# STATE-OF-THE-ART RESPONSES ON AUGMENTED REALITY APPLICATION IN MALAYSIA

**Nur Aniza Mohd Lazim[1*] and Khairul Aidil Azlin Abd Rahman[2]**
[1]Universiti Teknologi Mara, Malaysia
[2]Faculty of Design and Architecture, University Putra Malaysia, Selangor, Malaysia

*Corresponding authors:
cahayanizalazim@gmail.com

## ABSTRACT

*This research was conducted to accumulate the awareness, perception, interest and simulation excitement responses from Malaysian public respondents in the presence of AR (Augmented Reality) in Malaysia. The keyword used was user experience, usability and perception. The terms of Augmented Reality was quite an alien to Malaysian, respondents has witness samples in order to introduce the why, where, when and how AR works. Affinity Diagram such as brainstorming, keywords extract and gathering was held from various samples of AR videos using Youtube and Vimeo applications in order to form a solid survey and proper understandable term and language for layman understanding. The survey has been constructed as simple and understandable sentences to approach respondents, that is layman user. The data is used as a preliminary data to determine the design process of Augmented Reality visual interface in order to create persuasive effect of the visual usage in Augmented Reality Application in Malaysia.*

*Keyword : Awareness, perception, user experience, usability*

## 1. INTRODUCTION AND PROBLEM STATEMENT

### 1.1 Definition

State-of-the-art : 1adjective (prenominal) the most recent and therefore considered the best up-to-the-minute
Awareness : 2knowledge that something exists, or understanding of a situation or subject at the present time based on information or experience
Perception : 2a belief or opinion, often held by many people and based on how things seem:
User experience : 3encompasses all aspects of the end-user's interaction with the company, its services, and its products.
Usability : 31Usability is a quality attribute that assesses how easy user interfaces are to use. The word "usability" also refers to methods for improving ease-of-use during the design process.
Experience User : User with AR experience Inexperience User : User without AR experience

*[1] http://dictionary.reference.com*
*[2] http://dictionary.cambridge.org/dictionary*
*[3] http://www.nngroup.com*

### 1.1.1 Abbreviation

### 1.2 Virtual Reality (VR)

A VR system is a form or combination of
between hardware and software enabling user to develop the virtual environment. Ronald T. Hughes A (1997). The environment is created and view in a software form, while the hardware was normally different device attached together to enable the viewing experience, but nowadays explosive growth system, VR can to be viewed without any devices, such as view in the internet stream. We can be able witness VR art gallery, travel destination, a car driving simulation, 360 interior and exterior of building architecture experience rather than looking at 2D or tangible flip brochure Highton S. (2010).

### 1.3 Augmented Reality

Augmented Reality (AR) is a variation of Virtual Reality (VR). The synthetic environment ideas are usually presented in the form of video, audio, 3-D content through mobile device such as smart phone, tracking device, head mounted gear device, laptop/ desktop and eye-glasses into a portal to the digital world.

The use of AR can be found a great simulation in medical, gaming, advertising, military, fashion retailing, food and beverage industry, town planning, model making and etc.

### 1.4 Problem Statement

1.4.1 There is lack of knowledge report on AR existence in Malaysia.

1.4.2 There is no standard Visual Interface Augmented Reality design process found in Malaysia, therefore a measurement of AR visual acceptance has been conduct as a preliminary data to create the standard design process

## 2. RESEARCH OBJECTIVE

### 2.1 To Observe the Existence of AR in Malaysia

In order to position Malaysia name on the map is to keep up with the growth of technology that has been widely use in number one developed country such as US, UK and Japan as well. According to AWE (Augmented World Expo) founder, Ori Inbar on June 2005 Santa – Clara California at the Augmented World Expo, a virtual-world extravaganza, AR is all about bringing superpowers to the people, both at work and at home. He reported the prediction of AR/VR will hit $150 billion in revenue by 2020, with AR dominating 80% of the market and he believe that on 2016 will be the year of embracing AR.

### 2.2 To Understand the Acceptance of Malaysian Toward AR Visual Presentation

From time to time, qualitative researchers have embraced visual methods, as a means to create knowledge and convey understanding (Gibbs, Friese, & Mangabeira 2002, Pink, Kurti & Afonso, 2004) while, Harrison (2002) state that visual imagery can give strong insight into "wider cultural perceptions, categories, and metaphors, and provide us with views of how things are or should be" (p. 857), therefore this paper is carried out in order to measure the awareness, perception, usability and user experience in Malaysian, toward stay in line with the latest AR technology and to create better understanding of above attribute finally understand and develop persuasive effect of Visual Usage in Augmented Reality Application in Malaysia.

