Deaf Helper Mobile Application for Interaction of Hearing Disorders Communities

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***Abstract*— People with hearing loss in this world have not received much serious attention from the authorities. This makes these sufferers confused in choosing learning media to interact with and isolated from their social environment. This application was created to help people with hearing loss to be noticed and understood from the way they communicate using sign language through the mobile application called Assistant for the Deaf, which has many features such as registration, interactive videos, sign language translator, forums, customer service, library, information, history, events, donations, and shops. The application is designed using use case diagrams and class diagrams modeling the database, and the implementation used Android Studio and MySQL database.**

Keywords: Deaf Helper Mobile Application, Hearing Loss Mobile Application, Sign Language Mobile Application.

I.INTRODUCTION

Due to their limitations, people with hearing loss still have difficulty carrying out activities in social life, especially in communicating with others and the natural environment. In addition, poor attention to sufferers reduces their productivity and benefits in society. The impact is more significant for patients with children who affect their development, and the high cases of hearing loss are caused by various external ear diseases, ear blockages, cysts, drug deafness, and deafness from birth. Most of the causes of this disorder can be prevented, and therefore it is necessary to educate the public so that they are aware of maintaining cleanliness and ear health.

In the modern era like today, there are many hearing losses due to many factors, such as excessive use of a headset and many other aspects that also affect the ability to hear [4]. The most severe is someone who can not hear sounds above 90db, and this category has entered a difficult phase, commonly known as total deafness.

On the other hand, sign language supports language and speech development in children from childhood and is used for people with hearing loss to express what they want to communicate [3]. Sign language in Indonesia has two types: the Indonesian Sign Language System (SIBI) and the Indonesian Sign Language (BISINDO), but some deaf people have difficulty using SIBI because they use Indonesian, which is too standard. So, they prefer to use BISINDO to communicate every day [7]. The views of people with normal hearing, when they see people who have hearing loss, must be different, judging from the psychological condition of hearing sufferers who are considered a minority by most people.

The study of pragmatic understanding for people with hearing loss is significant for the growth and communication of people with hearing loss. Proper analysis is needed to help doctors, educators, and researchers get information about pragmatic skills for deaf or hard-of-hearing children and adolescents [8]. The theoretical integration of disability studies and communication allows us to view smartphones as part of the technological and communicative environment inaccessible to persons with specific disabilities. Future research should focus on the complex relationship between individual and “personal” new media devices or practices among persons with disabilities [15].

Deaf people have more difficulty accessing health information than hearing people. Deaf sign language users do not have access to information on health issues such as radio or TV, and there is a general shortage of health information and educational materials provided in sign language. Therefore, by learning sign language, it is hoped to educate medical personnel for sign language and families with hearing loss [14]. People with hearing loss often feel alienated from society so that their mental health is disturbed. With the Deaf Helper mobile application, people with hearing loss can feel they have valuable life and adapt to the broader community without feeling isolated [16].

Sign language is a method for deaf and deaf people to communicate with ordinary people. The expressive ability of deaf students is determined by the receptive ability of students to receive information, and several things affect the receptive ability. Like the communication patterns and communication media used by Deaf students, the family's contribution and the environment also affect how much language and information the Deaf students receive. The presence of a community in the application can also help the sensory abilities of these deaf students [25]. So we need the right approach to accommodate this [19].

II.EXISTING WORKS

The built application is intended to help deaf people communicate with ordinary people using augmented reality and 3D object tracking [28]. Previously, several research applications were used by people with hearing loss, such as Deaf Bible, Talk to Deaf, Deaf Communicator, and DEAF-ISL. They also help deaf people communicate, and in addition, there is a Sound Amplifier application used to increase clarity and volume and Live Transcribe as a transcription tool for more severe hearing loss [9].

Evidence suggests that deaf readers, both native and non-signal native speakers, must master the rule-based structures of spoken language to become proficient readers [27]. In addition, the use of other technologies such as facial recognition can also be an option by reading someone's expression through technology and converting encryption into a movement so that deaf people can communicate only by making facial movements. Furthermore, research in deaf education has great potential for fruitful exchange with educational research, but parallels, connections, and disconnections are unknown among many journal editors, grantmakers, or interdisciplinary collaborators [26].

