International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 05 | May-2018 www.irjet.net p-ISSN: 2395-0072

IoT Based Horn Detection System for Safety Four Wheel Driving

Syed Ali Fathima S J[1], Ajith Kumar M[2], Bhuvaneshneshwar[3], Arunsunai Bala Kumaresan P[4]

[1]Assistant Professor, Dept. of CSE, Kumaraguru College of Technology, Coimbatore, Tamil Nadu, India,
[2,3,4]UG Scholar, Dept. of CSE, Kumaraguru College of Technology, Coimbatore, Tamil Nadu, India.

Abstract - *The aim of the paper is to introduce a horn detection system that can be recognizing the horn sound and its direction for a safety four-wheel driving. This system can help deaf persons as well as the persons who were difficult to find in which side the vehicles are overtaking them during driving. The flashing lights are the visual cues to which Deaf people pay attention while driving, but honking horns does not inhibit any visual cues. For the safety of deaf people and to reduce the discrimination of society about deaf people driving, there is a need of a device that will alert deaf drivers and also indicate them from which side the sound is coming. To build that desired device, the Arduino Uno board is used as a microcontroller to acquire the sound signal.*

Key Words: Internet of Thing(IoT), Horn, Deaf Driver, *Arduino Uno*, Microcontroller

1. INTRODUCTION

Many research study is being conducted by professional researchers to collect data about the importance of hearing for safety driving. Some of the people believe that in the overall driving task, hearing takes only minor significance. Coppin and Peck in California performed a well-designed study of deaf automobile drivers and found that road crashes are 70% more by deaf person when compared to non-deaf men. In fact, Henderson and Burg (1974) have outlined driving situations in which hearing could be significant, and one of the most import fact is identified to be the audibility of warning sound from outside the vehicle. Due to these reasons, the discrimination is shown to deaf people and some of them are not allowed to drive. In order to overcome this situation and to avoid this major reason to be the stopper for the deaf people from four-wheel driving, there is a need for supplementary device to be attached to cars that can act as ears for deaf drivers [1].

In Oct 2016, Ministry of Road Transport & Highways of India – "If a person is rehabilitated with hearing amplification (hearing aid or cochlear implant) and can hear reasonably then license for them can be considered". This project will help the deaf persons to find in which side the vehicle is overtaking. Deaf driver or the driver who keeps window closed with loud music during driving, finds difficult to be aware about surrounding. To overcome this, sensors are used to sense the horn sound outside the vehicle and make the driver aware of surrounding. The literature survey of our report states that the sound of horn can be differentiated from the other sounds within the range of distance. So, the horn sound can be detected from the sensor using the micro-controller.

2. LITERATURE REVIEW

The people with hearing impairment may not be able to detect sounds unless the hearing level reaches around 25 decibels Hearing level (db HL) to 110 db HL whereas the normal people is able to hear sound with level below 20 db HL. Newby (1979) presented the severity degree of hearing loss and the level of impairment [2] based on the average pure-tone thresholds at 500, 1,000, and 2,000 Hz which is meaning but may vary based on the issue of application [3]. Refer table 1.

Table -1: Level of Impairment

Hearing level	Degree of Severity
0 to 20 db	Normal
20 to 30 db	Slight
30 to 45 db	Mild
45 to 60 db	Moderate
60 to 75 db	Severe
75 to 90 db	Profound
90 to 110 db	Extreme

The auditory requirements specific for safety driving are not known entirely and the relationship between the driving ability and loss of hearing is not well defined. Vision, smell, touch and hearing are the four senses which plays major role in the driving task in which a report identified that 95% vision is required for driving. Thus visual acuity test is required by most of the licensing agencies and very rarely the test for auditory or olfactory abilities are carried out. Even the normal driver can have affected by the noise environment and audibility of other sounds can be masked while driving [4].

This paper presents IoT based horn detection system built with Arduino Uno board with necessary sensors and microcontrollers in order to provide safety four wheel driving for normal as well as deaf drivers.

3. PROPOSED SYSTEM

The proposed system is to solve the problem by creating a device that will alert a driver and also will indicate from which direction the sound is coming from, whether right or left side.

3.1 Hardware Components

The hardware components used to implement the horn detection system for four-wheel vehicle is shown in Table 2.

Table -2: Hardware Components for horn detection system

Component	Description
Arduino	Used to control all the sensors in the system.
Servomotor	Used to make the radar with the help of ultrasonic sensor.
Ultrasonic sensor	Used to detect the distance range of the vehicle.
LCD	Used to display the output of the system.
Microphone sensor	Used to detect the sound of the horn.

Ultrasonic Sensor: It is used to find whether any vehicle is within the range to affect the vehicle then the microphone sensor is activated to check honking horn, Refer Figure 1.

Figure -1: Ultra Sonic Sensor

Servo Motor: Sonar is mounted on the servo motor and servo motor rotates 180deg back and forth. It acts as a radar to find whether any vehicle is within range. Refer Figure 2.

Figure -2: Servo Motor

Microphone Sensor: Two small microphones will be installed to the outside of the car body to receive the audible cues. In order to indicate where the sound is coming from, each microphone shall be installed around the back of the car about 120° apart. Microphone sensor such as the one shown below in Figure 3 is to be used. This type of microphone sensor is Arduino board compatible.

