English School Mate

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DECLARATION

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The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

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ABSTRACT

Nowadays most people in the world is using English language. And also English is become the international language. Because of above mention reasons, English is very important language. Sri Lankan students also learn English as a subject in their secondary school. But our team did a research about English language learning in Sri Lanka and identify some problems in Sri Lankan learning system. Lack of English teachers in rural areas of Sri Lanka, Lack of educational facilities, bored leaning system are major problem that we identified. Therefore, English School Mate would be the ideal solution to get rid of above mention issues. This proposal report is prepared to propose "Vocabulary Skill improvement and brain improvement game" under the research of "English School Mate".

Keywords— brain game, English vocabulary game

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List of abbreviations

API	Application Program Interface
DB	Database
UI	User Interface
ML	Machine Learning

Table 1-List of abbreviations

1. INTRODUCTION

1.1 Background

Education has become a very powerful human need nowadays. Because without education people can not win the future world. That means without education people can not find jobs on the society. Without jobs people can not make money for their living. Actually, in the present society is based on money. So, without making money people can not live in here. If we talk about Sri Lanka, our country also have money based society. So , in our country also there is a huge competition among people to make money. So, in Sri Lanka also there is a huge competition to be educate and win the future world.

If we talk about Sri Lankan education mechanism there are two stages[1], very first stage is primary stage and that is between nursery to grade 5 and the second stage is secondary stage that is between grade 6 to grade 13. Mathes, science, sinhala are few subjects that the secondary stage students are learning. And among them there is a subject called English language. This English language subject is very important because English language is the international language of the the world. So , if we want to win the world in the future we must learn English language.

Sri Lanka is a small country with both rural and urban areas. If we talk about urban areas in sri lanka , they are well developed and these area people have all the requirements for their living. And if we talk about education sector in urban areas, they have all the learning sources and good well developed schools. But in the rural areas we can identified many problems. If we talk about rural areas education sector, we can identify problems like less learning resources, and they have not so well developed schools. So there is a huge difference between rural and urban areas education sector.

So, in this study we try to reduce that difference using information technology. That means using the information technology we can do distance learning mechanisms. That means by using application on a smart phone we can remotely connect and can do information sharing. In this study we took english language as our subject and we make a mobile application to learn english. But our target group is grade 6 students. So, we need to teach english using interesting way. As a solution for that matter we use a mobile game to teach english. Actually, we use mobile game to teach vocabulary to the students.

1.2 Literature Survey

Game developing is one of the major developing areas in information technology. Game making is a creative art. So, developers make their games using their creativity. Game developers use different game making softwares to make their games. Android studio, Unity 3D, Unreal game engine are few major softwares that game developers are mainly used.

- **Xiye Feng and Meihui Xu, " 2D mobile game platform Based on the android system"**

    Nowadays in the world there is a rapid development in smartphones. Because of that the Android platform became more popular among smartphones. And also the mobile games based on the android became more popular in the world. In this paper Andengine engine was used to develop the game. In this game platform they use mainly four functions.

    1. **Andengine engine module** : It is responsible for the scene creation, initialization of characters and touch screen monitor about the game.
    2. **The game interface module**: responsible for control interface implementation.
    3. **Data storage module**: the game use shared preferences storage of data.
    4. **Audio and Video playback module**: video part responsible for the opening of the animation playback of the game. And the voice control responsible for game background music playback.
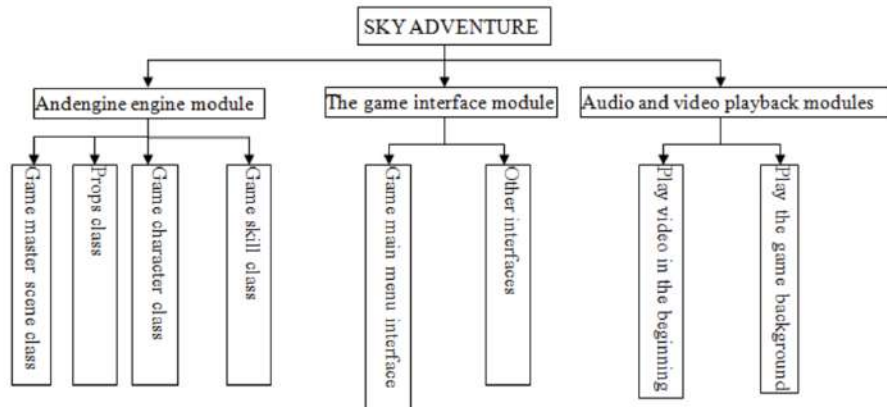

