

# **PUBLIC AWARENESS THROUGH GAME-BASED LEARNING**

Project ID: 2020-054

Project Proposal Report

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Sri Lanka Institute of Information Technology  
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(Proposal documentation in partial fulfilment of the requirement for the  
Degree of Bachelor of Science Special (Honors)  
In Information Technology

B.Sc. (Hons) Degree in Information Technology

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## Declaration

We declare that this is our own work and this proposal does not incorporate information without acknowledgement of any material previously submitted for a degree or diploma in any other university or institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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## **Abstract**

Day by day the problems in the society rises. Health, road safety, environment and cyber security are the main areas where much concern should be given. Dengue which is the most widespread fever in the world and day by day the number of dengue patients increasing is a huge problem to the society. Another problem is the garbage disposal method which leads to the incensement of the garbage level, improper road safety causes accidents and the death rate increases due to road accidents. When considering technological aspects User privacy violation caused due to lack of knowledge in social media usage is an area where much concern should be given. Apart from the risk associated with these problems, the main challenge is making the public aware of these problems. Even though there are public awareness programs on these problems, they are not very effective. So, a game-based learning approach to improve the public awareness by developing the current cognitive skills of people is the best way to overcome this. A Virtual Reality (VR) is used to the implement gaming platform.

**Keyword:** game-based learning, public awareness program, Virtual Reality (VR)

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# **1 INTRODUCTION**

People face many problems in the day today life. Finding solutions to these is not an easy task but making people aware about those will be good solution in reducing those problems. Awareness programs in the past are a bit similar, bored as well as complex, therefore the public faced difficulties in understanding how they should respond to problems. However, in the modern society game-based learning is a new and certified concept to aware people easily about the problems. In fact, public awareness through game-based learning is rather a new conception. Games can be an interesting medium for conveying information

## **1.1 Background**

Health, environment, safety and cyber security are main areas where problems arise. Through the data collected by the divisional secretariat a proper solution for the prevention of this further is highly required. Game based learning is the effective method to aware people about the social problems as it is an interesting awareness tool. Example: “The Monkey Wrench Conspiracy” first person shooting game was developed to help engineers understand the 3d design software usage [1]. In the medical field, “Re-Mission” was developed in medical field to help patients understand cancer [2]. Moreover, “Virtual leader” was developed to help players learn to play the role as a leader in a team [3]. a study indicated that the educational games with colorful images, multiple audio effects, and diversified teaching materials can be used to enhance students’ learning motivation and to further improve learning effectiveness [4].

So, in this research, we are planning to use a game-based learning approach to improve the public awareness on dengue fever, garbage disposal, social media and road safety. There is a saying that the greatest wealth is the health. The World Health Organization (WHO) consider dengue as a major global public health challenge in the tropic and subtopic nations [5].in Sri Lanka many activities are implemented to reduce the dengue

fever. A national-level multidisciplinary task force on DF/DHF has been established to govern the DF/DHF control activities [6].

Another main problem faced by the society is garbage disposal as there is no proper garbage disposal method which leads to the incensement of the garbage level.

Educational games are one form of application-based learning strategies that may have the pedagogical potential to enhance environmental education among the current generation [7] Social media is also an area identified as a problem. User privacy violation caused due to lack of knowledge in social media usage is the main cause for this. The real privacy risks are believed to arise when users disclose identifiable information about themselves online to people who they do not know or normally (that is, offline, in real life) would not trust (see e.g. Brooks, 2007). This is assumed to stem from the users' lack of privacy concerns (Gross & Acquisti, 2005) According to several studies, however, the awareness of the importance of online privacy is still insufficiently widespread [8] [9] [10].

Road safety is a serious issue which should be given proper attention. Improper road safety causes accidents and the death rates increase due to this. In learning of road safety, the use of computer is significant to ensure the knowledge can be converted to experience. The use of IT has already begun by children from the age of 2 years. These children are exposed to technology by their parents through gadgets and computers [11]. So, an awareness game using game-based learning will be the best method to aware about road safety.

## **1.2 Literature Review**

Making the people aware on the day today problems is a challenge. Game based learning which a new concept is in this era is important for this. Several researches on social media awareness through game-based learning, health awareness through game-based learning, road safety awareness through game-based learning, waste management through game-based learning and ability enhancement through game-based learning have been done.



As a developing country, social problems are significant in Sri Lanka. People need to be more aware about these to prevent these from happening further. At the end of the day, to ensure that a social issue sticks out, it must resonate with people in general at large. to take an action Individuals need to feel personally connected to a cause. The best way to reach the greatest audience is through awareness programs but it is not effective due to the busy lifestyle of the people. For that game-based learning is a good option which will be interesting for everyone. Many researches on the importance of game-based learning for students have been done. Games have been defined by researchers as “an immersive, voluntary and enjoyable activity in which a challenging goal is pursued according to agreed-upon rules” (Kinzie & Joseph, 2008). Prensky (2001) pointed out that combining games with educational objectives could not only trigger students’ learning motivation, but also provide them with interactive learning opportunities [12]. Moreover, several studies indicate the advantages VR technologies might have in terms of learning outcomes [13]– [14].

As the proposed game (AwareME) is to aware the society about the problems by enhancing their current abilities it is important to study about the researches done previously related to the ability improvement or cognitive skills. Game based learning is mostly important as it can enhance the abilities or the cognitive skills of the users. Cognition refers to capabilities including memory, thinking and reasoning, spatial processing, problem solving, language, and perception [15]. several studies have been done for this. Cognitive outcomes refer “to the knowledge structures relevant to perceiving games as artefacts for linking knowledge-oriented activities with cognitive outcomes” (Lameras et al., 2016, p. 10) [16].

According to the four areas of health, environment road safety and cyber security the previous researches are as follow: Trash Attack [17] which is a 2D Action Puzzle Video Game to Promote Environmental Awareness and Waste Segregation Behavior based with a storyline that revolves around a girl named Julie who is tasked by Heidegger Industries with cleaning up a community full of waste using her special weapon that can teleport

trash to recycling or proper disposal facilities. To help combat the increasing waste disposal and spread awareness about the environment, game mechanics were designed to familiarize players with the idea of waste segregation. The proponents created this video game over a three to four-month period using Unity Engine, Photoshop, Illustrator, Autodesk Maya and other multimedia editing software.

