Augmented Reality Based Product Availability Checker

Using Junaio Browser

by

Amirah Shaali Masri

Dissertation submitted in partial fulfillment of

the requirements for the

Bachelor of Technology (Hons)

(Information and Communication Technology)

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Tronoh Perak Darul Ridzuan

CERTIFICATION OF APPROVAL

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A project dissertation submitted to the

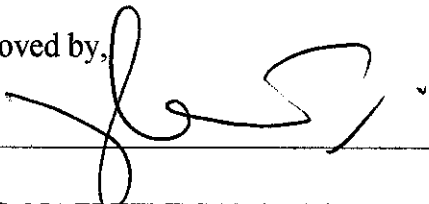Information Communication Technology Programme

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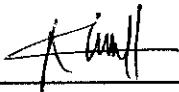
Approved by,

_____

(MRS. NAZLEENI SAMIHA BT HARON)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

SEPTEMBER 2011

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

_____

AMIRAH SHAALI MASRI

ABSTRACT

This project is about augmented reality (AR) used in Smartphone to aid people in checking product availability. Augmented reality is used as it is fast moving technology that becomes common to people but less known to the Malaysian. This project is about helping people in knowing what do they have in surrounding but it is strictly limited to buildings around them. Some people might not know what places or shops are there but to some people they are not familiar with the place. This project can be used by everyone regardless of their intention. Depending on the intended use, the basic system could incorporate a wide range of other components adapted for specific operational functions [19]. Some may use it to know what are the shops nearby, or they can check what are the shops selling or if they now one particular shop are selling, they might want to know whether the product they looking for is available or not. By using augmented reality, it can help bypass some steps in traditional searching process like people use Google search to find for something and not all the information available on the internet.

ACKNOWLEDGEMENT

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TABLES OF CONTENTS

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1   Background of Study

The basic idea of the project is the user of augmented reality in Smartphone to tell user what shops or mall are selling without actually go to the particular shop to check what they have to offer. It is very useful for the user when they are travelling. Giving example of people is having a meal in a restaurant and he wants to know what products or things that were sold by the shops across the road. He simply uses his Smartphone to scan the shop and click on the shop icon and browse through the product list that connected to the shop's database. It brings easiness to the user as they can check what products offered by the shop or checking availability status of the product at shops nearby without going to the shop while having a meal or chatting with friends. It also helps in skipping several steps in doing the searching by typing the shop name or searching it by finding it via the road name.

More than that, this augmented reality project can cover the area up to 5 kilometers in range. For example, a user knows that there is a shop that he wants to go nearby but his view cannot reach the intended shop. He can simply use his Smartphone to scan for the shop then tap on the shop icon on the screen and look what he wants. Same thing can happen to a user who does not know much about the place. He or she can use the application to check out what shops are there and what the shops are selling. Range data is a particular input that is vital for many AR applications [17] [18]. The AR system knows the distance to the virtual objects, because that model is built into the system. But the AR system may not know where all the real objects are in the environment. The application does not stop as providing such information. Again it is up to the user to use it to check on what shops are there, what they are selling and what type business they are doing. For people who always

1

moving from one place to another may need something that can help them in finding things that they want while they are still travelling. Using augmented reality (AR) for this application is a new way to help people view their surrounding in a different way. Less typing required and more information can be obtained. It also comes with simpler interface for the user to work with. The similarity of this project can be compared to the Event-Based Data Distribution Mechanism for Collaborative Mobile Augmented Reality and Virtual Environments by Dennis Brown et al. For example, a user walking down a street might be able to see the locations of other users, up-to-date information about prices in shop windows, and even email [5]. It will be focusing on shops within range of eyesight (camera) for the implementation. More improvement can be made but for now, the project will be more specific on shops and what they have in store.

1.2   Problem Statement

There are augmented reality (AR) application are available to inform the user what are there in their surroundings. But it is restricted to inform them that the type of business of buildings around them. For example, we can scan the surrounding using our Smartphone camera by selecting the restaurant option in application that divide the type of business of the building. Same goes to other AR application that provide information based on the type of business of the buildings such as near subway station location, grocery store, 24 hours mart and so on.

Some of mobile applications can help us in finding the things that we want to buy but it give us very limited information while we are on the go. It is frustrating when we went to the shop and end up that the things we were looking for is not provided by the shop. It is a bit tedious to find a product that we want to buy by doing the traditional search using internet browser and type in the things we want to look for in search engines or in certain websites that provide such information while we are travelling or in certain area and we want to look for a product at that very time. By using AR, we can bypass all those steps and get the result in just few steps.

2

Addition to the above problem statement is, not all the shops have website and some of them provide names that are not self describe. For example, the name 'Aktif' is known to be 'active' in English. The shop may be falsely translated into something else in the user mind if they do not know what the shop with such name is selling. The user might assume that the shop is not a shop and he or she has a thought that it is a gym or fitness center. The shop can be a grocery shop or anything else.

1.3   Objectives

The main objectives of this project are to introduce to the Smartphone user of Augmented Reality (AR) in the real world which it provides information of product availability instead of searching it on the web.

- To study augmented reality technology and implement it to the project.

- To develop the best approach in using augmented reality for the user to explore shops around them.

1.4   Scope of Study

Target user for this application is people who want to find something to buy nearby them when they are on the go. People usually browse the internet for quick look up on what they are looking for. Such method is not practical when the search result does not meant anything except for the product that the user looking for is available or not in particular shop that nowhere to be found nearby. If the user wants to buy it online, then it serves the purpose.

Augmented Reality is the latest trend in mobile computing. It offers a new way of viewing everything around us. It works well on Smartphone with internet access. Most of the places provide free access to the internet via wireless internet. Some of the Smartphone users also have third generation mobile telecommunication (3G) to access the internet. Both of the services can help the user to explore their surrounding with the Augmented Reality browser. In this project, Junaio browser is used to enable the Smartphone users to browse their surroundings using Augmented Reality (AR). The browser can be downloaded for free for Android device and iPhone or iPad. For Android devices, not all of the devices can be installed with Junaio browser because there are performance issues and it is advisable to use on Android version 2.1 (Éclair) and above. For this project, Android 3.2 (Honeycomb) is used as Android is open-source OS that give freedom to everyone to explore the mobile application developing experience. For iPhone, Junaio browser only compatible with 3Gs or iPhone 4, and iPod touch. It requires iOS 4.0 or later. Finally, for iPad have the minimum requirement for Junaio browser.

4

1.5   Relevancy of the Project

Most of the Smartphone user in Malaysia is not aware of the use of Augmented Reality (AR). They are more to social networking application such as Facebook, Twitter and many more. AR is used in short distance range from the user with the existing of internet. This project is more to helping the user to bypass tedious step to explore their surrounding by using search engines and type in their current location to reach the result. But it does not stop there. Filtering must be made before the user can reach the exact information they wanted to. By using AR, the users simply open their AR browser and scan their surroundings to get what they want.

1.6   Feasibility of the Project

The project can be use by everyone regardless of their background. It is useful for everyone to have a quick access to what they want to know regarding the product they are looking for nearby their location. The project will take into account of the steps of using the Junaio browser until the end of the process of looking at the product list of the shop.