Figure 1

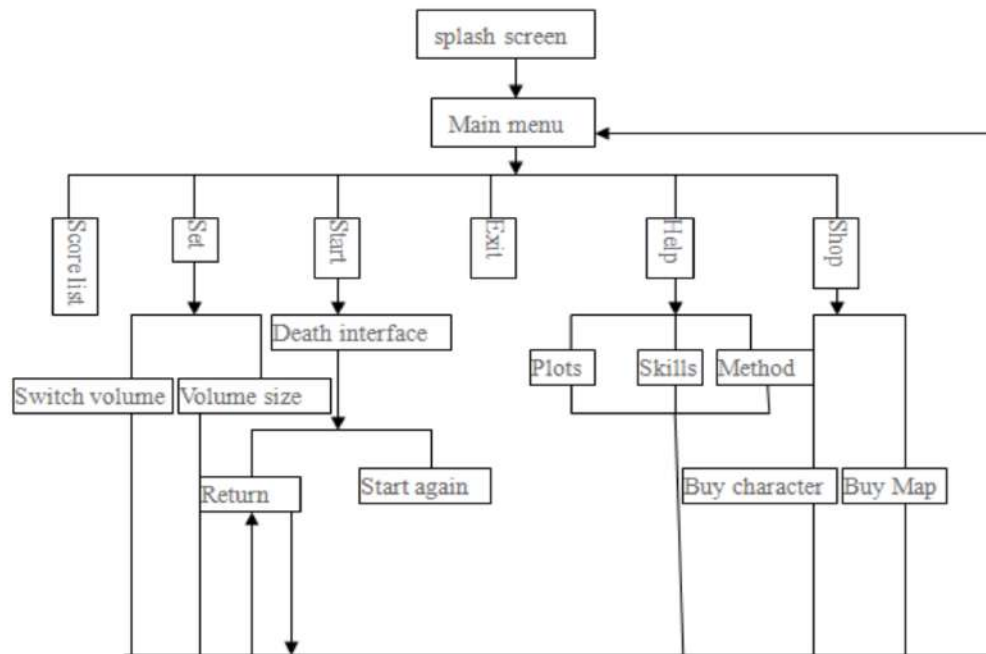Below figure shows the basic flow chart of the game.

Figure 2

- **Monther M.Elaish, Norjihan Abdul Ghani, Liyana Shuib, and Ahmed Al-Haiqi, " Development of mobile game application to boost students' motivation in learning English vocabulary. "**

