Catalyst Genesis : A Virtual Reality Application On Cryptocurrency Revolution

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***Abstract*—Virtual reality (VR) is a computer-generated simulation that allows you to operate electronic devices such as glasses with screens and gloves with sensors in an artificial three-dimensional environment. Malaysian citizens are not yet fully aware of cryptocurrencies and their benefits, despite the fact that technology has existed for quite some time. Lack of knowledge and sources of cryptocurrency among Malaysians, and their doubts about their credibility. This study aims to develop an interactive virtual reality walkthrough application for cryptocurrencies that uses both Blender and Unity. It focuses on the capabilities of cryptocurrencies, how they work, and their availability or readability in Malaysia. We analyzed the level of acceptance and knowledge of cryptocurrencies such as Bitcoin among Malaysians in order to develop virtual reality applications that teach Malaysian citizens how cryptocurrencies work. We used Agile model to create practical resources to support VR application development. The target group for this project were in range of age between 18-35 years. The application was distributed through the Windows Store or an exe file for publication and. As a result, the developed application help improve the understanding of cryptocurrencies through virtual reality walkthrough.**

Keywords—virtual reality; cryptocurrency; 3D walkthrough; usability; user acceptance

I. INTRODUCTION (*HEADING 1*)

A cryptocurrency, according to Investopedia, is a new type of digital asset built on a network that spans a huge number of computers. They are able to exist outside of the control of governments and central authorities because of their decentralized structure. The term "cryptocurrency" comes from the encryption techniques used to keep the network safe.

Cryptocurrencies are divided into three categories. The first blockchain was Bitcoin. All of the other blockchains, known as altcoins, were launched after Bitcoin. Other cryptocurrencies established following the popularity of Bitcoin are referred to as altcoins. In general, they promote themselves as superior to Bitcoin. Tokens or decentralized applications (dApps), such as Civic(CVC) and BitDegree, are the third type of cryptocurrency (BDG). Because of the global financial crisis in 2008, the cryptocurrency was formed. Cryptocurrency allows people to keep control of their money without having to rely on companies, banks, or governments [1].

A. Problem Statement

This study looking at several key problems to be solve. First is regarding lack of awareness in cryptocurrency as a digital currency and its benefit. Malaysian in general doesn't aware of the cryptocurrency existence and some of them doesn't know the benefits of what cryptocurrency has to offer. But, to those who aware of the cryptocurrencies, not all of them understanding the true benefits of it [2].

Secondly, the doubt regarding the cryptocurrency authenticity, where most of Malaysian citizens are Muslims and thus Malaysian are particular when it comes to this halal and haram matter. Due to this factor, it is important to make them understand which cryptocurrencies are safe to invest and are *syariah* compliant in Malaysia [3].

Lastly, there are issues regarding cryptocurrency legibility in Malaysia which is not convincing enough. There are a lot of investment applications for cryptocurrencies from investing in stocks and all the way to cryptocurrencies investment. But, not all investment and trading applications can be use in Malaysia or approved by Malaysia SC even though that application is widely used in other parts of the world [3][4].

B. The Purpose of Development

This study creates a framework named as Catalyst Genesis for the cryptocurrency in virtual reality and tests the Malaysian understanding in cryptocurrency as an investment. VR Catalyst Genesis Cryptocurrency allow the Malaysian to explore more in cryptocurrencies in an immersive experience instead of just reading from websites or even watch some educational video from YouTube. This virtual reality also changes the way the Malaysian understanding regarding cryptocurrency and give them a better understanding on the steps to properly invest in cryptocurrency.

Along with this study, the VR application was developed based on these research objectives:

1) To analyze the level of acceptance and level of knowledge regarding cryptocurrency like Bitcoin among Malaysian.

2) To develop a virtual reality application that teaches the Malaysian citizen on how the cryptocurrency works.

3) To evaluate the usability of Virtual Reality for explaining Cryptocurrency authenticity in Malaysia.