CHAPTER 2

LITERATURE REVIEW

2.1   Augmented Reality (AR)

Augmented Reality is considered as an extension of Virtual Reality. Virtual Reality (VR) is a virtual space where the player immerses himself into that exceeds the bounds of physical reality. In the VR, time, physical laws and material properties no longer hold in contrast to real-world environment [1]. Instead of considering AR and VR as exact opposite concepts, Milgram et al. claim as the Reality-Virtual (RV) continuum. For a layman term, augmented reality (AR) is a term for a live direct or indirect view of a physical, real-world environment whose elements are *augmented* by computer-generated sensory input such as sound, video, graphics or GPS data [2].The fields of computer vision, computer graphics and user interfaces are actively contributing to advances in Augmented Reality systems [13]. For this project, the implementation of the augmented reality needs the presence of the internet to load the data about the surrounding to make the augmented reality browser work.

This new technology try to eliminate the line between what is real and what is generated by the computer by enhancing what we see, hear, feel and smell. It tries to combine both elements into one presentation where it help the human see or know what they do not know behind the real world. AR can be thought of as the "middle ground" between Virtual Environment (VE) (completely synthetic) and telepresence (completely real) [3][4]. It means that we can put any information on a real world object without physically touch the object but it appears in augmented reality devices. This is a distinction that will show as the technology improves and the virtual elements in the scene become less distinguishable from the real ones [13]. Augmented reality adds graphics, sounds, haptic feedback and smell to the natural world as it exists. With augmented-reality displays, which will eventually look much like the user is wearing a pair of glasses, informative graphics will appear in your field of view and audio will coincide with whatever you see. These enhancements will be refreshed continually to reflect the movements of your head. Similar devices and applications already exist, particularly on Smartphone like the iPhone and Android devices.

6

AR could be used to annotate objects and environments with public or private information. Applications using public information assume the availability of public databases to draw upon. For example, a hand-held display could provide information about the contents of library shelves as the user walks around the library [14] [15] [16]. Similar to this project, it is about delivering information to the user by escaping few steps in searching process.

2.2 Augmented Reality (AR) Browser

There are several augmented reality browser available on the internet. User with Smartphone that meet the requirement of the browsers can download the application for free. For this report, only two augmented reality browser will be covered and they are Juanaio® and Layar.

Junaio®

Junaio® is an augmented reality browser designed for 3G and 4G mobile devices. It was developed by Munich-based company Metaio GmbH. It provides an Application Programming Interface (API) for developers and content providers to generate mobile augmented reality experiences for end-users. It is available for iPhone and Android platforms. Junaio® is the first augmented reality browser that has overcome the accuracy limitations of GPS navigation through LLA Markers (latitude, longitude, altitude marker, patent pending)[7].

It is an open development platform with the most diverse array of capabilities. 2D image recognition and tracking, QR code reading, barcode reading, navigational and GPS overlays, indoor navigation and coming soon- 3D object recognition.

With Junaio® you can easily augment magazines, newspapers, television, product packaging, and point-of-sale displays. Junaio® can be used to overlay a camera view with geo-tagged information describing one's immediate surroundings. You can use the SCAN function to instantly launch any AR content from an image in the Junaio® database [6].

Figure 1 Junaio

Further description about this browser will be covered in other section of this report as this browser is used to complete the project.

Layar

Layar is a Dutch company based in Amsterdam, founded in 2009 by Raimo van der Klein, Claire Boonstra and Maarten Lens-FitzGerald. They have created a mobile browser called Layar. The browser allows users to find various items based upon augmented reality technology [2]. Data in the browser comes in the form of *layers*. Layers are Representational state transfer (REST) web services serving geo-located points of interest (POI) in the vicinity of the user. Layers are developed and maintained by third-parties using a free API. Layar as a company is responsible for their validation in the publication process.

Figure 2 Layar

The software relies on downloading "layers" of data provided by developers that have coded the platform. Thus, while the information appears to display in real time, it's not truly real-time since the app can't analyze data it hasn't downloaded in advance.

2.3   Similar Applications

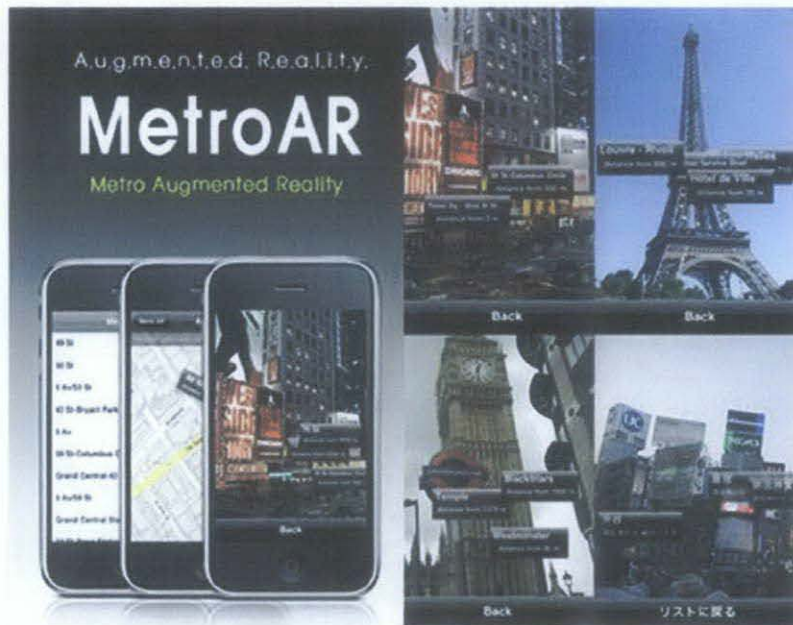*Metro AR*

<p align="center">Figure 3 Metro AR</p>

This application helps in finding the closest metro or subway from the devices current location. For example, the user just uses the application and scans their surroundings to find the direction to the closest subway station. It is very useful for tourist and locals.

Yelp

Figure 4 Yelp

Yelp is known to be the reliable AR application based on reviews and ratings form the user. It has better way to browse nearby restaurants through lens of the Smartphone camera. It provide adequate amount of information of the foods shown in very simple interface.

Figure 5 Nearest Wiki

This application helps in providing general knowledge of everything around the user. It provides an interactive way for the user to learn about the surroundings. It works in any country, anywhere in the world. Holding the phone vertically gives you an AR view, with a synopsis against points of interest near you. Taping on the place you wish to learn more about will give you more in-depth information on the location with images.

