BUS IDENTIFICATION FOR VISUALLY IMPAIRED PEOPLE

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K E Y W O R D S

Personal Assistance Segment

Bus Driver Segment

RFID Reader

Zigbee

Voice playback module

Application Building

LCD Display

A B S T R A C T

The objective of this radio frequency wireless communication project is to make it easier for blind people to move around. For someone who is fully blind, problems arise every day. The largest issue, though, continues to be using public transport. Bus travel is typically regarded as secure and comfortable, but for persons who were born fully blind, it can be quite challenging to navigate in outdoor settings. The visually handicapped have used a variety of strategies to use public transport, which has left them reliant on third parties, some of whom are untrustworthy. In light of these issues, we have developed a solution to help prevent visually challenged people from using public transport on a daily basis the application of contemporary technological developments. The objective is to create and put forth a model that will aid visually impaired people in navigating their external world and taking care of their identifying needs. Two detecting sub-systems are included in the proposed system: the personal assistance segment (PAS) for visually impaired people and the bus driver segment (BDS). Zigbee will send information to the BDS Section when the user (a blind person) arrives at the bus station and inserts their access card in the PAS. if the BDS and PAS data are compatible. The conductor will then hear a beep, and a message will appear on the LCD screen next to the driver. Following this, the BDS portion will transmit and return data to The visually impaired person will get some commands through the speaker from the PAS section and the Voice playback module. As a result, an RF module is used to facilitate two-way wireless communication between the bus driver and the blind passenger. The outcome demonstrates that the suggested solution performs better in terms of safety, cost, and usefulness.

1. Introduction

. People who are fully blind or have congenital blindness frequently experience challenges when they leave their homes, workplaces, or other familiar environments. They face several challenges in daily life, including travelling or even just walking down a crowded street. They must also be able to recall the locations of any obstacles and objects around them. One needs to be able to move freely, readily, and independently from one place to another using a variety of modes of transportation in order to live happily and easily. However, no one can rely on others to get them where they need to go the way some people with disabilities (especially the visually impaired) do. Blind people have limited choices in terms of transportation. Public transit is the preferred means of mobility for the majority of blind people in many countries. In this circumstance, they have trouble identifying and anticipating the arrival of buses at bus terminals. Additionally, they are unable to look through the bus fleet to find the right bus to board. We were motivated to make their lives better by putting into practise a notion that would let them use transport services as easily and freely as other people, independent of others. It will therefore help visually impaired people develop confidence in their freedom of movement. We think that the idea we've put out would solve a lot of the problems that the visually impaired experience and make their lives more enjoyable and manageable..

Applicability:

Visually impaired people will be able to travel and navigate more safely thanks to this idea, which is applicable to all forms of public and private transportation. We initially evaluated the viability and dependability of this idea using a bus system. Additionally, the development of this programme can yield fresh insights on private as well as public assistance.

2. Problem Statement

- This RF-based Wireless communication initiative aims to facilitate travel and mobility for those who are blind or visually impaired.
- For someone who is totally blind, every day is challenging. However, using public transit continues to be the most pressing problem.
- Bus travel is frequently viewed as secure and fun, however navigating in the outside world is really challenging for people who are born completely blind.
- A visually impaired person must rely on sighted assistance because route numbers in the bus system are only visible on the number plate, which reduces their independence and lowers their self-esteem.
- People who are blind or visually challenged have developed a variety of methods for using public transport, which has made them dependent on people who can be unpredictable at times.

3. EXISTING SYSTEM

- When the user (blind person) reaches the bus station and switches on his device, the ultrasonic sensor senses the presence of the bus in the nearby area and transmits the bus presence to the Arduino
- To this, the buzzer beeps and the visually impaired person get to know about the presence of the bus in the nearby area.
- The information transmitted by the blind person is received by the receiver installed on the bus driver’s module and thereby gets notified by a buzzer.
- The bus driver takes the help of a Bluetooth application which has a wireless connection with the Bluetooth module installed over the user’s module from his phone. The bus driver sends an acknowledgement to the blind person by entering an alphabet ‘a’ from the Bluetooth app.
- Thus by this way, wireless communication is carried out between the bus driver and the visually impaired person

DRAWBACKS OF THE EXISTING SYSTEM

In the existing system, a Bluetooth application is used for wireless communication. Bluetooth was created in accordance with IEEE 802.15.1, which is used to provide wireless communication via radio transmissions. Bluetooth's permitted frequency range is from 2.4 GHz to 2.483 GHz. It has a Zigbee's range is shorter. GFSK modulation is the technique used by Bluetooth. UWB (Ultra-Wide Band) and BPSK and QPSK modulation techniques are both employed in Zigbee. Zigbee normally supports a

frequency range of 2.4 GHz worldwide, but this is not always the case. It has a wider coverage area than Bluetooth, in comparison.

Difference between Bluetooth and Zigbee

S.NO.	Bluetooth	Zigbee
1	The radio signal range of Bluetooth is ten meters	The radio signal range of Zigbee is ten to hundred meters
2	Bluetooth was developed under IEEE 802.15.1	Zigbee was developed under IEEE 802.15.4
3	The time it takes to join a network using Bluetooth is about 3 seconds	The time it takes to join a network using Zigbee is about 30 milliseconds
4	There are seventy nine RF channels in Bluetooth.	There are sixteen RF channels in Zigbee
5	It uses GFSK modulation technique.	Whereas it also uses BPSK and QPSK modulation techniques like UWB
6	There are a maximum of 8 cell nodes in Bluetooth.	While there is more than sixty five thousand (65000) cell nodes in Zigbee

4. PROPOSED SYSTEM

The ARDUINO, an RFID, an RF module, and a Voice playback module make up the bus recognition system. Signals are sent and received from the blind person's equipment to the bus driver's device via an RF module, which is made up of a transmitter and a receiver. The encoder and decoder are connected to these transmitters and receivers, respectively.