For cases of deafness from birth in Indonesia, according to research results and available data, there are about 5,000 babies born with deafness in Indonesia or about 0.1% of all births. So that appropriate treatment is needed from an early age so that children with hearing loss do not have difficulty communicating in their social environment and can also help them live independently [1].

The ITU, a well-known research institute, reports that 466 million people have hearing difficulties in low- and middle-income countries [2]. Fundraising for corneal replacement has been carried out, and recent studies have shown that sign language and cochlear implants positively affect the academic achievement of deaf children [17]. Moreover, it is possible to facilitate communication between individuals with current technological advances. However, hearing or deaf people who use sign language and do not use the new technology (CI (cochlear implant) can better balance communication in society. [23]

III.PROPOSED IDEA

In this study, a mobile application was created to help those with hearing problems, especially families, communicate with people with hearing impairments. This built mobile application provides many valuable features for the Deaf Assistant Mobile Application users, especially those with hearing loss. For the user interface, Axure RP was used to match the design of the Deaf helper mobile app, and Android Studio was used to create Android apps and XCode for iOS apps. The mobile application can make it easier to learn about sign language simply by opening the various features provided.

The use case diagram in Figure 1 contains various features useful for the deaf as a mobile application for the hearing impaired. Furthermore, users registered on this mobile application can access features, such as interactive videos, sign language translators, discussion forums, customer service contacts. Moreover, they can access a library containing guides and e-books, information about the applications provided, events organized, and donate to the benefit of the fellow deaf and hard of hearing people who are less fortunate in terms of the economy.

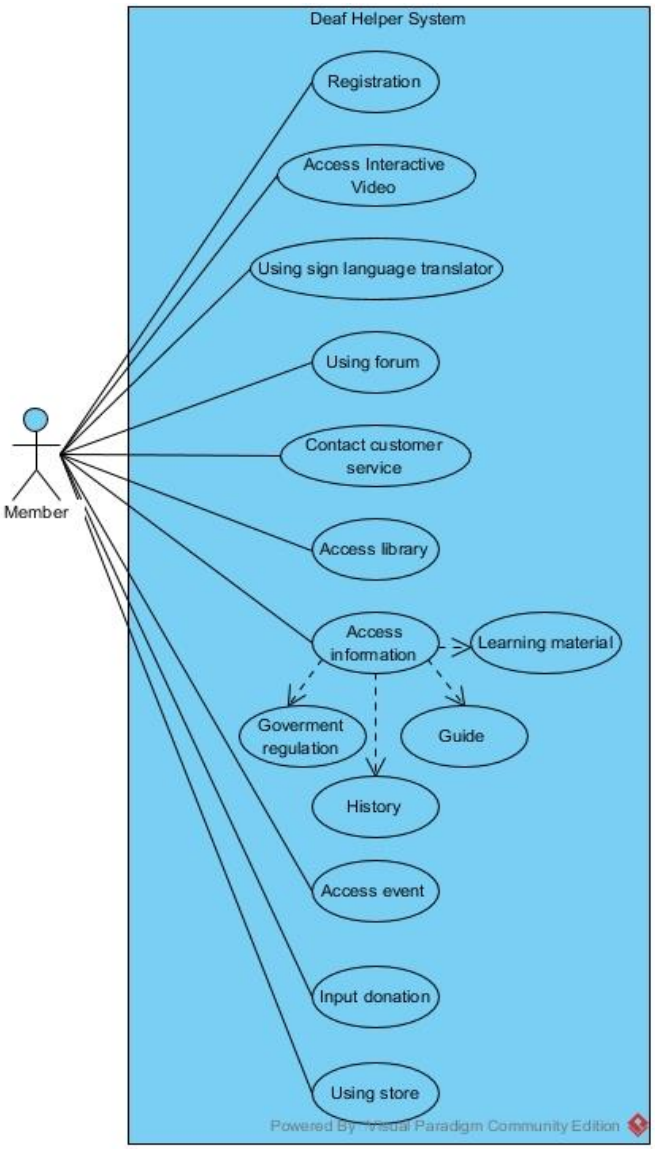

Fig. 1. Use case diagram.of Deaf Helper

The use case, as shown in Figure 1, shows the following features of the Mobile Deaf Helper Application, which consists of the following use case activities:

- Registration

Before using this application, a registration process is required where the user fills in personal identification such as name, address, gender, DOB, and email to access the features contained in the application, such as forums, donations, and shops. In addition, it can provide appropriate services based on the data that has been registered. UI Registration can be seen in Figure 4(A).