This study have been done to motivate students to learn english in Arab countries. In this study they mainly focused on English vocabulary learning. In here they have use digital gaming , such as mobile games to improve students' english vocabulary. In here they finally developed a game to successfully motivate the Arab students to learn english as their secondary language.
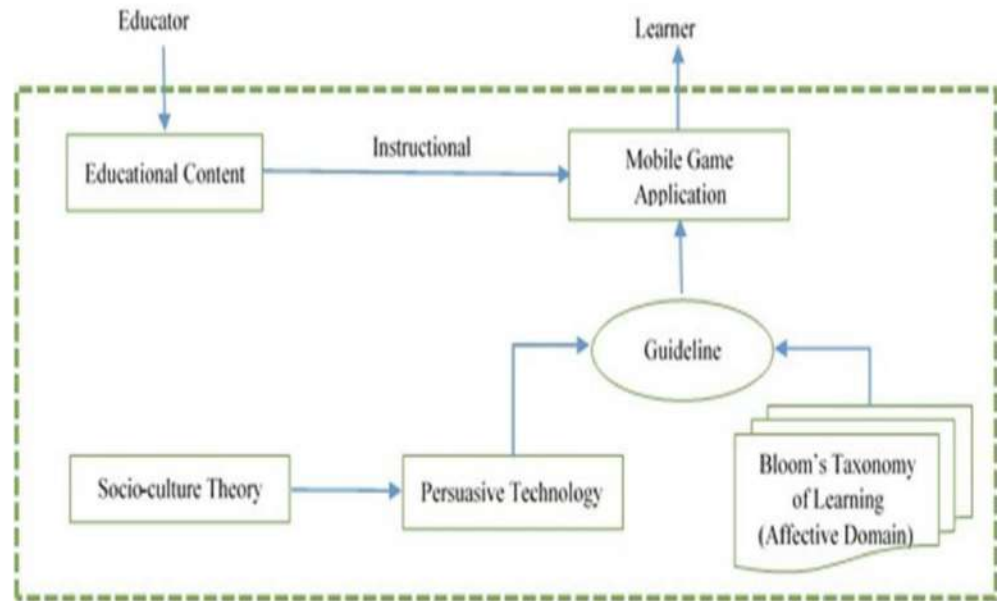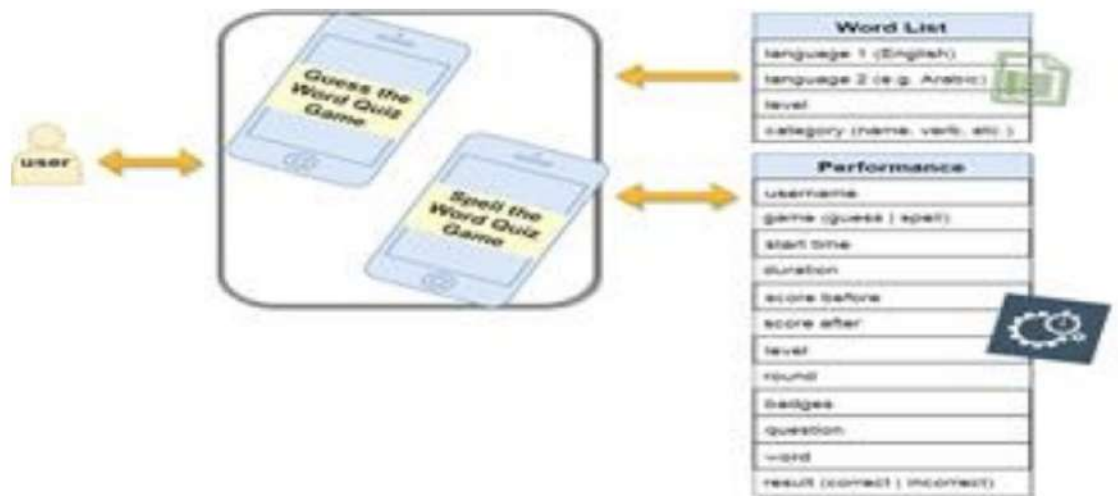
Figure 3-Game framework

Figure 4 - System architectur

- **Nilay Yildirim, Mustafa Ulas, and Asaf Varol, " A Game Development for Android Devices Based on Brain Computer Interface: Flying Brain."**

Human brain produces weak electrical signals that can be measured from the skull. Electroencephalography(EEG) is the method that can be used to monitor the electrical signal that is produced from the brain. In this study "Flying Brain" game has been developed as Brain computer interface based game to developed the human brain. In here they use Neurosky Mindwave as their EEG device. The game is controlled by attention and meditation measurements obtained by converting the signals received from the user.

The game play of this Flying Brain game is, there is a bird and the bird fly his wings when the player touch the screen. If the player didn't touch the screen the bird falls and finally game become over.

Figure 5 -Flying brain game play

5

1.3 Research Gap

Due to development of technology, over past few years researchers have introduced different kind of mobile applications and web applications to develop English learning abilities. Some applications mainly focused on English learning. But our application is focused on not only the English learning but also entertainment and brain improvement.

Research	Covered areas	Our application covered areas
Typing game to learn English	· Vocabulary skill improvement. · Distance learning facility.	· Vocabulary skill improvement through high quality graphical interfaces using the game. · Distance learning facility. · Focus on grade 6 to 9 students. · Brain improvement techniques through the game.
Contextual game for improving English	· Vocabulary skill improvement.	· Not only the vocabulary skill but also brain improvement skills through the game.

