

# Promotion of Malaysian Universities in Arab Countries using Mobile Augmented Reality App: A study of UUM's Brochure

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**Abstract**—Augmented Reality (AR) has been famous and well known due to the predominant and massive development of the technology as well as the wide distribution of smart phones. AR deals with a special form of Human Computer Interaction (HCI) and it augments a user's perception of the reality with additional information. Previous studies have shown that the augmented reality can be used with mobile application in numerous areas such as learning, medicine, tourism, advertising and so on. At the same time, the brochure is an advertising piece mainly used to promote a company or organization. Usually, it contains short sentences, still pictures and missing information. In this case, to overcome these limitations, an interactive brochure has been developed as an alternative to the traditional brochure. The essential purpose of this study is to develop interactive university brochure application (IUBA) based on Mobile Augmented Reality (MAR) to promote Malaysian Universities in Arab countries using Arabic language. IUBA was developed using Unity 3D and Vuforia and implemented for a proposed brochure of Universiti Utara Malaysia (UUM) as a case study.

**Keywords** – Promotion; Malaysian Universities; Mobile Augmented Reality; UUM's Brochure; Unity 3D and Vuforia.

## 1. INTRODUCTION

Recent years have seen significant advances in two promising fields of user interface research: virtual environments, in which 3D displays and interaction devices immerse the user in a synthesized world, and mobile computing, in which increasingly small and inexpensive computers and wireless networking allow users to roam the real world without being tied to stationary machines. It may well be asked how are virtual environments can be combined with mobile computing, in addition to the ultimate goal of supporting ordinary users in their interactions with the world [1].

Augmented Reality (AR) can be described as layering virtual digital content on top of a real time image. It is a variation of Virtual Environments (VE) which immerses a user inside a synthetic environment. AR can be defined as one of the achievable steps between two methods involving real-world and fully virtual reality [2]. The concept of augmented reality (AR) incorporates the use of technology applications that allow the use of 2D or 3D scenes of synthetic objects to enhance and augment the visual perception of the real environment [3]. It can be made an overlay having virtual objects onto the real life by acquiring camera images in real-time to produce a new layer towards the used environment [4]. [5] mentioned that augmented reality is a field of computer science, which deals with a special form of human-computer interaction. The same is true of the main concept of augmented reality to augment a user's perception of the reality with additional information. This additional information can be computer-generated, or simply information that humans can not perceive directly with their senses.

Mobile Augmented Reality (MAR) is defined as AR application running in a mobile environment [6]. A mobile augmented reality application (MARA) is a type of mobile application that incorporates and complements built-in components in a mobile phone and provides a specialized application to deliver reality-based services and functions [7].

The technology of augmented reality has become increasingly developed. We can see its application in various areas of life from transport through medicine ending at entertainment [8]. The typical user looks at their phone 150 times per day [9]. In 2012, the mobile industry grew its revenues by a massive 12% and hit 1.45 Trillion US dollars in total for the year. According to [10], in 2011, there were 835 million smartphone users, 5.6 billion future phone users.

The mobile industry set the record for the fastest industry ever to reach that massive Trillion-dollar level far bigger than the PC, TV, internet or advertising industries, just to mention few examples [9]. Also, 90% of human being who have ever taken a picture has only done so using a camera phone instead of stand-alone digital or film-based 'traditional' camera.

In addition, the changes in multimedia technology have more impacts on all aspects of our life. For instance training, commercial, learning, medicine as well as promotional applications which are being applied in useful way in our life [11]. Moreover, the advance in the area of technology such as multimedia has become a new medium that support and

provides interactivity on new media [12]. Thus, the augmented reality can be used to develop an interactive brochures mobile application. The rest of the paper is designed as follows: background of study is being discussed in section 2, methodology has been explained in section 3, the discussion of IUBA in section 4 and the paper is concluded in section 5.

## **2. BACKGROUND OF STUDY**

### **A. Augmented Reality**

Augmented Reality (AR) is a term describing those technologies that allow the real-time mixture between computer-generated digital content and the real world, it is currently widely researched and rapidly evolving [13]. This technology integrates the real world with composite 3D virtual objects. It is also interesting and interactive, therefore there is a vast range of potential applications of augmented reality such as medical, manufacturing, urban planning, architecture, archaeology, education and many more [14].