- Access Interactive Videos

The proposed mobile application is equipped with interactive videos for sign language learning that users can see step by step to understand better how to communicate with sign language [10]. UI for Interactive Video can be seen in Figure 5(A).

- Sign Language Translator

This sign language function translates from sign language to Indonesian and vice versa. Writing keywords or using the available word recommendations will display the appropriate sign language from English or Indonesian. In addition, using the Exact English Signing base with precise accuracy to understand vocabulary and grammar correctly and efficiently understood by deaf and hard of hearing people with various movements [12]. Furthermore, a feature to convert sound into images or symbols that deaf and hard-of-hearing people can read facilitate their communication [20]. The proposed mobile application has sign language features in photos and images to communicate with deaf and hard-of-hearing people [29]. The Sign Language symbol can be seen in Figure 2. The UI of the text translator can be seen in Figure 5(B), and the UI of the photo translator can be seen in Figure 6(A), including the UI of the voice translator can be seen in Figure 6(B).

Fig. 2. Sign Language Symbol [30].

- Using Forum

The forum feature in the proposed mobile application is used as a gathering and discussion place for deaf people and their families to discuss everything related to deaf and hard of hearing people motivate each other. In addition, all issues and related government regulations are also discussed. The UI for the Forum can be seen in Figure 7(A).

- Contact 24 Hours Customer Service

Users can contact the customer service, which is ready to serve, and answer questions about the deaf helper application within 1x24 hours.

- Access Library

Library services are provided for users who wish to download book files in pdf format that users of the proposed mobile application can read. The UI for the Library can be seen in Figure 7(B). The books displayed are books related to people with hearing loss.

- Access Information

The user uses this use case option to provide or find information related to people with hearing loss. The information provided can be from families who have family members who are hearing impaired, such as parents who have children with genealogical disorders, tips on how to interact, government regulations for the deaf, and others. In addition, there is also information such as the use of text or words to explain sign language better so that it is better understood by users [24]. In addition, the information provided by families who have family members who are hearing impaired becomes a piece of guide information based on parents' experience so that the community can apply this method to deal with people with hearing loss in their surroundings [18]. UI for use case Information can be seen in Figure 8(A).

- Access Events

The use case access event is used to see and join in activities held for the hearing-impaired community. The proposed activity has information and a schedule of events or activities for people with hearing loss to gather and interact without feeling isolated. The UI for use case access events can be seen in Fig. 8(B).

- Input Donation

The UI for Donations can be seen in Figure 9(A). This input donation use case is a feature that users can choose to donate or raise funds for people with disabilities who experience a lack of funds. Fundraising can be done by raising funds for hospital treatment costs buying hearing aids which the team will later send.

- Using Store

This use case using store is an online store that provides everything or tools related to people with hearing loss. The product will be sold at a price without making a profit, and besides that, this use case using store has a fundraising feature for people with disabilities by donating money to a product to

be given to people with disabilities who are less well off in the economy. The UI for using Store can be seen in Figure 9(B).

Based on the use case diagram in Figure 1, a class diagram as shown in Figure 3 is created and contains 11 classes where each class represents a table in the database, and the classes are Member, Shop, Forum, Dictionary, Admin, Video Details, Hand Video Movement, Library. , Information, Events, and Donations.

