韓國融合信號處理學會

2021 夏季學術大會 論文集

KICSP CONFERENCE 2021

일시　2021.06.25(금)

장소　부산광역시 BEXCO 컨벤션홀

주최 : KICSP 사단법인 한국융합신호처리학회

주관 : 동명대학교

언어 및 청각 장애인을 위한 모바일 어플리케이션 구현

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ConWis Mobile: Implementation of AAC Assistive Mobile Application

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Abstract For the development of human beings, being able to communicate is a fundamental element, assisting their coexistence in society. Communication is an integral part of humans' life. It helps to spread knowledge, information, and different forms of relationships between people. However, millions of people around the world are unable to enjoy this blessing. Whilst there are resources for augmentative and alternative communication (AAC), most of them do not completely satisfy the needs of individuals. Therefore, this study proposes a mobile AAC application tool we developed that helps disabled children and adults communicate effortlessly with other people, especially in office work, school, or social gatherings.

• Key Words : Convergence, Augmentative and Alternative Communication (AAC), Android, Hearing/Speech impairment

Ⅰ. Introduction

Nowadays, as science and technology evolve, assistive technology devices and equipment are advancing rapidly that can be used to help a person with a disability fully engage in life activities. According to the Korean Ministry of Health and Welfare, as of 2016, 2.511 million people were registered as disabled. Physical disability accounted for the largest share at 50.5%, followed by speech/hearing disability (11.6%) and visual disability (10.1%) [1].
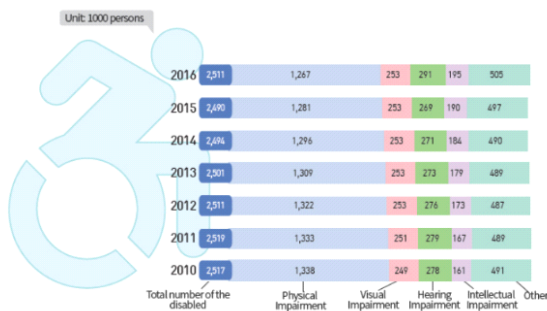

Fig. 1. Number and Status of the Disabled Registered (2010-2016), Korea

Among these, hearing impairment (also known as hearing loss) is a condition in which people cannot completely receive sounds through their ears. On the other hand, speech impairment (also called communication disorder, or voice disorder) is a condition in which people have trouble forming sounds [2]. Solving the problems encountered by people with speech disorders in daily activities has driven the development of several techniques and strategies to aid the speech of individuals. The first resources for augmentative and alternative communication (AAC) were developed in the 1970s in Toronto, Canada [3]. Since then, parents and special education teachers have been encouraged to use sign language and symbols to communicate with people with speech disorders.

The picture exchange communication system (PECS) was developed in the 1980s as a multi-phase AAC intervention to assist individuals with speech disorders [4]. Despite the technological advancement of AACs, speech-generating devices (also known as voice output communication aids) are extremely expensive, difficult to program or personalize, and not sufficiently flexible to accommodate the needs of users. To make optimal use of AAC devices, while producing a more affordable tool, AAC applications were created.
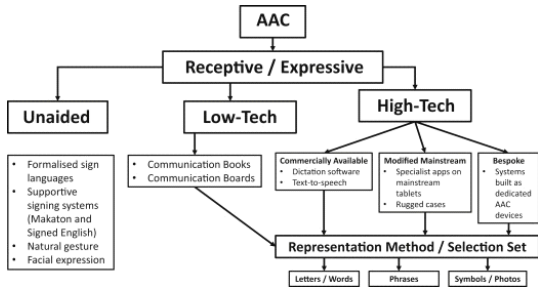
Fig. 2. Types Alternative and Augmentative Communication Devices

II. Main idea

This paper proposes a more user-friendly, and more readily available AAC application designed for smartphones for anybody to be able to use.

Before starting the development process, we had to make a concise plan to follow. We decided to use Android Studio IDE and Kotlin programming language. ConWis Mobile uses Samsung's default TTS engine to convert text to speech for patients with speaking disabilities. For those who have a hearing impairment, Google's speech recognition library was used to take speech audio and transfer it to visual text. The app is available in two languages English and Korean.

Fig. 3. Speech Recognition Process Diagram

Samsung Text-to-Speech enables developers to synthesize natural-sounding speech available in multiple languages and variants. As an easy-to-use API, we can create lifelike interactions for users when they want to speak something. We applied Google's most advanced deep learning neural network algorithms for automatic speech recognition (ASR). When a friend, family member, relative, or co-worker of a patient wants to speak the navigate to the STT section to receive real-time speech recognition results as the API processes the audio input streamed from your application's microphone.
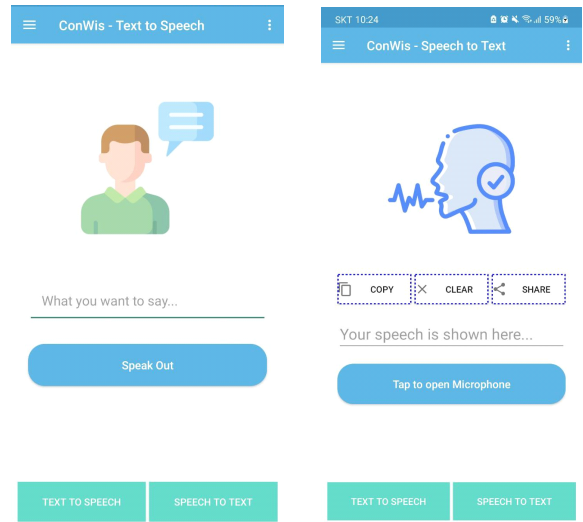

Fig. 4. TTS layout (left) and STT layout (right)

III. Conclusion

In summary, assistive technology can be a tool that helps people with disabilities learn, work, and live more productive lives. Ranging from simple mechanical devices to sophisticated hardware and software, assistive technologies address a wide range of disabilities.

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