Low Cost, Wearable Alert Notification System for Deaf and Blind People

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ABSTRACT

Technology has now evolved in each and every aspect of human world, from electric cars to smart washing machine. Technology has improved life of differently abled people in many ways too. Our motivation for this project is to provide comfort and security of the disabled people through the development of a low cost, multiple alert systems for the disabled (deaf and blind) people and also digitally sensing body temperature and heart rate using arduino. In this project a user module is designed which will notify the user whenever the door bell is pressed and also notify the location to their family members to find them whenever there is a threat. The notification will be send through a wireless module which covers a good amount of range. One module will be hooked at a mobile while other will be connected to the user module (wearable gadget) with some LED/vibrating motor for the indication purpose. The LCD screen will display the text for notification purpose. These modules are controlled by Arduino control Unit.

Keywords—Arduino, Wireless module, LCD screen,vibrating motor, LED, sensors,Heart rate,body temperature**.**

I. INTRODUCTION

Technology has always provided a platform for peoplewith disabilities. From helping a visual impaired reada book to help a mute speak and get included in aconversation. As we are advancing into the technology that we are trying to make machines smarter and smarterso that human lives can be improved by a greaterextent. The power of innovation is

 that now aperson can check their fitness level on their mobileapplication, these technologies along with serving its purpose also helps to boost the confidence of people who thinksthey are helpless and inferior to others. Not everyonecan afford surgical techniques in order to resolve therehearing and visual issues. How harsh it would be to live without one of thesenses? This question not only terrifies us to the

depthbut it also helps us to understand how important theyare to the human body. Each and every element of our body is so important that we could never imagine alife without them. Taking this as achallenge and our urge to help those people so,wethought of developing a smart device to help deaf and blind people to fight their problem whenever the user and their family members get the alert notifications.

II. RELATED WORK

In our day to day life, we come across many non speech sounds which give us important information about surroundings. Matthews et al has shown that how important it is to identify various non-speech sounds for deaf people. They conducted interviews with hearing impaired patients and normal people. Some examples of such sounds are friends or co-workertalking in a room, music or instructions given in public place, cry of children and critical Information like fire alarm, cell phone ring or doorbell ring.Sound visualisation for deaf people in this paper various techniques has been analysed which are used to create sound awareness amongst deaf people. Techniques which were analysed are Vibrational sensing, Flashing lights, Hearing dogs, Cochlear implants. Visually impaired individuals have the advantage of using a smart voice control speaker to interact with their smart homes. For example, by verbally asking the Amazon Echo to turn on the light, the device will trigger the preferred lights to turn on. They designed An Independent Living of Person with Disabilities and Elderly People using Smart Home Technology. Wireless Smart Home for assistive independent living Wireless Sensor Network Smart Home Components. A designed and implemented a Smart Home for Elderly and Disabled ,simple application of smart home technology. Arduino Mega board and an Arduino Ethernet shield was used to provide communication between the sensors and the microcontroller was used to process and send the gathered data to the system's users, and make the system to be remotely manageable.

III. SYSTEM DESCRIPTION

Smart wearable alert notifying system aims to simplify the lives of blind and deaf people. Keeping

our target in mind which was to develop for low cost, light in weight device which could be a wearable one, we developed device helps the disabled do basic things which occurs almost daily. Imagine a situation where a person with some disable is at home alone, and someone knocks thedoor or rings a bell, since the person cannot hear theknock or doorbell, the door won't be unlocked as aresult the visitor may go away. The situation would have been different if the person inside would have some portable/wearable device on which the notification would have been popped up whenever the doorbell would have been pressed, thus helping deaf people reach the door whenever the door is knocked.

Every alternate day we hear news about person missing. Many of these include blind person.
Some of these people are never traced.GPS based tracker for blind person solves theproblem by sending SMS to the family members of the Blind person.This SMS contains the Longitude and Latitude of the person.This project also has a Keypad which has 4 keys. Thiskeypad can be used to send emergency messages to the familymembers. 4 Keys has respective 4 emergency messages. GPS modem continuously send data string to the microcontroller. This data contains various type of information.It includes Longitude Latitude of the place where project/person is currently situated. Thus microcontroller gets co-ordinates of the place. Then it sends SMS after periodic interval of time, for example after every 1 minute.