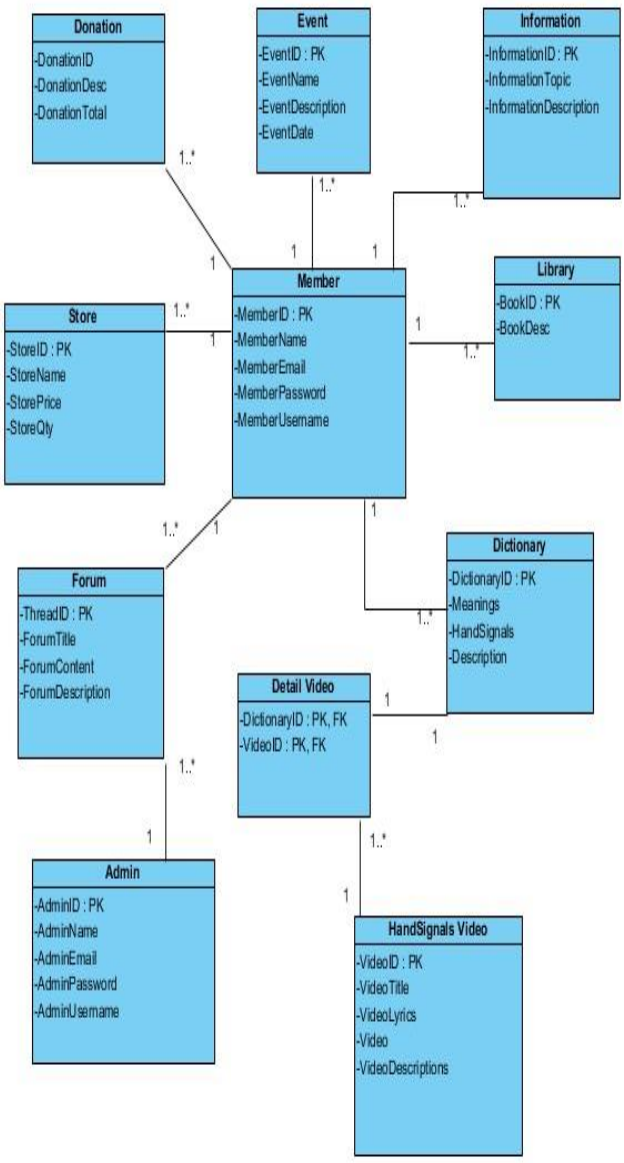

Fig. 3. Class Diagram of Deaf Helper Database Model.

The database shown in Figure 3 is a class diagram of the proposed mobile application. There are 11 classes in the diagram, such as Member, Dictionary, Library, Information, Event, Donation, Store, Forum, Admin, Video Details, and HandSignals Video. The Member can access several forums based on the available forum titles. Members can access multiple e-books in the library class based on the available bookID. Members can access multiple dictionaries based on DictionaryID, and Dictionary has one video detail which serves as sign language and hand sign video storage. Members can open multiple store pages and browse stores based on StoreID and StoreName. Members can go to multiple Donation pages and Request or Give Donations. Finally, members can open multiple Events pages. Then Admin can access and manage multiple Forum threads and search by ThreatID.

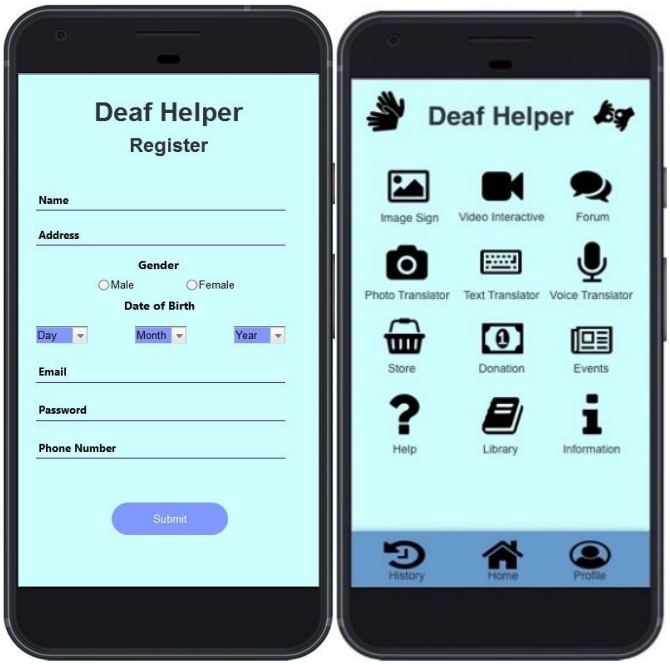

Fig. 4. (A) Registration User Interface, (B) Home User Interface.

