

# The AR Traveller

*Unlock a new dimension of the world*



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# Description of Application

The interface we are going to develop is an AR application called AR Traveller which works as a virtual tour guide. This application allows tourists to interact with their virtual tour guide when they are visiting a tourist destination. The tour guide can guide tourists to walk around a place while introducing the history, culture and other interesting activities about a place. The tour guides in this application are 3D cartoon characters or Live 3D characters which can be selected based on user preference. When a tourist arrives at a place, he/she can use their mobile phones to scan the surrounding environment, then a 3D tour guide will be popped up on the screen. Hence, the tourist guide will introduce this place based on GPS location information.

Besides, this application has a certain significance. First, with the development of mobile phones and AR technology, innovation in the tourist industry has been a key driver of the industry in recent years (Maaiah et al. 2019). People are no longer satisfied with traditional travel activities, they would like to try something different, such as AR or VR technology. Second, travellers often have difficulties to retrieve useful information in a place. Hence, this application provides the tourist with audio information based on GPS location. This function solves an issue which may have a potential market need, whereby reading text information takes up more energy than listening to audio information, and this application allows the tourist to enjoy both the view and the audio information simultaneously.

# Design of the application

## 1. User Requirement

This is a travel information offering based AR application. From the users' angle, they want this application to provide useful information and does not affect their sight-seeing experience. Yet it is often inconvenient for tourists to google what they want to know and walk around at the same time, while some important information may miss on these occasions. In this application, users can listen to the audio explanation of the site and either randomly walk around or follow the virtual guider of the AR interface. For example, when tourists visit an old church, they can open the application and listen to the virtual guide to introduce the site, as well as they can look at the mobile screen and follow the virtual guide to discover the old church.

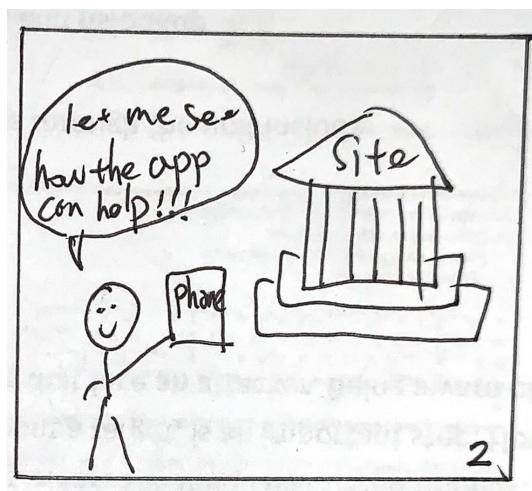
## 2. Interface System Requirement

- 1) Smartphone with the front camera. The front camera is important which initiates the environment scan function of the AR application.
- 2) Smartphone GPS module. The GPS location information needs to be retrieved so that the application can load relevant site information.
- 3) The later application is built based on the AR core, but the current version is only developed by Vuforia with an Android phone. Also, the 3D guide will be placed on the ground when the ground image is detected.
- 4) The audio function is required when the 3D guide is popped up on the screen. Meanwhile, the pre-recorded version will be played to simulate tour guide interpretation.
- 5) User-friendly interface design needs to take consideration. We will minimize all unnecessary buttons at the lowest level. For example, when the application starts up, there are only two buttons in the interface, one is the exit button, the other is the 3D character selection menu button. Hence, the application interface is clear enough for users to see the surrounding environment.

## 3. Interface Technologies

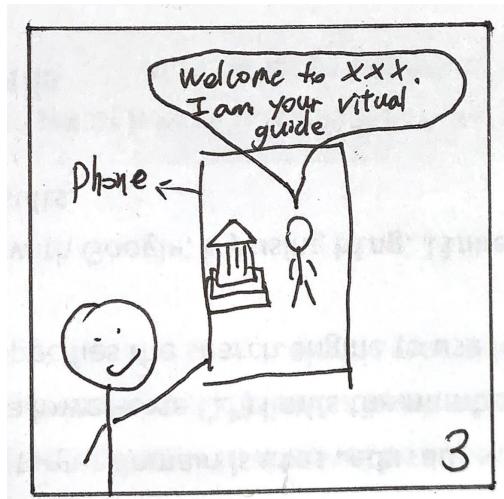
This application uses AR interface technology. Visual augmentation - the application places a virtual guide in the real environment to simulate a tour guide who can explain the location and lead the way. The user needs to use the mobile phone to see and hear the guide, which provides a unique user experience when they are interacting with the surrounding environment during the travel.