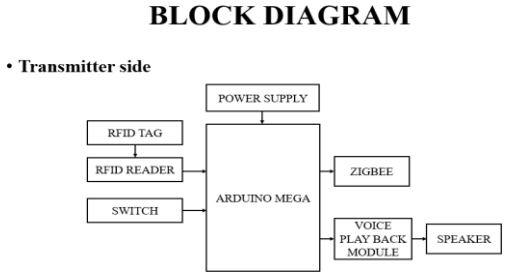
● The device would first be turned on, and the RFID card would be read in accordance with the destination to be reached. The bus module (receiver module) receives the data that was sent by the Zigbee module.

● It sends and returns data to other blind persons if the data received fits the destination; otherwise, it terminates the message and notifies the bus driver via the buzzer.

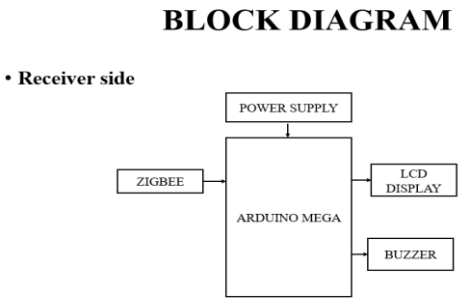
● The blind people module will then receive the return information, and the voice playback module will create an audio message for the blind people. This is how a blind person and bus driver establish a wireless connection so the blind person can board the desired bus. He didn't rely on anyone else to get him where he needed to go; he took a bus.

PROPOSED SYSTEM MODULES

Personal Assistance Segment Block Diagram



Bus Driver Segment Block Diagram



HARDWARE REQUIREMENTS:

- Arduino MEGA
- Power supply
- RFID
- ZIGBEE
- Voice Playback Module
- Switch
- Buzzer
- LCD Display

SOFTWARE REQUIREMENTS:

- Arduino IDE
- Embedded C
- PHP

5 REQUIREMENTS & SPECIFICATIONS

A technical statement of needs for hardware and software products is called a requirements specification. The process of requirements analysis begins with this phase. The hardware and software requirements specification's main goal is to give a thorough understanding of the project, its constraints, and its objectives. The sole hardware specifications a Personal Computer (PC)).

5.1 SOFTWARE REQUIREMENTS

5.1.1 ARDUINO IDE

The open-source Arduino platform is used to create electrical projects. With Arduino, you can write and upload computer code to a physical programmable circuit board (commonly called a microcontroller) using a piece of software called the IDE (Integrated Development Environment), which runs on your computer. With those just getting into electronics, the Arduino platform has grown rather popular, and for good reason. The Arduino does not require a separate piece of hardware (referred to as a programmer) in order to load fresh code onto the board; instead, you can do it by using a USB cable, unlike the majority of earlier programmable circuit boards.

Additionally, the Arduino IDE employs a condensed form of C++ that makes learning to programme simpler. Lastly, Arduino offers. For everyone interested in building interactive objects or settings, including artists, designers, hobbyists, hackers, and novices, the Arduino software was created. Button, LED, motor, speaker, GPS, camera, internet, TV, and other devices may all be controlled by Arduino! This adaptability, together with the fact that the Arduino software is free, the hardware boards are reasonably inexpensive, and both the software and hardware are simple to learn, has produced a sizable user base that has donated code and made instructions for a wide range of Arduino-based projects available.

There are many varieties of Arduino boards (explained on the next page) that can be used for different purposes. Some boards look a bit different from the one below, but most Arduinos have the majority of these components in common IDE for Arduino user interface Sketches are computer programmes created using the Arduino Software (IDE).

Arduino IDE User Interface

These drawings were created with a text editor and saved as files with the .ino extension. The editor offers functions for text replacement and text searching. When saving and exporting, the message section provides feedback and shows errors. The console shows text generated by the Arduino Software (IDE), including error messages in their entirety and other data. The configured board and serial port are visible in the window's bottom right corner.

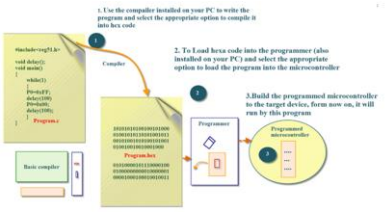
You may validate and upload programmes, make, open, and save sketches, and launch the serial monitor using the toolbar buttons. Although the Arduino IDE is relatively simple, it offers a nearly perfect environment for the majority of Arduino-based applications. Standard menu items such as "File" (new, load, save, etc.), "Edit" (font, copy, paste, etc.), "Sketch" (for compiling and programming), "Tools" (helpful choices for testing projects) and "Help" are available in the top menu bar. You can enter the programme code in the straightforward text editor located in the centre of the IDE. The output window, which is located at the bottom of the IDE, is used to view information such as the compilation status, memory use, programme faults, and several other helpful notifications.

The sketches used to create projects for the Arduino are often written in a condensed form of C++ that omits a number of C++ features. There are several device-specific libraries available since programming a microcontroller differs from programming a computer in a few ways (e.g., changing pin modes, outputting data on pins, reading analogue values, and timers). This occasionally misleads people who believe that Arduino is written in a "Arduino language." The Arduino, on the other hand, is actually C++ programmed. It merely makes use of specific device libraries.

The Arduino IDE has specific code organisation guidelines to support the languages C and C++. A software library from the Wiring project, which offers numerous standard input and output operations, is provided by the Arduino IDE. For the sketch to start and the main programme loop, user-written code only needs two fundamental functions, which are combined with a programme stub main() to create an executable cyclic executive programme using the GNU toolchain, which is also distributed with the IDE. The executable code is transformed via the Arduino IDE's use of avrdude into a text file with hexadecimal encoding, which is then loaded into the Arduino board by a loader programme in the firmware.