METHODOLOGY

3.1   Research Methodology
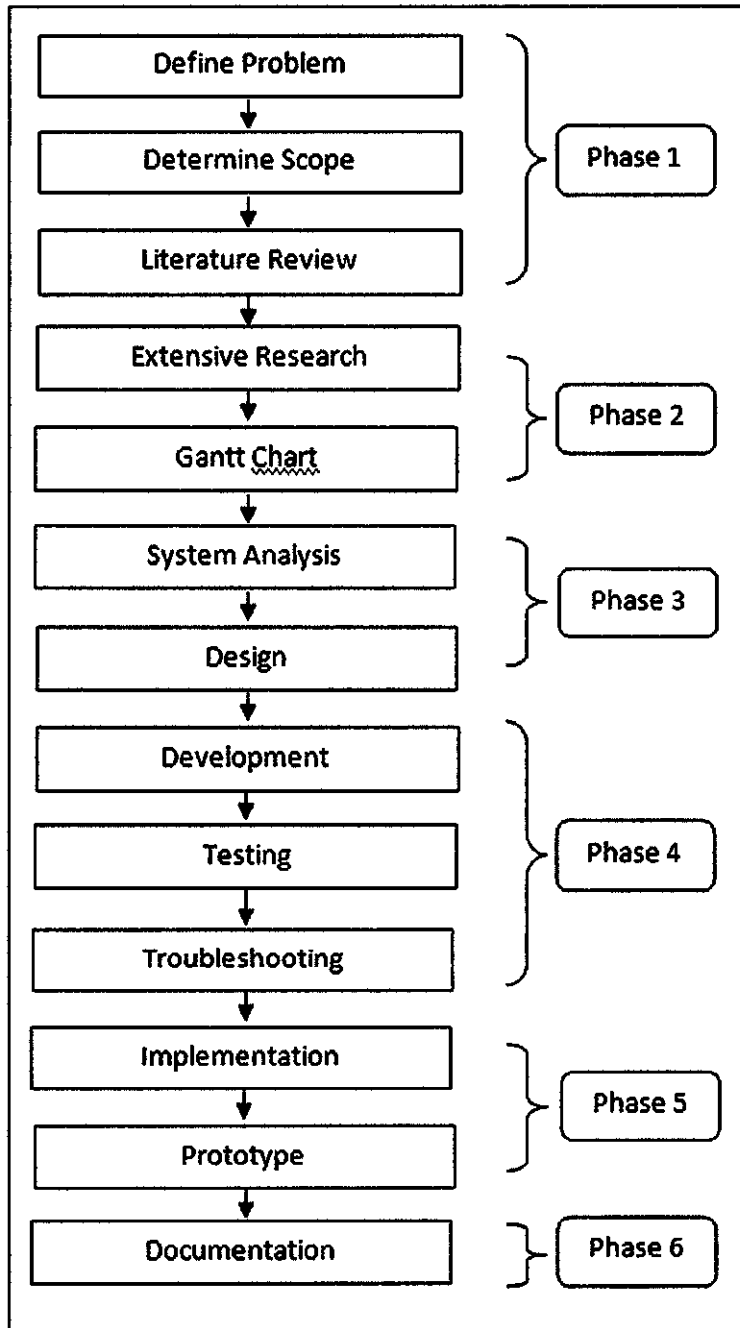

Figure 6 Research Methodology

3.2 Project Activities

Phase 1:

This phase is combination of three activities which are problem definition, determining scope and literature review. All of these activities are combined because all of them are closely related to each other.

Before started this project, it is crucial to define a problem to make sure that the project is worth to be build. After some time of brainstorming idea of what to do, some researches on the internet already been done. There are lots of possible idea could be embarked on. Finally, the field of Augmented Reality (AR) has been chosen as not many projects on this field were used by most of the students. The problem statement of this project is covering the location based service (LBS) on Smartphone. A Location-Based Service (LBS) is an information or entertainment service, accessible with mobile devices through the mobile network and utilizing the ability to make use of the geographical position of the mobile device [8][9][10][11]. The use of this LBS will be shown in later chapter regarding the augmented reality (AR) browser used for this project.

The scope of this project solely based on Smartphone owner. Nowadays, most of mobile phone user is the owner of Smartphone owner. So, it can be concluded that all of Smartphone user can use the augmented reality (AR) application. For this project, not all Smartphone can run the browser. It needs to meet certain requirement in order to use the browser. The coverage of his project will take into account of the area of the augmented reality will be implemented. Of course the technology can cover everything on the planet as long as we provide the coordinate of every point of interest (POI) in a channel (will be covered in later section of this report). But restriction of a channel and the POI is only to a certain level. For this project, POI will hold some information that describes itself.

Literature reviews are added to this report to support any statement that has been mentioned. It helps in strengthen any argument that contradicted to the project. It also gives extra understanding throughout the report and it can be further reading materials.

Phase 2:

More research has been done to help to complete the project. It covers more on the Augmented Reality (AR) field and the use of similar application to this project entirely. Thorough research in this field has been made to find the most accurate to describe the project and the relevant of the project. Some people might say that this technology is useless and tedious but it can be encountered by testing it in the real world. The result of the testing will be covered in the next chapter. Extensive research also covered the tools that can be used to finish the project. The detailed information about the tools will be covered in the next chapter.

After considering the tools, software and hardware that will be used in the project, key milestones of the project will be embedded in the Gantt chart. All the key milestones and its sub milestone are indentified and the time frame for each of them is documented.

System analysis is done later after the Gant Chart is completed. The existing augmented reality channel in Junaio is tested so that the whole system can be understood. After experimenting the various system of the AR application, analysis of the system is done properly. The needs of the system and the requirement of each of the function of the system are listed and not to be left out according to the previous phase of the research methodology which is the determined scope.

Tools

JUNAIO

This project is working on location based channels that show points of interest (POIs) in user surrounding. The user uses his or her phone to look around to see virtual objects or objects floating at the position of POI. Those virtual objects can be anything such as text, thumbnails or animated 3D objects. POI can also be linked with images, sounds, videos, websites and many more. For this project, it will be linked with the POIs' database list of products they are selling. Brief overview of the architecture is shown below.
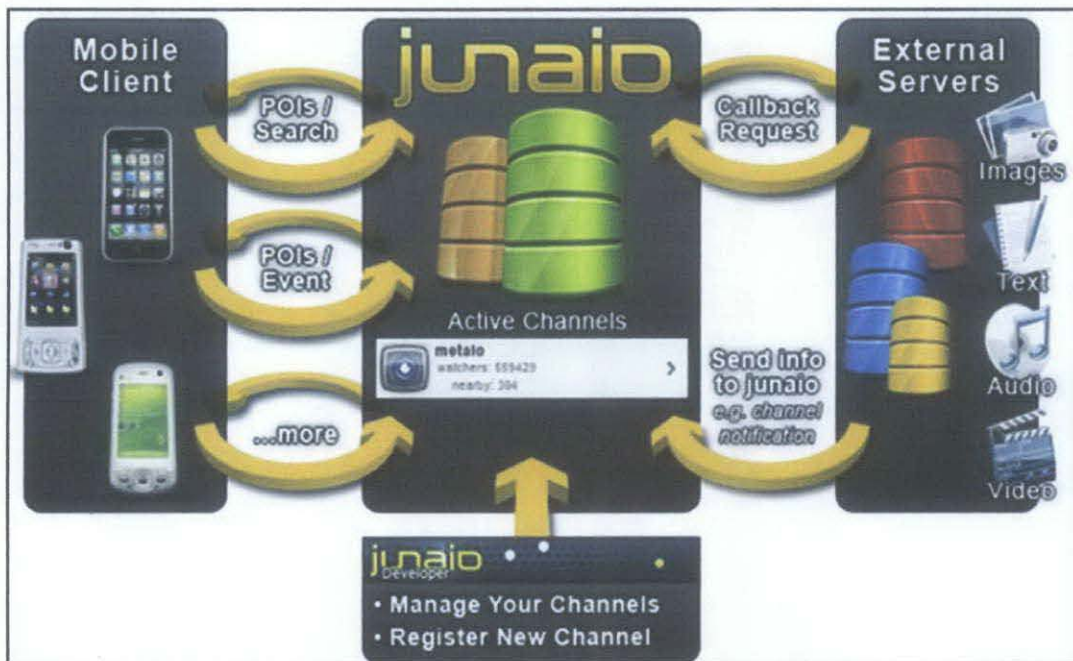

Figure 7 Junaio Architecture

Figure 8 Location Based Channel

Important terms:

- POI: POI is an abbreviation for "Point of Interest". The virtual information within a *Near Me* channel is displayed as POI. For example, the channel *Banking* displays all of the ATM machines in your immediate environment.. Every ATM is visualized as a single POI (virtually overlaid with the logo, name and description). Users of Junaio can move their phone or device to see all of the available POIs in the area and clicking them reveals detailed information relevant to the POI (description, route, address, etc.)