## 4. Storyboard

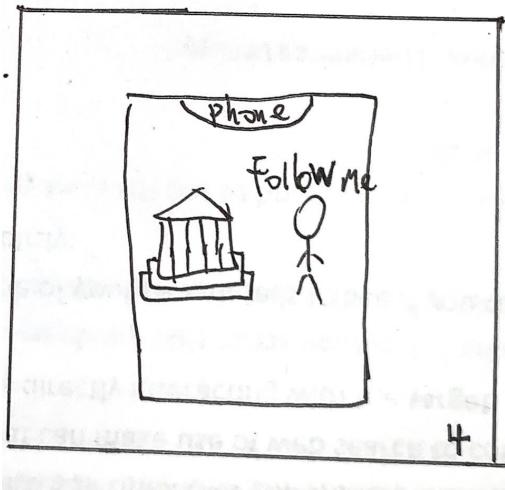


1. A user visited a tourist site, and he/she wants to know the details of the site.

2. The user opens the app and seeks a travel guide during the site seeing.



3. In the mobile screen, a virtual guide appears in the environment.



4. After an introduction, the virtual guide tells the user to follow him.

## 5. Details of the proof-of-concept prototype

### 5.1 Interaction

#### Proposed interactions in the application

In the AR Traveller application of our group, it is possible to allow tourists to use ARcore to scan the real scene to obtain a useful information introduction at a certain location. For example, in front of the library at the Newnham campus, students can download the unity software of our group application mobile phone. Then scan any position at the gate of the library, you can see a character appear next to it through your mobile phone. This virtual character was created by our team. Similarly, this virtual object can be a character or an introduction video about the place. Therefore, the software of our group just wants to expand into mobile phone software related to tourist attractions all over Australia. When ordinary tourists travel to a scenic spot, they can upload their videos or pictures to the background, and then produce a unique 3D item after processing. If there are tourists to the same place, download and install the mobile unity, and then scan the attraction, the previous video introduction or 3D items of the tourists will be displayed. This makes it easier for future visitors to have better playing experience, and can also cooperate with local stores to help them increase revenue. Similarly, we can also benefit from it.

#### Detail the implemented interaction in the Unity project

In the AR Traveller application, our team has only implemented the function of Vuforia with Android Phone, but not the function of using ARcore. We created and uploaded a video about introducing the UTAS. Users can download and install the unity software of the

mobile phone, and then scan the UTAS logo on the Building S, the UTAS map, Building V in Newnham Campus, the Lab indicator in front of Building V and then a 3D character will come out, he will introduce the campus in detail.

### **Importance of the proposed interaction in the application**

In this application, our team chose AR as the interface of interaction. AR has the capability to add to the search experiences by offering interactive engaging information while travellers are during the trip (Shah 2019). AR offers more engagement for travellers compared to VR technology. Our team chose the ARcore engine. Because compared with the use of virtual reality (VR) and augmented reality (AR), the advantage of ARcore is that it can support the movement of the real scene to establish and detect new feature points. Among the functions already implemented by our group, augmented reality with Android phones is used. In software testing, we found a problem that virtual characters cannot move with the user's movement, that is, the user must be fixed in a place and scan a fixed pattern to achieve the function of this application. However, using ARcore can perfectly solve this problem. The second reason for choosing ARcore is because it can build a map to help locate tracking or resume tracking. Because tourists sometimes block the camera, the phone drops or moves too fast, or unstable factors occur, the scene seen by the camera at this time cannot match the latest updated map. And ARcore in the position calculation, by collecting the feature points of the current and previous scenes, which makes the tracking more stable. The third reason is that ARcore has enough OEM manufacturers to provide strong support (Nenovski 2019).

## **5.2 Technical Development**

The Unity code of our group's application is a very basic augmented reality with Android phone. It is to upload the image to the Vuforia Developer Portal, then add the relevant license key to Unity, and finally import a video edited through Adobe Premiere Pro CC. In unity, you need to change this video into a 3D model to realize the function of this application. Finally, export the entire application to Vuforia with Android phone, install the relevant .apk file on the phone, and you can use it normally.