5.1.2 EMBEDDED C

The most often used programming language for creating electronic devices is embedded C. Embedded software is connected to every processor used in electronic systems. Assembly, BASIC, C++, Python, and other popular programming languages are also used to create embedded systems, but Embedded C is still widely utilised because of its effectiveness, speed of development, and portability. Embedded C programming is essential for the processor to carry out particular tasks. We utilise a variety of technological equipment in our daily lives, including mobile phones, washing machines, digital cameras, etc. These entire system of devices runs on microcontrollers that are written in embedded C.



Embedded C code block

The Embedded C code written in the above block diagram is used for blinking the LED connected with Port0 of the microcontroller. In embedded system programming C code is preferred over other languages. Due to the following reasons:

- Easy to understand
- High Reliability
- Portability Scalability

The majority of consumers are familiar with the application software that gives computers functionality. However, embedded software is frequently less obvious but no less complex. The inclusion of third-party hardware or software is strictly regulated in embedded software, in contrast to application software, which has flexible hardware requirements and capabilities.

Device drivers are created specifically for the hardware and must be included in embedded software at the time of production. The CPU and the particular chips used have a significant impact on the programme. The majority of embedded software engineers have at least a basic understanding of reading schematics and component data sheets to ascertain how registers and communication systems are used. As well as using bit manipulation, conversion between decimal, hexadecimal, and binary is useful. Although XML files and other output may be sent to a computer for display, web applications are rarely used. Both SQL databases and file systems with directories are often lacking. A cross compiler, which runs on a computer yet generates executable code for the target device, is necessary while developing software. A JTAG, SWD, or in-circuit emulator must be used for debugging. A complete copy of the kernel's (OS) source code is frequently available to software developers. RAM and storage memory sizes might differ greatly. While some systems only have 8 MHz CPUs and 16 KB of Flash memory, others can compete with modern computers.

Due to these space constraints, embedded C++ or C or C++ are used more frequently than C++. Although compiled BASIC and Java are available for ARM Cortex-M4, Cortex-M7, and older ARM11 used in Raspberry Pi and Intel Galileo Gen.2 microcontrollers, respectively, interpreted languages like BASIC and Java are less frequently used. However, an implementation of the interpreted Python 3 language called MicroPython is available specifically for microcontroller use, such as 32-bit ARM-based (such as BBC micro:bit) and 16-bit PIC microcontrollers.

It is crucial for processors to communicate with one another and with other components. Common protocols, in addition to direct memory addressing, include I2C, SPI, serial ports, and USB. Closed source communication protocols for embedded devices are offered by businesses like InterNiche Technologies and CMX devices. UIP, lwip, and other open-source protocols are their offspring. A keyword is a unique word that has a particular meaning to the compiler (a C compiler, for instance, is a piece of software used to translate C programmes into Machine Code). For instance, the following are some of the keywords for the Keil's Cx51 Compiler, a well-liked C compiler for microcontrollers based on the 8051 architecture

These are few of the many keywords associated with the Cx51 C Compiler along with the standard C Keywords.

5.2 HARDWARE REQUIREMENT

5.2.1 ARDUINO MEGA

Arduino Mega circuit board

The ATmega328P is the basis for the Arduino MEGA microcontroller board (datasheet). It has a 16 MHz quartz crystal, 6 analogue inputs, 14 digital input/output pins (of which 6 can be used as PWM outputs), a USB port, a power jack, an ICSP header, and a reset button.

It comes with everything needed to support the microcontroller; to get started, just plug in a USB cable, an AC-to-DC adapter, or a battery. There are several variants of the Arduino board available on the market, including the Arduino Uno, Arduino Due, Arduino Leonardo, and Arduino Mega, but these are the two that are used the most frequently. The greatest, simplest, and most affordable choice for an Arduino Uno project would be if it was related to digital electronics, embedded systems, robotics, or the Internet of Things**.**

5.2.2 RFID

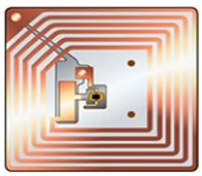
The term "radio-frequency identification" (or "RFID") refers to a technology in which a reader reads digital data contained in RFID tags or smart labels (described below) using radio waves. In that information from a tag or label is recorded by a device and stored in a database, RFID is comparable to barcoding. Contrary to systems that use barcode asset tracking software, RFID has a number of advantages. The most apparent difference is that although barcodes need to line up with an optical scanner, RFID tag data may be read from a distance.

WORKING

RFID is a member of the Automatic Identification and Data Capture (AIDC) technology family. AIDC techniques require minimal to no human involvement as they automatically recognise things, gather data about them, and input that data into computer systems. Radio waves are used by RFID techniques to do this. An RFID tag or smart label, an RFID reader, and an antenna make up an RFID system at its most basic level. An integrated circuit and an antenna are included in RFID tags, and they are used to transmit data to the RFID reader (also known as an interrogator). After that, the reader transforms the radio waves into a more useful type of data. Afterward, a communications interface transfers the data gathered from the tags to a host computer system.

Defining RFID

RFID or Radio Frequency Identification System is a technology-based identification system which helps identifying objects just through the tags attached to them, without requiring any light of sight between the tags and the tag reader. All that is needed is radio communication between the tag and the reader.



RFID Reader

- **A reader:**

It consists of a scanner with antennas to transmit and receive sends signals to the tag, is in charge of communication with it, and receives data from it.

