Smart hearing and visually impaired passenger voice alert system

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Smart Hearing and Visually Impaired Passenger Voice Alert System

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Abstract. The major challenge for the physically impaired persons is to recognize and cross obstacles in the surrounding environment. Hearing and visually impaired passengers find difficult to travel to their destination by bus or Train. The primary purposes behind the inconvenience are unpredictable train plans that have made it practically difficult to identify the hour of arrival at the necessary destination. In the current strategy, the traveler will know the destination of the train by getting the buzzer alert signal by utilizing the RF module. Some of the traditional methods used Zigbee module, GPS, ARM7 etc. This paper mainly focused on the issue looked at by hearing and visually impaired travelers who utilize public transportation. The departure and arrival time of trains should be intimated to challenged person for proper navigation. For this purpose, in Railway station, the information will be gathered from the display board and send to the voice converter which is the input for the seismic generator, and subsequently, the data will be felt as vibration to the passenger. The fundamental target is to make the visually and hearing hindered individuals realize the basic data reported in the railroad station with no troubles. The advantage is not only to help the Hearing and visually impaired people but also it is useful for the other traveler by knowing the information of the display board which is far away from the control room.

Keywords: Auditory information, Microcontroller, Seismic generator, vibration.

INTRODUCTION

The information of obstacles is taken into thought for development in new routes and planning. The two components in human way finding are environment location and evasion of deterrents. There are different methods of transportation like the metros, the railroads, and much other open transportation, the ordinary individuals confront numerous day-to-day issues in open transportation than a tremendous address in case of outwardly impeded and hearing impaired individuals. The challenges confronted by hearing crippled individuals and dazzle individuals are really complex and troublesome particularly when they got to explore through the open transportation framework. [1]. The need of availability for the visually disabled is central to a number of the issues the dazzle or low visual people face. A result of hearing misfortune is the misfortune of sound-related data and this misfortune may influence behavior in transportation circumstances and can decrease transport security. As shown by the Swedish about hard of hearing society, there are generally 1.3 million grown-ups in Sweden (17%) with a hearing misfortune. This number is expanding due to more clamor within the environment [2]. Hearing-impaired individuals utilize open transport can increment their chances of instruction and business and decrease the budgetary burden on their families. In most physical situations, the hearing impeded have trouble in getting to data around transport stops terminal and time plans, which anticipate them from utilizing open transport successfully. Agreeing to a study in Taiwan on the living requests of impaired individuals, using public transport was the foremost basic issue, summing to 71.04% of 602 hearing-impaired individuals [1]. The overview comes about appeared that as it were 14% of hearing and outwardly disabled individuals utilized open transport (city transport, mass fast travel, prepare, etc.) [3]. Knowing the flight of the prepare and the entry of the prepare arrive are two common troubles confronted by

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hearing-impaired individuals. In this paper, we propose a framework with a few highlights to supply a hearing and outwardly impeded traveler with implies for security and comfort. From the show board, the data will be accumulated by employing a Bluetooth module and send to the voice converter which is the input for the seismic generator, and in this way, the information will be felt as vibration to the passenger.

HARDWARE COMPONENTS

Block Diagram

The following figure 1 shows the block diagram of Smart Hearing and Visually Impaired Passenger Voice Alert System. From the Figure, the required power supply is given to the microcontroller (ATmega328p) and Bluetooth module using a battery. The timing of arrival and departure information will be received by the Bluetooth module and send to microcontroller from the control room.

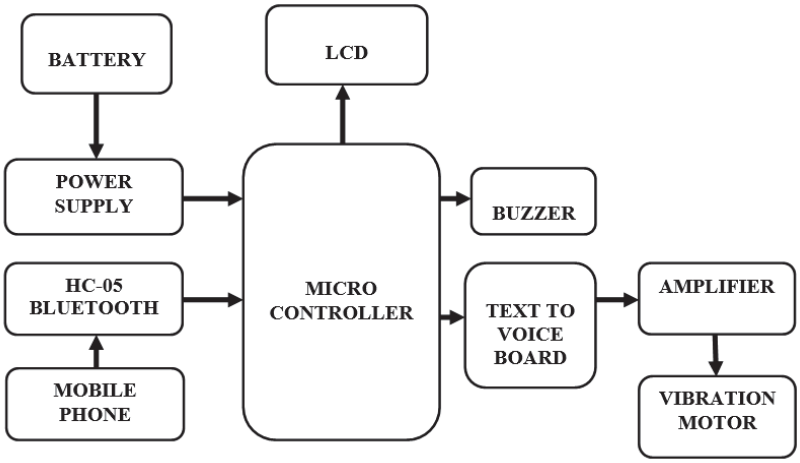

FIGURE 1.Block Diagram of Smart Hearing and Visually Impaired Passenger Voice Alert System

The information from the ATmega328p microcontroller is changed over into voice frequency utilizing text to voice board. From that signal is send to an amplifier for further strengthening and send to the vibration motor. At last, the passenger will feel the vibration in the jaw as the outcome the traveler will know the information.