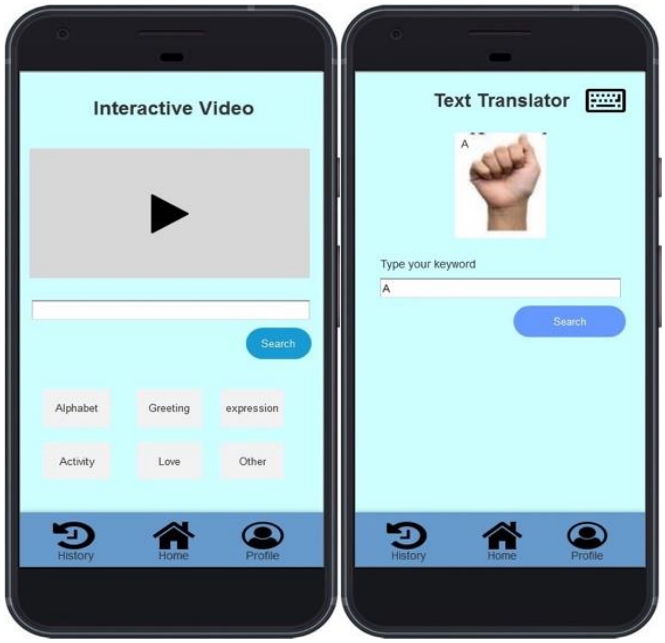

Fig. 5. (A) Interactive Video User Interface, (B) Text Language Translator User Interface

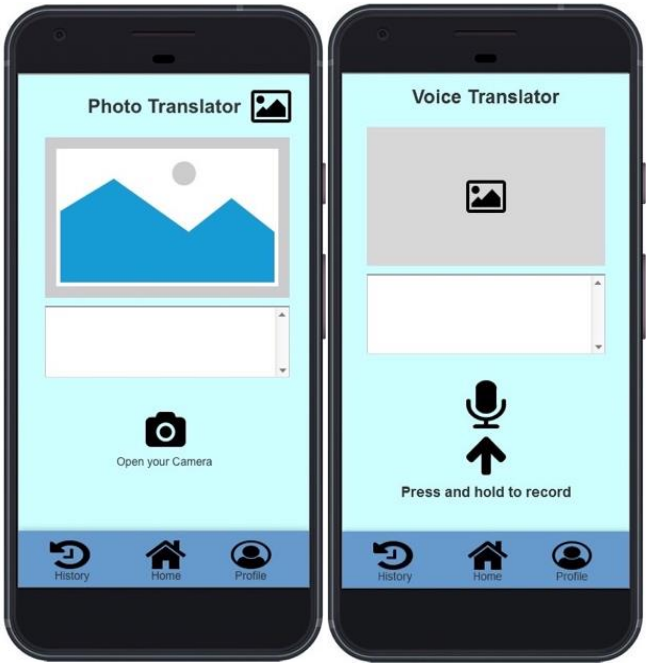

Fig. 6. (A) Photo Translator User Interface, (B) Voice Translator User Interface.

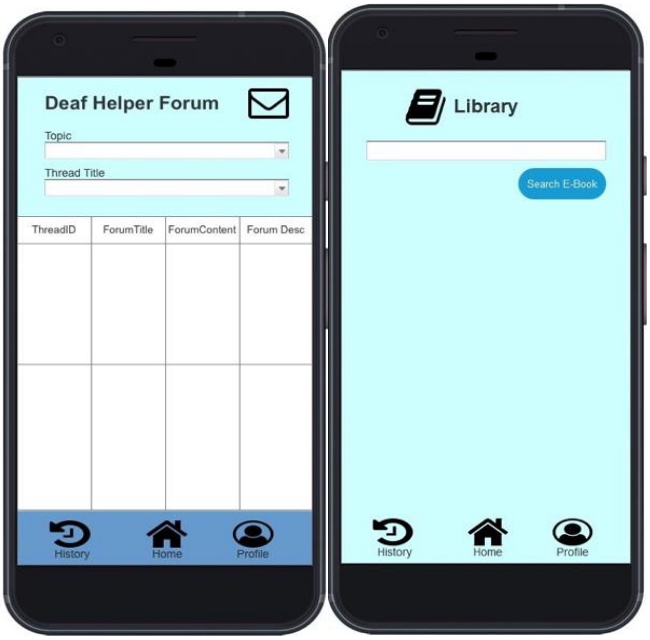

Fig. 7. (A) Forum User Interface, (B) Library User Interface.