- CHANNEL: Within Junaio the information is categorized in "channels". The channel is similar to a website in a normal web browser. Within a channel you can find the according information, like location-based Wikipedia content in the *Wikipedia channel* or tourist information from Lonely Planet in the channel *Lonely Planet*. Channels can belong to events, existing brands, magazines or use cases like *Everything a Man Needs*

17

- "NEAR ME": Discover instant information about interesting places, tourist attractions, restaurants, movie theatres, shops, doctors or museums. Last train home? No problem, Junaio knows.

Just click on "Near Me" and get a full list of channels with all of the information relevant to your direct environment. Activate a channel and see the information displayed directly in the live camera stream. Click on one of the available POIs and get detailed information about it.

Figure 9Junaio Browser Interface

HOPPALA

Hoppala Augmentation is the world's largest content platform for geo based augmented reality. It publishes the content of all three major AR browsers that are Layar, Junaio and Wikitude. Hoppala Augmentation is the perfect entry point even for non-technical people to learn about augmented reality. The graphical web interface makes it very easy to build geo referenced content with just some mouse clicks, there is no software installation required and no coding needed at all. Hoppala is a cross-platform for the three major AR browsers which means it can be integrated between one of the browsers but cannot be all at one time. For first time, this platform is used to set the intended POIs for this project. below is the screenshot of the first POI allocated in Taman Maju, Tronoh Perak.
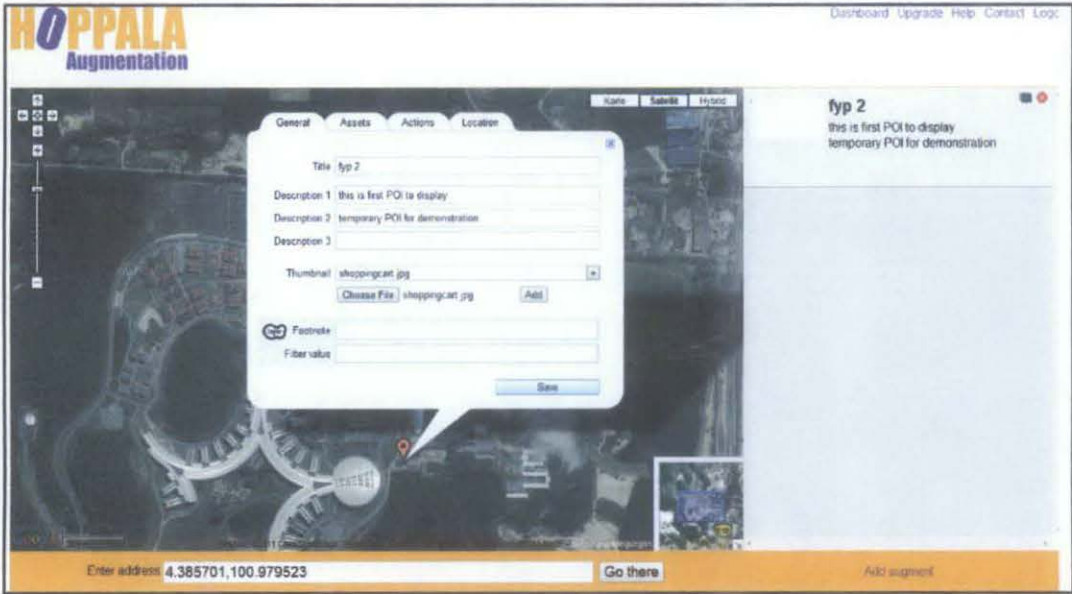

Figure 10Hoppala Augmentation

Figure 11 POI marked in Hoppala

SERVER

To use Junaio, the platform must be linked to a web host where all the information of the channels and POIs of the channels are stored. For this project, free web hosting is being used. Below is the screenshot of the external server that storing temporary information of POI. All the channel files are uploaded in the server. The web host must support Hypertext Preprocessor (PHP) file so that Junaio can read all the content in the uploaded files.

Figure 12 Web Host

Phase 3:

To design the system, each of the element and component in the tools that will be used is explored. Tutorials are provided to help in building each piece of the codes used in ht PHP files.

In development phase, the crucial part is the coding part of the PHP files. Each of the file has its own function. All the codes are included in all he files to run the application that linked to Junaio browser.

	/public_html					📋			Language: English ▾

Directory Tree: root /public_html

New dir | New file | Upload | Java Upload | | | | | | Transform selected entries: Move | Delete | Rename | Chmod

All	Name	Type	Size	Owner	Group	Perms	Mod Time	Actions		
	📁	Up ...								
☐	.htaccess	HTACCESS File	91	a5200236	a5200236	rw-r--r--	Nov 25 13:57	View	Edit	Open
☐	client.php	PHP script	2309	a5200236	a5200236	rw-r--r--	Nov 26 11:14	View	Edit	Open
☐	config.php	PHP script	428	a5200236	a5200236	rw-r--r--	Nov 26 11:14	View	Edit	Open
☐	example.php	PHP script	926	a5200236	a5200236	rw-r--r--	Nov 26 11:14	View	Edit	Open
☐	index.php	PHP script	1334	a5200236	a5200236	rw-r--r--	Nov 26 11:14	View	Edit	Open
☐	junaio.class.php	PHP script	2008	a5200236	a5200236	rw-r--r--	Nov 26 11:14	View	Edit	Open
☐	search.php	PHP script	1149	a5200236	a5200236	rw-r--r--	Nov 26 11:33	View	Edit	Open

Figure 13 PHP Files uploaded in the Web Host

Phase 4:

After all the design and development process have been done, the created channel that contain POIs is tested in nearby location which the coordinate set in the PHP file.

```php
1.  <?php
2.
3.  /**
4.   * @copyright  Copyright 2009 metaio GmbH. All rights reserved.
5.   * @link       http://www.metaio.com
6.   * @author     Bernhard Heindl
7.   **/
8.
9.  /**
10.  * When the channel is being viewed, a poi request will be sent
11.  * $_GET['l']...(optional) Position of the user when interacting with the POI
12.  * $_GET['p']...(optional) perimeter of the data requested in meters.
13.  * $_GET['uid']... Unique user identifier
14.  * $_GET['m']... (optional) limit of to be returned values
15.  * $_GET['page']...page number of result. e.g. m = 10; page 1: 1-10; page 2: 11-20, e.g.
16.  **/
17.
18.  echo "<?xml version=\"1.0\" encoding=\"UTF-8\"?>
19.  <results>
20.     <poi id=\"1\" interactionfeedback=\"none\">
21.        <name><![CDATA[shop fyp2]]></name>
22.        <description><![CDATA[This is a shop.]]></description>
23.        <l>4.385701,100.979523,0</l>
24.        <o>0,0,0</o>
25.        <mime-type>text/plain</mime-type>
26.        <icon> http://dev.junaio.com/publisherDownload/tutorial/icon_map.png </icon>
27.  <thumbnail>http://dev.junaio.com/publisherDownload/tutoria/thumb.jpg</thumbnail>
28.        <phone>555/1234567</phone>
29.        <homepage> http://www.hotelsroundthecorner.com </homepage>
30.     </poi>
31.  </results>"
32.  ?>
```