Table 2-Research Gap

Features Application	English learning	Entertainment	Brain-improvement	Thinking ability
Dulingo[1]	√	√	×	×
Magic Land[2]	√	×	×	√
Vocab game[3]	×	√	×	×
Our proposed application	√	√	√	√

Table 3-Research Gap

1.4 Research Problem

Nowadays English language is become very important language in the world. Because it is the international language. If you know English very well, you can definitely get a good job in a big multi-national company. And English is very important because if we know English, we can communicate with foreigners.

In Sri Lankan secondary school syllabus has English language as a subject. So Sri Lankan students can learn English from their school. But in Sri Lanka there are urban areas with good facilities and also rural areas with less facilities. So our team did a research about rural area English knowledge and urban area English knowledge. Then we found a huge gap between rural English knowledge and urban English knowledge. We identified some reasons for this matter. One reason is in rural areas there are lack of teachers and lack study materials. And other reason that we identified is teachers teach English not in a interesting way.

1.5 Research Objectives

1.5.1 **Main Objective**

The key aim of this study is to develop a hybrid approach to strengthen and test grade 06 students' spoken Language, written Language, English listening and English reading skills. The full approach is split into four major components in order to carry out this key purpose in a more innovative and productive way.The first component focuses on strengthening and measuring students' written English skills, while the second component focuses on developing and measuring students' spoken English knowledge. The third aspect is for the mentor's comfort, where the mentor can see the outcomes in an ordered dashboard and it is also possible for the mentor to forecast the marks based on external variables for each exercise. The fourth aspect is a mixed game that involves the creation of the brain and an immersive game for the production of vocabulary. The substance was produced as a whole by taking the four research areas listed above as the key goals. A variety of unique goals were planned, in addition to the main objective, to improve the competitiveness and efficiency of the manufacturer while retaining commercial consistency.

1.5.2 **Specific Objectives**

The main focus of this study to developed a game to improve students' English vocabulary skills and brain improvement skills.

- Collecting the English words.
- Categorize the English words into different levels.
- Make different levels using English words.

2. METHODOLOGY

2.1 Methodology

The solution proposed under the research topic is broken down into four major components in order to fulfill all the objectives required to cover the prevailing research problem.

1. Game module.
2. Writing module.
3. Speaking module.
4. Activity prediction module.

First we identify our target group as grade 6 students in Sri Lanka. We have been successfully implemented the system as for matched-up to the targeted group. Implemented system maily have two major parts. Android application and a web application are the two major parts. Game module, writing module and speaking modules are on the android mobile application. And the activity prediction module is on the web application. We sapare our four functions in above mention way, because the game module, writing module and speaking module are mainly used by the students. And the activity prediction module is used by the teacher or the guarding of that student. Above figure shown the system architecture of our English School mate system.
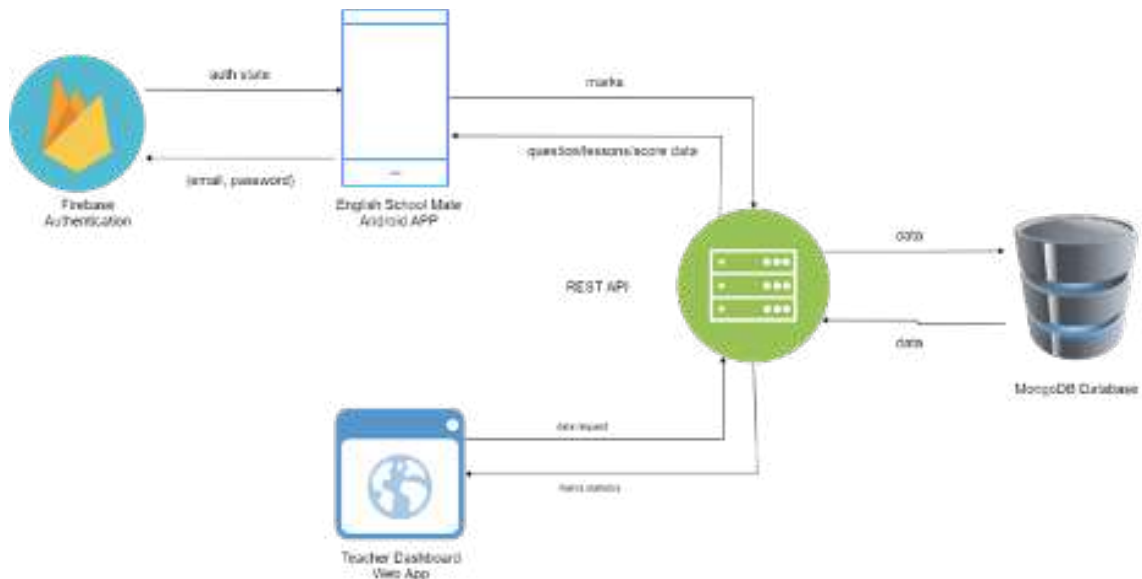