Fig: alert message for family members

This project is also implemented with heart beat sensor and body temperature detector Heart beat is sense by the heart beat pulse sensor in which We can measure the heart rate per minute We wire the pulse sensor to the Arduino as following: S of pulse sensor -> A0 of Arduino „-„of pulse sensor ->GND of Arduino „+" of pulse sensor -> +5V of Arduino device has an advantage over linear temperature sensors calibrated in degrees Kelvin, because the user is not required to subtract a large constant voltage from its Output to obtain convenient Fahrenheit scaling.

Heart Rate Calculation:

$$sum = \sum_{i=1}^{30} FreqMeasure.read()$$

$$frequency = F\_CPU / (sum / 30)$$

$$BPM = frequency * 60$$

Body Temperature Calculation:

Voltage to Temperature conversion: Temperature in degree Celsius is given by
Temp = Output voltage * 0.48828125
Celsius degree to Fahrenheit degree conversion:
Tempf= (Temp*1.8) +32.
The Arduino Mega is a microcontroller board based on the ATmega1280 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial Ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button
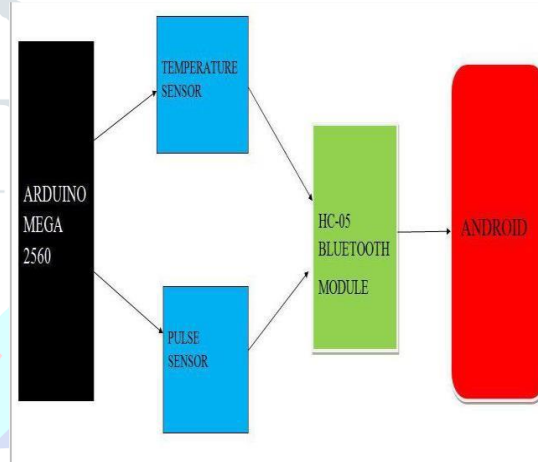

Fig: block diagram of heart beat sensor and body temperature sensor

IV. REQUIREMENTS

LCD Display:

Nokia 5110 is a display unit which is used in many applications. It uses PCD8544 which is a low power CMOS LCD controller/driver. It has 48 rows and 84 columns, display data RAM of 48x84 bits. It consumes low power which is suitable for battery operated systems

Vibrating motor/LED:

Here the vibrating motor and LED is used for the indication purpose along with LCD display. In this project the motor used was of rating, DC 3V-70mA

which was light in weight and had high speed. LED ofany colour can be used. In this project a red colouredLED was used.

GSM modem:

GPS modem continuously send data string to the microcontroller. This data contains various type of information. It includes Longitude Latitude of the place where project is currentlysituated. Thus microcontroller gets co-ordinates of the place.

Arduino ATMEGA2560:

Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights,motors, and other actuators.

LM35 temperature sensor:

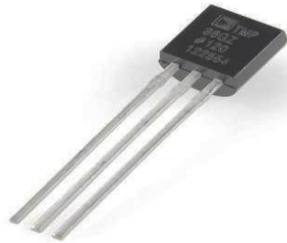This component is selected because this is the sensor which is used to measure the temperature accurately.

Fig:*LM35 temperature sensor*

Smart watches:

The watch could help make life for the deaf not only easier but safer too.Running on Android 4 and featuring the "Smart Care System" the watch can identify different sounds in the wearer's environment and convert them into visual and vibration notifications.For instance when the sound of a car horn is recognized then the watch displays an on screen notification such as "Honk Honk" and vibrates to alert the user. It can recognize many other sounds such as door bell ringing.

