Augmented Reality of Rasulullah SAW Traces in Receiving the Revelation of The Qur'an

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Abstract—Al-Qur'an is the holy book of Muslims whose information is eternal and has miracles that can always be proven by the progress of science and technology that is fast and powerful. The Qur'anic revelation revealed to the Prophet Muhammad for about 23 years left a long, special footprint in the cities of Mecca and Medina. In this Centennial era, some Muslims were preoccupied with technological advances which sometimes led to the neglect of the Qur'an. So that the crisis of knowledge of generations of Muslims about the footsteps of the Prophet Muhammad in receiving the revelation of the Qur'an is very little. This is very dangerous for the unity of Muslims. So that with technological advances we also attract the interest of young people to learn the Qur'an. Augmented Reality technology with the Marker-based tracking method utilizes QR Code and the use of agile development methods and design using UML so that application developers can produce Augmented Reality applications that can show traces of the decline of the Qur'an in Mecca and Medina. The appearance of Mecca and Medina in the form of 3 dimensions along with asbabunmuzul information causes interest and ease for someone to study the verses of the Qur'an. It is hoped that this application helps to facilitate the generation of Islam in learning and understanding of the Qur'an.

Keywords: Al-Qur'an; Augmented Reality; Marker-Based Tracking; QR Cod; UML.

1. INTRODUCTION

Al-Qur'an is the holy book of Muslims whose information is eternal and has miracles that can always be proven by the progress of science and technology that is fast and powerful. The Qur'an which was revealed to Rasulullah SAW for approximately 23 years left a long imprint on Rasulullah SAW, which is 13 years when Rasulullah SAW was still living in Mecca before migrating and 10 years when he migrated to Medina[1].

During the Centennial era, some Muslims were preoccupied with world activities that neglected the Qur'an. The opportunity to study the history of the Qur'an is only done in formal education and not in-depth. Information provided by the scholars through television, books and the internet was just passing by. So that the crisis of knowledge of generations of Muslims about the footsteps of the Prophet Muhammad in receiving the revelation of the Qur'an is very little, This is very dangerous for the unity of Muslims[2].

According to Abdullahi Ahmed An-Na'i'm, the message contained in the Makkiyah verses is an eternal and fundamental message of Islam, which emphasizes the inherent dignity of all humanity, without distinguishing gender (gender), religious beliefs, and race. Whereas the message of Medina is a practical and realistic compromise when the highest level of the message of Mecca is unacceptable to the seventh-century historical society of M. [3].

Augmented Reality is a merging application of the real world with the virtual world in 2D and 3D forms that are projected in a real environment at the same time[4]. The application of Augmented Reality technology and supporting application technology will be used to show the Prophet Muhammad's footsteps in receiving the revelations of the Qur'an.

"SketchUp is a 3-dimensional (3D) 3-dimensional (3D) program that is the most widely used today. It is listed more than 30 million SketchUp users now and continues to grow "[5].

This research was developed based on previous research that was made by Ilmawan and Nanang entitled "Development of Augmented Reality-Based Learning Media". The research discusses the use of Augmented Reality for teachers to make learning media fun, interactive, and easy to use[6].

In contrast to the above research conducted by Yusron entitled History of the Fall in the Qur'an Full of Phenomenal (The Charge of Psychological Values in Education). In this study, the Qur'an was revealed in stages, intended as a lesson for mankind filled with educational values, intended so that Muslims can understand the background, events or natural phenomena to be used as studies as valuable lessons for greatness and power in the universe[7].

2. RESEARCH METHOD

2.1 System Development Life Cycle (SDLC)

System Development Life Cycle (SDLC) is a concept used to build and develop systems, where this concept uses several phases. One of the SDLCs used to build this application is the Agile Method is a mindset and habits, namely[8]:

1. Identify the problem
2. Move and follow up
2.2 Application of the Marker Based Tracking Method

Is a method that uses a marker (marker) that is used, such as QR code or barcode in the form of a thick square black and white with a white background[9]. The smartphone will recognize the position and orientation of the marker with sub X, Y, Z and points 0, 0, 0. This QR code is placed next to the Verse - Al-Qur'an to detect the verse. The Qr Code used in the application is as follows:

![QR Code](image1.png)

**Figure 1. QR Code**

2.2.1 Register Markers on Vuforia

Augmented Reality Markers are the method used in this study, but markers must be registered in the Vuforia database, so they can be recognized by AR devices[10]. Types of markers in vuforia are markers, meaning the form of marker that will be used can be in the form of a free image but must be registered on the official website of vuforia[11]. How to register a marker to vuforia, you must first make a licensing, the way is as follows:

1. Login to the vuforia site using an account that has been registered.
2. Select the Develop Menu.
3. Select the License Manager.
4. Then Add License Key.
5. Fill in the Application Name then Next.