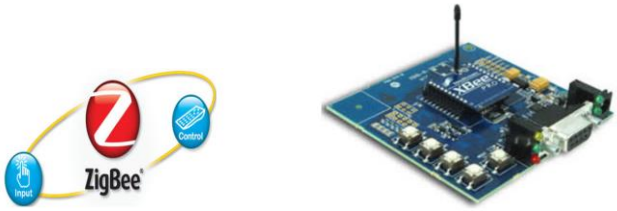
- **A Processor or a Controller:**

A host computer with a microprocessor or a microcontroller that processes the data after the reader inputs it can be used..

5.2.3 ZIGBEE

The Zigbee specification outlines a technology that is meant to be less complex and more affordable than existing wireless personal area networks (WPANs), such Bluetooth or more widespread wireless networking, like Wi-Fi. Applications for short-range low-rate wireless data transfer include traffic control systems, wireless light switches, home energy monitors, and various consumer and industrial equipment.

Transmission distances are limited by its low power consumption to 10-100 metres line-of-sight, depending on power output and ambient factors. In order to reach farther-off devices, Zigbee devices use a mesh network of intermediary devices to relay data across long distances. Zigbee networks are protected by 128 bit symmetric encryption keys, making it ideal for low data rate applications that also need long battery life. Zigbee is best suited for sporadic data transmissions from sensors or input devices because it has a predetermined rate of 250 kbit/s.



Zigbee circuit board

Zigbee Modem

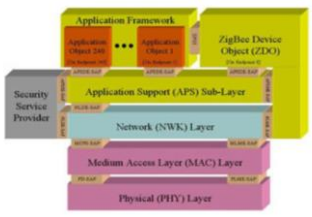
Zigbee modem was developed in 1998, Zigbee was standardised in 2003, and updated in 2006. The term alludes to the honey bees' waggle dance when they return to the beehive**.**

Zigbee Architecture

Three different types of devices, including the Zigbee coordinator, router, and end device, make up the Zigbee system structure. A coordinator who serves as the network's root and bridge is a requirement for any Zigbee network. The coordinator is in charge of managing the data while carrying out procedures for receiving and sending data.

Zigbee routers function as middlemen, allowing data to move back and forth between them and other devices. In order to conserve battery power, end devices can only connect with parent nodes to a limited extent, as depicted in the picture. Depending on the type of network, such as star, tree, or mesh networks, the number of routers, coordinators, and end devices varies..

ZIGBEE PROTOCOL ARCHITECTURE



Zigbee Protocol Architecture

The IEEE 802.15.4 physical and MAC levels serve to define the Zigbee protocol architecture, which is made up of a stack of additional layers that include the network and application layers specific to Zigbee.

Physical Layer:

This layer modulates and demodulates signals that are sent out and received, respectively. The frequency, data rate, and number of channels for this layer are listed below.

BAND	COVERAGE	DATA RATE	# OF CHANNEL(S)
2.4 GHz ISM	Worldwide	250 kbps	16
868 MHz	Europe	20 kbps	1
915 MHz ISM	Americas	40 kbps	10

Physical Layer of Zigbee Protocol

MAC Layer:

By using carrier sense multiple access collision avoidance (CSMA) to connect to various networks, this layer ensures the secure delivery of data. Additionally, beacon frames are transmitted in order to synchronize communication.

Network Layer:

All network-related tasks, including network setup, end device connection and disengagement from the network, routing, device configurations, etc., are handled by this layer.

Application Support Sub-Layer:

The services required for Zigbee device objects and application objects to interface with the network layers for data handling services are made possible by this layer. The task of matching two devices in accordance with their services and requirements falls on this layer.

Application Framework:

Key value pair and generic message services are two different forms of data services that are offered. The format of a generic message is one that the developer defines, whereas the application objects' key-value pairs are utilized to retrieve characteristics. In Zigbee devices, ZDO offers an interface between application objects and APS layers. It is in charge of locating, launching, and connecting other devices to the network.

USES:

Zigbee protocols are designed for embedded systems that can handle low data speeds and minimal power requirements. The resulting network will consume very little power; each device must pass Zigbee certification with a battery life of at least two years. Common application domains include: Wireless sensor networks home automation**,** Building automation, embedded sensors, medical data gathering, smoke and intruder warning, industrial control systems, and

5.2.4 VOICE PLAYBACK MODULE (APR33A3)

Voice Playback Module (APR33A3) offers high quality playback and recording with 11 minutes of audio at an 8 kHz sampling rate and 16bit resolution. The aPR33A series C2.x is specifically made for basic key triggers; users can record and playback messages for an average of 1, 2, 4 or 8 voice messages by switching. It is appropriate for simple interfaces or when the length of a single message needs to be limited.

Specifications

Single Chip, High Quality Audio/Voice Recording & Playback Solution, Minimum External Components Needed, No External ICs

Programming and development systems are not necessary. The voice recording lasts for 680 seconds (11 minutes) in APR33A3-C2.

No battery backup is necessary thanks to nonvolatile flash memory technology.

● External Reset pin

● Powerful Power Management Unit

● Very Low Standby Current: 1uA

● Low Power-Down Current: 15uA

● Supports Power-Down Mode for Power Saving

● Built-in Audio-Recording Microphone Amplifier

● No External OP AMP or BJT Required

● Easy to PCB layout

● Configurable analog interface

Voice Playback Module circuit board

● Differential-ended MIC pre-amp for Low Noise

● High Quality Line Receiver

● High Quality Analog to Digital and PWM module

● Simple And Direct User Interface

● Averagely 1,2,4 or 8 voice messages record & playback

5.2.5 BUZZER

A buzzer or beeper is a mechanical, electromechanical, or piezoelectric (short for piezoelectric) auditory signalling device. Buzzers and beepers are frequently used as timers, alarms, and confirmation of human input such a mouse click or keyboard.

