

# An Improved Design of Smart Alarm System for Hearing Impaired People using Arduino

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**Abstract**— About nine million people in the world are considered to be a hearing impaired people. Communications between hearing impaired peoples and a normal person have always been a challenging task. This lack of communication can be minimized or rectified by using suitable technologies. Thus developing such a technology which is connecting the hearing impaired people and normal people are necessary in this situation. This project work represents the design and construction of smart alarm system for hearing impaired people. The inconvenience caused to the people standing outside the door seeking for the response from the hearing impaired person who is inside. This system consists of Arduino Microcontroller for controlling all the operations. Vibration motor which is fitted as a smart band on hearing impaired person wrist which is used to notify the person is standing outside. Camera paired along with this system used to see and monitor the person standing outside. Along with this DC Gear motor coupled for automatic opening and closing of doors.

**Key words:** Alarm System, Vibration Motor and Surveillance Camera, Opening and Closing of Door

## I. INTRODUCTION

Communication plays an important role in day to day life. Among people about nine million peoples are considered to be a hearing impaired people. They face a major problem in daily life while communicating with common people. They face many problems in their life due to lack of communication and causes inconvenience to other also. One of the major problems faced by them was taken into account and a solution is provided in this project. Here issue considered is hearing impaired person are left home alone. They can't hear calling bell ringing sound and thus causes inconvenience to the person standing outside. This problem can be rectified by using this project. Our proposed project is based on designing of smart alarm system which can easily detect and inform the hearing impaired people via smart indication using vibration motor. When the alarm rings, the hearing impaired people can't hear the sound, instead of this vibration motors vibrates. This system helps in identifying the person standing outside the door, via camera which is connected to mobile phone wirelessly. Command is given via mobile application for automatic closing and opening of doors.

## II. SYSTEM COMPONENTS

This system is designed considering the present scenario of hearing impaired persons who are home alone. It consists of seven main components. They are Arduino UNO, ringing bell, RF transmitter and receiver, vibration motor, wrist band, driver circuit, linear actuator and security camera.

## III. DESIGN OF SYSTEM COMPONENTS

The system is divided in to four main units. Controlling unit, Indication unit, surveillance unit and command unit. The indication unit is used to indicate whether someone is standing outside or not. Surveillance unit is used to see the person who is standing outside and the command unit is used to send command to the door lock whether to lock or unlock.

### A. Designing of Controlling Unit

Controlling unit controls the other three units that is the indication unit, surveillance unit and the command unit. At controlling unit we are using Arduino UNO which is microcontroller board based on AT mega 328. It has 14 digital input output pins (of which 6 can be used as a PWM outputs), 6 analogue inputs, a 16 MHz ceramic resonator, USB connection, power jack, an ICSP header and a reset button. One of the important features is its ease of programmability.



Fig. 1: Arduino microcontroller

The ESP8285 is an ESP8266 with 1 MiB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi running at 80 MHz's. It has 8 pin outs they are VCC Voltage (+3.3 V; can handle up to 3.6 V), GND Ground (0 V), RX Receive data bit X, TX Transmit data bit X, CH\_PD, Chip power-down, RST Reset, GPIO 0 General-purpose input/output No. 0, GPIO 2 General-purpose input/output No. 2.

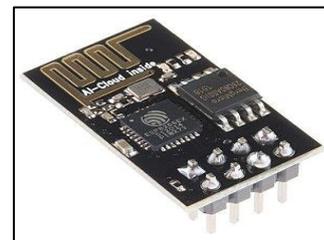


Fig. 2: Wi-Fi module

### B. Design of Indication Unit

This indication unit consists of RF transmitter and receiver. This transmitting unit is fitted with the alarm bell and the receiving unit is fitted with vibration motor. Whenever the

alarm bell rang the transmitter unit transmits the signal to the receiving unit and thus the vibration motor runs and it indicates the person that someone is ringing the bell.