Another research on waste management through game-based learning is the implementation of the game recyclops. it is a virtual reality educational game for the awareness of the waste management [18]. The research targets the freshman college students. The game's learning point is appropriate removal of waste, for example, treating the soil and reusing, inside a virtual model of a local college campus. Serious and educational games have been indicated not exclusively to engage and motivate students yet additionally to encourage the improvement of complex critical thinking abilities. Virtual Reality (VR) is another technological advance which is known to increase student engagement by immersion. VR has been shown to lead users to create empathic connections to their virtual environment.

As We live in an exciting time of new technological advancements and opportunities, access is possible to more information and more connections are made easily throughout the world in just few seconds. This was made easy with the introduction of social media platforms to the world. Though this sounds interesting there are many bad effects due to this technological improvement. Due to this, many researches have been done in the awareness of social media. A study by Bioglio, Livio & Capecchi, Sara & Peiretti, Federico & Sayed, Dennis & Torasso, Antonella & Pensa, Ruggero address the issue of upgrading youngsters' attention to the systems including security in online social networks by displaying an inventive methodology dependent on gamification. They proposed a web application named social4school that permits children and adults to encounter the normal elements of data spread through a sensible intuitive reenactment. Under the supervision of the teacher, the students are embedded in a little fake social chart, and, through the various phases of game, they can post sentences with various degrees of sensitivity, and

"like" or share messages distributed by friends. Toward the finish of game session, the application figures numerous conduct scores that can be utilized by the teacher to raise the interest of the students and stimulate discussions. Besides, a total intuitive report is created to dissect each students' actions of the ended game sessions. The study has been utilized inside a broad exploratory examination including in excess of 450 children and 22 teachers in seven Italian primary schools. The results show that our approach is stimulating and supports teachers in helping kids discover and recognize potential privacy risks in social network activities [19] .

A serious game named friend inspector was developed by Cetto, M. Netter, G. Pernul, C. Richthammer, M. Riesner, C. Roth, and J. S"anger to enhance the privacy awareness of the social network site (SNS) users. Friend Inspector tends to the present test of SNS clients, to be specific to comprehend who can see their shared personal items. A game-based approach was used to address the younger crowd. The applied plan of Friend Inspector depends on two foundations: firstly, an in-depth understanding of privacy awareness as the match or mismatch between perceived and actual visibility of shared items. Secondly, an inductive learning approach that allows its users to experiment and play with their own Facebook data in order to actively learn about the visibility of their personal items [20].

Understanding fundamental role of the awareness and knowledge of traffic guidelines and terrible driving rehearses in reducing traffic accidents is very important. Due to this Games to aware people about road safety was a research area done by several researches. Road Safety Awareness among College Students in a North Indian Town was one such research done. This game has mainly been used for the college students in a North Indian town. Using this system, the students are given a knowledge about road safety and traffic regulation [21].

A computer-based game which mainly covered about road accidents was done by M S Zeedyk Department of Psychology, University of Dundee, Dundee DD1 4HN, UK. How

they happened? / Who are victims? / Why their accidents happened the places? / Where accidents happened mostly?

This system has mainly been focused for children. As it is a computer base game, they use 2D technology [22].

A mobile based application called tackling children's road safety has been implemented to give the students an idea using video clips and animations about road safety. 2d technology is used here. This is a method of tackling children's road safety [23].

Virtual reality is the technology used for the proposed game (AwareME) when considering it a study on Using VR with smart phones for road safety awareness and timing was found. This system uses VR technology, to make people aware about road safety. Answers for these questions were covered there, how they cross the road? / Traffic accidents? / How accidents occur? / How do they prevent them. Through this system it can be used to measure the knowledge about road safety of people [24].

Lord Buddha Quotes "health is the greatest gift, contentment the greatest wealth" [25]. In the beginning of this Century as a developing third world country Sri Lanka faces some Health issues where dengue plays a major role in it. Making people aware about, and as a public how we should prevent from the dengue fever is a big challenge.

Diego Buchinger and Marcelo da Silva Hounsell are graduate students in Santa Catarina State University, DCC – Computer Science Department, Brazil. For final year research project, they implemented a game including 8 sublevels to aware people about dengue fever. In this research they focused on traditional learning concept. Some levels of that game used Augmented Reality Technology while some levels used Virtual Reality Modeling Language [VRML]. They used Sherlock Holmes 3d model as an Actor in this game. In this research using of Sherlock Holmes investigative skills and thinking ability to increase the effectiveness and the awareness of public was done [26].

In 2005 Jeffery L Lennon and David W Coombs publish a research paper about dengue awareness. They implemented an educational gaming tool called GBD for school age children. The purpose of this research was to examine the debriefing of Philippine students

after playing of the health education game on dengue fever, determining the student's opinions of this game, their awareness of dengue fever and finally exploring the possibilities of this game. In this research, researchers mainly focused on data collection part. They collected data from grade 5 students of two different schools and checked the current awareness of students. They encouraged the students to play the GBD. Finally, researchers manually analyzed the new awareness status of the students who played the game with the students who didn't play the game [27].

### **1.3 Research gap**

The research gap of the proposed game (AwareME) with the researches previously done by several other researchers based on the areas of health awareness using game based learning, social media awareness using game based learning, waste management using game based learning, road safety awareness using game based learning are below:

#### **Health awareness using game-based learning**

Sherlock Dengue Game is a well-prepared virtual reality game using 3D modeling. [26] They used Sherlock Holmes investigative and thinking abilities to implement the game. Mainly focusing on the implementation parts of the game. They encourage only the school children to play the game.

According to the good bye dengue game it is a web-based application implemented using Augmented Reality Technology. In this research they mainly focus about the data collection part. they manually get feedbacks from the children those who played the game and who didn't play the game to check the new awareness status. Game development process was not given much consideration. They also encouraged only the school children to play the game [27].