## 3. METHODOLOGY

In this research, online survey is the main instrument to gain data. A constructive and open questionnaire has been constructed. Researcher has used free online survey application4 to construct and design the interface of the questionnaire.

### 3.1 Affinity Diagram

The research begins with a massive brainstorming activity better understanding on AR technology which includes the purpose of AR, the effective visual content, possible measurement of awareness, perception usability and user experience.

### 3.1.2 Brainstorming

The Brainstorming activity was form to get the clear connection of each selected components. Multi keywords from various groups of nouns and adjective have been discussed and spill on a2pieces of A1 Papers. Ideas and

keywords were gained from an observation of 50 Youtube and Vimeo AR videos from multi sectors.

### 3.2 Questionnaires

There are four types of methods suggested by Landa H.M, Bandyopadhyay P. (2014) (pg.4) to cover the aspects of AR usability methods, which are usability inspection (namely cognitive walk-through and heuristic evaluation), usability testing (laboratory observation) and user reports (questionnaire).

The development the instrument was based on every related keyword gain from the brainstorming. The keyword was properly selected to approach layman respondents to create excitement of responds to the instruments.

The TAM5 (theory of Acceptance) have been adopted and selected during the instrument construction.

The open and close ended questionnaires has been divided into 5 sections and 9 sub sections which are :

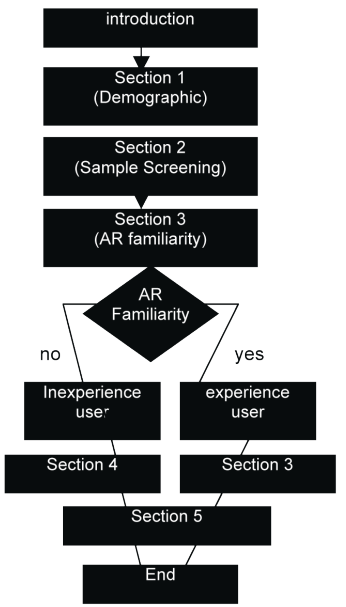



*Figure 1 : Online Questionnaires Flow*

*4 freeonlinesurvey.com**
*5 UTAUT Unified Theory of Acceptance and Use of Technology (UTAUT) (refer reference)*

1. Demographic (Q1- Q6)
Gender, Age, Profession, Area Working/study, race, nationality.
2. Awareness of AR presence (Q7-Q9))
Have they heard about AR before, Have they seen the Similar Application Shown in the Video Two set of difference questions has been construct dedicated to people who have experience to AR and never experience the AR before. This is the Question meant for those who are familiar with AR, (Q10-Q17) it was measured using the Liked scale from 1 (poor) – 5 (most liked).
3. Application Familiarity
4. Device Familiarity
5. Common AR application been used

This Question has been answered by both who have experience and never experience AR before and answering question based on the shown video. (Q18-Q22). It was measured using the Liked scale from 1 (poor) – 5 (most liked). Both set of questions are similar set.

6. User most attraction
7. User experience
8. Usability and perception
9. Curiosity, Ideas and opinions

The videos shown were from the Ikea AR application on home deco and Augmented Reality expo held in Kuala Lumpur. Both videos were obtained from Youtube.

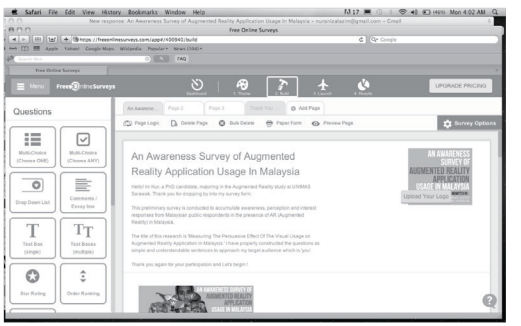



*Figure 2 : Questionnaire interface*

### 3.3 Distribution

The distribution of the instrument was made through social media that is direct application through Facebook.com where the respondents may answer online directly.

The Other method was an announcement through personal Instagram Personal Account where a link of the questionnaires has been shown.

And lastly, the link was also announced through mobile application that is Whatsapp and the application will be appear on mobile device for the whatsapp users to respond to the questionnaires.

### 3.4 Data Analysis

Data Analysis has been done through online application cater by website itself[4].

## 4. FINDING

The finding was categorized into 8 components including the demographic, awareness of AR presence, application familiarity, device familiarity, common AR applications been used, user most attraction, user experience, usability assessment and perception.