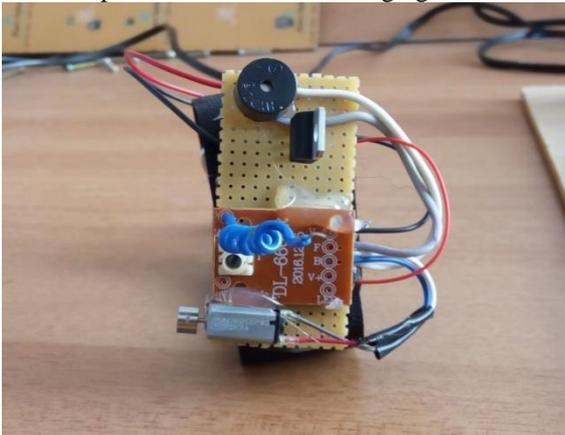


Fig. 3: Wrist bad with vibration motor

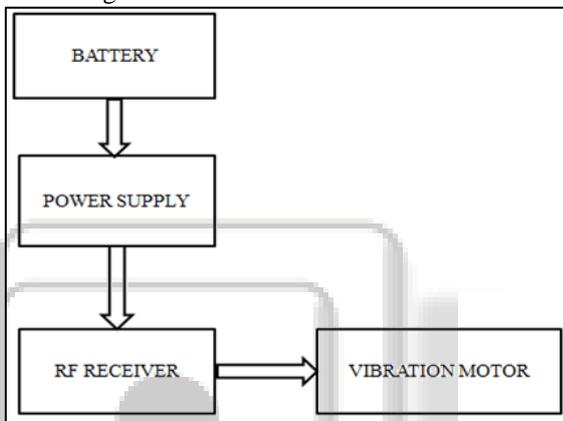


Fig. 4: Block diagram of wrist band setup

#### C. Design of Surveillance Unit

The surveillance unit consists of wireless camera which transfers the data to the mobile display by which we can able to see the person standing outside. This wireless digital night vision camera is capable of capturing and transferring the videos to the mobile device. By which we can able to see the person who is standing outside.



Fig. 5: Wireless camera

The surveillance unit is also come along with android apk. By using that apk we can able to view the video wirelessly anywhere from the world. The android apk used in this project is V380S. In this app we can able to control the camera to view in 360 degree and used to record and to see the video. The app working environment is shown below.



Fig. 6: Working environment of V3803 app

#### D. Design of Command Unit

By using the command unit we can give commands to the door lock by which we can lock and unlock the door without getting near to the door. The door lock along with Wi-Fi module is used. By connecting the mobile phone to the Wi-Fi signal we can give command to the lock whether to lock or unlock.

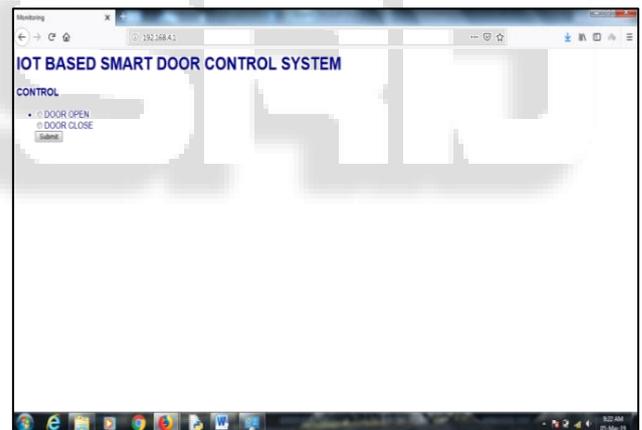


Fig. 7: command window

#### IV. CONSTRUCTION OF MAIN STRUCTURE

This system is designed by using all the components mentioned above. This system consists of Arduino which is connected with calling bell. When the calling bell rings it sends the signal to the RF transmitter which sends signal to the receiver and it activates the vibration motor. This vibration motor indicates that someone is standing outside the door. The surveillance camera which is fitted outside the door is used to view the person who is standing outside. If the person standing outside is known person, by using the Wi-Fi module connected to actuator we can give command to unlock the door.