Fig: smart watches

Android:

The output of the results will be showed on the android screen.
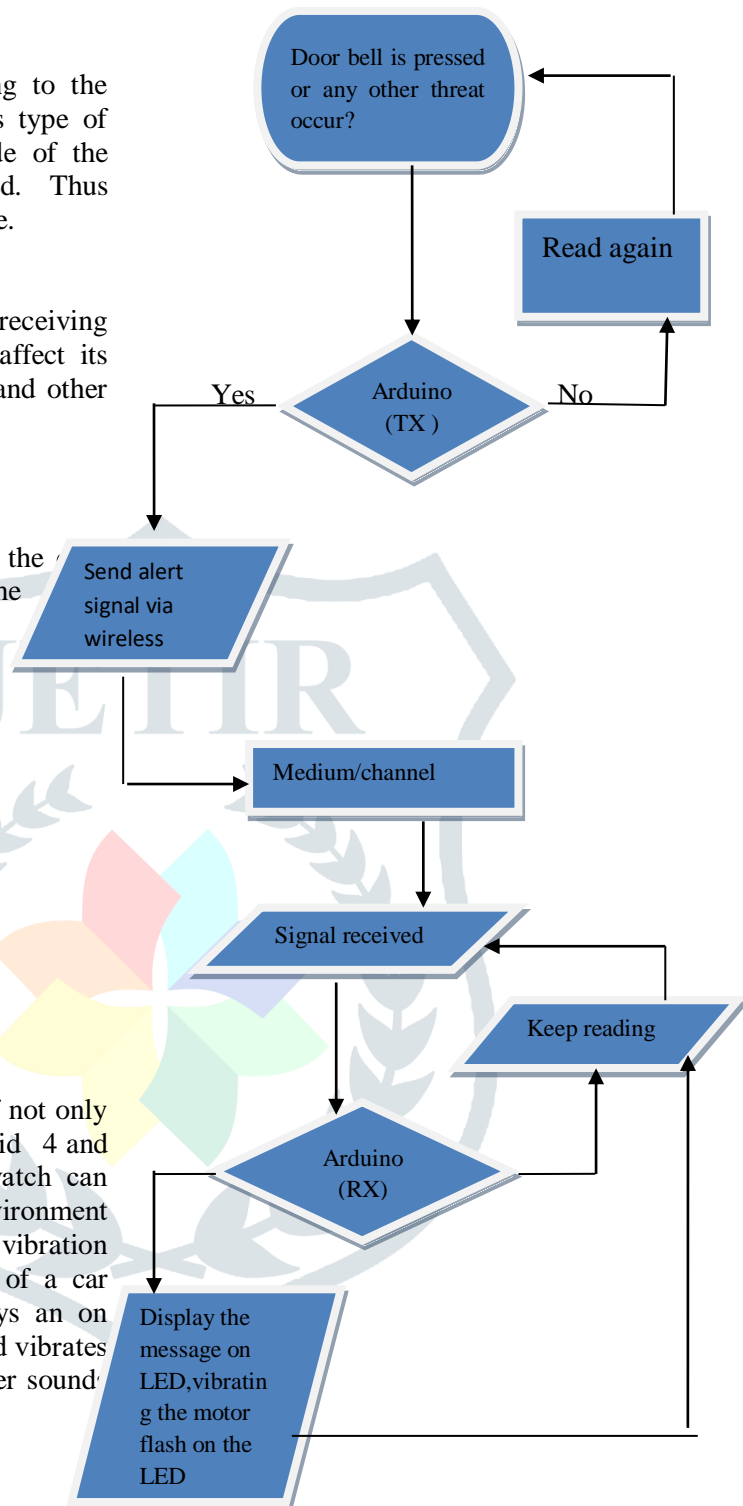
## V. BLOCK DIAGRAM:

Fig: Block diagram of the system

VI. WORKING PRINCIPLE:

The flow of the process is shown in the figure. Here the process is divided into two segments. The regionabove "Medium/Channel" is transmitter's region andthe region below it is receiver's region. One Arduino unit will be attached at the doorbell and other is attached to the smart watch which is with the disabled person. The Arduino connected over there

will continuously monitor whether the doorbell is pressed or any threat is occurred or not, if Yes, then send thealert signal "open the doorbell" or if we want to trace the missing disabled person then it can be traced using GPS tracking so you get the latitude and longitude message to the guardian android phone and it also check the heart beat and body temperature of the disabled person's if the person it not well the alert message(pulse rate and body temperature) is sent to the guardian phone via wireless module. And if the result is negative then Arduino will continuously keep reading.Below is the schematic view of the transmitter andreceiver module. Whenever there is riskfound,the wireless module of transmitter module willtransmit a signal to the receiver's wireless module,which as a result fetches a signal and displays anotification on the screen