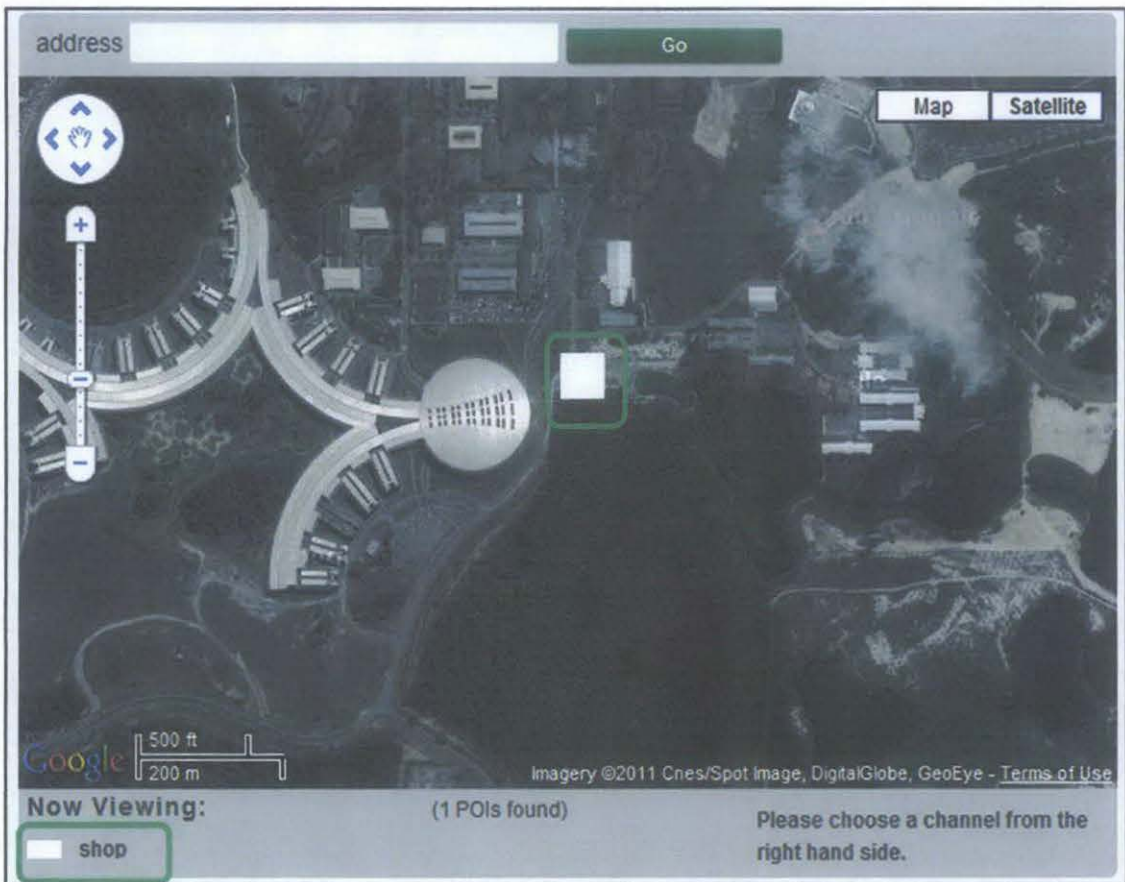**Figure 14 Search.php piece of codes**

Figure 15 POI marked in Junaio

Troubleshoot process is being done alternately with development and testing process. Because of the development of this project requires programming part, there will always be errors by the time the codes are tested.

ID	Icon	Name	Type	Special	Region	Rating	State	
105275	☁	Taman Maju Shop (public)	Location Based	None	World	No Rating	New	Delete Edit Validate Submit junaio Plugin submit Get QR Code

Figure 16 Channel

State of the channel	new (non public) ▾ ❓
* Channel Name	Taman Maju Shop ❓
* Channel Type	Location Based Channel ▾ ❓
* Channel description	utp
	⁄ ❓
Thumbnail	Choose File No file chosen
* Callback URL	http://shopfyp2.web44.net ❓
Channel Tags	❓
Channel Visibility	public ▾ ❓
Homepage URL	· ❓
Screenshot Support	☑ ❓
Channel refresh time	0 ❓
Support LLA Marker	☐ ❓

Filter Options

Search Filter Mask	☑ ❓
Search Label	
Default Value (optional)	
Filter URL	❓

* ❓

Region (mandatory and no "World" for GLUE Channels only)

World

Edit

* = Required   Cancel   Save

Figure 17 Channel Registration

25

Validation Location

The initial position is based on your channels region if found.

You are currently validating at this position:

Teronoh, Perak, Malaysia
Latitude: 4.385701
Longitude: 100.979523

If this is incorrect, you can set new values here.

The **Geo Location** is valid for **all requests**. Insert a LLA - coordinate (latitude, longitude, altitude seperated by comma) or an address.
The **POI ID** is the id of the poi a **pois/event** will be triggered with.
The **Device** is the type of device (iphone, ipad or android) valid for **all requests**.

Geo Location:	4.385701,100.979523,0
POI ID:	validation_poi_1
Device:	android

Validate

Figure 18 Channel Validation

Phase 5:

For implementation part, all the codes that have no error will be used to build a prototype. The prototype will be shown in the next chapter.

CHAPTER 4

RESULT AND DISCUSSION

For this chapter, there will be the result of a survey, questionnaire, the usability test of the Junaio browser to the dedicated channel, and the current development of the project. It also covers the discussion section where it will be based on the result gathered.

4.1 Data Gathering and Analysis
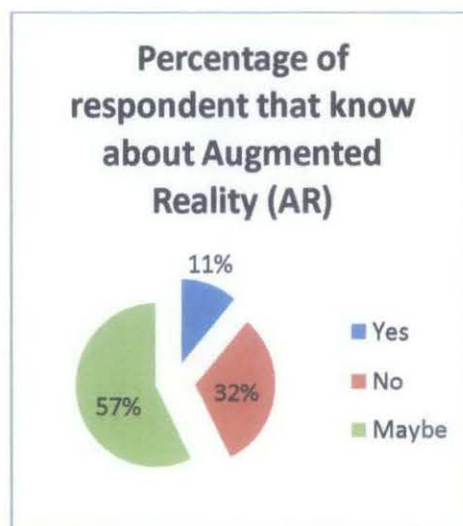
Survey

Figure 19 Percentage of Respondent that know about AR

Based on Figure 19, it shows the percentage of respondent who asked whether they know what is Augmented Reality (AR). Most of the respondents falls in between know about what is AR and do not know about it. They mostly assume that it is the same with virtual reality and environment reality. The respondent can be described