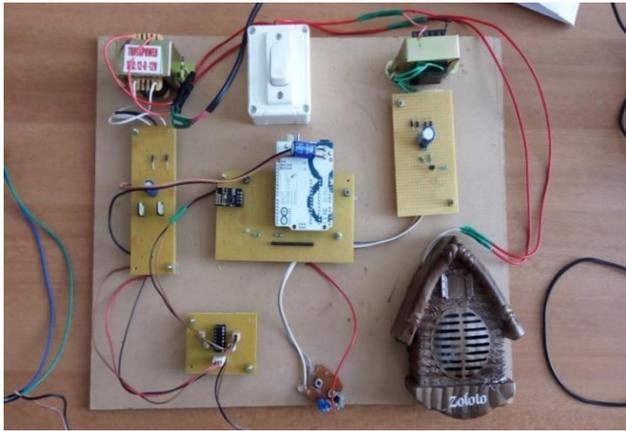


Fig. 8: Main structure

## V. WORKING PROCEDURE

The calling bell is given by direct AC supply. When the calling bell rang it sends HIGH signal to the Arduino. Then Arduino sends signal to the RF transmitter. The RF transmitter sends signal to the receiver which is connected to the buzzer and vibration motor. The vibration motor is used because the hearing impaired people can't be able to listen to the ringing sound of the calling bell. So this vibration motor indicates the hearing impaired people that someone is ringing the bell. But the hearing impaired person doesn't able to know who is standing outside. So that surveillance camera is used to see the person who is standing outside.

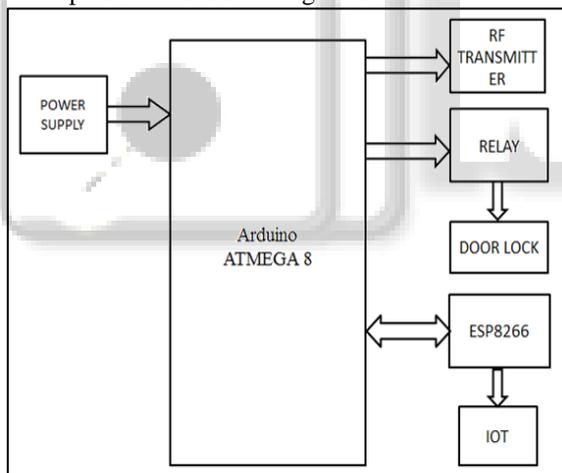


Fig. 9: Block diagram

This surveillance camera is wireless and night vision. So the person who is inside the home can able to see the person who is standing outside by using the android application in his mobile. After knowing the person standing outside we need to open the door. So the Wi-Fi module connected to Arduino creates the local network. By using that network we can give command to the door lock to lock or unlock. After the command is given the lock will automatically respond to the command. This door lock is made by using actuator which is driven by driver circuit connected to 12V DC supply.

## VI. CONCLUSION & FUTURE SCOPE

This proposed project gives better output when compared to the other existing system. Implementation of a product label

reading system that reads printed text on hand held objects for assisting blind person. This method can be effectively used by visually challenged people for shopping. The proposed barcode to text as well as speech conversion system provides the solution to the problems faced by blind people. In proposed system it applies a simple and fast method. The future scope may include some innovations like, preventing accidents and avoiding obstacles when moving they are alone. By using ultrasonic technology alarm can be implemented for avoiding accidents. In future these implementations may be very useful for the visually impaired persons to live independently. It is concluded that smart alarm system for hearing impaired people was successfully designed. This system has designed with innovative features which are very helpful for hearing impaired people who are home alone. This type of alarm could be very effectively used in homes which will provide safe and security to the hearing impaired people. The construction of smart alarm consists of Arduino as a controller which is user friendly to code. On the other hand to construct the main system very simple tool work is needed and the materials used in this project are cheap and easily available in the market. So it is not complicated to design this system. This system can be further developed by using image processing and also by artificial intelligence.

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