POSTECH

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LANEMATE

Car Sensing System for the deaf

LAMfor:D
LANEMATE for the Deaf

CONSIDERATION

Most deaf people feel discomfort walking along a road that coexists with a street

■ **Narrow road**

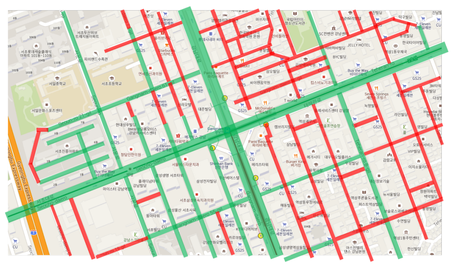
Seoul street statistics [1] indicate that 39.8 % of the street is a one-lane narrow road and most of them are side streets that do not have a clear distinction between a sidewalk and a street.

■ **Lack of ability to detect**

People with hearing impairment usually experience the inconvenience from the lack of the ability to detect background

This specific traffic condition in Korea endangers people with hearing impairment who cannot detect a car's movement when it is out of sight.

■ road with sidewalk
■ road without sidewalk



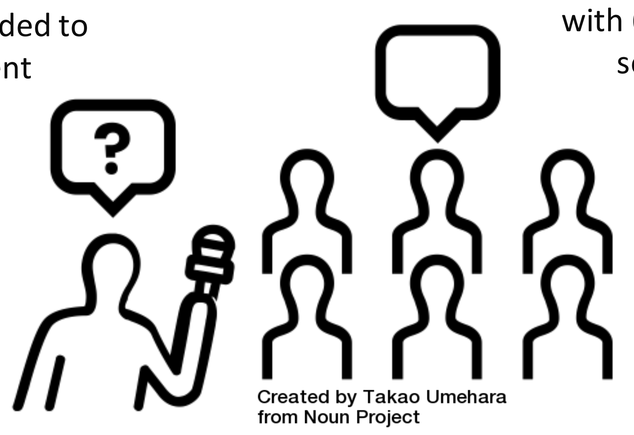
RESEARCH

■ **First Group interview**

After visiting Pohang association of the deaf and listening to two deaf people, we decided to solve problems in the external environment and set up the goal suggesting a solution concerning hearing impaired people not being able to detect cars.

■ **Online Survey**

We contacted the deaf society in Daegu University in South Korea to get feedback for first concept Design from more people.



Created by Takao Umehara from Noun Project

Finding needs that the deaf wants using survey and interview

■ **Second Group interview**

We proceeded the second group interview with 6 deaf students in the deaf society and listened to their opinions about the second concept design and experiences they actually had.

■ **User Testing**

We produced the prototype with Arduino, and proceeded user testing with 4 deaf students in Daegu University.

1st Group Interview
Problem Investigation
Select the Problem

↓ 1st Concept Design

Online Survey
1st Concept Feedback

↓ 2nd Concept Design

2nd Group Interview
2nd Concept Feedback

↓ Prototype

User Testing
Prototype Feedback

DESIGN

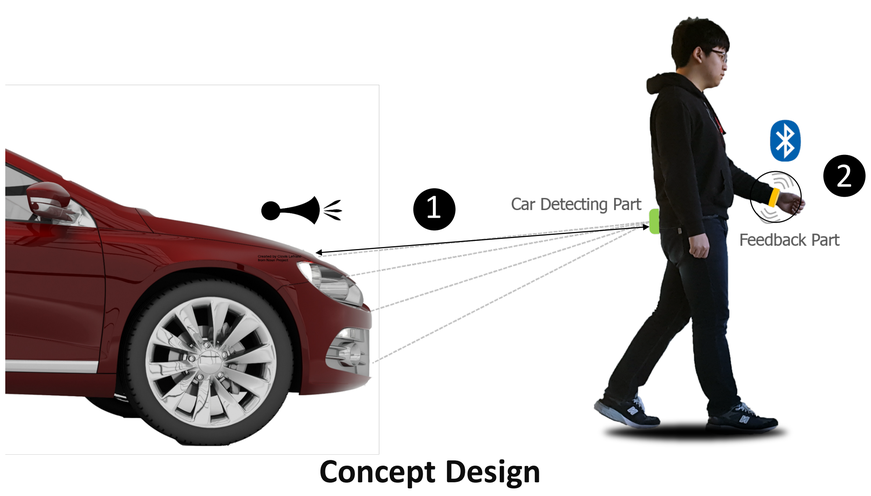
Adapting hardware and software for the deaf

■ **Car Detecting Part**

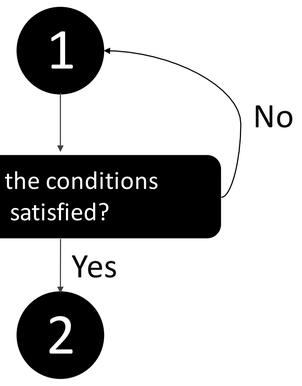
Car Detecting Part is composed of ultrasonic proximity sensors, a sound analog sensor, Bluetooth modules, a microprocessor, and a case. Car Detecting Part is placed on the user's shoulder with sensors facing the rear. The ultrasonic sensor measures the distance between the user and the object, and the sound sensor measures the loudness of the ambient sounds. The microprocessor checks two conditions to recognize the presence of the car at the rear.