Figure -3: Arduino board compatible Microphone Sensor

Microcontroller: When the input sound signal is received, the signal is should be analyzed and filtered in order to trigger the output signal. The microcontroller board used in this system is Arduino Uno board which is used to process the signal, Refer Figure 4. The Arduino board is programmed with the Arduino software. First Arduino board will be connected to servo motor and ultrasonic sensor and the second Arduino board will be connected to microphone sensor and LCD display to display the direction.

Figure -4: Microcontroller - Arduino Uno board

LED and LCD: To alert a deaf driver, output signal is important and necessary. Among many options, the blinking LED and the LCD display are chosen. Arduino board will be connected to LCD display to display the direction and to blink LED light on the panel.

Figure -5: LCD Display

3.2 Software IDE

The Integrated development environment (IDE) software used to build the system is shown in Table 3.

Component	Description
Arduino IDE	Open-source Arduino IDE is used to write code and upload it to the microcontroller board easily. It runs on Windows, Mac OS X, and Linux
Processor IDE	Open source computer programming IDE built for the electronic arts, new media art, and visual design communities

3.3 Architecture and Workflow

Architecture diagram of the proposed system is shown in figure 6.

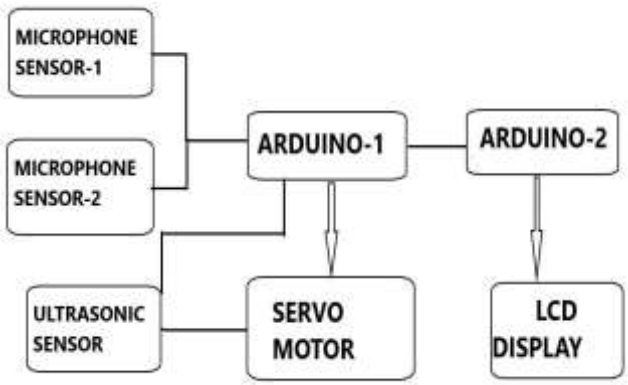

Figure -6: Horn Detection System Architecture

Workflow:

The system begins with sensing the object in back of vehicle. The ultrasonic sensor fixed in back will sense the object at particular distance and pass signal to Arduino. Then the two microphone sensor fixed on left and right side of system will sense the horn sound and provide information about the direction of vehicle. The display fixed in front the driver will intimate whether the object is in right or left. With this intimation the driver can move on safer side of the lane and avoid crashing. Simulated working model of the system is shown in Figure 7.

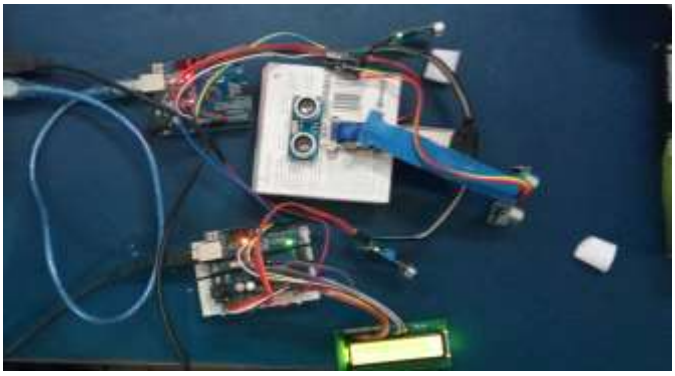

Figure -7: Horn Detection System- Working Model

4. CONCLUSION

This paper has given the idea of integrating a horn detection to the four-wheel vehicle to enhance safety while driving by the hearing impaired or normal people by giving an additional awareness about the surroundings of driving environment. The Future scope of this system is to add the usage for the people who tend to hear songs while driving with high sound. The accuracy for the detection of horn sound from other noises can be improved by separating the frequency of horn sound from noise frequency, thus maximizing the efficiency of the system.

REFERENCES

[1] Craig Mokhiber, "WFD Statement on Deaf People's Right to Drive a Car or Other Vehicles." World Federation of the Deaf, Mar. 31, 2009.

[2] http://auditoryneuroscience.com/acoustics/clinical_audiograms, last accessed 10/05/2018.

[3] http://www1.vanasch.school.nz/pdfs/audiogram.pdf, last accessed 10/05/2018.

[4] Thomas J. Songer et al., "Hearing Disorders and Commercial Motor Vehicle Drivers", Technical Report Documentation, US Department of Transportation Federal Highway Administration, Mar. 1993, Publication No. FHWA-MC-93-W

[5] "Arduino Support from Simulink." MathWorks. N.p., n.d. Web. 14 Nov. 2013.

[6] World Federation of the Deaf, "WFD Statement on Deaf People's Right to Drive a Car or Other Vehicles." March 31, 2009.

[7] "Vehicle Horn." Wikipedia. Wikimedia Foundation, 09 July 2013. Web. 23 Oct. 2013.

[8] "Blind Spot Crashes Increase." The Telegraph. Ed. David Millward. N.p., 22 Sept. 2011. Web. 01 Oct. 2013.