II. LITERATURE REVIEW

A. Cryptocurrency

Cryptocurrency is a new type of digital asset that is based on a network that spans a huge number of computers. Bitcoin, created by Satoshi Nakamoto in 2009, was the first decentralized cryptocurrency [3]. Bitcoin is widely regarded as the first cryptocurrency and one of the finest for investing, trading, and mining. Bitcoin was created as a payment system and is based on mathematical evidence. The outcome is a digital currency that is decentralized and virtually instantaneously transferable without the need for a bank, with cheap transaction fees.

Since the first bitcoin was created in 2009, hundreds, if not thousands, of new cryptocurrencies have entered the market. Because they are more accessible and provide an alternative to Bitcoin, all cryptocurrencies other than Bitcoin are referred to as Altcoins. Ethereum and Litecoin are currently the most popular Bitcoin alternatives. The primary goal of cryptocurrencies was to establish a safe and anonymous means to send money from one person to another without having to go through a bank or wait for a wire transfer. In order for this to happen, Satoshi Nakamoto, the founder of Bitcoin, had to come up with something new, which is when the Blockchain, or digital log of Bitcoin transactions, was born [2][5].

Blockchain is a constantly increasing list that records every bitcoin transaction and uses encryption to safeguard each block. A timestamp and transaction date are included in each portion of a block or chain, which are approved and kept on a peer-to-peer network. The nicest part about this Blockchain is that once a block is saved, it cannot be changed, ensuring that Bitcoin ledgers cannot be tampered with.

Investment in general is a pretty normal thing to do by Malaysian citizen. But, what makes this topic is quite complicated is that the Malaysian need to understand the true meaning of the cryptocurrency itself. Cryptocurrency is designed to be the next digital currency that can be use worldwide, but treating the cryptocurrency as an exchange is not what this project is trying to accomplish.

Just like investing in stocks, not all cryptocurrencies are *syariah* compliance and some of it we need to check in further details before we make any investment. In order to be really sure, it is recommended even by the Malaysian government to invest in cryptocurrencies that are approved by Securities Commission of Malaysia or also called as Malaysia SC. Malaysia SC is an organization responsible to check and approved every cryptocurrency that will be available in Malaysia and make sure it follows the Malaysia's guideline and focusing on *syariah* compliant [4].

To this date, there are four cryptocurrencies approved by Malaysia SC. Those cryptocurrencies are Bitcoin. Litecoin, Ethereum and Ripple XRP. Malaysian citizen can invest in cryptocurrencies by registering through mobile application called 'Luno'. Luno is also an application approved by Malaysia SC to be use by Malaysian citizen.

B. Open World Environment

An open world environment is a gaming concept that many games use to give the player a more "in control" feeling while playing the game [6]. Since 2015, the open world game has grown in popularity, and demand for it has increased. The open world gaming concept, according to Julie Muncy of Wired.com, "truly transform the way we play" [7]. By 2021, there will be a plethora of open world environment concept games available on PC, console, and mobile platforms.

Because open world games strive to be as realistic as possible, they usually necessitate a higher PC specification. This is typically an issue on older computers, and consoles such as the PlayStation3, PlayStation4, and Xbox will decrease the game's graphics.

What makes open world games so appealing to players? Is it because of the game's graphics? Is it because open world games have such a large number of features? Or is it because, like GTA V, the open world game is so large, and it will take a long time to complete the game or storyline? Perhaps it's because an open world game allows you to create your own tale and play with the game's mechanics? Is it any or all of the answers above? All of the above, and then some, are the answers. According to an article published on PrimaGames.com on May 21, 2020, author Nicholas Barth believes that open world games are so large that a game like GTA V, for example, will take roughly 31 hours to complete the storyline.