X-Dengue game is a web-based gaming platform. It mainly used gamification techniques to implement the game. They mainly focused on information gathering about dengue fever

as a research part of this research. User abilities were not focused. In the development part they used 2D models to implement the X-Dengue Game. 3D modelling was not focused. Virtual reality technology was not used as of the proposed game.

Table 1. 1: Social media awareness projects

Features	Sherlock Dengue Game [1]	Good Bye Dengue Game [2]	Design and development Serious Dengue game [3]	Dengue homeorhetic Fever Game [4]	Proposed Game [AwareME]
Identifying the abilities of the player should improve	✓	✗	✗	✗	✓
Identifying the most suitable game to be implement	✗	✓	✗	✓	✓
Using Virtual Reality	✓	✗	✓	✗	✓
Using 3D modeling prototypes	✓	✗	✓	✗	✓
No restriction for the different ages	✗	✗	✗	✗	✓
Using Mobile Application	✓	✓	✗	✗	✓

## **Social media awareness using game-based learning**

Social media awareness through game-based learning was an area where many researchers have focused. If the research on ‘social4school’ is concerned it is a web application-based awareness game where school children were drawn to attention. The website and the game are in Italian. goal of our game is to let young people experience the typical dynamics of an online social network in a simulated and controlled environment [19] . the social media platform they have considered is Facebook. User privacy violation due to poor awareness of social media usage is the main problem they have payed attention to.

Next the research on friend inspector, which is also a web-based game, emphasizes the need for better tools to understand privacy settings on Social Networks. Targets the younger users aware them from social exclusion due to the consequences of poor privacy awareness [20].

CyberCIEGE which is a high-end, commercial-quality video game developed jointly by Rivermind and the Naval Postgraduate School’s Center for Information Systems Security Studies and Research.<sup>1–3</sup>This dynamic, extensible game adheres to IA principles to help teach key concepts and practices [28].

AwareME (Proposed game) is a web-based game developed using virtual reality which helps the users improve their abilities when using Facebook. The ability “decision making” is mostly concerned here as decision making is the most important cognitive skill needed when using technology in a safe manner.

Table 1. 2: Social media awareness projects

Features	Social4school	Friend inspector	CyberCIEG E	AwareME (proposed game)
User privacy violation awareness	✓	✓	✗	✓
Using virtual reality	✗	✗	✗	✓
Weak password and oversharing information awareness in Facebook	✗	✗	✗	✓
Identification of user abilities	✗	✗	✗	✓
No restrictions for different ages	✗	✗	✗	✓
Mobile based game	✗	✗	✗	✓

### Waste management using game-based learning

As shown in the table 1.3 most of the researches that have been completed is based on technology 2D and 3D. Some of the games have been used to aware people about garbage categories. A lot of games are designed to enhance the user's abilities at the end of the game. Most researches have not collected data from the users before the game was implemented.

The proposed system will be developed under virtual reality (VR) technology. At the level of data gathering, the collected data is to be analyzed. The main research part of proposed system is to create the best game to improve user ability. The human ability to develop is determined by using gathered data. According to this environmental awareness game, it



is mainly focused on garbage disposal. It has been decided to create games under environmental pollution, garbage disposal, and garbage collection.

*Table 1. 3: Waste management projects*

<b>Researchers Features</b>	<b>Trash Attack</b>	<b>Attack of the Recyclops</b>	<b>reCyCLOR</b>	<b>Proposed Project (AwareME)</b>
<b>Segregation of garbage (Bio-degradable, degradable , recycling)</b>	✓	✓	✓	✓
<b>Proper waste disposal</b>	X	X	✓	✓
<b>Improve user ability</b>	X	✓	✓	✓
<b>Virtual reality</b>	X	✓	X	✓
<b>2D</b>	✓	✓	✓	✓

### **Road safety awareness using game-based learning**

There are many road safety systems developed by the people. But most of them are focused on small children. Most of the systems are developed by using different methods. And most of these systems are developed by looking at only the general problems. But here in the proposed game (AwareME) focusing on the user abilities and the improvement of it using game-based learning is mainly focused.

Table 1. 4: Road safety awareness projects

	Features	Road Safety Awareness among College Students in a North Indian Town	Computer Games as Learning Children Road Safety Education	Tackling children's road safety	Using VR with smart phones for road safety awareness and timing	Proposed game [AwareME]
Safety Awareness [Road Safety]	Rules of road (crossing the road, traffic accidents)	✓	✓	✗	✓	✓
	Audience (Children)	✓	✓	✓	✗	✓
	VR (Virtual Reality)	✗	✗	✗	✓	✓
	2D/3D Technology	✗	✓	✓	✗	✓
	Using ability	✗	✗	✓	✗	✓

### **1.3 Research Problem**

There are many types of public awareness programs presented in Sri Lanka to understand people how they respond and solve public problems in day to day life. In past decade awareness programs are a bit similar, bored as well as complex, therefore the public faced difficulties in understanding how they should respond to public problems while living in the society. However, in the modern society in Sri Lanka game-based learning is a new and certified concept to aware people easily about the problems. In fact, public awareness through game-based learning is rather a new conception. It has not been the subject of much researches.

After analyzing the Gathered information by the divisional secretariat, we found out four public problems in Sri Lanka to aware people including Health, Environment, Safety and Cyber security. Using game-based learning we are implementing four Virtual Reality games to inform public about the mentioned areas.

The greatest wealth is health, currently in present days Dengue is the most widespread fever in world as well as Sri Lanka. In 2010, 2261 dengue infections and 24 deaths were informed by WHO, after 10 years of time it increased to 55,894 infections and 74 confirmed deaths by the end of the 2019 October. WHO reports shows 80% of human activities responsible for increase numbers in past 10 years of time [29]. Most of the health awareness sessions were conducted by the divisional secretariat to aware people about the current dengue problem. But the minimum attractiveness and understanding of the sessions wasted their hope.