### 4.1 Demographic

| | | |
|---|---|---|
| Respondents | : | N = 130 |
| Gender | : | 73 male 57 female |
| Age | : | 15-25 51 |
| | | 26-35 59 |
| | | 36-45 18 |
| | | 46 above 2 |
| Profession | : | 44 students |
| | | 70 employed |
| | | 18 un-employed |
| Working/study | : | 45 IT related |
| | | 75 Non-IT related |
| | | 10 AR related |
| Race | : | 111 Malay |
| | | 9 Chinese |
| | | 3 Indian |
| | | 7 Others |
| Nationality | : | 123 Malaysian |
| | | 7 Others |

### 4.2 Awareness of AR Presence and Application Familiarity as a Knowledge Report on AR Existence in Malaysia.

| Components | Yes | No |
|---|---|---|
| Awareness on AR | 44.07% | 55.93% |
| Application Familiarity | 34.75% | 65.25% |

Awareness of AR presence: 44.07% states that they are aware of the AR presence, while 55.93% did not aware of this technology.

Application Familiarity: 34.75% shows that they familiar with the application and the technology, while another 65.25% have no idea about the application.
Experience Users: 45 respondents
Inexperience Users: 85 respondents

### 4.3 These are the Responses From Respondents who had Experiences Ar Before. They Are 34.75% or 45 Respondents Responded to this Section.

#### 4.3.1 AR Device Familiarity

*Table 1 : Device Familiarity*

| | 1 | 2 | 3 | 4 | 5 | Standard Deviation | Responses | Weighted Average |
|---|---|---|---|---|---|---|---|---|
| Smart Phone | 0 (0%) | 2 (7.41%) | 4 (14.81%) | 8 (29.63%) | **13 (48.15%)** | 4.63 | 27 | 4.19 / 5 |
| Head Mounted Gear | **5 (41.67%)** | 2 (16.67%) | 2 (16.67%) | 3 (25%) | 0 (0%) | 1.62 | 12 | 2.25 / 5 |
| Eye Glasses | **4 (50%)** | 2 (25%) | 0 (0%) | 1 (12.5%) | 1 (12.5%) | 1.36 | 8 | 2.13 / 5 |
| Computer / Laptops | 0 (0%) | 2 (10%) | 3 (15%) | 3 (15%) | **12 (60%)** | 4.15 | 20 | 4.25 / 5 |
| Motion Tracking Device | 3 (13.64%) | 1 (4.55%) | 7 (31.82%) | **8 (36.36%)** | 3 (13.64%) | 2.65 | 22 | 3.32 / 5 |
| | | | | | | | | **3.54 / 5** |

27 responded that the are familiar with AR through smart phone device while 22 responses to motion tracking device, 20 responses from computers/laptop while 12 and 8 responses to head mounted gear and eye glasses, this occur due to the hard to find of this device in Malaysia.

### 4.3.2 Common AR Applications been used

| | Gaming | Tourism | Online Shopping | Navigation System | Entertainment | Education | Advertising | Food & Beverages | Sports | Medical | Other (Please Specify) | Responses |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All Data | 19 (54.29%) | 9 (25.71%) | 14 (40%) | 10 (28.57%) | 19 (54.29%) | 12 (34.29%) | 16 (45.71%) | 8 (22.86%) | 6 (17.14%) | 3 (8.57%) | 4 (11.43%) | 35 |

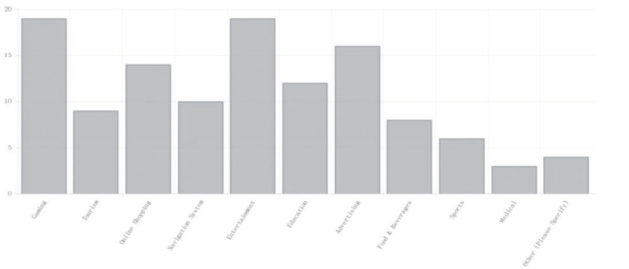


*Figure 3 : common AR applications been used*

19 have responded that they commonly used gaming and entertainment apps, while 16 in advertising, 14 in online shopping, 10 in navigation system, 9 in tourism, while food and beverages is only 8 responses, 6 in sport, 3 in medical and 4 in other apps. This scenario was a common one according to the observation of the growth of gaming and entertainment in AR apps.

4.4 This sections are the comparative finding of respondents who had experience AR before and respondents who are inexperience and only answered the questionnaires based on observation of the videos shown earlier on the visual presentation, user experience, usability and acceptance.