## **5.3 3D Models**

- 1) An image of the UTAS logo on Building S
- 2) An image of the UTAS map
- 3) An image of Building V in Newnham Campus
- 4) An image of Lab indicator in front of Building V
- 5) A 3D video (Art, Culture and Technology Purdue University 2020) edited via Adobe Premiere Pro CC

## 6. Preliminary User Evaluation

### 6.1 Target Audience

The target audiences are travellers (User A) and local business owners (User B) in the AR Traveller app platform.

User A is the traveller who is travelling to a new spot, they are looking for extra local travel information. They want to learn about the history, culture and local guide of the place that they are visiting. They are primarily solo travellers or small group travellers, who are not attracted by the traditional travelling guide in a group. They enjoyed having the freedom of exploring the location. They are young to middle-aged users who are familiar with smartphones and mobile devices. Low to middle-income earners such as students, graduates and gap year travellers.

User B are local business owners who want to advertise their business to the traveller by creating a virtual 3D appearance on the street through video recording, introducing their business to attract customers.

### 6.2 Testing Design

For the evaluation paradigms, we have chosen the Informal feedback via a survey after participants used the demo AR Traveller app for about 10-15 mins, to get fast feedback input into the design process. Following is the survey link, app link and participants' feedback.

#### Google Survey Link

<https://forms.gle/GFQUYpuT6fvwPvhx5>

#### The AR Traveller APP Link

[https://drive.google.com/drive/folders/1Lok7LrmPZbo1z8NJ0Mq-z\\_oj3u8yMez2](https://drive.google.com/drive/folders/1Lok7LrmPZbo1z8NJ0Mq-z_oj3u8yMez2)

#### Participants Feedback

All participants were able to use the AR scan feature of the app to activate the virtual guide.

All participants were able to hear the audio and from the animation virtual guide.

All participants were able to see the movement of the virtual guide in the recorded video.

### 6.3 Survey Response Analyse

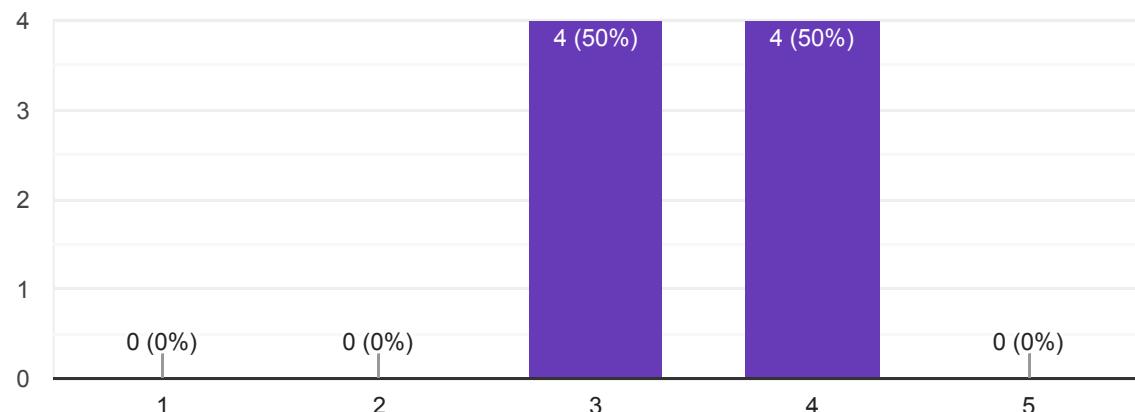
(Please refer to the following page)