Catalyst Genesis application were made with open world concept in mind. Therefore, most project that we referred as case study come from open world 3D games title. We looked into several titles to compare different type of interactivity offered, 3D graphics settings, minimum requirements and length of gameplay. Table below showing simplified comparison of each case study we look into.

TABLE I. CASE STUDY COMPARISON

Related projects	**Input device**	**Platform**	**VR Capable**
Grand Theft Auto 5	Keyboard and controller	PC, PS4, Xbox	No
Genshin Impact	Keyboard and controller	PC, PS4, Xbox, Mobile	No
Naruto Shippuden Ultimate Ninja Storm 4	Keyboard and controller	PC, PS4, Xbox	No
The Devouring	VR Controller and keyboard	PC, Oculus	Yes
Home of the Time	VR Controller and keyboard	PC, Oculus	Yes

The Devouring has the shortest length gameplay with five to six hours excluding open world in application interactivity such as VR Chat. Home of the Time, which is another VR games capable title last a little bit longer. However, the developer of

VR headset ready game is considering that most VR headset user won't be able to wear the device for longer than two hours. While other title in table 1 is having a longer gameplay time where Naruto franchise game is about nine hours without open world completion, and around 33 hours long to achieve 100% completion. Title like Genshin Impact is having a continuous updates and gameplay time is different for each missions.

C. Virtual Reality Technology

Virtual reality simulations are divided into three categories: non- immersive, semi-immersive, and fully-immersive. Because virtual reality is now so widely used in everyday life, non-immersive virtual experiences are frequently neglected as a virtual reality genre [8].

The non-immersive kind uses simply a computer or video game console, as well as a display and input devices such as keyboards, mice, and controllers. Because users can remain aware of and manage their physical surroundings, this type of virtual reality is safer. A video game or console game is a perfect example of a non-immersive virtual reality experience.

Semi-immersive simulations are the second type of virtual reality. Semi-immersive virtual reality is a sort of virtual reality that allows users to interact with virtual three-dimensional worlds while remaining connected to the real world through sights, auditory, olfactory, and haptics, as well as maintaining control over tangible objects [9]. The user is able to view what is going on around them and interact with the thing they require. High-resolution monitors, powerful computers or consoles, and cockpits, as well as hard simulators that partially reproduce the form and functioning of genuine real-world machinery, are all essential components of semi- immersive VR systems. The realistic 3D virtual world, haptic feedback, high quality sound perfectly matched with a digital image, and advanced high simulator are the fundamental aspects of semi-immersive virtual reality. Flight simulation is an example of semi-immersive virtual reality. Formula 1 simulation is the second example.

Fully immersive virtual reality is the third type of virtual reality. Virtual reality with full immersion is a digital technology that allows users to experience artificial settings as if they were in the real world [9]. The major goal of this technology is to make consumers unable to distinguish between a simulation and a real-world environment. The visual material is one of the most important aspects of full immersion virtual reality. To achieve a pleasant user experience, the 3D graphics must be as realistic as feasible. Users can utilize virtual reality headsets like the HTC Vive, Samsung Gear VR, and Oculus Quest to immerse themselves in a digital world as if it were real. The adjustment of a digital image to the user's position or head orientation is the second main component for fully immersive virtual reality.

III. METHODOLOGY

Research Methodology refers to the practical 'how' of any given piece of research, or in detail, research methodology is about how a researcher systematically designs a study to ensure that the data is valid and reliable results that aims the research objectives. We used Agile model approach for this study

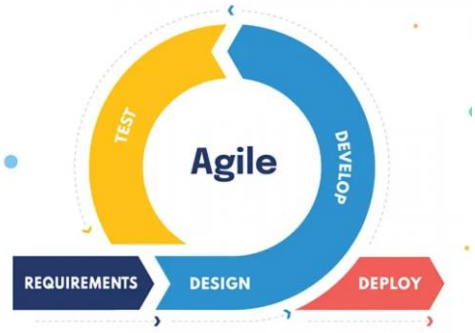

Fig. 1. AGILE model

Agile methodology makes the project development more efficient and more doable. Agile methodology is a type of project management process, mainly used for software development where demands and solutions evolve through the collaborative effort of self-organizing and cross-functional teams and their customers [10]. Agile method has six phases which is requirements, design, develop, test, deploy, and review.

