

Designing and Developing A Smart Application for Improving the Communication Between the Deaf, Dumb People and Society

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ABSTRACT

Technology and Science have made Human life addictive to luxury but still there exists poor people who are trying to find innovative ways which make the communication process easier. Regarding to the World Health Organization, about 1 million people are dumb and 300 million are deaf in the world. Whereas; the communication is one of the most important issues for deaf and dumb people. This work aims to propose a smart application named "Jusoor" to improve the communication process and bridge the gap between the deaf, dumb People, and society. The proposed application provides the user with a dictionary that contains many vocabularies with videos explaining the way that the word is indicated, the most important sentences used in public places (markets, parks, restaurants, etc.), Emergency calls that enable recognizing the type assistance needed with the feature of locating the person which makes it easier to reach and provide the assistance, and service of communication with sign language experts. The proposed work was analyzed using the Unified Modeling Language (UML), Firebase, XML and Java programming languages.

Keywords: Deaf, Dumb, Android Application, Sign Language and Unified Modeling Language.

I. INTRODUCTION

The World Health Organization (WHO) stated that about 300 million are deaf, 1 million are dumb and many more are suffering from one or more of the aforementioned physical disabilities. The developments in Science and Technology have reached to great heights in making the Human Life easier and comfortable within a short span of time [1-10].

During the few last years, many technologies have made our life more comfortable and easier, even without moving our bodies to do a task. The physically disabled people are part of our community who are deprived from the advancements of

Technology and Science since they need it to feel that they are the part of the society and they can walk hand in hand and participate with others in the community development. Also, Communication is a important issue in the human life especially the people who are Deaf or Dumb [1-4, 6, 11].

This work aims to propose a smart application named "Jusoor" to bridge the gap and improve the communication process between the deaf, dumb People, and society. The proposed application provides the user with a dictionary that contains many vocabularies with videos explaining the way that the word is indicated, the most important sentences used in public places (markets, parks, restaurants, etc.), Emergency calls that enable

recognizing the type assistance needed with the feature of locating the person which makes it easier to reach and provide the assistance, and service of communication with sign language experts.

II. Study Significance

This proposed application achieves a great positive impact on deaf and dumb people and the rest of society. Where, the proposed application removes the barriers between them, enhances their self-confidence and makes them feel able to communicate with the community, and performs all their activities without feeling fear of not understanding others, which makes them feel comfortable in Communication. Moreover; the proposed application serves the community in dialogue with this category in public facilities, schools, universities, etc.

For example, shopping through the application allows to communicate with sellers as well as in restaurants when choosing food, sports clubs and others, and helps them to participate in events and celebrations, and allows the delivery of their ideas to society without the need for a person to help them.

III. Related Works

- **Ihsan Human "إحسان إنسان"**

Ihsan Human "إحسان إنسان" is a mobile phone application that was worked on in Saudi Arabia, an application developed to help the category of people with hearing impairment by converting written words or phonetic phrases into sign language, as the goal of the application is to integrate this category of deaf and dumb with the community and facilitate the process of communication with others [12]. The application contains more than 24 thousand Arabic words converted to the sign language, and the developer intends to introduce other languages and

the possibility of converting the sign language from the deaf person into phrasal phrases. Figure 1 below show screenshot of Ihsan Human application.

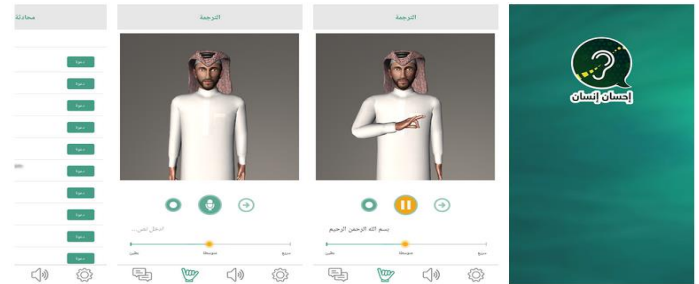


Figure 1: Screenshot of Ihsan Human application.

- **Tawasoly "تواصلتي"**

Tawasoly "تواصلتي" is an application that serves the urgent need for people with hearing impairment and hearing impairment to communicate with society in an easy and dual way communication, so that the deaf uses a communication application to communicate with the listener by writing words in the Arabic sign language keyboard and then the text will turn into a voice in Arabic [13]. The listener also use the application to communicate with the deaf through the sign language without the need to learn it, as the application will convert the text and voice to the Arabic sign language through 3D animation. Figure 2 below show Screenshot of Ihsan Human application.