that they can give a meaning of what is virtual reality. The term was defined as a computer generated, interactive, three-dimensional environment in which a person is immersed [12]. But they do have a little idea on what AR is. There are 32 percent of respondents do not know about AR. After they are being told, they said that they do not know such technology exist in real world. Most of them only recognize the technology only in hi-tech movies and television show and yet they do not have any idea that that shown in the movie or the television show is AR. The rest of the respondent know about AR and they can describe what it is and gives example of AR technology used in real life. But most of the examples are from another country and not in Malaysia.
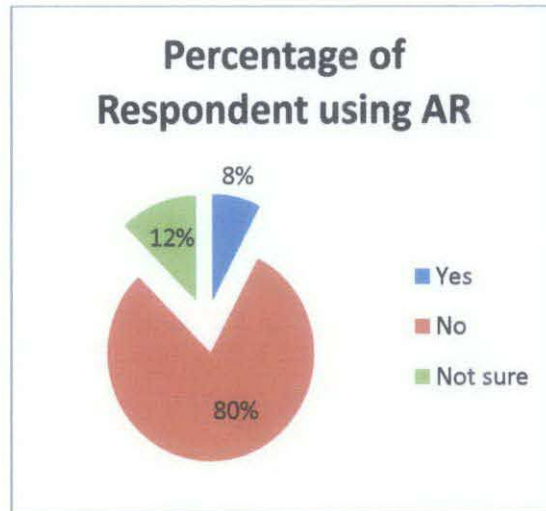
Figure 20 Percentage of Responding using AR

Based on above figure, it is shown that only 8 percent of respondent using AR or have been used AR before. It can be concluded that Malaysian is not aware of this technology and they are alien to the technology. 12 percent of the respondents are not sure whether they already experience AR technology before. Same thing for the above survey, they cannot distinguish between virtual reality and with other similar technology. Most of the respondents claimed that they never use AR in their life.

Percentage of Feasibility Test on Junaio Browser

- Easy
- Hard
- Medium

5% 8%

87%
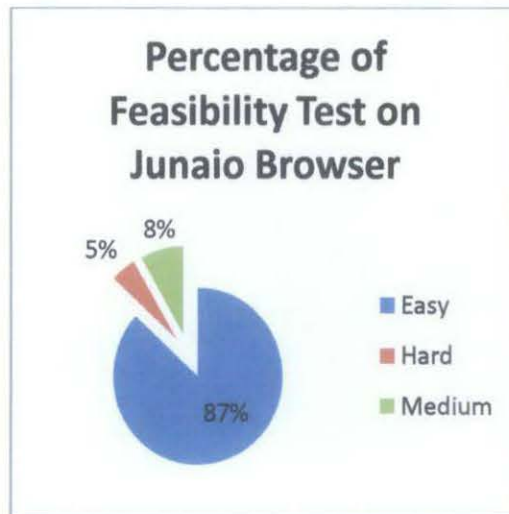
Figure 21 Percentage of Feasibility Test on Junaio Browser

Above figure shows the percentage of feasibility test that conducted to random user in Taman Maju, Tronoh Perak. The device used is Samsung Galaxy Tab 10.1 with wireless internet connection enabled. Most of the respondents can easily use the Junaio browser to get to the intended channel which is called 'shop'. The channel will be shown in the next section of this chapter. The least of respondents which is only 5 percent said that it is hard to use the browser. The respondents consist of people of the age above 40 years old. It is obvious that they do not know how to use the browser at all. For the remaining respondents, they found that the browser is same like the other application they use. They claimed that it is not too easy to use the browser, nor too hard.

4.2 Functionality Test

For the functionality test, the steps to get to the intended channel on junaio browser are shown.
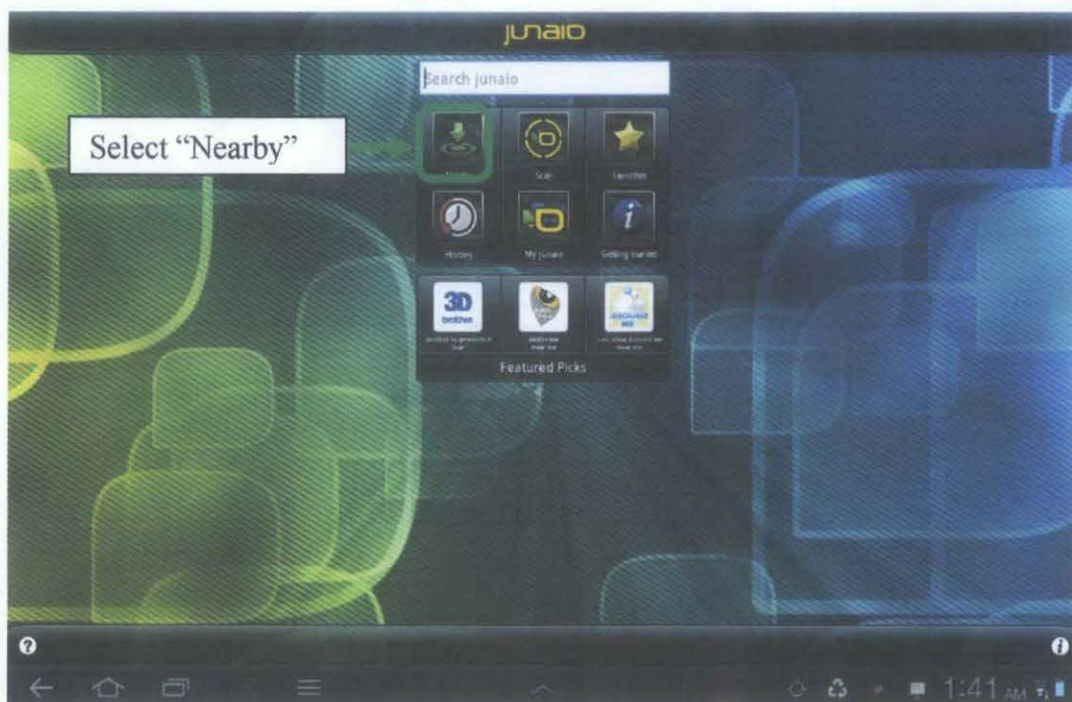
Figure 22Junaio interface

Step 1: Click on Junaio Browser and wait for the interface like above loaded on the screen. Choose "Nearby" icon to browse the available channel in current location.
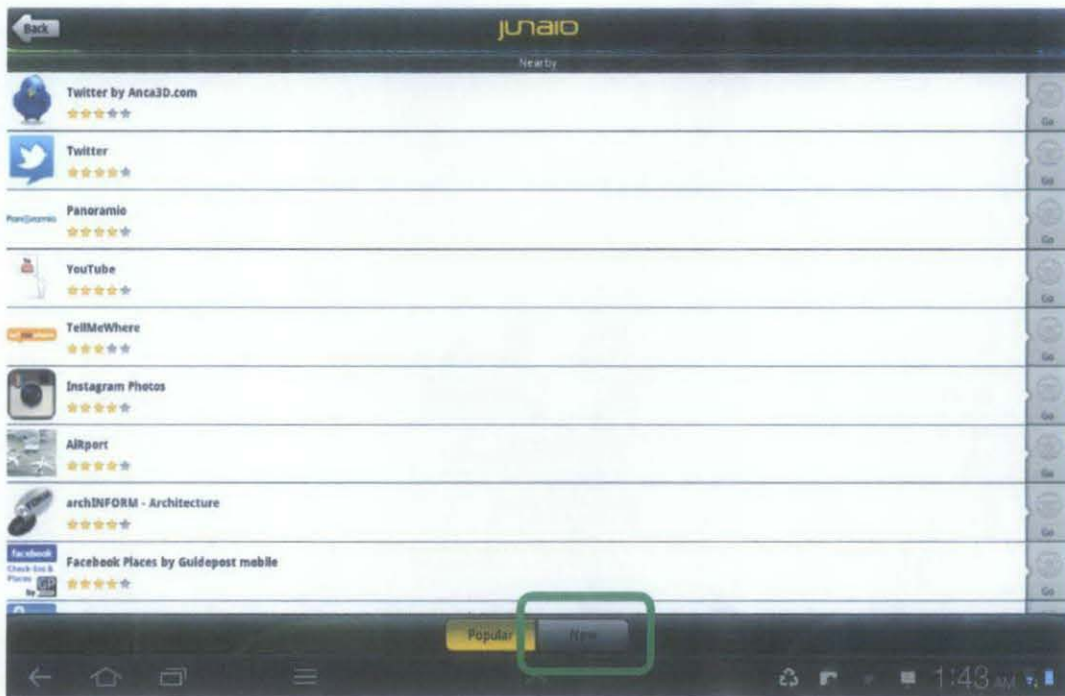
Figure 23 List of Popular channel in Nearby option