A. Phase 1: Requirements

In this phase, we prepare and write documentation that outlines all of the preliminary requirements. The ultimate result that the project will attain is one of the most important things that must be included in the documentation. Consider the text editor. The second example is the features that will be available in that project, and the third example is the features that will not be supported at first, such as adding animations to text. There are a few prerequisites that we must meet in order to perform the virtual reality project from the bottom up. The initial set of criteria will be on the hardware and software fronts, as well as the coding language to be utilized, as not all coding languages are suitable for virtual reality.

B. Phase 2: Design

Agile technique, provides two approaches to design: visual design and app architectural structure [10]. Researchers will receive a mockup of the app design to offer them a general notion throughout this step. The concept is resurrected from the previous step. This phase will take a look back at the goals that have been established. As a result, the output design will achieve the desired results.

Designers might construct a basic mock-up of the user interface during the design stage to get a sense of how the project will flow. When a product is offered to a larger group of people, such as consumers, having a strong user interface and user experience becomes even more vital.

C. Phase 3: Development

The develop phase is the most time-consuming because it is the foundation of the entire process. This is the phase in which all of the preceding phase's research is applied to the creation of the prototype. If the first two phases are completed successfully, this phase will become much easier. In this phase, researchers will apply all of the plan and design objectives to the technology in order to develop the prototype. All of the content and material requirements that were agreed during the design phase must be checked in the prototype.

Fig. 2. Samples of Catalyst Genesis screenshot

It is critical for the project researcher or developer to feel at ease with the software and hardware they are utilizing during the development phase. Using the incorrect software and hardware will be inconvenient and may cause them discomfort, necessitating the installation of new software or the upgrade of new gear, all of which will take time and make their task more difficult. Multiple software tools will be used in the development phase, including Adobe Illustration for producing graphics and content for the application, Blender for modelling 3D objects and the environment inside the Virtual Reality, and Unity for developing the virtual reality itself.

D. Phase 4: Integration and Testing

The developers spent the Integration and Testing phase making sure that the program was bug-free and compatible with everything else in the documentation. The major purpose of the testing phase is to see how users perceive the entire application and how it aligns with the project goals. In any organization, there should be a 'Quality Assurance' team. The Quality Assurance team performs a series of tests to guarantee that the code is clean and that the solution's business goals are satisfied. They are between the ages of 18 and 35. The reason for this age range is that the project researcher believes that 18 is the ideal age to begin learning about investing, and that they are more likely to be receptive to new things like bitcoin. The other reason is that it may not be acceptable for the target audience of 36 and older because it is more difficult for them to use this prototype without assistance and may have problems using it.

E. Phase 5: Implementation and Deployment

The application may be published in any game/app store such as Steam or Windows Store and users can download it to their PC and connect it to their virtual reality headset. The application is deployed during the implementation and deployment phase. The distinction between the testing and deployment phases is that the deployment phase is when the prototype is released in its final form. The application could be distributed in a variety of methods. Another way is publishing on the Oculus Store, which is the primary method for downloading Oculus applications. But, we decided to keep Oculus Store for future plan due to existing strict rules.

F. Phase 6: Review

After all previous development phases have been completed. The team start discussing the progress achieved toward meeting the requirements. This is where ideas brainstorming happens to correct some issues that arises during the previous phases, and suggestion were taken into considerations. The Agile software development lifecycle phases then begin again, either with a fresh iteration or by progressing to the next stage and scaling Agile.