Garbage disposal is the biggest problem faced by the Sri Lankans in the future. It is difficult to imagine the absence of garbage. Garbage generation levels are rising. Sri Lanka generates 7000MT of solid garbage per day with the western province accounting for nearly 60% of garbage generation. Each person generates an average of 1-0.4kg of

garbage per day [30]. Municipal councils and government institutions have attempted to figure out a solution for garbage disposal in past decades. But unfortunately, failed to find out permanent solutions to the garbage disposal.

Today in the increasingly congested country Road safety is a main topic discussed by the society. In last year, 105 children between the ages of 1-15 years and 464 youths between 14 and 25 years died in road crashes. Police department encouraging government and private sectors to conduct public awareness sessions to inform people as a responsible citizen how should they behave on the road. Reckless driving and avoiding the road safety rules are reasons for increasing these numbers.

We live in an exciting time of new technological advancements and opportunities, and we can access more information and make more connections all around the world than ever before. Social media is the platform providing these types of services. Though information sharing through social media is interesting a great deal of security and privacy is required by social media. Cyber security awareness sessions are conducted by the professionals in the industry to inform people how we should protect our privacy while using social Media. Due to the lack of understanding of cyber security methods in awareness sessions, people face many user privacy violation problems.

- **How do we prevent, response and recover from dengue?**
- **How do we properly recycle the garbage?**
- **How do we use social media properly?**
- **How to decide the preventive actions in an accident?**

## **2 OBJECTIVES**

### **2.1 Main Objectives**

The main four areas where many problems arise are environment, health, safety and cybersecurity. There is no one platform for these 4 categories. Therefore, there is a need to have one platform for these four categories. So, the main objective is to improve the Quality of people by making them aware on environment, safety, health, cyber security problems using game-based learning platform.

### **2.2 Specific Objectives**

- To make people aware about health awareness mainly focusing on prevention of dengue and to help reduce the threat of dengue for the lives of people.
- To make people aware about Environmental awareness mainly focusing on garbage disposal which will help to reduce the harm for the environment and to get an idea about disposal of garbage.
- To make people aware about cyber security awareness mainly focusing on social media which will help to ensure the privacy of the users and security in social media.
- To make people aware about Safety awareness mainly focusing on road safety and which will help to make people aware on the road rules and help to minimize the day to day road accidents.
- To enhance the player's ability to think, make decisions, quickly respond and recall knowledge through the game.

### 3 METHODOLOGY

#### 3.1 System Overview

The overview diagram shows the basic elements of the overall system in our proposed awareness game platform. According to Figure 1.1, it shows four main game functions based on the single platform of the public awareness game called AwareME.

First, the user must register and login to the game. After that user (gamer) must select one of the awareness games to play. The four main games are split up into several sub-areas. The game will cover all the sub-areas already listed. While playing the selected game, the system will identify the current knowledge of the player. Once the user has played the game, they can improve their knowledge, awareness

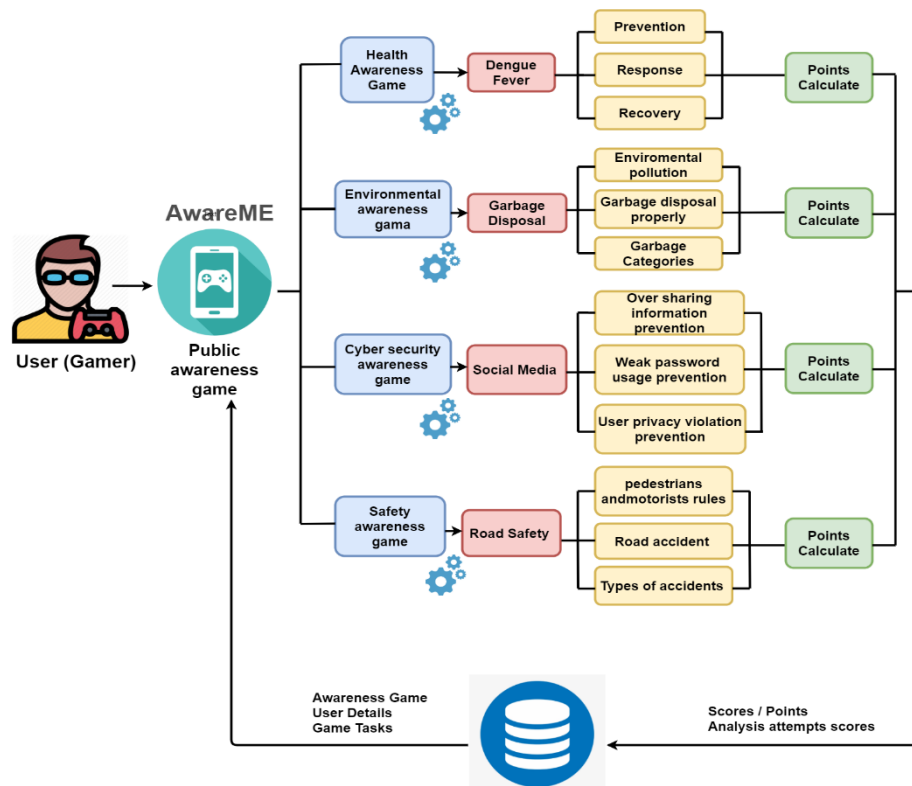


Figure 3.1: System Overview

of the selected area and individual ability. The database includes the main game and all game analysis part is done.