Figure 6- System Architecture

In our system we used 3-tier architecture because our system is based on English lessons and lessons are updated from time by time, and if we want to change the lessons we can easily change them in our database easily. Otherwise if we hard code our lessons in our application, when we update the lessons we need to fully change the code and it is very

hard to do it time by time. And because if we use this 3-tier architecture the scalability of our application becomes higher.
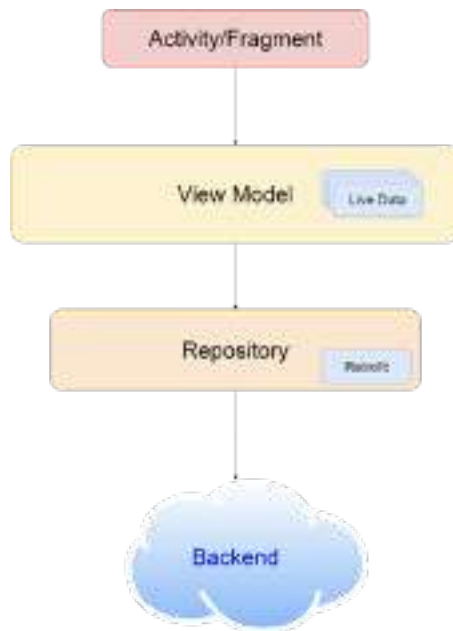

Figure 7- 3-tier architecture

We use mongo DB atlas as our database because it is a well performing database and it provides low latency for high work loads. It means in our system we mainly have to read database data other than writing. So lower latency makes that fast.

As our android application API we used REST API. because it is more efficient and have more performance than other APIs. The main advantage of REST API is that they provide great deal of flexibility. In REST API the data is not tied to resources, so REST API can handle multiple calls at a time.

And For the Authentication of our application we used firebase authentication. We use firebase because it has more advantages than others. synchronizing data with real time databases, crash reporting to fix bugs are some advantages of firebase authentication.

In the game module as a outline we mainly developed a game to achieve main objectives. Thats are vocabulary skill improvement and brain development through a mobile game. So , if we study little bit about how games are using in education, there are so many information that we can refer.

Educational games that are specifically designed or have incidental or secondary educational significance for academic purposes. In a learning environment, all types of games can be used, but educational games are games that are intended to help individuals learn about certain topics, broaden concepts, improve growth, understand a

historical event or culture, or help them learn a skill while they play. Educators and the government realize the benefits that gaming has on learning. Games teach us goals, rules, problem solving as a story.

If we study about benefits that has on gaming. The gaming is a social activity so, students become socialized because of games. And another big advantage is gaming improves critical thinking on students. So gaming can be used on learning purposes on students. Because students like interesting ways to do their learning because, current education system is much bored system to learn.

In our solution, we mainly developed two separate games to achieve two objectives that I mentioned earlier. So, I used two different game developing softwares. Android studio and Unity 3D are the main softwares that I used. I developed a English Vocabulary improvement game using Android studio. In my android game I developed it as 3-tier architecture. And in my android app I hard coded the answers of my game levls. I did it because in a game first we decided game levels answers that will never change. And if the answers on the application then we can match the answer quickly. It is a good way to up lift the performance of the game.

The brain development game is mainly focused on increasing the thinking and analyzing power of students. It is important to note that the Implementation was done using both Android Studio and Unity3D to test the performance of the game since the logical complexity is high at each level. When compared to Android Studio, Unity3D is easier to use if both the software are not familiar. Furthermore, regardless of whether you should know Android Studio and not Unity 3D, you would just profit by that in a specific way.