■ **Feedback Part**

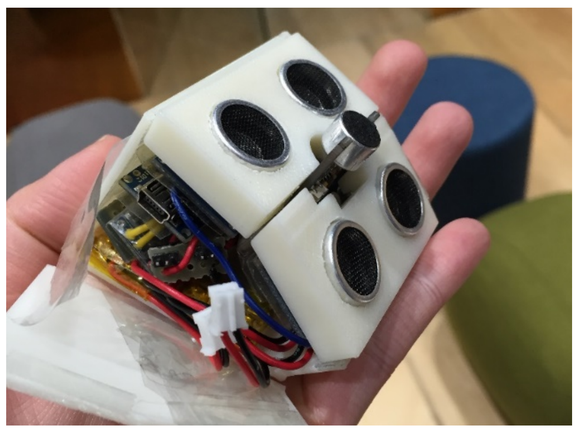
Feedback Part is composed of vibration motors, a Bluetooth module, a microprocessor, and a case. This part is worn on one's wrist. When the Bluetooth module gets a signal, the microprocessor runs vibration motors.



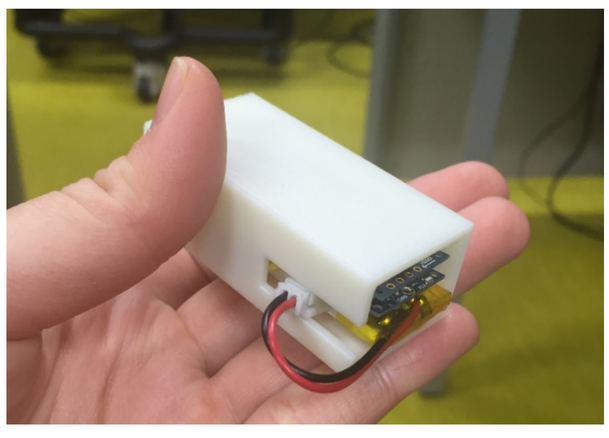
Concept Design



Process Algorithm



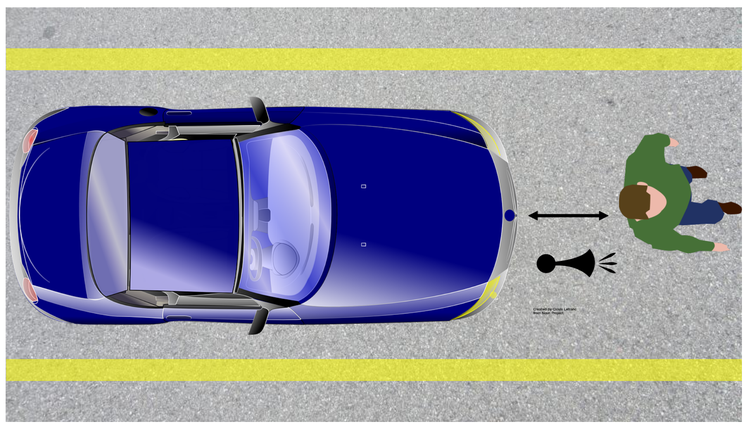
The Prototype for car Detecting Part



The Prototype for feedback Part

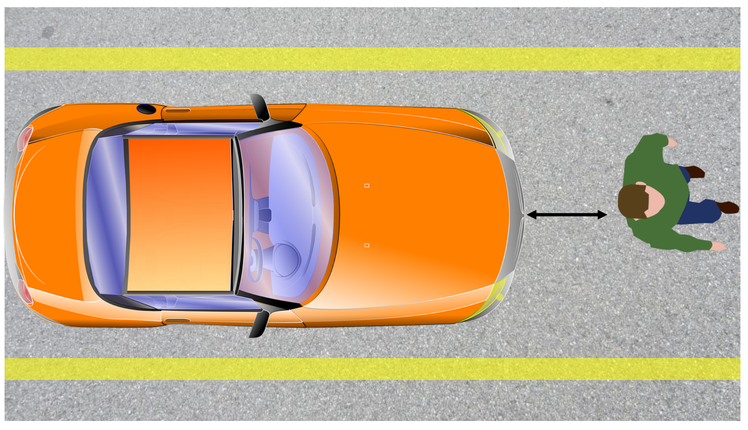
APPLICATION

■ **Situation 1**



The first condition is that the measurement by the sound analog sensor is larger than a specific value and the second condition which is whether the value measured by the ultrasonic proximity sensor is in a specific range.

■ **Situation 2**



The third condition that an object be behind the user for a long time with a constant distance when a car without a horn waited behind the user.

If at least one of two situations happens, we can infer that a car is behind the user, so the microprocessor sends a signal to the Feedback Part through the Bluetooth.

Reference 1. Korean Road Traffic Authority, Traffic Accident Statistics
2. Asphalt texture - http://www.cc-content.net/index.php?site=showimage&show=238&lang=en