### 3.2 Flow of the Project

This section presents all the phases of the gaming platform being proposed. Every step ultimately helps to give a good product. This Figure 3.2 shows in detail all the steps that need to be taken to create the game

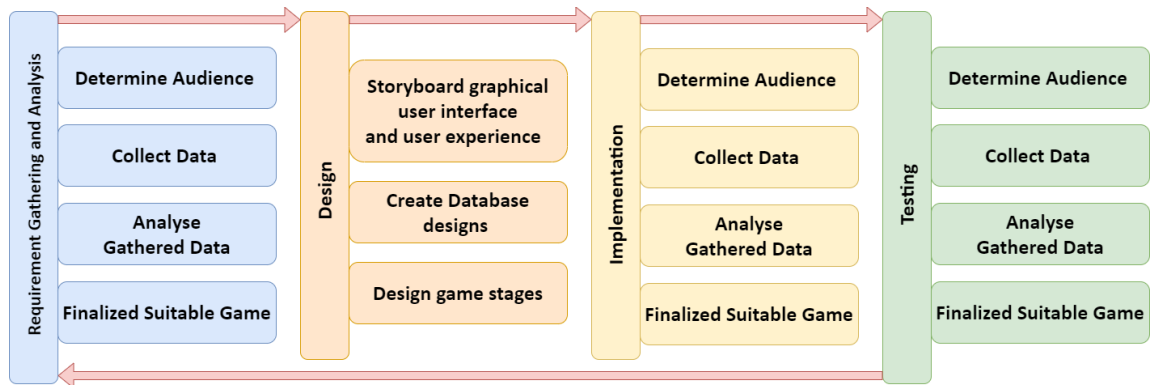


Figure 3 2: Process of Project

#### 3.2.1 Requirement collection and analysis

At the beginning of the research project, the most important thing to follow is the requirement gathering and analysis. It's very important to study and analyze the research area precisely.

At the beginning of the research, the audience has to decide on the data collection process. There are four main separate games in the proposed awareness gaming platform. They are Dengue Fever, Garbage Disposal, Road Safety and Social Media. Each separate game needs different age groups. It depends on the requirement

In this study, initially must gather data to create the most perfect game to increase people's awareness. Therefore, our group decided to collect data through the standard questioner. As an example, relevant questions from World Health Organization (WHO), Central Environmental Authority etc. Questionnaire should be designed as needed. The questionnaire gives to a selected group of people and marks each answer.

After collecting the data, we need to analyze the data as required. Based on the information obtained, our members will decide what is the best game to be implemented for each

separate game. The main target of our research is to create a perfect game to enhance people's abilities in thinking, decision making. Four weeks will be set aside for this purpose

### **3.2.2 Design**

In this phase of the development, the game will be designed. System design helps to gather the system requirements and come up with the overall architectural design. According to our research, there are four separate games should be designed. Each game needs a plan for the implementation. In this stage of the game, how to give scores, how the interface appears, sounds, 3d models, database and interface design should be built. Three weeks will be set aside for this step.

### **3.2.3 Implementation**

In the implementation phase, requirement specifications and design specifications will be implemented by each group member. The overall project will be implemented using the waterfall model. Virtual reality is main technology in our research. Five weeks will be set aside for implementation



### **3.2.4 Testing**

Testing stage is the most important to our research. In this stage we need testing to see how well the user is aware about each component of the game.

#### **User Acceptance Testing**

After creating the game, users must be able to play the game. Three opportunities are given to each player. Players are the same group who participated in the information gathering stage. The data collected at requirements gathering stage will be compared with the scores obtained after playing the game.

After analyzing every user's data get an idea about how far this game helps to aware people about each problem and how far the users have developed the abilities through the game. If good results cannot be achieved from the game, the stages of the model should be repeated with appropriate modifications again and again until the expected results are obtained.

All the task should be tested and check whether they run without any bugs.

**Unit Testing** – Each team member will have to do unit testing for each of the parts they are implementing.

**Component Testing** - By combining several Units, component testing will be done.

**Integration Testing** – To test whether the communication between each component working together, Integration Testing will be done.

**System Testing** – After the components are finished and they will be integrated and the whole system will be tested to test if the complete system is working perfectly.

## Test Cases

These test cases are used to test the game after its implementing

Table 3. 1: Test Case Table

Test Case #	Test Case Description	
1	Check background music and sound effects	<ul style="list-style-type: none"><li>• ON/OFF sound</li><li>• On/OFF background music</li></ul>
		Verify if sound effects are in sync with action
2	User Interface	Check <ul style="list-style-type: none"><li>• Landscape</li><li>• Portrait mode</li></ul>
		Check <ul style="list-style-type: none"><li>• Animation</li><li>• Movement of character</li><li>• Graphics</li><li>• Zoom In/Out (all gestures)</li></ul>
3	Performance	Check <ul style="list-style-type: none"><li>• Loading time of a game</li></ul>
		Make sure no action takes a considerable amount of time, game flow should be fast
4	Score	Calculation of the score
		Check <ul style="list-style-type: none"><li>• Score registration functionality</li></ul>
		Check <ul style="list-style-type: none"><li>• Level finish synchronizes with score</li></ul>

### **3.3 Requirements**

#### **3.3.1 Functional Requirements**

Awareness sessions are no more valuable concept to aware people in these decades. As per the survey of the Divisional Secretariat, aware percentage of public are less than 40% about mentioned modules (Health Awareness based on Dengue Fever, Cyber Security Awareness based on Social Media Awareness, Environmental Awareness based on Garbage Disposal and Safety Awareness based on Road Safety. According to the requirements of the Divisional Secretariat this research mainly focus on increasing the awareness percentage, the improvement of abilities by the public about mentioned modules and implementation of four games in a single platform named [AwareME] using game-based learning concept.

Finally, the output of this AwareME gaming platform is providing public an attractive gaming experience and much better awareness about mentioned problems as well as improvement of the abilities to prevent these kinds of hazards.

