media sites such as signing with one's Facebook or Twitter profile. The about section can be further enhanced through a virtual information center with the location of important junctions such as the navigation.

CHAPTER 5

CONCLUSION

5.1 Skill and Conclusion

The Adorsholipi is primarily educational application. The system takes care of all the requirements of an average Bengali word book. Additionally, we expanded the application system is a fully functional state of the art and presentation. This application inherits all the previous modules and additional functionalities have been developed.

This report also extensively mentions the components used in the system and the functionality of each of the component. It gives a list of flowcharts that can be implemented to design this system. This system concept can be used in future applications as well.

From the beginning of developing this system, our main goal was to develop a fully functional state of the art system which could cater to the masses and it would become a tremendous commercial entity. By introducing this application in the educational sectors, it would be a stepping stone for learning and understanding object. Our focus was not only to finish the project in due time but to design this system in such a way that it would genuinely be useful in the real world. To conclude, we believe that we have come a long way in achieving such a significant milestone and we have no qualms in mentioning that we have really surpassed our expectation in order to achieve what we have accomplished so far. Thus, we have faith that this is just the beginning of innovation in the educational field.