Since most games contain things like realistic resources, sound resources, an explicit treatment of client input, liveliness and so forth and so on, and a game motor like Unity 3D is extraordinarily evolved to be acceptable at taking care of those things, whereas increasingly "nonexclusive" improvement devices like Android Studio, Eclipse, Visual Studio, etc. All things considered, nonexclusive. Solidarity 3D additionally lets you run the game inside the game supervisor, empowering you to change the properties of your game resources legitimately and see the outcomes right away. You would need to grow a large portion of such prospects yourself should you make your game in an apparatus like Android Studio[2].

The coding portion of building up a game is best made in a device for coding, and Unity 3D in and without anyone else isn't a coding instrument. For that part, you need an extra tool likeMonoDevelop (which you get packaged with Unity 3D) or Visual Studio, whereas the Unity 3D editorial manager is made for building the game scenes and taking care of the game resources.

It is exceptionally lightweight and asset the executives is done entirely well in this IDE. It boots up quickly when contrasted with other improvement IDEs. It's anything but a memory hungry IDE. Even beginners can work with this IDE very easily. Emulator begins extremely delayed in Android Studio, possibly that is where it needs improvement. It takes a great deal of memory space to introduce the IDE. Heavy application and will hinder PC execution[3].

The motor is exceptionally favored for its all-inclusive help to 27 stages. The application created and conveyed can be effortlessly shared between PC, web, and versatile stages. Moreover, the spry philosophy empowers quick prototyping and steady discharges, which thus accelerate game development. The content manager is given by IDE to compose the code, however once in a while, a particular code supervisor is likewise utilized by the designers to mitigate