#### **Game based functional requirements**

##### **Programming language and development software**

- The games must be implemented with C# Script
- The games must be developed in Unity3D

##### **Display control and audio**

- The games must be controlled with Xbox Bluetooth controller
- The games must be played on mobile then display resolution will be high.  
Ex:(1920 X 1080)
- The games must be feature music and sound effects

### **Games must be played on Android Operating System**

- Android OS compatible with Virtual Reality

### **Levels, contents and messages**

- Games must help user to build strategy
- Games must have 3 Levels for each
- Games must convey four special messages about Health, Environmental, Cyber Security and safety awareness

### **Device must be able to play Virtual Reality Games**

#### **3.3.2 Non-functional requirements**

##### **Final product**

**Performance of the Product** – Performance of this product can be determined by its responsive time and the expecting time ranges to complete the given task. According to the AwareME Gaming Platform we are expecting 5 seconds to load the initial screen and about in 15 min to end up the whole tasks as well as user current awareness status

**Scalability of the Product** – In this product we are providing an option to the user to select the game user wants to play and improve their current awareness. Then user doesn't need to play all four games and waste their time. And this product recommends to the users about these four games and if user have time to play all four games and improve their current awareness of these four hazards

**Responsiveness of the product** - After the user played the game, if user not satisfied of their current awareness status, user can review what are the mistake they done throughout the game and they have only 3 attempts to face it and improve their abilities to educate about mentioned hazards.

**Reliability of the product** – after user played the game of his 3 attempts user can see a notification summary of their current awareness and list of the mistake, he/she done through the game

**Availability of this Product** – Users can download this game-based application in the Play Store and can be rate it. And share among the friends, and recommend to the friends who has less awareness of these topics

**Screen Adaption:** In these days lot of mobile phones comes with different sizes and different layouts.in this application we are render it for different screen sizes. And automatic adjustments of gaming screen to different screen sizes.

### 3.3.3 Use case Diagram

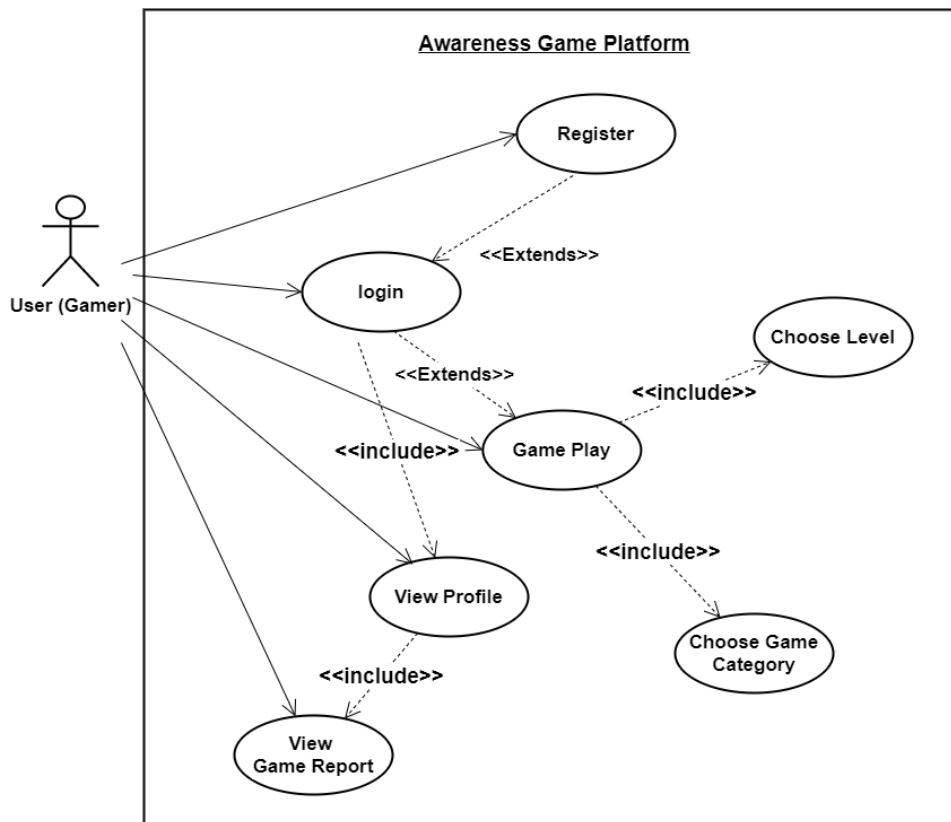


Figure 3. 3: Use case Diagram of the Game Platform

### **3.4 Tools and Technologies**

#### **3.4.1 Tools**

**Unity** - Unity is the best platform for developing game play. We can use Unity to create and deploy high-quality 3D and 2D games across smartphone, VR / AR, console. It is an engine of the cross-platform game. This is mainly used to create video games and simulations for computers, consoles and mobile devices.

**Android studio** - Android Studio is Android's official IDE. It offers Android developers personalized applications including tools for rich code editing, debugging, reviewing, and profiling.

**Adobe Photoshop** - Adobe Photoshop is a basic apparatus for designers, visual specialists, and inventive experts. It is broadly utilized for picture altering, modifying, making picture arrangements, and adding effects. Computerized or scanned pictures can be altered.

**SQLite** - SQLite is an open-source relational database for example used to perform database procedure on android gadgets, for example, storing, controlling or recovering tenacious information from the database

**Adobe illustrates** - Adobe Illustrator is utilized to make an assortment of advanced and printed pictures, including cartoons, outlines, charts, diagrams, logos, and illustrations. Illustrator permits a client to import a photo and use it as a manual for follow an item in the photo.

**Blender** - Blender is a program used for 3D modeling, animation and rendering. Using Blender, you can create a 3d model from scratch, sculpt, rig, texture, animate and render it to still or movie formats. Blender also features its own game engine and can be extended to support third party render engines.

**Wwise** - Wwise is Autokinesis' product for interactive media and computer games, accessible free to non-business clients and under license for business computer game designers. It includes an audio authoring tool and a cross-platform sound engine.

### **3.4.2 Technologies**

**Virtual reality** - The main technology that implements our game is virtual reality. Virtual reality technology is a three-dimensional (3-D) artificial environment that is applied to computer games. Virtual reality experiences are developed with VR software and presented to the user in such a way as to simulate the real-world environment, create illusion suspension and help the user experience the VR environment as real.

**3D Modeling** - 3D modeling is the process of creating, using specific software, a mathematical representation of any surface of an object in three dimensions. The 3D modeling process creates a digital object which can be fully animated, making it an important technique for an animation of characters and special effects.

**Full Motion video** - Full Motion Video (FMV) games are video games that rely on pre-recorded TV or film quality recordings and animations instead of characters, vectors or 3D models to represent game action.