Step 2: The above interface will be loaded. Shown are the lists of all available "popular" channels for the current location. Because of the POIs for the project is new, it does not listed in here. Choose the "New" button to look at new channel lists.
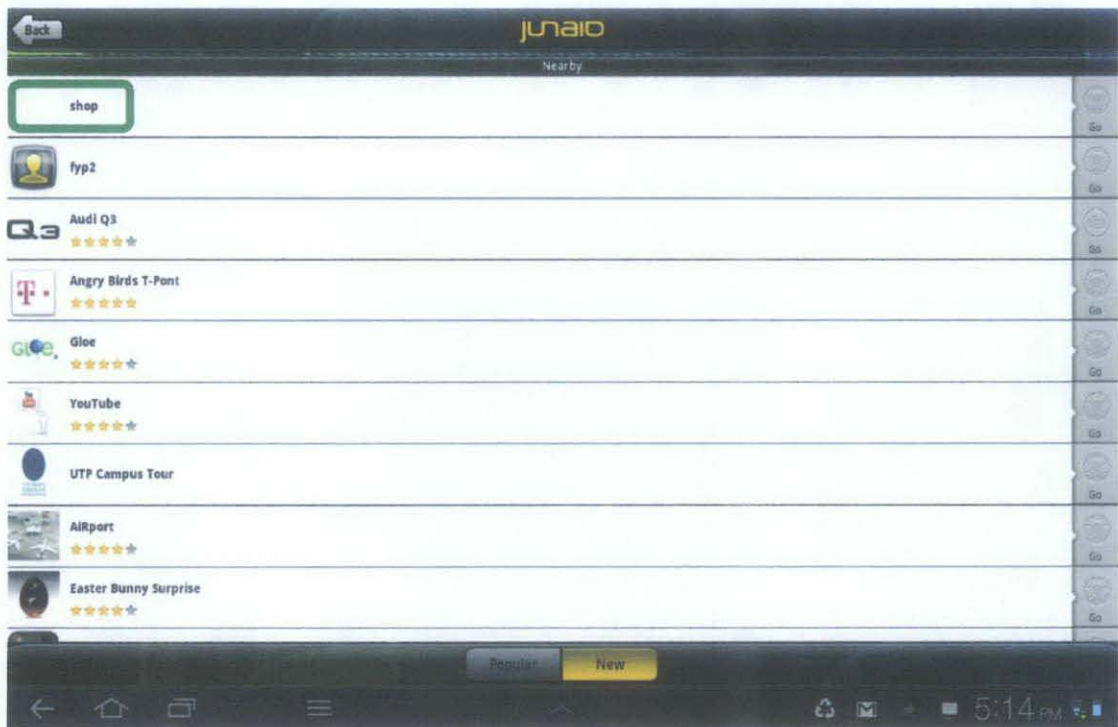
Figure 24 List of New channel in Nearby option

Step 3: Choose the first channel on the list as this project is using "Shop" as the channel name.
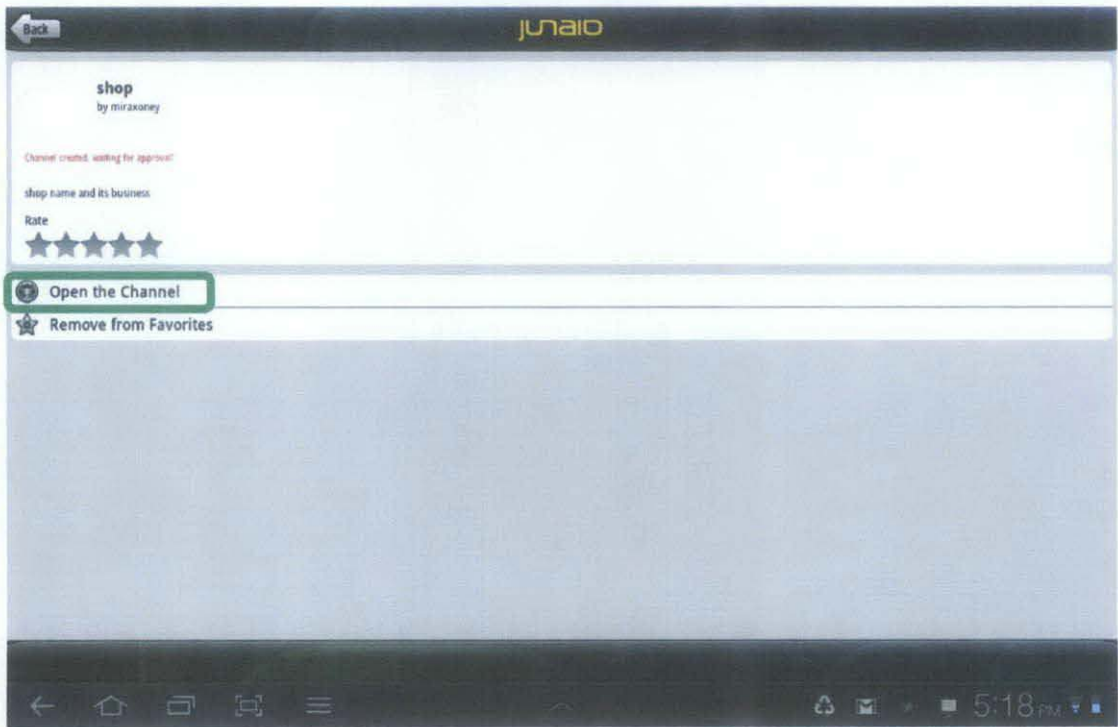
Figure 25 Shop channel