disarray. Moreover, the incorporated improvement supervisor support JavaScript and C# for scripting and offers eminent highlights that are perfect for the game development. The excellent sound and special visualizations are upheld by the motor that facilitates the game turn of events. The visuals are versatile on each screen and gadget with no twisting or bargain with the picture quality. It's an unquestionable requirement. The fledgling designers need the straightforward documentation that is given in detail by the Unity motor. The definite documentation incorporates the clarification of each little topic. The troubleshooting and tweaking are incredibly simpler with Unity game advancement since all the game factors are shown during interactivity, which thusly permits the designers to investigate the procedure at runtime. Not to state, yet the motor lingers behind from a graphical perspective. It doesn't offer a variety of apparatuses to make staggering illustrations instead of other game advancement engines. In Unity 5 motor, the inherent help for the PhysX material science motor has some presentation issues and comes up short on some significant functionalities which should be added to make the incredible game app. The designers need to have licenses for the best illustrations, organization, and execution upgrades. These licenses are costly to buy. Besides, the utilization of rendering, cradle support, stencil support, and truly more highlights scale up the advancement costs because of costly licenses. The code is steady in Unity rather than different motors and pressed with extraordinary engineering that improves the game application execution. Be that as it may, inaccessibility of the source code makes discovering, tending to, and fixing the exhibition issues difficult. The game created utilizing Unity motor devours more memory, which thus makes OOM blunders and investigating issues in the applications[4].
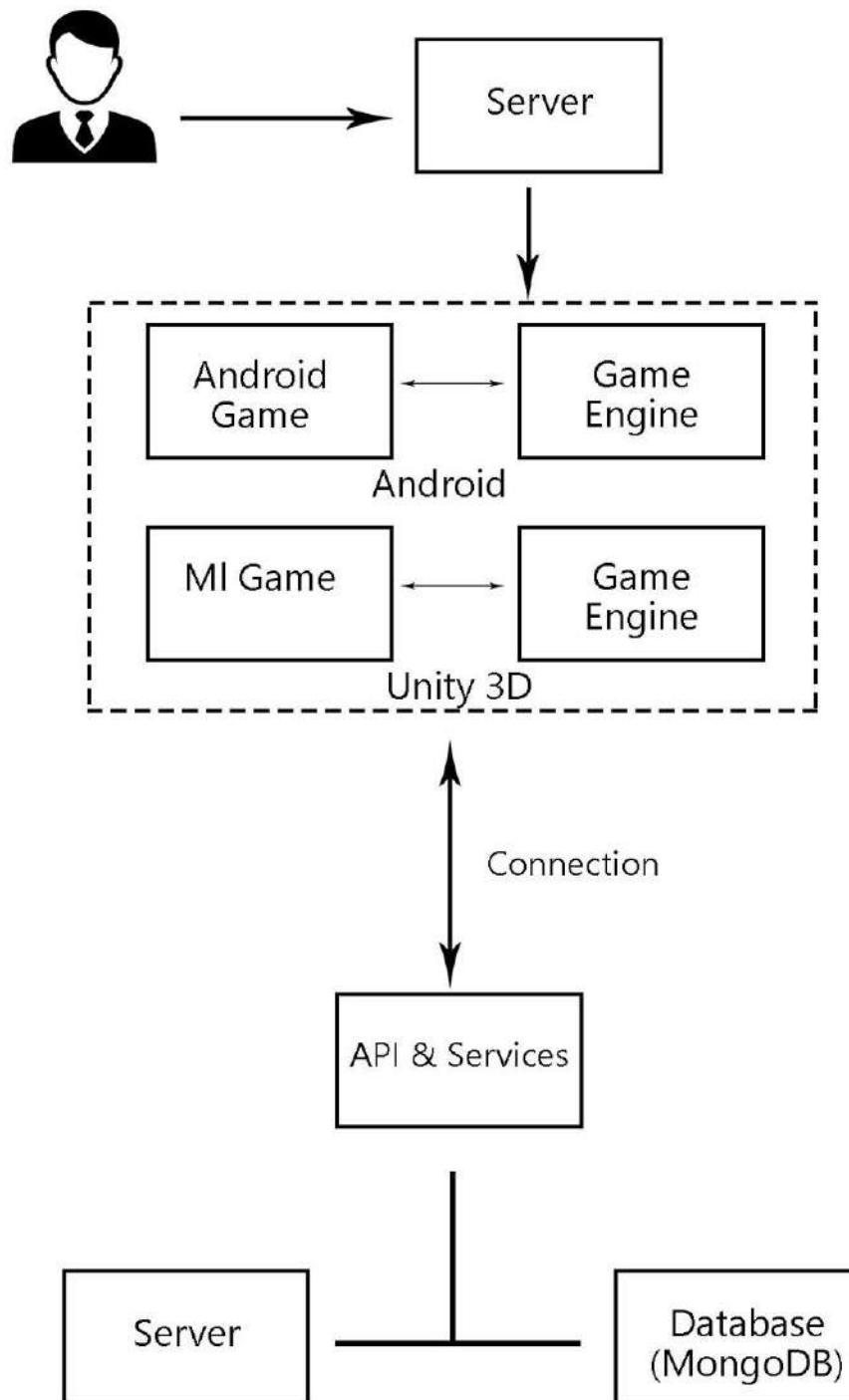
Figure 8- System Diagram