There are two types of AR: the first is the marker type which uses a camera connected to a device. When a “marker” comes into view, the digital image data are overlaid onto the display. The second is the marker-less type which employs subject that has its particular shapes and colors. When the camera recognizes this subject, then the digital image data are overlaid based on these shapes and colors [15].

### **B. Android Augmented Reality**

Android application development is a hot topic since the introduction of android by Google. Hundreds and thousands of applications are being developed and shared in the android market from time to time. The Android platform is the first software platform and operating system that has been built for open and complete mobile device. It consists of the operating system, middleware, user interface and application software [15].

Android supports a wide range of input/output devices, sensors and communication media. Google has revealed the power of "Open Source" and it has enriched the web with its search engine by mobile computing technologies with its open source Android platform [16]. Augmented reality has the capability to change significantly the way in which information can be delivered to individuals.

### **C. Related AR Applications**

Previous researches in augmented reality has addressed variety of application areas including aircraft cockpit control, assistance in surgery, viewing hidden building infrastructure, maintenance and repair, and parts assembly [13].

One of the related systems is a touring machine which has been prototyped as 3D Mobile augmented reality systems for exploring the urban environment [1]. They described a prototype system that combines the overlaid 3D graphics of augmented reality with the unlinked freedom of mobile computing. Their goal was to explore how these two technologies might together make possible wearable computer systems that can support users in their everyday interactions with the world. In addition, they introduced an application that presents information about their university's campus, using a head-tracked, see-through, head worn, 3D display, and an untracked, opaque, handheld, 2D display with stylus and track pad.

Finally, they provided an illustrated explanation of how the prototype is used, and described the rationale behind designing its software infrastructure and selecting the hardware on which it runs.

### **D. Traditional Brochure vs. Interactive Brochure**

A brochure is an advertising pieces mainly used to introduce a company or organization and inform target audience about products or services. Usually, the normal brochure contains short sentences, still pictures and insufficient information, thus, make it non interactive to readers.

According to [17] the traditional use of brochures in advertising would be more effective for verbalizers, whereas the virtual experience mode would be more effective for visualizers. Under a hybrid of the two advertising modes, a recent effect was found indicating that the subsequent or more recently experienced advertising mode would generate a greater impact.

Previous studies conducted have shown that augmented reality can be used with mobile application in several areas such as learning, medicine, tourism, advertising and so on [18]. This study suggests that an interactive mobile application could be developed based on AR to overcome the limitations of traditional brochure and promote Malaysian Universities in Arab countries using their language.

The Interactive University Brochure App (IUBA) is a mobile application that focuses on overcoming the limitations of traditional brochure. IUBA depends upon AR to merge the digital content with real-world brochures to produce powerful, interactive content and creating increased engagement to attract readers and provide them more information.

Moreover, this application will give comprehensive scenes with Arabic narration by using traditional brochures and MAR application on an Android device. Besides that, IUBA promotes UUM in Arab countries and gives sufficient information about the facilities which are provided by the university.

As a result, the following significant achievements can be satisfied:

- Overcoming the limitations of traditional brochure.
- Enhancing the utilization of the mobile phones.
- Enriching the brochure with massive information in term of video and narration.
- Investigating the benefits of using AR for attracting the Arabian students to study at UUM.

### 3. DEVELOPMENT OF INTERACTIVE UNIVERSITY BROCHURE APP

#### A. App Requirements

IUBA has been developed using Unity 3D and Vuforia to run in Android mobiles. JDK7.0, Android and SDK 2.2 platform were also used for the development. Also,

Photoshop CS3 (Image Processing Program) was used to create and modify the required image targets as well as the proposed brochure. Additionally, Pro show 5 was used to produce videos which show and give much information about UUM, Library, Sport Center, Health Center and Transportation.

#### B. The Proposed System

Figure 1 below, shows the overall structure of the proposed system. It has Qualcomm Vuforia's SDK (QCAR SDK's) marker detection module to detect image marker. Also, it has video play module to play video file when marker is detected. All contents (image targets and videos) of this application were produced using Unity 3D and built in forms of apk file in order to run on the Android platform.