Buzzer

TYPES

i. Electromechanical

Early devices were based on an electromechanical system identical to an electric bell without the metal gong. Similarly, a relay may be connected to interrupt its own actuating current, causing the contacts to buzz. Often these units were anchored to a wall or ceiling to use it as a sounding board. The word "buzzer" comes from the rasping noise that electromechanical buzzers made.

ii. Mechanical

A joy buzzer is an example of a purely mechanical buzzer and they require drivers. Other examples of them are doorbells.'

iii. Piezoelectric

A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep.

A piezoelectric buzzer or beeper also relies on Helmholtz resonance or acoustic cavity resonance to generate an audible beep**.**

APPLICATIONS

Although buzzers are no longer useful or desirable due to technology improvements, buzzers and comparable circuits may still be utilised in some situations. Apps used nowadays include:

- Novel applications

- Panels that judge

  Annunciator panels; electronic metronomes; game show lock-out devices; microwave ovens and other home appliances; sporting events like basketball games; and electrical alarms are just a few examples of what might be used for educational reasons. Joy buzzer, a prank-oriented mechanical buzzer.

Simple Piezo Buzzer circuit diagram

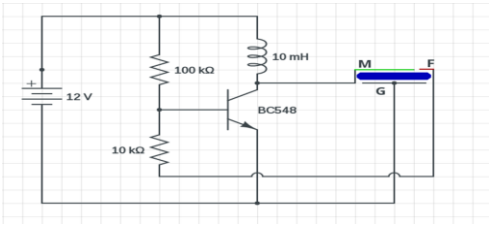
One of the most popular buzzers on the market is the piezo buzzer, which acquired its name from the piezoelectric substance that was employed as the active element.

These buzzers can nevertheless produce a very loud sound even if they are typically driven at a relatively greater voltage but lower current.

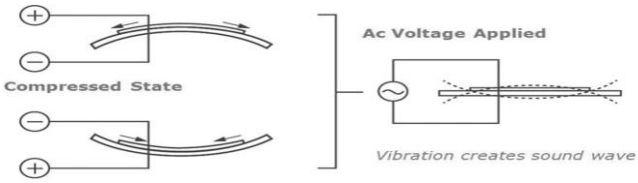
Piezo elements must have three terminals, as shown in the illustration.

Fig 5.2.4 Simple Piezo Buzzer

The blue wire is connected to the feedback(**F**) terminal, red wire to the main (**M**) terminal and the black wire to the piezo element's ground(**G**) plate.
The inductor coil's value and shape is not crucial. You can use any coil from **1mH** to **10mH** or more, or even no measured value at all. I used a 40 turn coil on a small ferrite toroid in the final design.
Circuit diagram and construction
Let's have a look at the circuit diagram,



Note the piezoelectric element's pinout, **M** is the main terminal, **F** is the feedback terminal and **G** is the ground plate.
The circuit is fairly simple, you can use a little piece of strip board to make it. As this piezo buzzer circuit uses very few components, it also could be constructed by soldering the components to each other.
When A voltage is applied to the electrodes of the piezo element, they produce flex in either way. This flex force bends the ground plate up and down.



Additionally, the complete opposite occurs; when a piezoelectric device is exposed to fluctuating pressure, voltage is generated.
Self-drive piezo buzzers are built with an additional, electrically separated feedback electrode, as you've already seen. The feedback terminal can access the voltage produced by the flex force.
The piezo buzzer is positioned in a resonant cavity, which has a hole on the side opposite from the one through which the buzzing sound is produced.
The driver circuit and piezo buzzer quickly cooperate with one another and begin oscillating at the piezo buzzer's resonance frequency.
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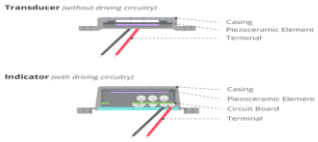
Piezo Buzzer Characteristics

- Wide operating voltage: 3~250 V
- Lower current consumption: less than 30 mA higher rated frequency
- Larger footprint
- Higher sound pressure level

STRUCTURE OF PIEZO BUZZER

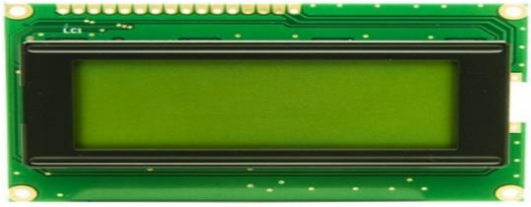


Piezo buzzers come in two varieties: transducers and indicators.

A housing, a piezoceramic element, and a termination make up a transducer. The user must communicate a square wave signal to the buzzer in order to activate a transducer. A housing, a piezoceramic component, a circuit board, and a terminal make up an indicator. The user must send the buzzer a specific amount of dc voltage in order for the indicator to work.

5.2.6 LCD DISPLAY

A flat-panel display or other electronically manipulated optical device that makes use of liquid crystals' ability to modulate light is known as a liquid-crystal display (LCD). Liquid crystals don't emit light directly; instead, they create images in either colour or monochrome utilising a backlight or reflector. There are LCDs that can show arbitrary graphics (like on a general-purpose computer display) or fixed images with little information that can be seen or hidden, such text, numbers, and seven-segment displays that are pre-programmed, like on a digital clock..



They both make use of the same fundamental Technology, however different displays have larger elements whereas random images are made up of a lot of tiny pixels. Depending on the polarizer configuration, LCDs can be switched between being normally on (positive) and off (negative). A character negative LCD will have a black backdrop with letters that are the same colour as the backlight, while a character positive LCD will have black writing on a background that is the opposite of the colour of the illumination. Blue LCDs have optical filters applied to the white to give them their distinctive appearance.