2.2 Commercialization Aspect of the Product

Commercialization Factor	Previous Solution	English School Mate
Academic relavance	Acceptable	High
Audience	Not Specific	Specific
Lower resource Consumption	No	Yes
Portable	No	Yes
Cast effective	No	Yes
Evaluatable	No	Yes
Vishualizable	No	Yes
Covers every Subject areas	No	Yes
Low operational knowlage	No	Yes

Table 4-commercialization

2.3 Testing and Implementation

The main implementation of the English School mate has two main parts. Authentication and the Backend part and database part is the mentioned parts. Authentication was done by using Firebase authentication and the database that was used is mongo DB atlas and the REST API was used as the API.
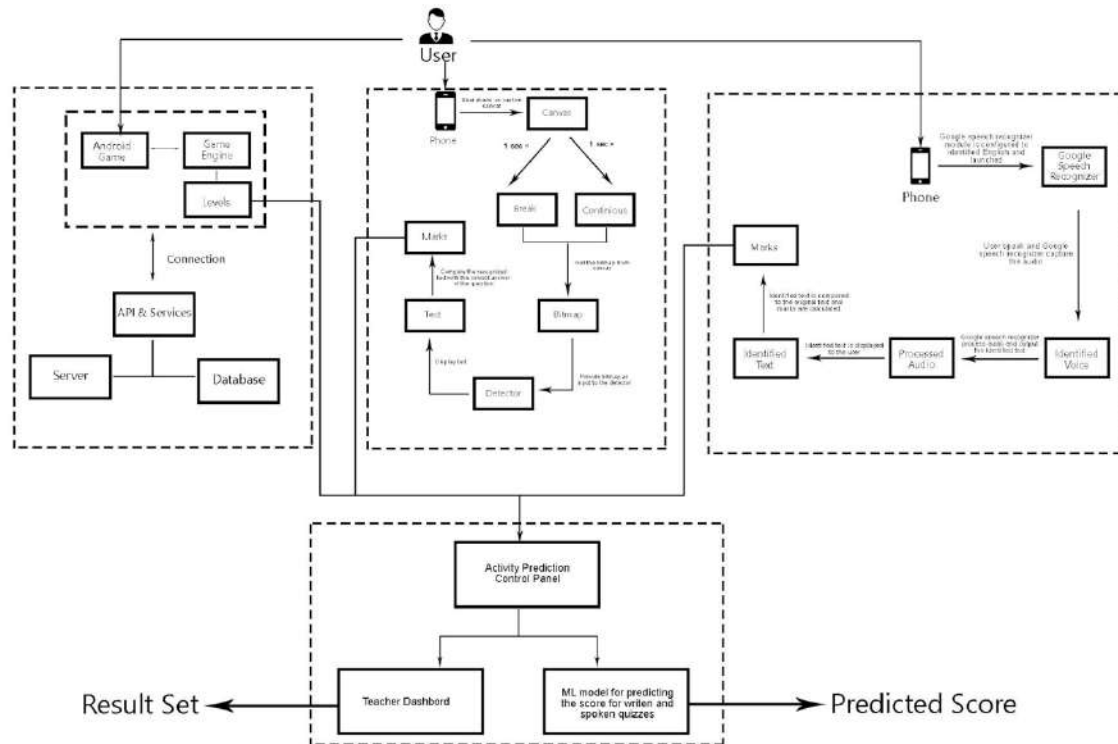

Figure 9-High level architecture

3. RESULT AND DISCUSSION

3.1 Results

Results based on ML game.

Figure 10- ML game

Test Case#	expected Results	Actual Results	Accuracy
1	1	1	100%
2	1	0	0
3	1	1	100%
4	1	0	0
5	1	0	0
6	1	0	0
7	1	0	0
8	1	1	100%
9	1	1	100%
10	1	1	100%
11	1	0	0
12	1	0	0
13	1	1	100%
14	1	0	0
15	1	0	0
16	1	0	0
17	1	0	0
18	1	1	100%
19	1	1	100%
20	1	1	100%

Table 5-testing

Results Based on Android Game.

Figure 11- Android game interface

Figure 12- Android game UI

Test Case#	Expected Resulyts	Actual Results	Accuracy
1	pen	pen	100%
2	car	car	100%
3	bird	bird	100%
4	bat	bat	100%
5	pipe	pipe	100%
6	van	van	100%
7	mobilephone	mobilephone	100%
8	weel	weel	100%
9	cat	cat	100%
10	rat	rat	100%
11	mat	mat	100%
12	table	table	100%
13	skirt	skirt	100%
14	shirt	shirt	100%
15			
16			
17			
18			
19			
20			

Table 6- testing

3.2 Research Findings

- Give best solution for distance learning using an android application to learn English for rural area students in Sri Lanka.
- Give solution for the lack of resources problem in sri Lankan rural area students to learn English using Information Technology.

3.3 Discussion

The vocabulary skill and brain improvement game section are entirely based on unity 3D. We implemented four levels to develop the game. The game gave me an extra interest in English with huge knowledge. The 1st level is Word categorization. Here we develop the vocabulary level of the students. The 2nd level is Counting the cubes and brain improvement is the main target of this level. The 3rd one is the words match puzzle. The vocabulary level is highly increased in that level. The 4th one is the solve equations level so this is also a brain improvement one. In here totally successful the main objective of brain improvement.

4. CONCLUSION

The overarching purpose of this research is to establish an integrated functional approach for the implementation of English language learning for Sri Lankan students to address their English language learning challenges in their high school education. This also presents a method for the tutor to independently assess individual student performances along with a forecast feature to determine how many marks a student will get before completing the quiz. The tutor will get an idea about the student's standing from this.

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APPENDICES