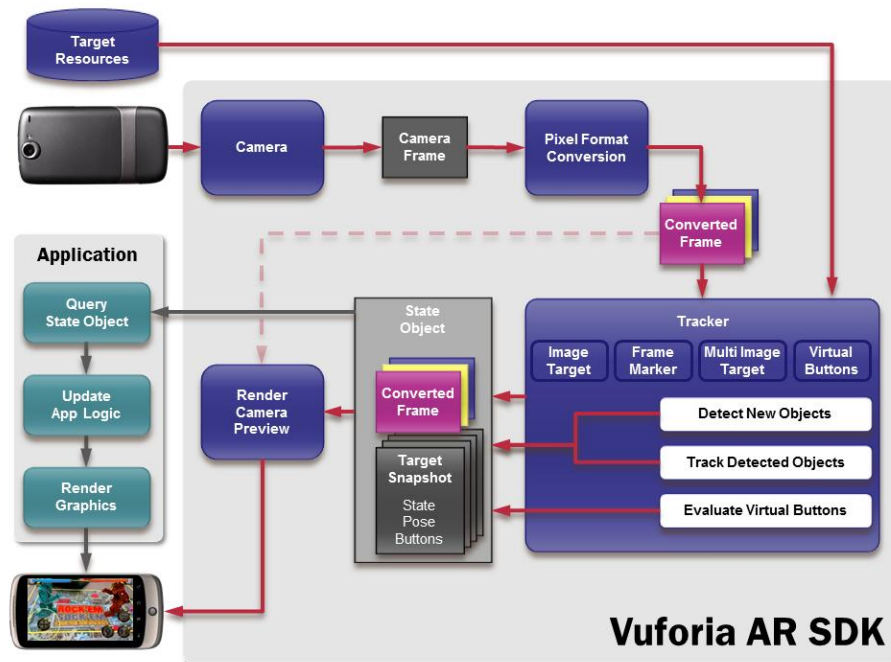


FIGURE 1: Overall Structure of the Proposed System

#### 4. The IBUA DISCUSSION

Figure 2 below; show the proposed brochure that we have designed to be our case study. The images, which are in this proposed brochure, have been considered as targets. While in Figure 3 below, when the IUBA started, it will show a splash screen on the mobile phone, followed by an introductory screen with some basic instructions and a start button at the bottom named OK.