Hardware Requirements

Bluetooth

HC-05 Bluetooth Module could be a basic to make use of Bluetooth Serial port protocol module. From the figure 2, the Bluetooth module has 6 pins. In HC-05 Bluetooth module has two data modes. In HC-05 module could be a MASTER or SLAVE mode. The Part of the module can be outlined solely by COMMANDS. It gives trading mode among master and slave mode which suggests it prepared to consume not only getting other data nor communicating data. It takes the 2.45GHz repeat band. The trade pace of the data can vary up to 1Mbps and is in scope of 10 m. It can be worked interior 4-6V of constrain supply. The consecutive port (UART) with the default baud rate of HC-05 Bluetooth module. The specifications of HC-05 module are:

- Serial Bluetooth module for microcontrollers
- Operating Voltage: 4V to 6V (Typically +5V)
- Operating Current: 30mA
- Range: <100m
- Works with Serial communication (USART) and TTL compatible

The **HC-05** has two operating modes such as Data mode and AT command mode. Data mode can send and receive data from other Bluetooth devices and AT Command mode used for changing default device settings.

Microcontroller

The ATmega328P is a single-chip microcontroller. It is designed by Atmel and belongs to the Mega AVR family. Fig. 3 shows the microcontroller ATmega328P.

Parameters	Range
Operating volt	Range from 5V
Input voltage	7V – 12V(maximum)
DC input current	40 mA
Program memory type	Flash
Input and output pins	18 pin
Length & width	68.64mm & 53.4mm
weight	20g

It acts as the processor for the Arduino board. It contains 28 pins. It has three ports named as port B, port C, port D. Port C is an analog port and it has six pin and port B and D are digital port and have 7 pins. It consists of pulse width modulation. This PWN is helpful to transmit all signals in a pulse modulation. It consists of different types of memories such as flash memory, EEPROM, SRAM. A high-level language like c, c++ has been used as the programming language in ATmega328P. Analog input is also called a continuous-time signal. For various applications, these analog signals are used. It has 6 analog input pins and can be named from A0 to A5. Digital input is also called a non-continuous time signal with discrete input pulses. It has 12 digital inputs and names from D0 to D11. Working of microcontroller includes checking the power supply and also input ports. According to our application, the output pin is connected with the external device. Using Arduino software the program is created for execution. Using the power jack cable the program is uploaded through the Arduino microcontroller. ATmega328P saves the program and the IC present will act as the processor without any error it is processed. The reset button is present and the purpose of the reset button is to reset the program which means it deletes the previous program. ATmega328P is mainly used for robotics applications and also in automatic process industries.

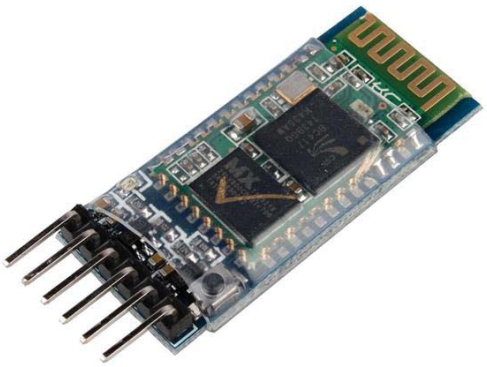

FIGURE 2. Bluetooth – HC-05

FIGURE 3. Microcontroller (ATmega328p)

LCD

Liquid Crystal Display screen is an electronic module and it has wide range of applications. Figure 4. Shows the 16x2 LCD. A 16x2 LCD is a fundamental module .It can display 16 characters which are present in each line. Command and Information are the two enroll in LCD. The LCD (Liquid crystal Display) has a parallel port interface which means that the microcontroller has to uses several port pins for the display. The interface consists of several pins, RS (Register Select) pin used for the writing data purpose in LCD's. In LCD's there are two modes namely data modes and command modes. R/W (read or write) pin is used to read or write the data in LCD's.