# The AR Traveller - App Survey - KIT508

8 responses

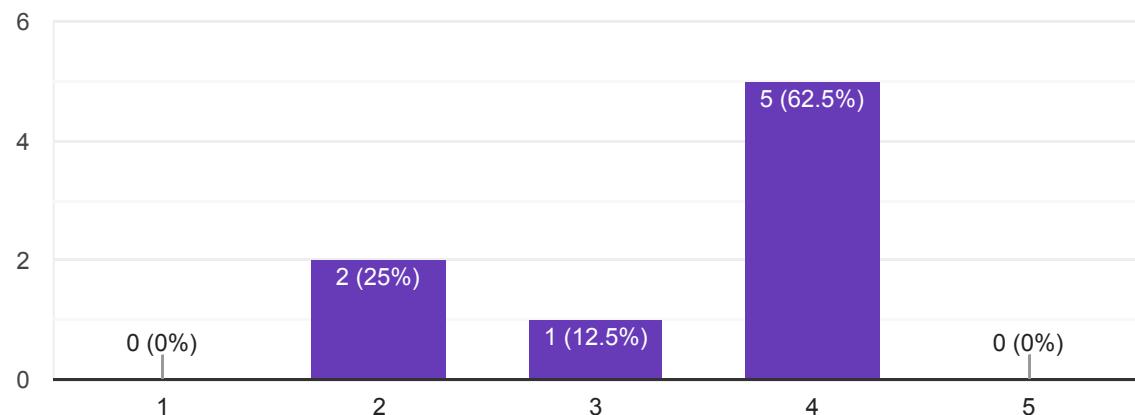
How would you rate our app?

8 responses



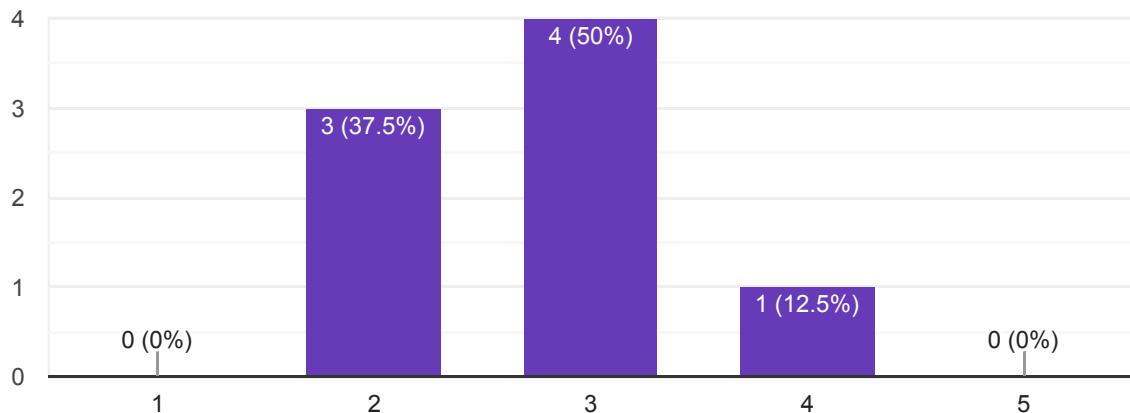
The feature 'scan the spot' during travelling helps you to activate the virtual guide.

8 responses



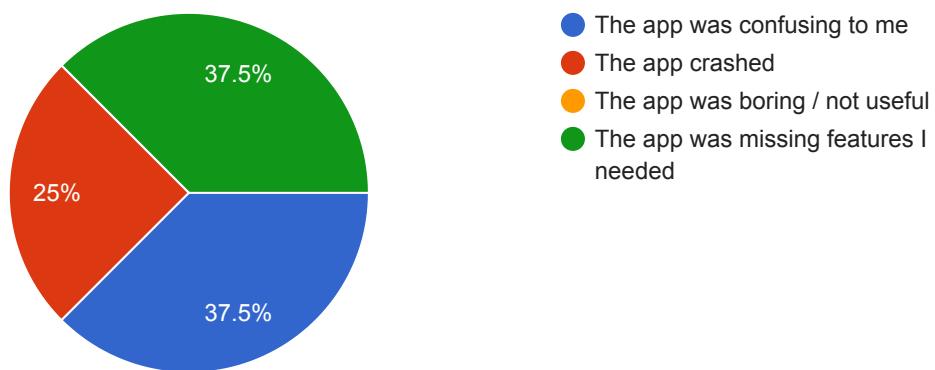
This app demonstrates the potential to help the traveller to find out more information (history/story/culture) of the destination.