### 4.4.1 Most Attraction of AR

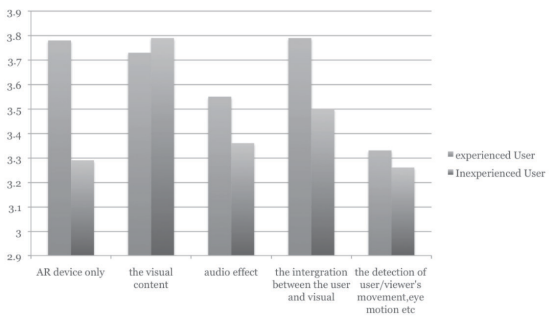



*Figure 4: Most Attraction on AR*

According to the inexperience user, they are more attracted to the devices used in operating AR and they also enjoy the integration between viewer and the visual used in application because of the blending and the immersion, both have an average weight 3.76 and 3.62 to the liked scale which is around 69-71 respondents, compare to the experience users, they are more attracted to the visual content of the application such as 3D, 2D, Graphic contents, photography and animation. While both are not likely to attract to the detection of viewer movement or eye motion this maybe due to seldom witness of the this type of application and lack of understanding.

### 4.4.2 User Experience on AR

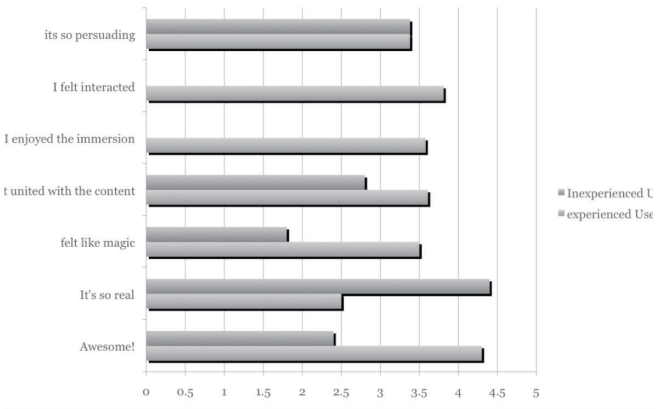



*Figure 5 : User Experience on AR*

By using a common daily used language on the liked scale, the researcher obtains data of user experience towards the apps and the AR device. The experience user with average of 4.14 equal to 29 respondents were most likely choose 'awesome' to refer as their enjoyment to the apps, compare to the average of 2.5 out of 5 inexperience user which maybe they haven't experience the apps before hand.

An average of 3.61 out of 5 felt united with the content showed throughout their experience while the inexperience with average of 2.7 maybe cant feel the unity of the AR and apps because they never experience it, but still they felt the realness through their viewing experience with average of 4.4, while to user who had experience the AR only an average of 2.5 feels the realness. This happened maybe due to the lack of the apps or the devices. Nevertheless, both responded that the AR convinces and persuading to them.

### 4.4.3 Usability and Perception

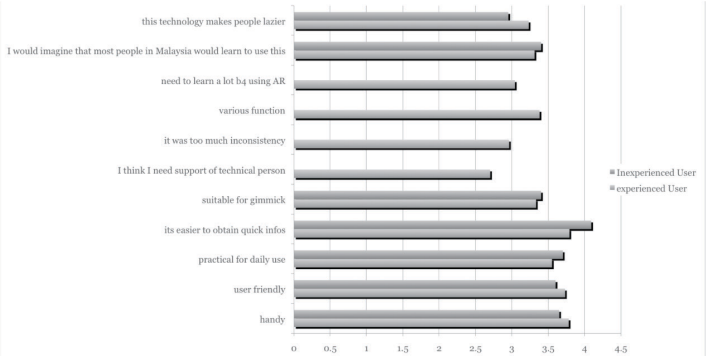



*Figure 6 : Usability and Perception*

Both experience and inexperience users agree at the average of 3.8 and 4.1 that AR is easier to obtain quick info. Both at the average of 3.5-4 have also agree that its practical for daily uses, user friendly and handy but finally differences shows between inexperience and experience user when the inexperience user ad average of 3 think that this technology wont make people lazier, while 3.3 experience user agree that this technology will make people lazier.

### 4.5.1 Curiosity 1


*Figure 7 : Curiosity 1 (for experience user) :*
*Will still continue using AR application in the future*

97.06% respondent from the experience users responded that they definitely will continue using AR application in future.