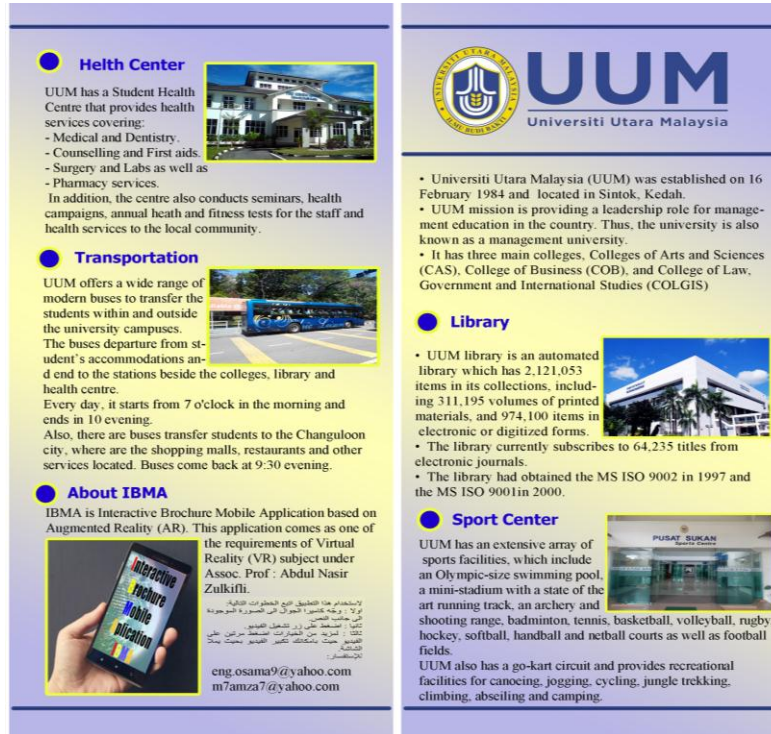


FIGURE 2: The Proposed UUM Brochure

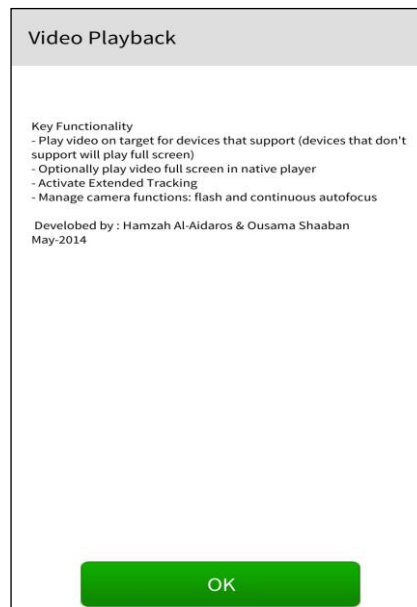


FIGURE 3: An Introductory Screen with Basic Instructions

After the click of OK, the live camera image will appear on the mobile screen. By holding the mobile device up against the printed brochure, the user should see a play button centered on top of the target Image. Each facility has its own video with Arabic narration. By clicking the play button, the application will play the related video which will give massive information and attract the user in an interactive way. For instance, Figure 4 presents the video file that is detected when the mobile app comes over the image.

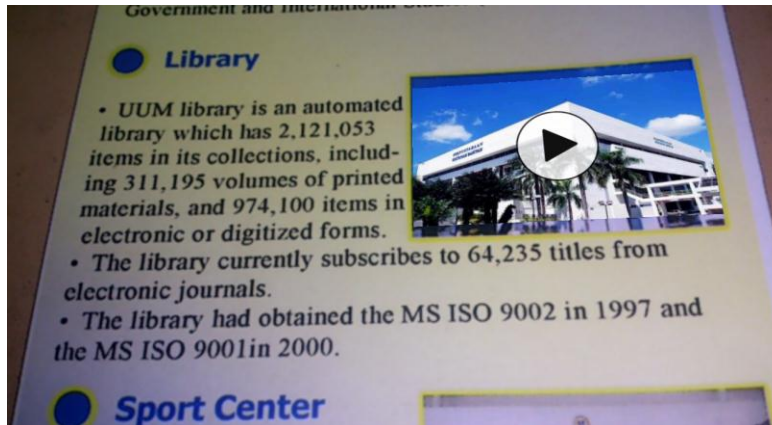


FIGURE 4: The Detected Video File

At the end of the proposed brochure, there are additional instructions in Arabic targeting the Arab speaking audience who cannot read English. These teach them how to use this application. See Figure 5 below.

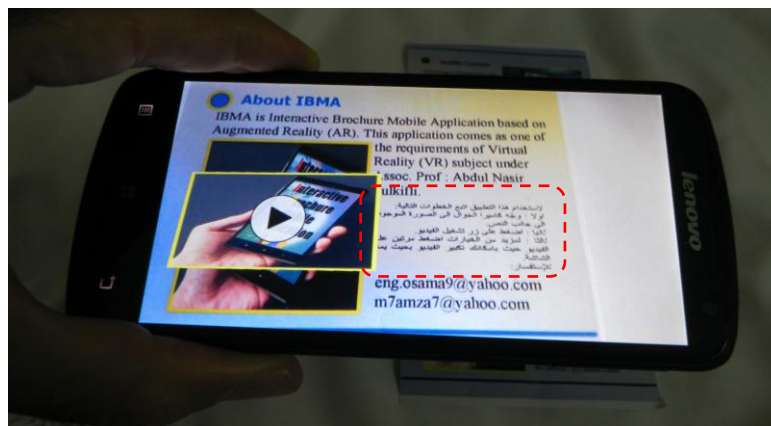


FIGURE 5: The Instructions in Arabic Language

## 5. CONCLUSION

Augmented Reality (AR) is used with mobile applications in numerous areas such as learning, medicine, tourism, advertising and so on. At the same time, the brochure is an advertising pieces mainly used to promote a company or organization. Usually, it contains short sentences, still pictures and missing information. This study proposed developing an interactive university brochure application (IUBA) based on Mobile Augmented Reality (MAR) to promote Malaysian Universities in Arab countries using Arabic language. As a case study, a proposed brochure of Universiti Utara Malaysia (UUM) has been developed as well as the IUBA using Unity 3D and Vuforia. IUBA can help universities and other organization to achieve their aims and objectives and introduce their services and activities using the simplest and cheapest promotional way.

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