ILLUMINATION

- CCFL: The LCD panel is lit either by two cold cathode fluorescent lamps placed at opposite edges of the display or an array of parallel CCFLs behind larger displays. A diffuser then spreads the light out evenly across the whole display. For many years, this technology had been used almost exclusively.
- Unlike white LEDs, most CCFLs have an even-white spectral output resulting in better color gamut for the display. However, CCFLs are less energy efficient than LEDs and require a somewhat costly inverter to convert whatever DC voltage the device uses (usually 5 or 12 V) to ≈1000 V needed to light a CCFL. The thickness of the inverter transformers also limits how thin the display can be made.
- EL-WLED: The LCD panel is lit by a row of white LEDs placed at one or more edges of the screen.
- A light diffuser is then used to spread the light evenly across the whole display. As of 2012, this design is the most popular one in desktop computer monitors.
- It allows for the thinnest displays. Some LCD monitors using this technology have a feature called dynamic contrast, invented by Philips researchers Douglas Stanton, Martinus Stroomer and Adrianus de Vaan Using PWM (pulse-width modulation, a technology where the intensity of the LEDs is kept constant, but the brightness adjustment is achieved by varying a time interval of flashing these constant light intensity light sources

The LCD contrast is increased to the highest levels possible while the backlight is dimmed to the brightest colour that can be seen on the screen. This allows the LCD panel's 1000:1 contrast ratio to be scaled to different

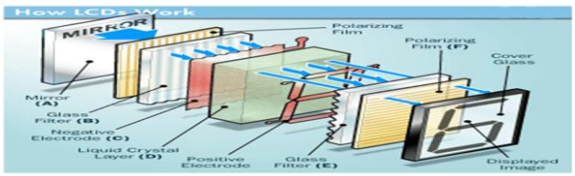
light intensities, producing the "30000:1" contrast ratios that are advertised on some of these monitors.

Since computer screen images typically contain a full area of white, the backlight will typically be at maximum intensity, making this "feature" primarily a marketing gimmick for computer monitors. However, for TV screens, it significantly improves the viewing angle dependency, increases the perceived contrast ratio and dynamic range, and significantly lowers the power consumption of conventional LCD televisions.

WORKING

The liquid crystal molecule tends to untwist when an electrical current is given to it; this is the basic idea behind LCDs. As a result, the angle of light travelling through the polarised glass molecules and the angle of the top polarising filter alter. As a result, a little amount of light is permitted to flow through a specific portion of the LCD's polarised glass. As a result, that particular spot will get darker than others. The LCD operates on the idea of light blocking. At the back of the LCDs that are built, a mirrored mirror is placed. A polarised glass with a polarising layer is kept on top, an indium-tin oxide electrode plane is and LCD LAYER

DIAGRAM:



The second piece of glass that follows has a rectangle-shaped electrode on the bottom and another polarising film on top. The fact that both parts are maintained at right angles must be taken into account. When there is no current, light enters the front of the LCD, bounces off the mirror, and travels through the LCD again. The liquid crystals between the common-plane electrode and the electrode shaped like a rectangle will untwist as the electrode is connected to a battery by the current from it. As a result, the light cannot pass through. That particular rectangle seems to be empty.

Advantages of an LCD's:

- LCD consumes less amount of power compared to CRT and LED
- LCD are consisting of some microwatts for display in comparison to some mill watts for LED
- LCD are of low cost
- Provides excellent contrast
- LCD are thinner and lighter when compared to cathode ray tube and LED

Applications of Liquid Crystal Display

Liquid crystal technology has major applications in the field of science and engineering as well on electronic devices.

- Liquid crystal thermometer
- Optical imaging
- The liquid crystal display technique is also applicable in visualization of the radio frequency waves in the waveguide
- Used in the medical applications

5.2.7 POWER SUPPLY UNIT

A power supply is a device or system that provides electrical or other types of energy to an output load or group of loads (also known as a power supply unit, or PSU). The word is most frequently used in reference to electrical energy sources, less frequently to mechanical ones, and infrequently to others..

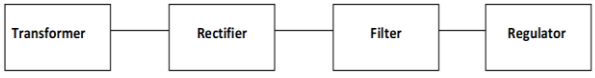


Figure 5.2.7 Block diagram of power supply

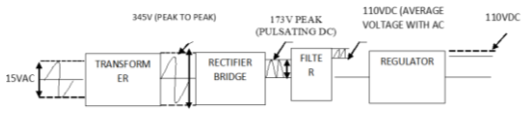


Figure 5.28 Processing of Power supply

The transformer isolates the power supply from the power line and steps up or steps down the input line voltage. The alternating current input signal is changed into pulsating direct current by the RECTIFIER component. However, you will discover as you go further in this chapter that pulsing dc is not preferred. Because of this, pulsating dc is transformed into a purer, more aesthetically pleasing type of dc voltage using a FILTER section..

The REGULATOR, which is the last element, accomplishes exactly what its name suggests. Despite significant variations in load current or input line voltage, it keeps the power supply's output constant. Let's follow an ac signal through the power supply now that you are aware of what each part accomplishes. You need to check how this signal is changed in each part of the power supply right now. You will observe how these changes occur later in the chapter. A 115 volt AC input signal is applied to the transformer's primary. The transformer has a 1:3 turn ratio and is a step-up transformer. The output of this transformer may be calculated by multiplying the input voltage by the proportion of primary to secondary turns; as a result, the output voltage for this transformer is 115 volts ac 3 = 345 volts ac (peak-to-peak). The output of the rectifier will be one-half, or roughly 173 volts of pulsing direct current since each diode in the rectifier portion conducts for 180 degrees of the 360-degree input. The rise and fall times of the changing signal are controlled by the filter section, which is made up of a network of resistors, capacitors, or inductors. As a result, the signal is kept at a more consistent dc level. The debate will make the filtering process more obvious.