### 4.5.2 Curiosity 2

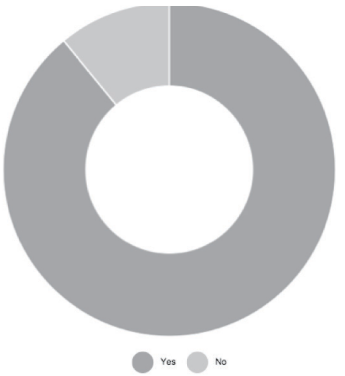
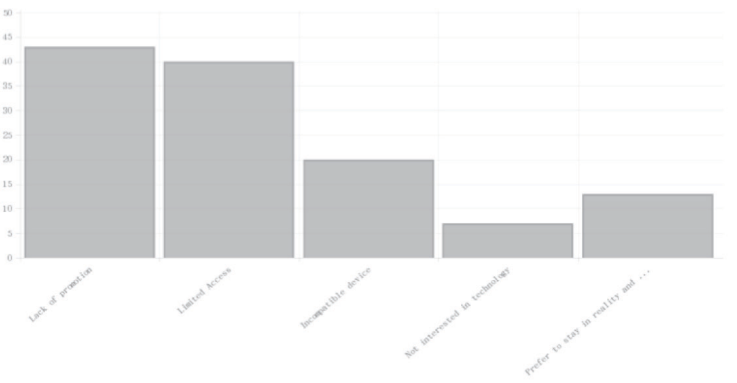



*Figure 8 : Curiosity 2 (for inexperience user) :*
*Will consider using AR application in the future*

89.04% of the inexperience user will consider using AR apps in future.

### 4.5.3 Curiosity 3




and they have limited access to the technology maybe due to their location

*Figure 9 : Curiosity 3 (for inexperience user) :*
*The reasons for never uses AR application before*

to urban area such as Kuala Lumpur. And 9.59% surprisingly states that they are not interested in this technology, while 17.81% states that they prefer to stay in reality and tangible product rather then viewing it using AR technology.

**4.6 Ideas and Opinion**

There are few respondents responded their additional ideas and opinions.

1. 20% Most suggested to have AR application in Malay Language
2. 40% The application is high cost technology
3. 35% A great application to scale and space out for visual presentation.
4. 5% find that this technology will be abused and misuse in Malaysia.

## 5.CONCLUSION

As a growing country, the knowledge of AR technology is only about 40% reported and recognised by the Malaysian. The results show that respondents are interested to learn and get to know about AR technology despite the lack of information and technology equipment in Malaysia.

In order to be accepted widely, many sectors in Malaysia should venture into this technology as only gaming and entertainment was recognized as the top sectors using this technology. Many grants shall be injected among researchers to develop more AR application in dedication to learning, teaching, military, tourism and etc.

This survey is meant for statement of problem in PhD dissertation. The data is used as a preliminary data to determine the design process of Augmented Reality visual interface in order to create persuasive effect of the visual usage in Augmented Reality Application in Malaysia. will further discuss in the thesis in future.

## 6. ACKNOWLEDGMENTS

This survey is meant for statement of problem in PhD dissertation. This preliminary data is meant for the current AR acceptance in Malaysia for measuring the persuasive effect of Visual Usage on Augmented Reality Application in Malaysia and will further discuss in the thesis in future.

The researcher shall thank to all who participate in the online surveys, and anonymous reviewers for their constructive criticism and suggestions for improving the instrument.

## REFERENCES

Ronald T. Azuma Hughes Research Laboratories 3011 Malibu Canyon Road, MS RL96 Malibu, CA 90265

Highton S. (2010), Virtual Reality Photography : Creating Panoramic and Object Images. Library of Congress Cataloging - in Publication Data.

Harrison, B. (2002). Seeing health and illness worlds - Using visual methodologies in a sociology of health and illness: A methodological review. Sociology of Health and Illness, 24(6), 856-872.

Gibbs, G. R., Friese, S., & Mangabeira, W. C. (2002). The use of new technology in qualitative research. Forum: Qualitative Social Research, 3(2). Retrieved from http://www.qualitativeresearch. net/fqs-texte/2-02/2- 02hrsg-e.htm.

Marco Del la Cavva (2005) 10.June.2015 www.usatoday.com

Landa H.M, Bandyopadhyay P, (2004), Usability Evaluation for Augmented Reality. University of Helsinky, Department Of Computer Science.

Unified Theory of Acceptance and Use of Technology (UTAUT)* Venkatesh, V., Morris, M.G., Davis, F.D., and Davis, G.B. "User Acceptance of Information Technology: Toward a Unified View," MIS Quarterly, 27, 2003, 425-478