IV. Result and Discussion

The questionnaire distributed towards targeted group of user between 18-35 years old. In total we received 43 responses from variety type of users. 13 responses come from user ages above 35 was removed from analyzed result. The questionnaire was divided into three parts which is demographics, questions related to cryptocurrency exposure, and usability of VR application developed.

A. Demographics

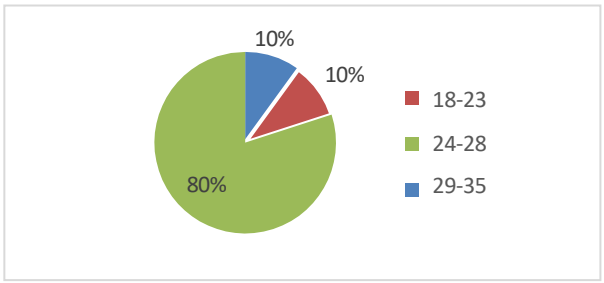

Fig. 3. Respondents age distribution

According to figure 4, 80% of the respondents are ranging from the age of 24-28 years old while another 10% are from the age of 29 to 35 years old and the last 10% are 18 to 23 years old. This survey could be access by those downloading and playing the developed VR application. Therefore, by analyzing this data, we know that at least, those with age 24 to 28 years old are interested in VR application and also may interested in cryptocurrency's topic.

B. Cryptocurreny Exposure

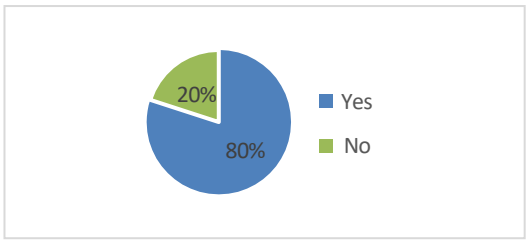

Fig. 4. Respondent with invest or currecny exchange experiences.

Data in figure 5 showing that 80% of our respondents are actively involve of having prior experiences in investing in stocks, currency exchanges, gold or cryptocurrency. These responses coming from users age 24 and above, might be a sign that user age 23 and below aren't yet ready to involve with investments or currency trading.

Additional supporting data we received telling that 63% of our respondent have heard about cryptocurrency but without any convincing knowledge to interact with it. There are a lot of factor to be consider before starting an investment in cryptocurrency and one of most basic is enough knowledge and exposure. We

believe the best age to get exposed into cryptocurrency investment are between 18-23 years old. This is due to most people within this range are students and somehow most open to retrieve new things [3]. Besides, investment is likely a good passive income for these young adult generation.

However, if we look from different perspective, money capital is needed in order to be active in investment. Those with age below 23 may be struggling to spend money to start investment. Investment is all about the money that we are afford to lose and take risk. People who are currently working has more money that they can afford or willing to lose compared to students who's most of the time stuck on tight budget and be very careful in what they are spending and in this case investing.

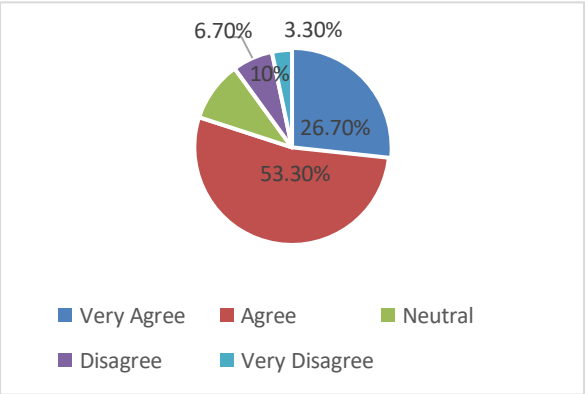

Fig. 5. The importance of syariah compliant

Another factor that affect the readiness to invest in cryptocurrency is *syariah* compliant. Figure 6 showing respondent's answer towards either they agree that *syariah* compliant factor is a necessary element before you invest in cryptocurrency. Without knowing the *syariah* compliant status, it is very risky to know if the platform is halal and safe to use or not for Malaysian. Majority agrees that it is really important to use the legal exchanges that are available in Malaysia. Some cryptocurrency exchanges in Malaysia is already verified by Security Commission Malaysia (Malaysia SC) and they are *syariah* compliant, so the Malaysian who's a muslim can use the exchanges without any doubt. There are also disagreement regarding this matter with 10% of the responses, and we believe this may be related to opportunity to invest cryptocurrency globally. Some country already far ahead in term of crypto quality and values, some investor might not want to wait until certain cryptocurrency to enter Malaysia market where the value may be different.