Filter is a signal of 110 volts dc, with a ripple riding on the dc. The reason for the lower voltage (average voltage) will be explained later in this chapter. The regulator maintains its output at a constant 110-volt dc level, which is used by the electronic equipment (more commonly called the load).

Simple 5V power supply for digital circuits

- Brief description of operation: Gives out well-regulated +5V output, output current capability of 100 mA
- Circuit protection: Built-in overheating protection shuts down output when regulator IC gets too hot
- Circuit complexity: Very simple and easy to build
- Circuit performance: Very stable +5V output voltage, reliable operation
- Availability of components: Easy to get, uses only very common basic components
- Design testing: Based on datasheet example circuit, I have used this circuit successfully as part of many electronics projects
- Applications: Part of electronics devices, small laboratory power supply
- Power supply voltage: Unregulated DC 8-18V power supply
- Power supply current: Needed output current + 5 mA
- Component costs: Few dollars for the electronics components + the input transformer cost

Circuit description

A modest +5V power supply like the one in this circuit is helpful for testing out digital circuits. These transformers are widely available however they often have very poor voltage regulation, making them ineffective for experimenters with digital circuits unless a stronger regulation can be provided in some way.

When adequate cooling is provided to the 7805regulator chip, this circuit's +5V output can be boosted to 1 A at a current of roughly 150 mA. Overload and terminal protection are present in the circuit.

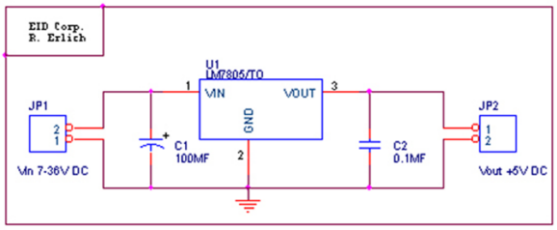


Figure 5.2.8 Power Supply Circuit diagram

Circuit diagram of the power supply:

To securely manage the input voltage supply to the circuit, the capacitors must have a sufficient high voltage rating. It is quite simple to incorporate the circuit into a piece of Vero board.

The 7805 regulator IC's pinout is as follows:

1. Unregulated voltage in Ground

2. Regulated voltage out

COMPONENT LIST

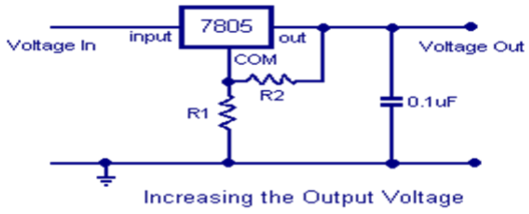
- 7805 regulator IC.
- 100 uF electrolytic capacitor, at least 25V voltage rating.
- 10 uF electrolytic capacitor, at least 6V voltage rating.
- 100 nF ceramic or polyester capacitor.

More output current

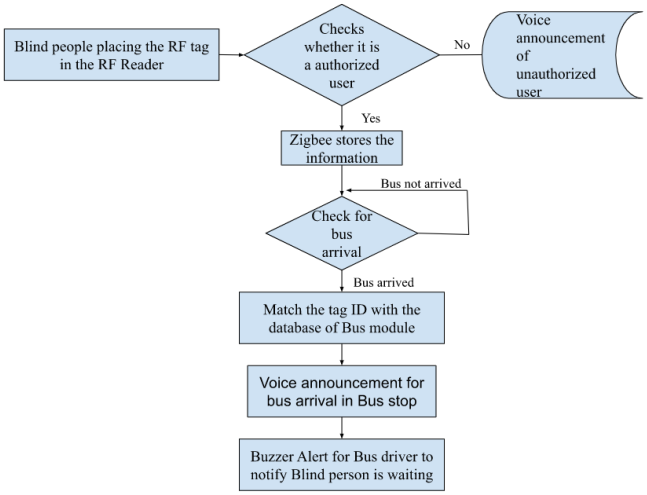
If we need more than 150 mA of output current, we can update the output current up to 1A doing the following modifications:

- Change the transformer from where we take the power to the circuit to a model which can give as much current as we need from output

- Put a heat sink to the 7805 regulators (so big that it does not overheat because of the extra losses in the regulator)



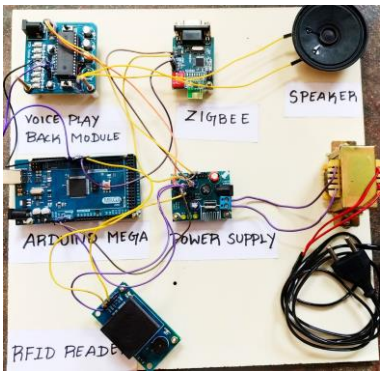
6. SYSTEM DESIGN AND DEVELOPMENT



`The sequence starts with the process of blind people placing their RF tag in the RF reader, which is in the bus stop, and then the RF reader will verify the RF tag to see if it is from an authorized user. case (i): if yes, Zigbee stores the information from the RF tag. case (ii): if not, a voice announcement is made, "unauthorized user," and the process repeats until it's an authorized user.

let's consider case (i), now the bus stop module checks for the bus arrival by sending the signal to incoming buses. it matches the database stored in the Bus module. when it matches a voice announcement is made “Bus is arrived”. A LCD Display is displayed as an alert raised in the bus to notify the bus driver about the blind person waiting at the next stop. Thus the system flow and its working.