EN (Enable) pin is used for enabling the operation in writing modes. In LCD they are 8 data pins(D0-D7). The position of these pins is used to know the reading or writing modes of operation in LCDs. They are also having a display construct pin (V0) and has a power supply pins(+5V and Gnd) and LED backlight pins used to power the LCD and they are display contrast and also having a turn ON or OFF LED backlight

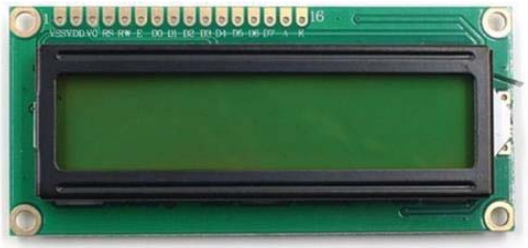

FIGURE 4. LCD

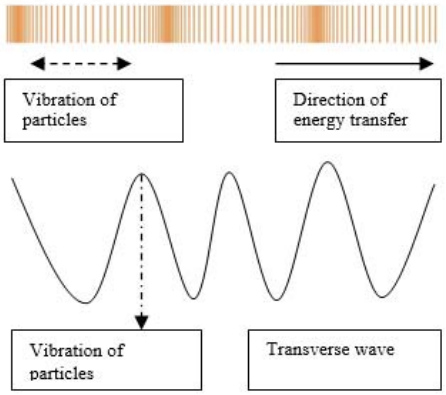

FIGURE 5. Seismic wave

Text to Voice Converter

In the text to voice converter, the data signal is converted into a voice signal. In microcontroller (ATmega328p) there is a header file called Talkie.h by using this text is converted into voice and given to the amplifier for reducing the noise. With the help of this voice converter, deaf and blind people will get the benefit. By this converting the text, the disabled people can easily understand the things which were displayed in the railway station.

Seismic Vibration Motor

Sound travels in waves by the air. Usually, sound waves pass by a few area within the ear, sometime recently being interpreted and conduct by our anxious structure to our brains. To start with, the waves go in for the outside ear, or pinna, which is the colossal wave piece of twist that helps with centering the sound. From there, the sound enter into the overfed center ear, which comprise the auditory canal and the eardrum, a fold of skin that pulsate when uncovered to the vitality from acoustic waves. On the opposite side of the eardrum, there are three small bones, the ossicles, which are joined to it. They communicate the vibration to the cochlea, a liquid filled design that takes those vibrations and changes over them to electrical main impetuses that are sent along the hear-able nerve to the mind. In any case, that's not by any implies the as it were way our body can handle sound. When the bones vibrate, the sound comes to the cochlea, fair because it would be going by the center ear and eardrum, and comes about within the similar sort of nerve driving forces being conduct to brain. This strategy of echo is called seismic vibration conduction. Figure 5, shows the seismic wave.

The vibration which generate amplifies sound pulse goes into the ear. Surviving hair cells distinguish the larger pulse and change over them into aural signals that are progress along to the brain. The higher the harm to a person's hair cells, the more serious the hearing misfortune, and the more prominent the hearing help enhancement required to form up the distinction. In any case, there are down to earth limits to the sum of intensification a hearing help can give. In expansion, in the event that the internal ear is as well harmed, indeed expansive pulse will not be changed over into aural signals.

METHODOLOGY

In this paper, the information regarding train arrival and departure timings data will be fetched from the control room and send to the ATmega328P microcontroller with the help of the Bluetooth module. The fetched data will be encoded and converted into the voice signal and send to the amplifier unit, where the output will be amplified. The amplified signal is given to the vibration motor. The vibration will be generated; by this the disabled people can easily understand the data which was displayed in the railway station.

CIRCUIT DIAGRAM

In the circuit diagram shown in the fig. 7, the power supply is connected to the atmega328p microcontroller and this microcontroller has 28 pins. The LCD is connected to the microcontroller for display purposes for our reference and LED for indication of input data, then the data will be encoded and send to the Bluetooth module and the buzzer is connected through a driver from the microcontroller.