Step 4: The name of the creator/developer of the channel will be shown. Choose "Open the Channel" to explore the POIs in the channel.
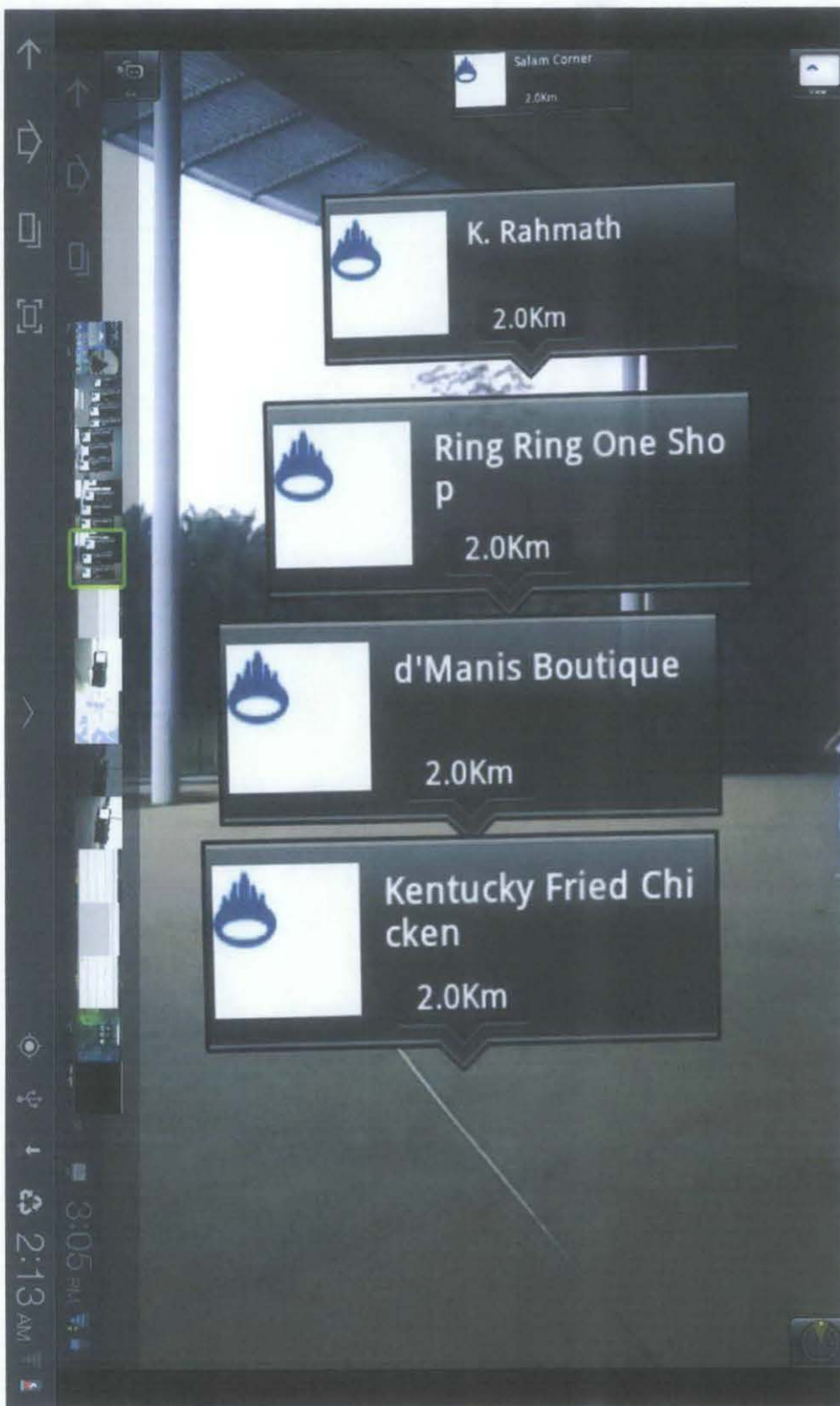
Figure 26 Result of Shop Channel

Step 5: Choose any shop name shown on the screen.

Product code	Product Name	Description	Price
0001	Beras Jati (10kg)	Rice	RM27.90
0002	100 PLUS (1 X 12)	Isotonic Carbonated Drink	RM 15.00
0003	Chipsmore	Cookies	RM 3.50
0004	Premier Tissue (4 boxes)	Facial Tissue	RM 5.00
0005	Johnsons Baby Oil (120 ml)	Mineral Oil	RM 3.20
0006	Herbal Essence Shampoo	Hair Shampoo	RM 8.30
0007	Hurix Cough Syrup	Cough Syrup	RM 12.50

Figure 27 Product list of the shop

Step 6: The product list is shown

4.3 Discussion

From the test above, it is shown that the shops names are floating in the air without pointing to any particular building or object. It is because the test is done in Universiti Teknologi PETRONAS compound. But, according to the location of the test conducted, the direction of the shops is right. The best location to test the channel is a bit far from the shops, and the shops are facing towards the device that being used. The test cannot be done at the mentioned location because of the wireless connection is not available at that moment.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

So far, the project is being tested for several times to get the intended result. It already passed the early stage of the functionality test by having the validated channel that contains POIs of different shops. It is shown that this project can be done within the time frame and have the value in it. It is useful for anyone that new to a certain place that he or she not familiar with. To cover certain area using this technology, it is true that everything has to be based on how big the area and how many shops are there in the area. But, the point is, it can be done by proper and good design of the channel. For this project, it will cover a small area to prove the concept or purpose of this project. For time being, the project is in a good track and it will become a complete project soon.

5.2 RECOMMENDATION

More things can be done to the project. The interface of the AR can be improved. Accuracy of the POIs can be further improved to eliminate any discrepancies or confusing while using the browser. Maybe the POIs can be set not only on one storey shop. Another element in coordinate which is altitude can be included in the POI position for shops that in more than one storey shop building. Apart from telling the list of products that offered by the shop, more features can be included such as job vacancies, discounts, activities and so on can be included. But it is encourage not to put so many things to keep the interface neat and clean.

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Appendix A

No	Task	Duration (days)	Start	Finish	Month 1	2	3	4	5	6	7	8	9	10	11	12
	AR Based Product Availability Checker	212	24/01/2011	25/12/2011												
	Stage 1 – Proposal Approval	7	07/02/2011	14/02/2011												
	Project topic endorsement	1	02/02/2011	02/02/2011												
	Project proposal submission	1	07/02/2011	07/02/2011												
	Stage 2 - Research	197	08/02/2011	25/12/2011												
	Phase 1 – Define, determine, research	45	08/02/2011	25/03/2011												
	Define problem	1	10/02/2011	10/02/2011												
	Determine Scope	1	10/02/2011	10/02/2011												
	Literature review on related works	18	12/02/2011	02/03/2011												
	Extended Proposal Submission	1	04/03/2011	04/03/2011												
	Phase 2 – Extended Research	19	06/03/2011	25/03/2011												
	Extensive research	17	06/03/2011	23/03/2011												
	Key milestones	1	11/03/2011	11/03/2011												
	Gantt Chart	1	15/03/2011	15/03/2011												
	Proposal defense and progress evaluation	1	25/03/2011	25/03/2011												
	Phase 3 – Analysis and Design	30	28/03/2011	28/04/2011												
	System analysis	4	28/03/2011	02/04/2011												
	System design	2	02/04/2011	06/04/2011												
	Interim report submission	1	08/04/2011	08/04/2011												
	Phase 4 - System Development	41	20/09/2011	31/10/2011												
	Framework development		22/09/2011	25/10/2011												
	Testing	30	25/09/2011	25/10/2011												
	Troubleshoot	30	25/09/2011	25/10/2011												
	Progress report submission	1	31/10/2011	31/10/2011												
	Phase 5 – Prototyping	25	02/11/2011	27/11/2011												
	Implementation		05/11/2011	27/11/2011												
	Prototyping	7	28/11/2011	05/12/2011												
	Phase 6 – Documentation	212	24/01/2011	25/12/2011												
	Dissertation submission	1	07/12/2011	07/12/2011												

41