System Prototype



Personal Assistance Segment Prototype **RFID**

When a Visually Impaired Person reaches the Bus Stop by using the RFID(Fig 5.3) given by the authority is placed in the RFID Reader of the Personal Assistance Segment Prototype shown above Fig 5.2 which is connected to the Power Supply. RF Reader will bypass the information of the RFID to Zigbee if it is a valid access card(AUTHORIZED CARD) and it is alerted by a Buzzer or less by “UNAUTHORIZED CARD” played by the voice playback module. In the case of Authorized card(M12 Bus), the information is carried over to Zigbee which is connected over Arduino Mega. Zigbee stores the information (M12 Bus) and transmits signal to the incoming bus which having Bus Driver Segment Prototype(Fig 5.4)

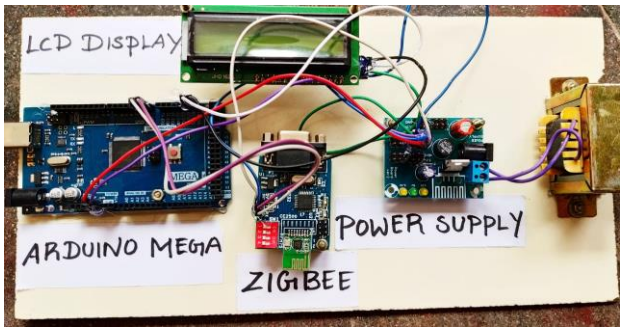


Figure 5.4 Bus Driver Segment Prototype

Each Bus will be attached with a Bus Driver Segment Prototype shown above Fig 5.4 which is connected to the Battery of the Bus as the Power Supply to the prototype. In the LCD display “BUS NO. M12” When the M13 Bus arrives in the range of 30-100m Zigbee gets connected and transmission of information takes place. The Bus Driver is alerted by the LCD that will display “BLIND IS WAITING”. So that he/she will click the reply button to notify the Visually impaired Person in the Personal Assistance Segment. Therefore in Bus Stop by voice playback module the Visually Impaired Person is notified by the audio output as “M12 Bus is near”. Finally, the Visually Impaired Person get to know the bus and reach the bus without anyone's help. The Bus Conductor will make note of total number of Visually Impaired Person riding the bus in a day and submit those notes to the authority.

7. RESULT

As a result, the visually impaired individual may be able to identify the bus they need to board by receiving a signal on their Zigbee-enabled device when the bus approaches within a specific radius. This signal could include information such as the bus number or route, allowing the individual to confidently identify and board their intended bus. The usage of Zigbee technology could give a dependable and low-power solution for bus identification, allowing visually impaired users to have a seamless and accessible experience.

1. Increased independence: With the help of Zigbee technology, visually challenged people can detect buses more readily on their own, without the assistance of others. This can help them feel more independent and self-sufficient.

2. Increased safety: Being able to clearly identify the correct bus reduces the danger of visually impaired people unintentionally boarding the wrong bus or missing their stop, which can improve their overall safety and reduce anxiety.

3. Saves time: By allowing visually impaired people to quickly and easily identify the correct bus, Zigbee technology can save them a significant amount of time and effort while using public transit, making their life more efficient.

4. Improved user experience: Using technology to assist visually impaired people in identifying buses can improve their overall travel experience, making it more comfortable, convenient, and enjoyable, and so increasing their social inclusion.

5. Reduces stress: For visually challenged people, the possibility of confusion or ambiguity when attempting to locate the correct bus can be unpleasant. Using Zigbee technology to make this procedure simpler and more dependable can assist to reduce stress.

6. Allows for faster reaction: If a visually impaired individual has to rapidly identify the correct bus, Zigbee technology can provide a faster response time than manually looking for identifying information.

7. Provides real-time information: If the Zigbee system is linked to a central database, it can deliver real-time information regarding bus timetables, delays, or cancellations to visually impaired people, giving them with more accurate and up-to-date information.

8. Encourages greater participation: Using advanced technology such as Zigbee can help to encourage greater inclusion of visually impaired individuals in public transport networks, ensuring that they have an equal opportunity to travel independently and with dignity.

9. Improves accessibility: By making public transport more accessible to visually impaired people, Zigbee technology can ensure that they have the same options and possibilities as sighted people, thereby increasing their overall quality of life.

Overall, employing Zigbee to assist visually impaired folks in locating the correct bus can result in a number of advantages, including lower stress, faster response times, real-time information, increased inclusion, accessibility, and an improved user experience.

8. Future Scope

1. Development of additional features:

The project can be expanded to incorporate new features such as real-time bus tracking, route optimisation, and safety alerts to improve the overall user experience and the safety of visually impaired people who utilise public transportation.

2. Integration with other technologies:

To further increase its capabilities and provide a more advanced level of bus identification services for visually impaired people, the system can be integrated with other technologies such as artificial intelligence, machine learning, and smart sensors.

3. Personalization and customization:

The system can be customised and personalised to match the needs and preferences of visually impaired people, such as allowing them to select their favourite voice assistant or control settings.

4. Global implementation:

Once the Zigbee system has been successfully deployed in one city or region, it can be further developed and expanded globally to provide more visually impaired people with accessible bus identification services.

5. Collaborations with other industries:

The project can work with other businesses, such as automotive and healthcare, to use their experience and technologies and deliver creative solutions to better the lives of visually impaired people

6. Research and development:

Ongoing research and development can be carried out to keep abreast of the current trends and technologies in the accessibility field, as well as to continuously improve the system's capabilities and functionalities.

7. Integration with other modes of transportation:

The Zigbee system can be combined with other forms of transportation such as trains, subways, and even ride-sharing services to give visually impaired people with a seamless and accessible experience.

8. Cloud-based system:

The system can be converted to a cloud-based system, in which data is stored and processed in the cloud for greater efficiency, flexibility, and scalability.

9. Improved reliability and accuracy:

Advanced technologies such as GPS tracking, AI algorithms, and computer vision can be used to improve the system's reliability and accuracy, ensuring that visually impaired people arrive at their destination safely and conveniently.

Overall, the project's future scope is broad, and it has the potential to have a substantial impact on the mobility and independence of visually impaired people by encouraging accessibility, inclusion, and safety in public transit networks.

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