Deaf Helper Mobile Application User Interface provides an overview of the proposed mobile application with several features, such as Registration, Home, Interactive Video, Sign Language Translator, Forum, Library, Information, Event, Donation, Store. The User Interface can be seen in figure 4 for Registration User Interface and Home User Interface, figure 5 for Interactive Video User Interface, and Text Language Translator User Interface. Meanwhile, figure 6 for Photo Translator User Interface and Voice Translator User Interface and figure 7 for Forum User Interface and Library User Interface. Lastly, figure 8 for Information User Interface and Event User Interface, Figure 9 for Donation User Interface and Store User Interface.

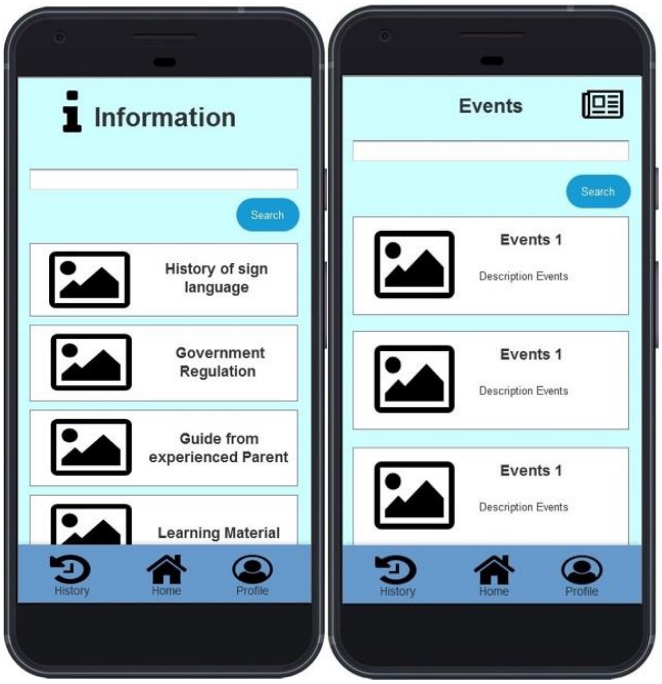

Fig. 8. (A) Information User Interface, (B) Event User Interface.

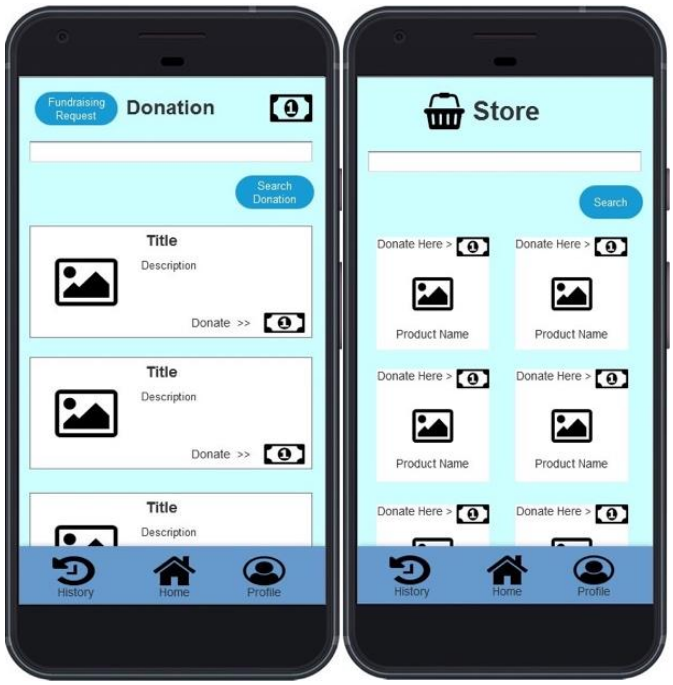

Fig. 9. (A) Donation User Interface, (B) Store User Interface.

IV.Conclusions and Recommendations

With this application made, many people still have hearing loss and have difficulty finding the suitable learning media to learn hand language with many languages and abundant

features. It is easier for people with hearing loss to carry out daily activities to know sign language more quickly and interpret sign language through the features of the application made. It is suggested that this mobile application can be used as a practical learning tool and to interact with other people and does not see limitations such as hearing and other disorders. This is mainly because the interaction between humans as social beings is essential for lives on this earth.

Acknowledgments

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