Then check the rules and conditions of Vuforia and do the confirmation. When licensing has been completed, the next steps in the process of creating a marker database are as follows:

1. On the Develop menu, select Target Manager, Add Database.
2. Fill in the Database Name select the Device with the Type, then select the License Key that was previously created.
3. If the database is successfully created, continue to add the target marker, which is how first to select the database created earlier
4. Add Target and Import the file to be used as a marker. Fill in the name and size of the file.
5. Finish.

Techniques To download objects that have been registered as markers can be done in the following way as follows:

1. Check the object that will be used as a marker.
2. Click download the selected target.
3. On the download form, selected target select as needed.
4. Click Download.
5. Wait a while until the database download process for the selected object is complete.

The next stage is Vuforia SDK. Vuforia SKD is an Augmented Reality Software Development Kit (SDK) that is used on mobile devices to enable it to make Augmented Reality applications. Initially better known as QCAR (Qualcomm Company Augmented Reality)[12]. This technology uses Computer Vision technology to recognize in order to track planar images (Target Image) and simple 3D objects such as, like boxes in realtime. Some important components of the Vuforia SDK so that it can work well. These components are as follows:

1. Camera
   Camera is needed to ensure that each frame is captured and forwarded efficiently to the tracker. The developers only need to tell the camera when they start capturing and stopping.
2. Image Controller
   Convert from camera formats (for example YUV12) into formats that can be detected by OpenGL (for example RGB565) and for tracking internally (such as luminance).
3. Tracker
   Contains computer vision algorithms that can detect and track real-world objects that are on the video camera. Based on images from the camera, different algorithms are tasked with detecting new trackable, and evaluating virtual buttons. The results will be stored in the Object state that will be used by the video background renderer and can be accessed from the application code.
4. Video
Background Renderer Renders images from the camera stored in the state object. The performance of the video background renderer is very pockets on the device used.

5. Application Code
   Initialize all the components above and perform three important steps in the application code as follows:
   a. Query State Object on the detected new target or marker.
   b. Update application logic every new input entered.
   c. Added graphic (augmented).

6. Target Resources
   Created using on-line target management system assets downloaded containing a configuration XML - config.xml - which allows developers to configure some features in trackable and binary files that contain trackable databases.

3. RESULTS AND DISCUSSION

3.1 Data Analysis

3.1.1 Surah of Makkiyah
   This letter data will be used in the augmented reality application to show the verses of the Qur'an, its translation and the cause of the fall of the Qur'an or asbabun nuzul.
   Q-S Ibrahim : 28 – 29
   ❞ِۙ۞ اَلَمْتَرَاِلَىالَّذِيْنَبَدَّلُوْانِعْمَتَاللّٰهِكُفْرًاوَّاَحَلُّوْاقَوْمَهُمْدَارَالْبَوَارِ ٨٢ جَهَنَّمَ يَصْلَوْنَهَاۗوَبِئْسَالْقَرَارُ٩٢ ❞
   Meaning[13]:
   28. Don't you pay attention to those who have exchanged the favor of Allah with the denial of Allah and brought down their people into the valley of destruction?
   29. that is Hell; they enter it; and that is the worst place to live.
   AsbabunNuzul:
   Ayat 28 and 29 are derived in connection with the Quraysh infidels who were killed in the battle of Badr. In essence, this verse explains that their sacrifice is nothing but an introduction to the direction of kufr and to plunge themselves and friends into the abyss of misery and the fury of hellfire Jannam. (Narrated by IbnuJarir from Atha bin Yasar)[14].