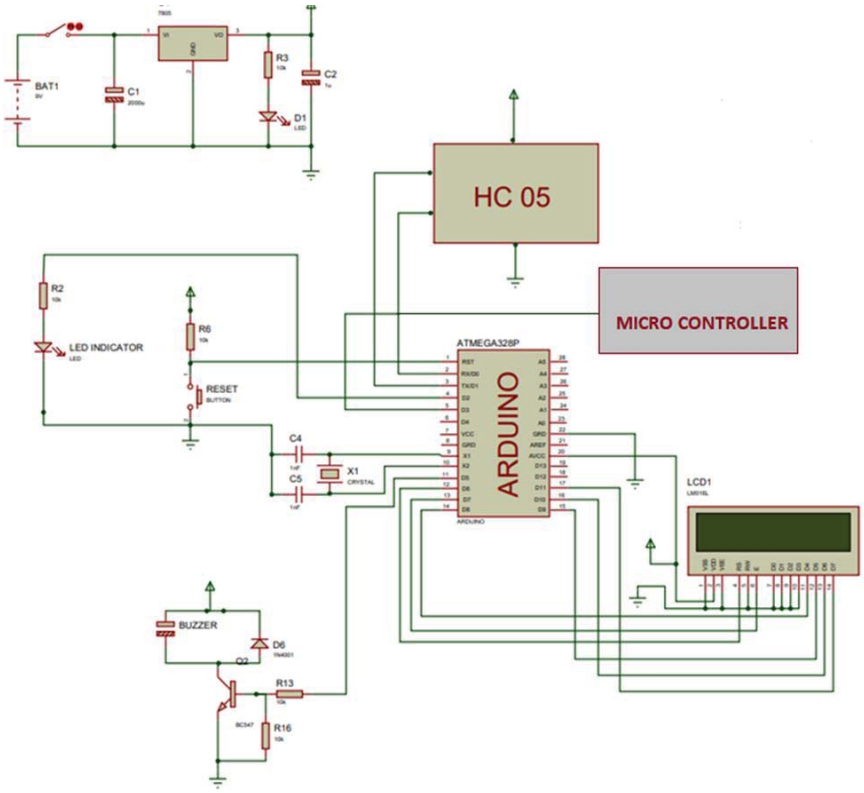

FIGURE 6. Circuit Diagram of Smart Hearing and Visually Impaired Passenger Voice Alert System

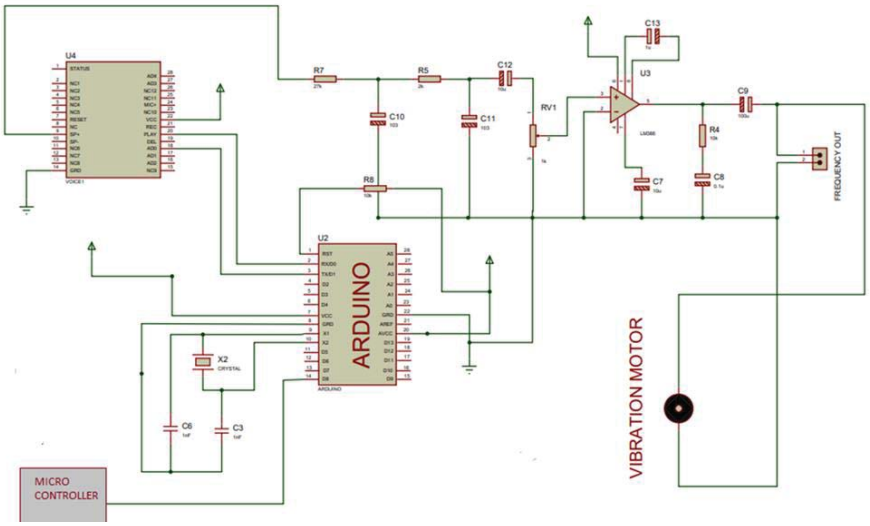

FIGURE 7. Circuit Diagram of Smart Hearing and Visually Impaired Passenger Voice Alert System

And in the receiver part from the Bluetooth module, the data is decoded and then send to the microcontroller and then data signal will be amplified by the amplifying unit which produces the pure voice signal and this pure voice signal is given to the signal to frequency converter and the output will be frequency. This frequency is given as input to the vibration motor and vibration will be created. The required information which was announced and displayed in the railway station was easily understood and identified by the hearing disabled and visually impaired people.

CONCLUSION

This paper is helpful for the hearing and visually impaired people to know the common announcement which was given in the railway station like train departure time, arrival time, and so on. With the help of this paper, the impaired people can act like normal people without any difficulties of knowing information. Hearing and visually impaired people can easily know the data which is displayed in the railway station with the help of Bluetooth module and also understand the voice signal with help of vibration motor. Hearing impaired people will get alert message in their mobile phones.

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