AR Presentation Mobile Application

Department of Computer Science
Faculty of Engineering
University of Hong Kong

Yung Tsz Hin, 3035277353
Li Chun Hang, 3035304259

Supervisor: Loretta Yi-King Choi
September, 2018
Table of Contents

1 Project Background 3
   1.1 Motivation 3
   1.2 Previous Works 4

2 Project Objective 5
   2.1 Popularise the use of AR technology and 3D models 5
   2.2 Create presentation with ease 5
   2.3 Suitable for variety use case 5

3 Problem to be solved 5
   3.1 Perceived complexity of using augmented reality in presentation 5
   3.2 Unnatural integration of models into video 6
   3.3 Time cost of creating 3D model 6

4 Proposed Application 6
   4.1 Major features 7
   4.2 Technologies to be used 8

5 Project Schedule 8

Reference 10
1 Project Background

1.1 Motivation

Visual aid is an integral part of presentation. Presenters utilize visual aid to improve comprehensiveness and to make their presentation more impactful. The most popular kind of visual aid is presentation slides. However, it is difficult to integrate slides into the presentation well due to the separation between the slides and the presenters. The problem gets worse as the popularity of E-learning increases, where more presentations will be conducted through the Internet. In the video, presenter and slides cannot be shown together, which may cause confusion to the audiences.

By using augmented reality in presentation, presenters and visual aid will both become a part of the scene. According to a journal investigating interactive marketing, comparing to web-based product presentations, AR-based product presentations are said to be providing more effective communication benefit. Audience’s purchase intention and immersion is enhanced through enjoyment and excitement in AR experience [1]. Presenters can treat the elements in a presentation slides, such as text and images, as if they were real objects on the stage, which leads to a more coherent experience to the audience.

Despite the maturity of augmented reality technologies, only large scale campaign or conference use AR technology (See Figure 1). There is nearly no presentation software which incorporates such technologies. Therefore, our team decided to develop a presentation software which focuses on augmented reality.

Figure 1 Screenshot from a news report
1.2 Previous Works

1.2.1 Microsoft PowerPoint

PowerPoint creates presentation slides which is displayed page by page. Users can quickly design an aesthetically pleasing slides using its built-in templates. Users can also apply animations on text, images and transition between slides.

Starting from PowerPoint 2016, users can also add 3D objects to the presentation. Rotation can be made to the model during the presentation to show different features of the object [2].

The disadvantage with PowerPoint is that it does not produce memorable presentation slides. Templates may appear to be too boring and it sometimes prevents text from standing out. Animation and sound may distract rather than impress audience [3]. PowerPoint also work poorly when the presentation is recorded since only one of the presenter and the slides can be shown at a time. Video editing have to be done to show both simultaneously.

1.2.2 Prezi

Prezi create presentation slides based on zooming in and out on a giant canvas. This provides more room for users to design unique presentation slides. Like Microsoft PowerPoint, it does not work in recorded presentation well. However, Prezi is planning to add augmented reality functionality to their product, which overlays the slides on the video [4].

Although this functionality has not been released yet, there are some possible limitations shown in their previews. First, the images do not react to speakers’ gesture. Also, the images are always on top of the video, so it may look unnatural when part of the images are supposed to appear behind the speaker.

1.2.3 Nissan Teana Presentation in Guangzhou Auto Show

Nissan has used augmented reality in their presentation of Nissan Teana during the Guangzhou Auto Show [5]. They used it to present the internals of the car. Compared to showing the objects in a presentation slides, this is more immersive and will give a more believable experience to the audience.

Similar presentations can also be be found elsewhere, but it is often seen in big events done by professional. Our team hope to enable ordinary users to make use of augmented reality to enhance the visuals used in their presentations.
2 Project Objective

2.1 Popularise the use of AR technology and 3D models

Our team want more people to learn and promote the benefits of augmented reality. Our final product allows user to add 3d objects into presentation and using AR technology to visualise the object. Therefore, our product will provide ways for user to build their 3d objects. At first, we would like implement 3d models import function that are created by third-party software. Moreover, we will explore the internet if there is any free 3D model library which provides API call. If there is an option, we can include a list of 3D models in our application. Furthermore, if there is sufficient time and resource, we would like to implement 3D scanning function in our app.

2.2 Create presentation with ease

In order to create a presentation using augmented reality technology in a convenient way, our team decided to build a mobile application as our product. In the application, we expect the interface to be user-friendly which people can build their own AR presentation even they are not experienced with AR or new to our application. Therefore, comprehensive guidelines to the functionalities of our app should be included. Moreover, 3D models, text, image, and graph presets should be included in the application to ease the speed of constructing the presentation.

