

# Alturjoman Alsagheer: Basic Language App for kids

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**Abstract:** We implemented an application that teaches Arabic children the basics of the languages; English, Spanish and German. The application teaches the children the alphabets, basic words and basic phrases. In addition, it uses voice recognition and image recognition to provide the user with fun and beneficial learning experience. The application tests the kids using a simple quiz to test what they have learned.

## I. INTRODUCTION

Learning Languages other than the native language is very important and required in various fields. For some companies, employees with second foreign language are highly recommended. Moreover, students studying abroad sometimes face difficulties in communicating with others. It is much easier for children at young age to know the structure of a language and develop it as they grow up. Combining technology with education can be very beneficial in helping children learn fast and in a fun way. Thus, we created an educational application that will attract the child's attention in learning new languages.

## II. BACKGROUND AND RELATED WORK

As we are Arabic students studying the field of Information Technology, we decided enhance our knowledge in application development and contribute to our society and culture. According to UAE demography, almost 90% of the population are non-Emiratis, which means a citizen may have to deal with foreigners in his/ her daily life [1].

There are different other applications that teach languages but all with their own different functionalities. AR Flashcards – Animal Alphabet application teaches children the alphabets using AR only [2]. Word Lens is an application that translates sentences to other language which supports text recognition [3]. Elements 4D by DAQRI also uses AR but for the purpose of teaching chemical elements [4]. Duolingo that offers courses in teaching different languages [5].

## III. REQUIREMENT & ANALYSIS

The following are the functional requirements of the project. It specifies the services and the operations that the game is providing to the users [6].

FR 1. The system shall allow the user to register.

- FR 1.1. The user shall enter a unique username.
- FR 1.2. The user shall enter an email.
- FR 1.3. The user shall enter a password.
- FR 1.4. The user shall re-enter the password for confirmation.
- FR 2. The system shall allow the users to login into the game using their registered username and password.
- FR 3. The system shall provide the following languages for the user to select from: English, German and Spanish.
- FR 4. The system shall provide the following options for the user.
  - FR 4.1. Choose Alphabets option.
  - FR 4.2. Choose Words option.
  - FR 4.3. Choose Phrases option.
- FR 5. The system shall allow the user to draw letters.
- FR 5.1. The system shall allow the user to trace letters by following dotted shape.
- FR 5.2. The system shall allow the user to move to the next letter.
- FR 5.3. The system shall provide the audio sound for each letter.
- FR 6. The system shall allow the user to learn phrases.
  - FR 6.1. The system shall allow the user to learn any of the first eight phrases.
  - FR 6.2. The system shall allow the user to take a quiz to unlock the next phrases level.
  - FR 6.3. The system shall allow the user to take the quiz after learning at least five phrases.
  - FR 6.4. The system shall allow the user to speak the phrase.
- FR 7. The system shall allow the user to learn words.
  - FR 7.1. The system shall detect the targeted image.
  - FR 7.2. The system shall display a 3D object of the image.
  - FR 7.3. The system shall provide audio sound of the word.
- FR 8. The system shall allow the user to logout.
- FR 8.1. The system shall direct the user to the main screen.

The following are the non-functional requirements of the project.

- NFR 1. The system shall be easy to use by all users.
- NFR 2. The system will be provided in Arabic language.
- NFR 3. The system shall be designed efficiently and shall have effective sounds.
- NFR 4. The system shall load within 2 seconds.
- NFR 5. The system shall be available 24/7.
- NFR 6. The system shall operate fast without any buffering.
- NFR 7. The system shall be accessed on pc and portable devices

The development requirements:

- DR 1. Operating System: Windows 10 + Macintosh
- DR 2. Languages: C# and JavaScript.
- DR 3. Android SDK 25.2.5
- DR 4. JDK 1.8
- DR 5. IDE: Unity

#### IV. DESIGN AND ARCHITECTURE

In this section, we introduced the general architecture that describes the overall scenario of the system. The player can either access the application as a guest user or by registration. The user chooses a language to learn. Then the user will follow certain tasks that will be given to learn. The tasks will support augmented reality, tracing, voice recognition.

We developed the use case diagram which identifies the functionalities that our system will provide to the user. Each case is written as we described in the system functional requirement. we identified the cases for register, login, choose the language. The learn phrases case includes pronounce phrases. The learn letter case includes write letter. We provided the take quiz case that includes true/false questions and multiple choice questions. We also identified the learn words case and logout case.

