Available online at www.sciencedirect.com

ScienceDirect

Procedia Computer Science 94 (2016) 295 – 301

Procedia Computer Science

The 11th International Conference on Future Networks and Communications (FNC 2016)

Assistive Technology for Deaf People Based on Android Platform

Emad E. Abdallah[a,*] Ebaa Fayyoumi [b]

[a,b]*Faculty of Information Technology, Hashemite University, Zarqa 13115, Jordan*

Abstract

Social communication is one of the most important pillars that our society based on. It is well-known that the language is the only way to communicate and interact with each other verbally or non-verbal way. People with special needs are members of this society and have the right to enjoy the communication with the external environment in an easy and professional manner. This paper aims to provide an interesting application that guarantees ultimate communication with the disabled users and vice versa. The key feature of this application is employing the Arabic language as a medium of communication to learn all the sign language terms.

The power of this application appears in two aspects: first of all, the ability of normal people to communicate with the targeted people without having any previous knowledge on signs language. This can be either achieved by voice recognition of words or by typing the words in the Arabic language. The application is then displays the appropriate image(s) in the sign language. Secondly, and more importantly, people with special needs communicate with normal people by choosing the signs images on their phones from the numerous categories stored in the databases which express their ideas and thoughts. Consequently, the set of images is transformed into a text paragraph. We evaluated our application by testing it on real deaf and dumb users. We carefully created scenarios on realistic situations. The early results are promising as all deaf found the proposed technology useful and 90% of them wanted to use it on daily basis.

Peer-review under responsibility of the Conference Program Chairs

Keywords: Disabled people; deaf; assistive technology; sign language; mobile application.

* Corresponding author. Tel.: +0096-795673231; fax: +00962(05) 3826625.
E-mail address: emad@hu.edu.jo

Peer-review under responsibility of the Conference Program Chairs
doi:10.1016/j.procs.2016.08.044

1. Introduction

Deafness and hearing loss is the condition of incapability to hear things, either totally or partially. According to the World Health Organization, 360 million people worldwide (Over 5% of the world's population) have disabling hearing loss where 32 million are children ("World Health Organization," 2015). It is the second largest proportion in the distribution of people with disabilities according to the General Census of Population and Housing. Deafness has a deep impact on the quality of life for the deaf individuals and their community. Some people think that intelligence of deaf and dumb people are less than normal people, but what we would like to express that this idea is not true! Deaf and dumb people have sharp intelligence that makes them equal with normal people.

Hearing disabilities differ from other disabilities, due to the presence of another language that compensates for verbal or oral language and it is known as a sign language. We can define the sign language that it is the language which used by deaf and dumb people to communicate with each other and with other people. Despite the existence of another language that compensates the verbal language. The communication between the disabled people and the normal people is still difficult even with the existence of the sign language. This is because of the misconception which is common among people. As human we would like to contribute by developing an android application to connect people with special needs and other people.

Assistive technologies cover a wide range of assistive, adaptive, and rehabilitative devices for people with special needs. In the past 20 years, there has been a huge development in the sector of deafness and hearing loss assistive technologies. Assistive technologies are classified into hardware based, software based, and prosthetic implants [1]. For many years, people with hearing loss have used text telephone or telecommunications devices to communicate by phone. Assistive technologies allows people who are deaf, hard of hearing, or speech impaired to communicate through a communications assistant (CA) with people who use a standard telephone. A CA relays the TTY (text telephone or telecommunications device for deaf and hard of hearing people) [2,3] input to the telephone user and types that person's response back to the TTY user.

A game for deaf children is proposed in [4] to develop the children language skills. The game uses camera and sensors to detect and collect signal data for the American Sign Language (ASL) recognition system. The user will wear gloves and any sign made will be captured by the camera. The system then shows a video with a signer demonstrating the correct ASL phrase. The user can then mimic these gestures. The possibility for deaf educational technology is increased by allowing signing children to interact with the computer using their gesture-based language.

A computerized scheme to assist the deaf people is THETOS, it translate a spoken language to Polish sign language. The system uses natural language processing techniques[5]. They used a scripting notation for signing signals and a web browser plug-in to interpret this notation into gesture data. They achieve a very good delivery of signing. Moreover, they escape the inflexibility of video or motion capture. Tests with deaf community have shown that the method can deliver suitable quality of signing.

Interactive computer identification and correction of language errors is proposed in[6]. The main objective is to employ natural language processing to train deaf people on written English. A deaf person send his writing and the system will then execute a syntactic analysis, defines the errors and deliver feedback. The feedback will help the deaf to be aware of the nature of the errors he/she commit. The writing could be resubmitted for a second check and the cycle is repeated.

Application for deaf people is presented in[7], the idea is to help dumb or deaf people to express their feelings to normal people with the help of sign language. The application provides deaf people with an approach to become