An Auxiliary Device for the Deaf

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Abstract: Disability is far story for the people. People look at them with prejudice rather than with good will. The number of hearing-impaired people worldwide is about 400 million, three times the Japanese population. We have created an assistive device that allows the hearing impaired to solve this problem. We visited the Korea Deaf Association for this project and found the most uncomfortable. In Korea, the number of assistive products for them is few. They are even expensive and difficult to obtain. Prior technology can't be used indoors and outdoors at the same time. There is a problem in everyday life because there is no indoor or outdoor integrated product. And there are few products that tell us the cause of the sound. Unlike conventional products, you can identify the cause of the sound and respond quickly.

1. Background and Purpose

We focus on identifying and solving uncomfortable problems with deaf people. The purpose of this project is an integrated sound processing system for the hearing impaired. The project aimed to develop products for the hearing impaired. The present invention recognizes the surrounding situation through vibration of LED lights, smart phones and wristbands, and helps to recognize indoor and outdoor (indoor doorbell, ringing, baby cry, smoke alarm, outdoor vehicle sound).

2. Concept and Idea

The products on the market today tell the direction of the sound but do not tell the cause of the sound. So we have built a device that can be used both indoors and outdoors, and it tells us not only the direction of the sound, but also the cause of the sound. In the interior, we use LED lights, smart phones and wrist bands, and outdoors, we use smart phones and wrist bands.

3. Design and Functions

Smart phone Application: When you send sound results from the main device to your smartphone, the image appears and vibrates. In the case of application configuration, it consists of three buttons (Bluetooth connection, disconnection, confirmation) and a screen for checking the image. In order to inform the main device that the user has understood the situation, you must press the OK button for each situation.

4. Problems and Future Work

In this project, there is a problem about the type of wireless communication and sound described above. To be more specific, a total of six communications are required for this project. Therefore, it is not desirable to deal with the radio in consideration of each delay of communication, and solves the problem by connecting the microphone and the main processing unit by wire. In the case of the kind of sound, when the FFT is used, it grasps the characteristics of the sound in the frequency band. However, there is a problem that it is difficult to clearly distinguish the sound in the similar frequency band by the FFT. Also, similar sounds may be recognized if the frequency bands match. The FFT is inadequate to solve this problem. Therefore, if the technology of speech recognition is applied rather than solving in the

frequency band, it seems that the work will be more complete.

At the target stage, the aim was to wirelessly communicate the microphone and the main processing unit. However, when used wirelessly in the design process, the sampling frequency decreases with the delay and is connected to the line. We aimed at least eight kinds of sounds, but each sound has a problem of overlapping frequency domains, and the target is corrected by picking four distinct sounds.

Therefore, we were able to accomplish our goal except for the initial wireless problem and the reduction of the type of sound. As an improvement, it seems to be possible to solve the wireless problem by using a Bluetooth module supporting a slightly higher specification. If we apply the technology of speech signal processing instead of FFT, we can distinguish desired sound without restriction of sound even if frequency band is similar.

< Application>

| <Car> | <Baby cry> | <Fire alarm> | <Doorbell> | <Default state> |

< Band Device>

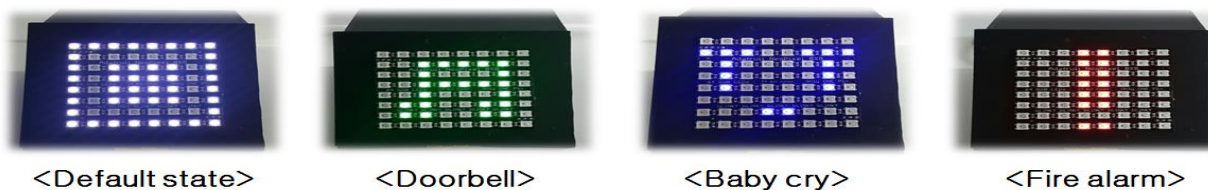| <Car> | <Baby cry> | <Fire alarm> | <Doorbell> | <Default state> |

Wrist band: When you send sound results from the main device to your wristband, The LED will work for that value and the wristband will vibrate. The wrist band has one switch, which is the same as the confirmation button for the application described above.

<Dot matrix Display>

| <Default state> | <Doorbell> | <Baby cry> | <Fire alarm> |

Dot matrix Display: this device is built with indoor LED lighting.