Fig:Schematic of Transmitter module

Now in the receiver's side that is the wearable device, the Arduino connected over it will check whether any signal has been detected or not, if yes then message is displayed over LCD screen along with vibrating motor and with flashing LED.
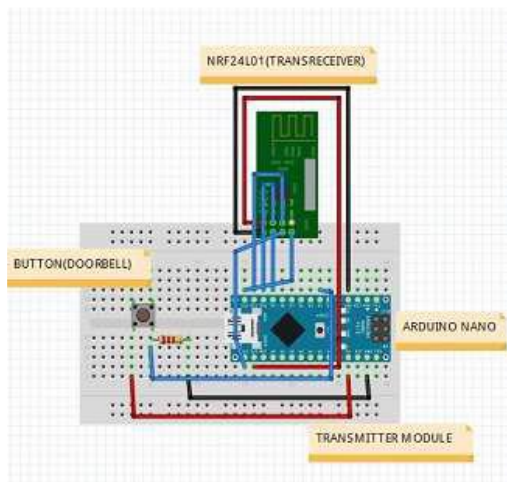
transmitter's side.

And if the result is No, then keep waiting for the signal until it is send from the
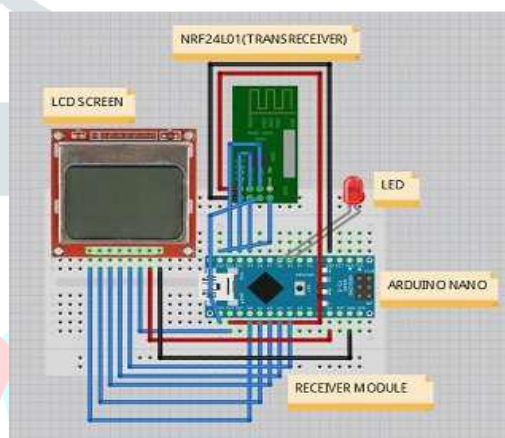
Fig:Schematic of Receiver module

VII. ADVANTAGES:

1. This project is very easy to install and easy to use.
2. Person can be immediately tracked.
3. This project can be used for Blind person.
4. This project can also be used for tracking senior citizens, elderly person in our home.

VIII. DISADVANTAGE:

1. Again a doctor far away from the patient need to know heart rate and body temperature for initial treatment.
2. An embedded system which can measure the heart rate and body temperature and store the data for the doctor to know the condition of the patient can help for this purpose

IX. FUTURE ENHANCEMENT

Scope and utility of this device can be increased byadding more features in it.adding sensor like gas sensors would allow the user to escape or call anyone of the members for the help if in case there's a fire caught up in the place or near the surrounding. Apart from adding gas sensor a noise level monitoring system can be implemented on the device, this will enable the user to respond against the noises present in his/her surroundings Not only this, it will also help the

user to respond against emergency sirens like fire extinguisher truck's sound, Police van's sound orAmbulance vehicle's sound. We can make the deviceas compact as possible.We see that the device iscompact in size which not only makes it light in weight but also makes it very assessable, this project can also be used for tracking senior citizens, elderly person in our home

X. CONCLUSION:

In this project a user module is designed which will notify the user whenever there is a obstacles occur. The notification will be send through a wireless module which covers a good amount of rangedigitally sense body temperature and blood pressure using gardenia can show the accurate results will be displayed on the LCD monitor.This device will allow to measure continuously the mean arterial

pressure (MAP) in about one minute and the accurate body temperature andsends SMS to the family members of the Blind person this SMS also contains the Longitude and Latitude of the personwill be displayed on the LCD screen.

XI.   REFERENCE:

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