**Game Audio** - We can make, hear and tweak sound effects and behaviors while playing the game. It features an audio authoring tool, and a cross-platform sound engine that allows audio on - the-fly.

3.5 Gantt Chart

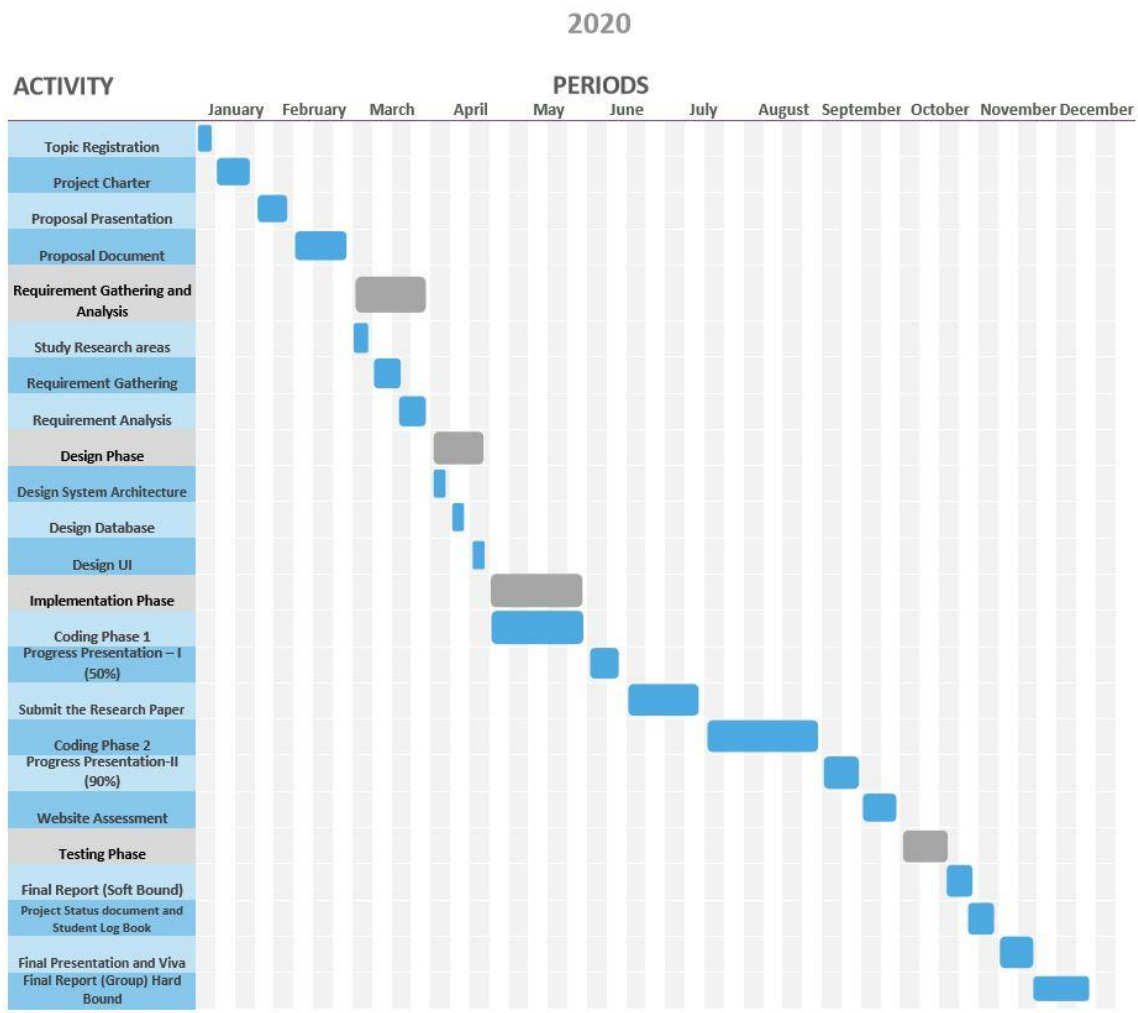


Figure 3. 4:Gantt chart



### **3.6 Benefits of the System**

**Divisional Secretariat** - This mobile application is mainly targeting on the divisional secretariat. So Divisional secretariat can recommend this application for the people when awareness about health, environment, cyber security and road safety are needed.

**Awareness Sessions** - There are many awareness sessions conducted by different sectors for different people. Such as for disabled people. So, this mobile application can be used to improve their living standard.

**Hospital** - There are many different programs conducted by the hospitals such as awareness programs on the accidents, on dengue. So, this mobile application can be given to the hospitals to identify why people face accidents? Why people suffer from dengue? And what are the other factors influence for this and can take preventive measures.

**NGO** - Now Non-governmental Organizations mostly conduct many programs for people. So, this mobile application can be used by NGO for getting for more details on people.