2.3 Suitable for variety use case

Through our investigation, we categorised two different use cases when using our application: live presentation and online presentation. Both of the use cases require different features. During the project development, features will For live presentation, screen sharing to external display devices is required and remote control device is required. For online presentation, video recording is required.

3 Problem to be solved

Augmented reality does appear in current presentations. However, to make it popular among ordinary users, there are some problems which need to be solved.

3.1 Perceived complexity of using augmented reality in presentation

Using 3D models in presentation is unfamiliar to the general public. The user interface of our program should not be cluttered with options which are rarely used. By having a cleaner interface, users may find it easier to learn how the program function.
3.2 Unnatural integration of models into video

One major benefit of using augmented reality in presentation is to give audience an immersive experience. Therefore, images must appear to be a natural addition to the video. To meet this requirement, our team have to find ways to calculate accurate lighting and to handle occlusion between real and virtual objects.

3.3 Time cost of creating 3D model

To fully utilize the augmented reality capabilities of the software, 3D models should be used. However, 3D models can be difficult to make. Users may want to download ready made models from the Internet and use them in their presentation. In order to simplify this process, our team will explore the possibility of offering model downloads from some 3D model repositories directly in the program.

4 Proposed Application

We proposed to build a mobile application in iOS platform. Our target user is iPad user who needs to deliver a presentation. Users can be:

- Teacher
- Presenter
- Content creator using video-sharing platform

For live presentation, we also proposed to build a remote control app to control the slides during presentation. The device and remote control is planned to be connected by bluetooth.

There are two major use cases:

- Live view presentation
- Video presentation

Figure 2 shows the basic flow when user is using the application.
4.1 Major features

4.1.1 Presentation creation
User can create a presentation slide from scratch in our application. During presentation creation, user can add different element into each slides such as 3D models, text, image or graph. User can also input the stage dimensions and the initial position and direction of the tablet, which will be used as a camera during a presentation.

4.1.2 Face tracking mode / Full view mode
While user is presenting, sometimes the presenter may want show the 3D object or graph which may use up a large portion of space and therefore, they need the camera to view their body and leave a lot space for presentation. However, presenter sometimes may not need visual aid and wish the audience focus on their facial expression or speech. Therefore, a close-up view on their face is also essential for presenting. As usual, we need two cameras in order to achieve these functions. We want to simplify these function by using only one camera. To include this feature, we will implement some computer vision technique to keep track on presenter face and the camera can zoom in to presenter’s face and move accordingly.
4.1.3 3D model import

Users can import their own 3d models into the slides. The application should support popular 3D model formats such as .fbx and .obj. It should also support the retrieval of 3D models from cloud storage services such as Google Drive and Dropbox.

4.1.4 Video recording and export

Users can record their presentation and export to various formats such as .mp4 and .avi. In the video, both presenter and the visual aid will be included so that viewers will get the full experience. Users are also given the chance to re-record parts of their presentation. In the recording mode, screen will display a dialog on the screen with the reminder of the next slide to enrich user experience.

4.1.5 Remote control

In case of a live presentation, users can control the presentation slides with a remote control app that pairs with the iPad showing the slides.

4.2 Technologies to be used

For app development framework, we are going to use Microsoft Visual Studio Development Environment along with Unity Framework. For augmented reality library, Vuforia engine in Unity will be used to create AR objects.

5 Project Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Deliverables of Phase 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 September 2018</td>
<td>(Inception)</td>
</tr>
<tr>
<td></td>
<td>• Detailed project plan</td>
</tr>
<tr>
<td></td>
<td>• Project web page</td>
</tr>
<tr>
<td>7-11 January 2019</td>
<td>First presentation</td>
</tr>
<tr>
<td>20 January 2019</td>
<td>Deliverables of Phase 2</td>
</tr>
<tr>
<td></td>
<td>(Elaboration)</td>
</tr>
<tr>
<td></td>
<td>• Preliminary implementation</td>
</tr>
</tbody>
</table>
The team will be adhering strictly to the timeline. After the deliverable of phase 1, deadline has been allocated to each stage of the project is as follows:

1. Determining the scope of the project - 20 Oct
2. Analysis of the hardware, and software such as APIs and frameworks - 20 Oct
3. Design and Development of a functional prototype with basic scanning and visualization features - 30 Nov
4. Development of first demo of the application - 31 Dec
5. Documentation for first demo - 7 Jan
6. Development of second demo of the application - 31 Jan
7. Documentation for second demo - 15 Feb
8. Development of final product - 17 Mar
9. Integration Testing - 30 Mar
10. Documentation and final report - 12 Apr
Reference