3.1.2 Surah of Madaniyah
   Ayat, translations and asbabun nuzul for application needs are as follows:
   1. Q.S Al-Baqarah : 44 dan 62
   ❞۞ اَتَأْمُرُوْنَالنَّاسَبِالْبِر ِوَتَنْسَوْنَاَنْفُسَكُمْوَاَنْتُمْتَتْلُوْنَالْكِتٰبَ ۗ اَفَلََتَعْقِلُوْنَ٤٤ ❞
   Meaning[15]:
   44. Why do you tell others (do) goodness, while you forget yourself, even though you read the Book (the Torah)?
   Don't you understand
   AsbabunNuzul:
   Ayat 44 was revealed in connection with the Jews of Medina. At that time a man said to his son-in-law, his relatives and relatives who had embraced Islam: "Stay firm in the teachings of Islam that you have embraced, and whatever Muhammad ordered to obey. Because everything that Muhammad ordered was true ". The man ordered others to do good, but he himself did not. In this connection, Allah SWT gives him a warning not to forget himself. This 44th verse was revealed intentionally to warn those who give instructions and order others to do good, while they themselves do not do it. (Narrated by al-Wahidi and Tsalabi from Kalabi from Abi Salih from Ibn Abbas)[16].

3.1.3 Feature Requirement Analysis
   Analysis of application feature requirements based on user categories that run application scenarios as follows:
   1. The user can open the application
   2. Users can login the application
   3. Users can access the camera AR
   4. Users can detect markers
   5. Users can see the type of verses of the Qur'an based on the location down
   6. Users can exit the application
   In order to achieve the ideal user experience, the AAR (Al-Qur'an Augmented Reality) application requires an android device that has a camera to send a QR Code.
3.1.4 Model Design

The process model design is a design that is used to view the process model in the Augmented Reality application system[17]. This is done as a requirement of a software design that can be estimated before the coding process is made. The design process model carried out in this application uses UML (Unified Modeling Language). UML diagram used is use case diagram.

![Use Case Diagram Aplikasi AAR](image)

**Figure 2. Use Case Diagram Aplikasi AAR**

3.2 Design of the City of Mecca and Medina

The traces of the Messenger of Allah on the descent of the Qur'an are located at the locations of Mecca and Medina. Designed using the Sketchup application in 3 dimensions. The 3-dimensional Mecca location design is in the following figure:

![Mecca City Design](image)

**Figure 3. Mecca City Design**

The design 3-dimensional of the city of Mecca is used in the application to show the footsteps of the Prophet in receiving the revelation of the Qur'an in the city of Mecca. The design of the City of Medina using the Sketchup shown in Figure 4 is used to display the location of the Prophet's footsteps in receiving the revelation of the Qur'an in 3-dimensional form in the Augmented reality application.
3.2.1 Testing AAR Application Main Page

At the testing stage that the application has been implemented and tested for its use. In testing the main page when the user runs the Augmented Reality application, what will appear is on this page. The following picture is the main page of the system:

![Figure 4. Medina City Design](image)

The main menu page is used to display the main menu in the application. The main menu consists of augmented reality, Al-Qur'an and close menus. Testing to display the main menu can be done by the application.

![Figure 5. Testing the AAR Application Home Page](image)

![Figure 6. Testing the AAR Application Main Page](image)
3.2.2 Testing the AAR Application Menu Page

Testing to use the augmented reality menu where when the menu is selected, then the user can mark AL-Qur'an verses on the module. The application scans the marker, then the application sends the marker data to the vuforia website. If in vuforia found the data.

Figure 7. AAR Application Testing for Ayat Makkiyah

Figure 8. AAR Application Testing for Ayat Madaniyah

4. CONCLUSION

From this research it can be concluded that Rasullah Saw’s trace information on receiving the Qur'anic revelations was sourced from religious books and experts that the Qur'an was revealed only in two important cities namely Mecca and Medina. Application of marker-based tracking method found in the module using QR Code can identify objects using camera resolutions above 6 Megapixels. Building an Augmented Reality application to apply information about the decline of the Qur'an and its ashabun nuzul has provided information updates that are very important so that the technology of Augmented Reality and its development theories provide changes in progress for the development of Islamic knowledge.

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