## 4 DESCRIPTION OF PERSONAL AND FACILITIES

### 4.1 Work Breakdown Chart

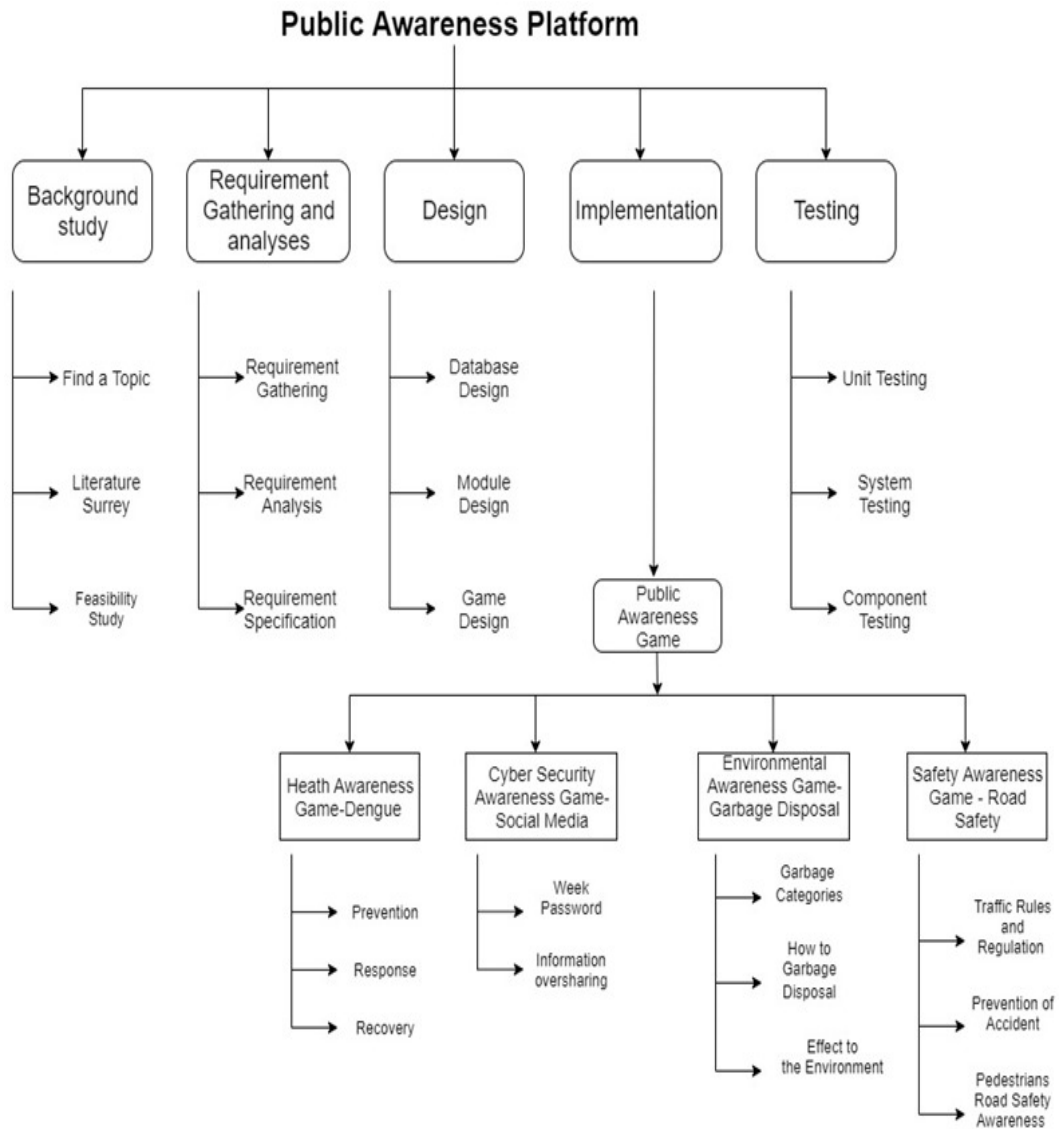


Figure 4. 1: Work Breakdown Chart

## 4.2 Description of Personal and Facilities

In order to achieve a successfully developed system, team collaboration is essential.

Table 4. 1: Description of Personal

Dassanayake D.K.M.P.M.M   IT17160308	
Component	Task
<b>Health Awareness Game – Dengue Fever</b>	<ul style="list-style-type: none"><li>• Developing the health awareness platform</li><li>• As a use case we are using dengue fever, usually we identified three stages<ul style="list-style-type: none"><li>➤ Prevention</li><li>➤ Response</li><li>➤ Recovery</li></ul></li><li>• Identifying the abilities related to three stages (thinking ability, decision making, reacting speed and recalling)</li><li>• Identifying the most suitable games to be implemented (survey or any suitable methodology)</li><li>• Implementing the most suitable awareness game</li></ul>
S.N Wijesinghe   IT17013642	
Component	Task
<b>Cyber Security Awareness Game – Social Media</b>	<ul style="list-style-type: none"><li>• Developing the cyber security awareness platform</li><li>• As a use case we will focus on how to secure private information in social media (Facebook).</li><li>• Identify the abilities required (thinking ability, decision making, reacting speed and recalling)</li><li>• Identify the knowledge required.</li><li>• Identifying the most suitable games to be implemented (survey or any suitable methodology)</li><li>• Implementing the most suitable awareness game</li></ul>

T.L.C Jayasiri   IT17701174	
<b>Component</b>	<b>Task</b>
<b>Environmental Awareness Game – Garbage Disposal</b>	<ul style="list-style-type: none"> <li>• Developing the environmental awareness platform</li> <li>• As a case studies we will focus on garbage disposal, environmental pollution and Garbage category in Sri Lanka</li> <li>• Identify the abilities required and knowledge required for case studies (thinking ability, decision making, reacting speed and recalling)</li> <li>• Identifying the most suitable games to be implemented (survey or any suitable methodology)</li> <li>• Implementing the most suitable awareness game</li> </ul>
K.A.R.T Keenawinna   IT17162142	
<b>Component</b>	<b>Task</b>
<b>Safety Awareness Game – Road Safety</b>	<ul style="list-style-type: none"> <li>• Developing the safety awareness platform</li> <li>• As a use case we will focus on traffic rules and regulations, prevention of accidents and road safety aware for pedestrians in Sri Lanka</li> <li>• Identify the awareness abilities required and knowledge required for use cases (thinking ability, decision making, reacting speed and recalling)</li> <li>• Identifying the most suitable games to be implemented (survey or any suitable methodology)</li> <li>• Implementing the most suitable awareness game</li> </ul>

## 5 BUDGET AND BUDGET JUSTIFICATION

*Table 5. 1: Budget Table*

<b>Requirement</b>	<b>Description</b>	<b>Price per unit (Rs.)</b>	<b>Quantity</b>	<b>Total (Rs.)</b>
<b>Special Software and Hardware</b>	VR Box and Joystick	15000.00	1	15000.00
<b>Documenting and Binding</b>	Document hard copy printings			3500.00
	Binding cost			1500.00
<b>Total Cost</b>				<b>20000.00</b>

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