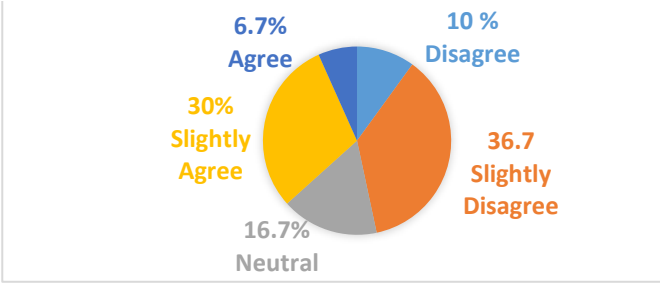

Fig. 6. Bright future investing in cryptocurrency.

We also asked each respondent opinion either they agree that there is a bright future in cryptocurrency investment. Data presented in figure 7 showing that 46.7% disagree with the statement. This is relatively true since cryptocurrency is somehow vague in term of ownership, transaction and digital currency concept. We believe, due to the lack of understanding lead to this answer. While 36.7% saying they agree with the statement, maybe because their own experiences in investment world and how they grow up as someone who are ready to take risk in something new.

Compared to cryptocurrency, gold also has not much use cases other than the investment tool and we can't use it as a form of payment. Unlike gold, other countries like El Salvador already accepted Bitcoin as a legal tender and use Bitcoin as their payment medium. Malaysia is still not ready to allow Bitcoin as a legal tender, but who knows what happen in the future? Maybe Malaysia will follow the footsteps from El Salvador? There is so many use cases of Bitcoin but in Malaysia it is stricter because everything has to go through Security Commission of Malaysia first. Maybe in the future, Malaysia SC will allow 'stake' and 'savings' feature in cryptocurrency like other countries and this definitely improve the awareness of Malaysians citizens on the benefits of investing in cryptocurrency [4].

C. Catalyst Genesis Usability

Interactivity that we provide in Catalyst Genesis is somehow similar to any interactivity from 3D games that using keyboard as their main input device. Therefore, most user do not face any problem in interact with in application control. From total of 30 respondents, only 4 of them have a VR headset device and thus allow them to interact with application more immersive.

We received positives result from all respondent regarding in-application content. However, we did received comments about realism of 3D environment in the application. We decided to not to put so much detail in 3D modeling and designing the open world environment because of lacking of time, cost and manpower. Besides, we also take into consideration that we need more user with lower computer specification to be able to run Catalyst Genesis application. We believe the comments come from heavy-gamers type of user where they usually have computer specification high enough to render high quality graphics in real-time.

Most users also agreed that content of Catalyst Genesis is somehow increasing their knowledge regarding cryptocurrency and a good platform to introduce it to newcomers.

V. Conclusion and Recommendation

Cryptocurrency is definitely a huge topic in the whole world let alone in Malaysia right now. We believed that all the research objectives have been accomplished. In the near future, the future for cryptocurrency is really bright. There are a lot of things that can be added in this Catalyst Genesis especially in order to make it fully immersive. This may be achieved in new future with improvement of VR headset device available in market.

Second improvement could also be done within the content of the application. Current application is yet to support online transactions for buying of selling NFTs and the live charts for

cryptocurrency price are not updated as frequent as it should be. It could be better if the price could be updated every seconds within the application.

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