8 responses



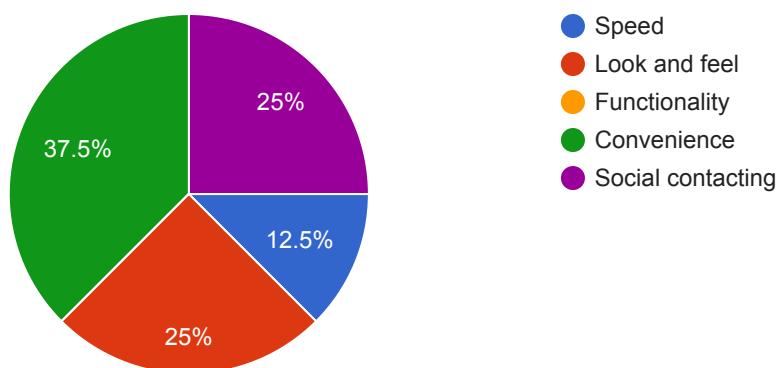
What do you most dislike about the app?

8 responses



What do you most like about the app?

8 responses



Briefly describe the strength and weakness of the app, including the features not working properly.

7 responses

The advantage of this app is that it can give visitors a brand new tour explanation, and it's free. But the disadvantage may be that it still needs to improve its functionality and the compatibility of the mobile phone.

The advantage is that it can realize the function of a tour guide, but the disadvantage is that many people cannot use this software at the same time, so the background capacity needs to be increased. In addition, if this can achieve ARCORE, it will be better combined with the real scene.

I really like the idea of the app, however, there are not many features supported. And it only works in a certain spot. I wish it can be used in more spots when I am travelling. Or even talk to the characters during the interaction. :)

I found the 3D characters is interesting, however, it is a short loop video only, it will be great to have more content that introduce the story of the place and spot I was visiting.

Sometimes the app works. but sometime it did not show the virtual characters. Hope it is more stable in the next version.

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Google Forms



## 6.4 Analyse the findings

	SD	D	N	A	SA
The feature 'scan the spot' during travelling helps you to activate the virtual guide.	0%	25%	12.5%	62.5%	0%
This app demonstrates the potential to help the traveller to find out more information (history/story/culture) of the destination.	0%	37.5%	50%	12.5%	0%

\*Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), Strongly Agree (SA)

From the survey result, we found that participants are neutral (50%) or disagree (37.5%) with the extra information that they can get from the virtual guide from the demo AR Traveller app. Regarding the main feature “scan the spot” to activate the virtual guide, there are 25% users who find it is not working properly, 12.5% users find it is not smooth to activate the virtual guide on the spot.

## 7. Modifying Initial Design

Regarding the feature of “scan the spot” design, since in the current demo version, we are using Vuforia as the image recognizing engine, and during the light change in different times of the day and weather, which will affect the image target on the spot. Thus in the further version. We will adopt the AR core, enabling GPS location and QR code to enhance the accuracy of the virtual character activation.

Regarding the content, we modified the Initial design of the content creating model, instead of creating the content ourselves, allowing users to upload the content. We added User C as the primary content creators to the AR Traveller app platform.

User C will record himself in the spot introducing the local information, giving feedback to a spot, a restaurant, a shop etc. The role of User C is similar to the google map local guides (<https://maps.google.com/localguides>), but instead, giving feedback and rating to a spot via text. In the AR Traveller app platform, User C can offer feedback and information via a 3D video format. The video will be uploaded to our server, to be processed as a 3D character and shown to other users (User A) who are visiting the spot. In this way, the content is not only created by our team but created by users themselves, the app can be a social platform that integrates the virtual world to the real world. It is an additional layer to the real world with more useful, and easy to get information.

## References

- Art, Culture and Technology Purdue University 2020. *Augmented Reality - Video With Alpha Channel: Unity 2019.3, Vuforia 9*. [online] Available at: <<https://www.youtube.com/watch?v=VrALbQAeqRk>> [Accessed 1 June 2020].
- Maaiah, B, Al-badarneh, M, Al-shorman, A & Alananzeh, O 2019, 'The Dynamic Role of Augmented Reality in Tourism', *Tourism Culture & Communication*, vol. 19, no. 1, pp. 43–53, viewed 7 June 2020, <<http://search.ebscohost.com/login.aspx?direct=true&db=hjh&AN=135591294&site=eds-live>>.
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