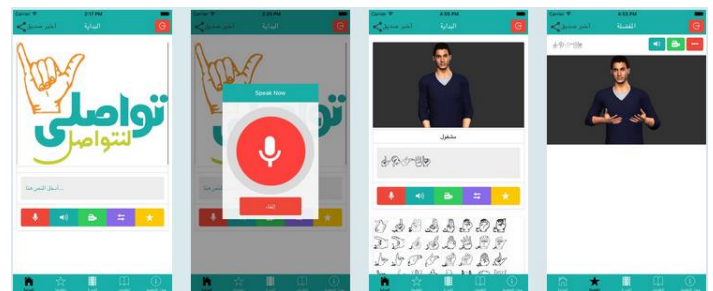


Figure 2: Screenshot of Ihsan Human application.

- **"let me Hear you" Application**

This app is designed to help people with hearing disabilities and the hearing impaired to communicate and ask for help in case of emergency [14]. So that the user can touch and ask for help and will automatically determine his/her location and write an author and automatically sent to the security agencies and to persons designated through the application settings, making it easier to reach the user, and provide assistance. The application is simple to use, and boasts several classifications and emergency situations (traffic, police, road safety, ambulance, fire fighting). Figure 3 below show Screenshot of Hear you application.



Figure 3: Screenshot of Hear you application.

- **AlTurjumanSL**

AlTurjumanSL is an application to translate written and spoken sentences into Arabic sign language through three-dimensional characters at the same moment easily [15]. The application facilitates the process of communicating with the deaf community without the need for the speaker to know the sign language, in addition to the fact that the AlTurjumanSL application is a very effective tool for learning the sign language in a fun and easy way.

Figure 4 below show Screenshot of AlTurjumanSL application.



Figure 4: Screenshot of AlTurjumanSL application.

The technological revolution influenced everything [16-93], even the approaches that aim to bridge the gap and improve the communication process between the deaf, dumb People, and society by introducing a free electronic application. Today, the use of Artificial Intelligence (AI) algorithms is expansive, particularly in providing solutions to challenging problems including image segmentation [17], information retrieval [63] and Healthcare Monitoring system [56, 67]. Therefore; many technologists have used AI as an effective technique for introducing new smart applications to improve the communication process between the deaf, dumb People, and society.

IV. Methodology

Object-oriented design and analysis offer an approach which facilitates rapid, logical, and detailed methods to create new systems responsive to a changing business landscape. Object-oriented techniques well-functioning in situations in which complicated information systems are undergoing continuous adaptation, maintenance, and redesign.

In this work, the unified modeling language (UML) will be used, the industry standard for modeling object-oriented systems. The UML toolset includes

diagrams that allow to visualize the construction of an object-oriented system.

1.1 Use Case Diagram

In UML, use case diagram is a behavior or dynamic diagram. Use case diagrams model the system functionality using use cases and actors. Use cases are a set of services, actions, and functions that is needed by the system to perform. In this context, a "system" is something operated or developed, for example a web site. The "actors" are entities or people operating within the system under defined roles. In the proposed application, the actors are the Normal User, Admin, Deaf User, Visitor and Assistant User. Figure 5 shows the use case diagram for the proposed application.

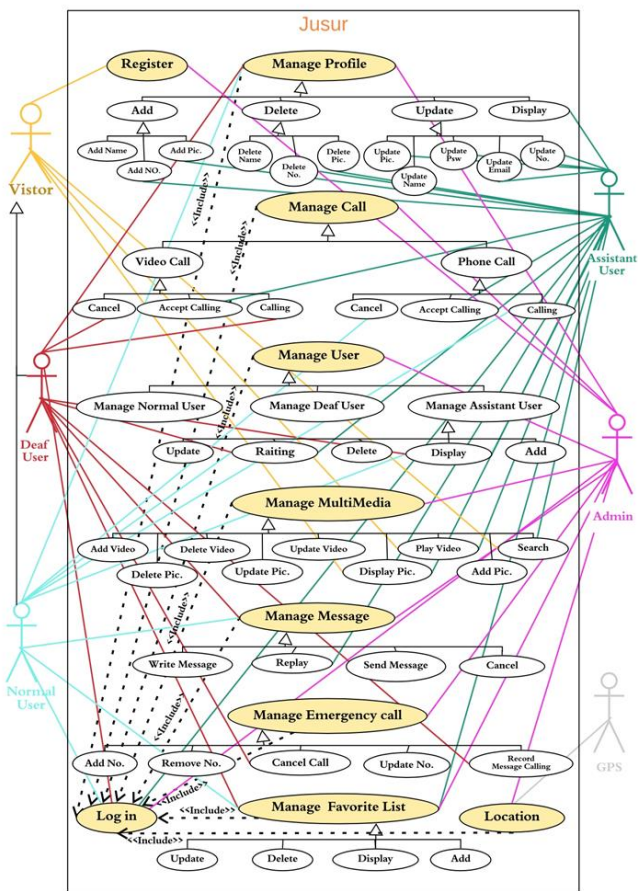


Figure 5: Use case diagram for the proposed application.