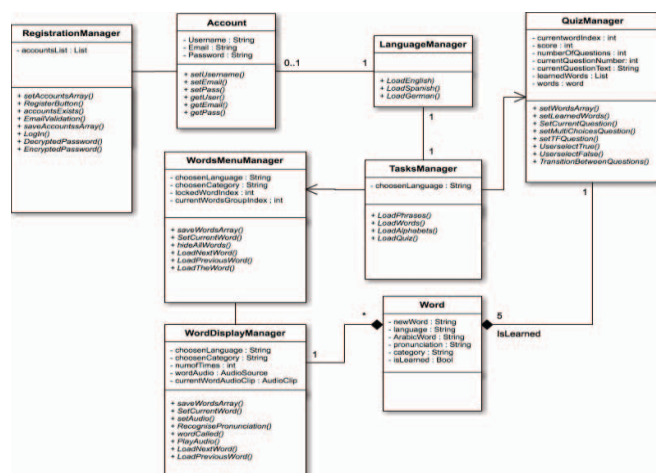


Fig.1. Class diagram

Fig 1 shows the class diagram of our system. It contains 8 classes; RegistrationManager, Account, WordsMenuManager, Language Manager, Tasks Manager, Quiz Manager, Word Display Manager, and Word. We identified the relationship between the classes and showed each class attributes and methods to deliver the idea of the system more clearly.

We developed the entity relationship diagram to represent the system data architecture. The entities of the system are User, Language, Letter, Word, Quiz, Record. We identified the attributes of each entity and described the relationship for each attribute.

#### Implementation and Testing

This section explains how we implemented and tested the main methods and functionalities of AlturjomanAlsagheer application.

Starting with the registration feature, we created a class of type account that holds the username, email and password as strings. Each time a new user registers, the username, email and password are added into a list of type Account. The user must correctly fill all the required field in order to register.

Moving to learning phrases, the user will be provided with a screen showing some well-known phrases and the user may learn the first 8 phrases. In order to unlock the next phrases, the user has to take a quiz and must answers at least 3 questions out 5 correctly. To load the phrases on the screen, we created an array of type word. When the user hears a phrase 3 times, the variable isLearned is set to be true. After that, the array will be updated and saved. We used the PlayerPrefs to save the array in the phrase display scene to be used later in the Phrases Menu Scene and the quiz. The Word class is serialized so it can be saved in PlayerPrefs.



Fig. 2. Phrases scene

For the voice recognition part, a script is attached to the audio button in the Learning phrases scene so the user can start speaking. Each word pronunciation is added in an array that compares the spoken word by the user to the actual word saved in the array. There are audio sounds for each phrase and

are saved in separate files. They can be accessed by selecting the language and the name of the audio files. And the program will add each sound to its suitable phrase in the array.

To write a letter, the user should trace the dotted arrows following the order of the numbers in the letter. Polygon Collider 2D component was used on each letter; it covers the shape with line segments to increase precision. The tracing color is set to be changed randomly for each letter.

In the Augmented Reality part, we used Vuforia SDK in order to save all the images that the user will be using in order to learn the words. In order for the 3D model to appear, we used a TargetImage for each word and attached it with its related 3D model.

To unlock next phrases scene, the user must take a quiz. The quiz includes true/false and multiple questions. Before generating a question, the learned phrases are added into a list. The word used for the question will be removed from the list after the user selects an answer.

We used the black box testing method to ensure the quality of our system. We identified the equivalence classes, provided the test cases and got the actual results. We used these steps to ensure that our application gets executed without any problems.

We have conducted a survey for the users in order to get their feedback towards the functionality, usability and the layout of our system. We visited an elementary school to test the application with the children. We tested our application with 21 students from grade 3. We got feedback from 45 people.

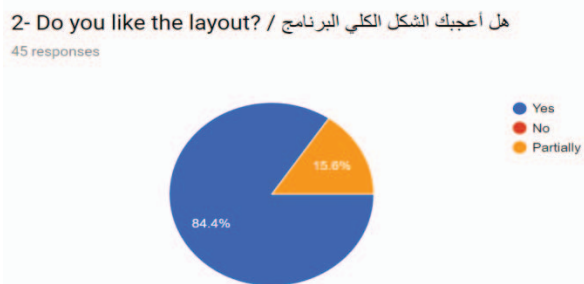


Fig. 3. Statistic of the layout



Fig. 4. Statistic of the most like tasks

The analysis of the results shows positive feedback from the users. 84.4.7% of the people liked the layout. Only 51.1 % managed to use the application easily on their own while the rest needed some guidance. 95.5% of people said that the functions are clear and easy to use. 73.3% of people said that they will keep using the application once it gets fully developed with more material to use. The majority enjoyed learning the phrases task (See Fig.4). The results showed that the phrases and the words sections are useful among the teaching methods. 71.7% of the people said the content of each page is clear and reasonable. 88.9% did not use such an application in Arabic language, while the rest have tried Arabic learning apps. Finally, only 24.4% of people prefer the applications to be in English language rather than Arabic.

## V. CONCLUSION

This application aims to is to educate Arab children to learn the basics of different languages such as alphabets, words, and well known phrases for each language in a fun and easy way. It is an interesting application for children because we are tracing, image recognition, voice recognition for the tasks. Although we faced some challenges during the implementation part, we became more confident in learning on our own and to learn and get better from our mistakes. For future development, we will be offering more languages for the user to learn and we will add more features like text recognition. We will also modify the application so it has both Arabic and English interface. This way the user decides which interface to use.

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