1.2 Context diagram

A Context Diagram is a simple but robust tool that obviously shows the under consideration system and the external entities which interact with it [94, 95]. A context diagram shows at a very high level:

- The boundaries of the system
- The external entities – these could be other systems or people
- The information which flows between these external entities and the system

External entities include several systems and stakeholders that have direct interactions with the system under consideration. Figure 6 represents the context diagram of the proposed application.

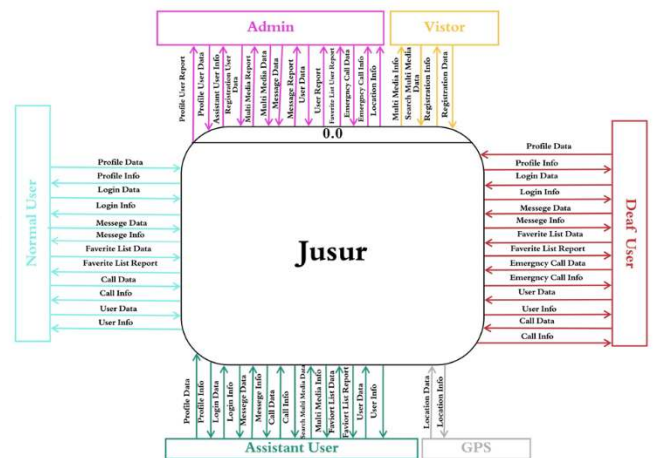


Figure 6: Context diagram of the proposed application.

1.3 Entity Relationship (ER) Diagram

An Entity Relationship Diagram (ERD) is a flowchart which shows how “entities” relate to each other within a system [96-102]. ER Diagrams are often used

to debug or design relational databases in software engineering, education, business information systems and research. Figure 7 shows the ER diagram for the proposed application.

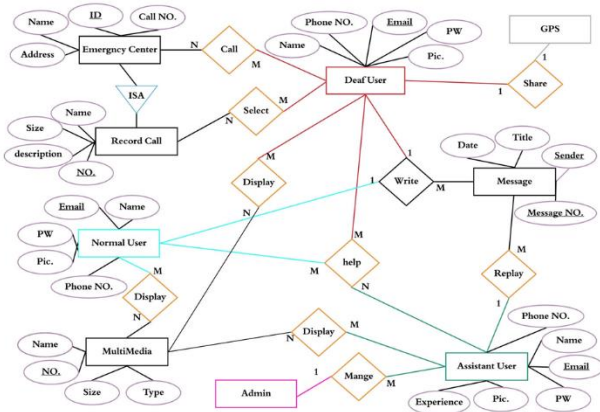


Figure 7: ER diagram for the proposed application.

2. Interface Design

Interface Design is the graphical design of the application which consists of the text, button, text entry fields, images, slider, and all the items that users use for interaction. The figures below are examples of the designed interfaces.



Figure 8: Home page



Figure 9: Registration interface

interface



Figure 10: Login interface



Figure 11: Profile interface



Figure 12: Video upload interface



Figure 13: Emergency call interface

V. Discussion

Usability testing is the experimental way for detecting product's user elements and finding the problems which are facing the users. The main goal of testing usability is to evaluate the product usability and evaluate the system, 20 students from the Imam Abdurrahman Bin Faisal University (IAU) from our faculty were invited to use the proposed application. Then the student answered a survey consisting of 10 items for measuring the user satisfaction level (as shows in figure 14). As can be understood from the result, most of the users agree that the system is beneficial, easy to use and achieves the main objective of the project.

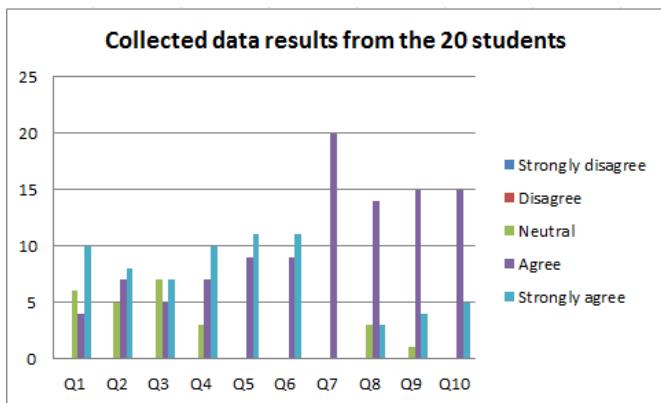


Figure 14: collected data results from the 20 students.

VI. Conclusion

This work successfully designed and developed a smart application named "Jusoor" to bridge the gap and improve the communication process between the deaf, dumb People, and society. The proposed application provides the user with a dictionary that contains many vocabularies with videos explaining the way that the word is indicated, the most important sentences used in public places (markets, parks, restaurants, etc.), Emergency calls that enable recognizing the type assistance needed with the feature of locating the person which makes it easier to reach and provide the assistance, and service of communication with sign language experts. The proposed work was analyzed using the Unified

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