An Ultrasonic Sensor-based blind stick analysis with instant accident alert for Blind People

B. Tech

in

Department of Electronics and Communication Engineering

by

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CERTIFICATE

This is to certify that this project report entitled

"**An Ultrasonic Sensor-based blind stick analysis with instant accident alert for Blind People**" By

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Submitted in partial fulfillment of the requirements for the degree of **Bachelor of Technology in Electronics and Communication Engineering** at **Gokaraju Rangaraju Institute of Engineering and Technology**, Hyderabad, during the academic year 2021-2022, is a bonafide record of work carried out under our guidance and supervision.

The results embodied in this report have not been submitted to any other University or Institution for the award of any degree or diploma.

Internal Guide External Examiner Head of Department

DECLARATION

I declare that this project report titled **An Ultrasonic Sensor-based blind stick analysis with instant accident alert for Blind People** submitted in partial fulfillment of the degree of **B. Tech in (Electronics and Communication)** is a record of original work carried out by me under the supervision of **Mr.ARUN VIGNESH** and has not formed the basis for the award of any other degree or diploma, in this or any other Institution or University. In keeping with the ethical practice in reporting scientific information, due acknowledgements have been made wherever the findings of others have been cited.

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Yours Sincerely,

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ABSTRACT

Then project is about the blind people who can't move without a stick, so we thought of doing a smart stick for blind people which can sense the obstacles and make buzzer sounds so he can move forward with that, in addition to that, we add fire and water sensors it beeps with different intensities to get attention from it. we can use ultrasonic sensors for a variety of obstacles like a pit, wall, drainages, vehicles, people etc . whenever he forgot the stick through his mobile phone with an app on the home screen can speak to it and the stick responds through voice output like 'you forgot me here' with the help of Bluetooth connection. Apart from these things, there may be chances to meet with an accident then we connected vibrate sensor with certain intensity more than usual . If in case the vibrator sensor senses the accident level frequency we set before then it sends msg to relatives through GPS and GSM connected to the Arduino board.

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CHAPTER 1
INTRODUCTION TO EMBEDDED SYSTEM

1.1. Introduction Of Embedded System

Embedded systems, digital information technology that is integrated into our everyday life, are becoming more prevalent. Today, more than 98 percent of all processors in use are embedded in systems that are invisible to the end user. In an Embedded System, the PC is totally encased or dedicated to the device or system it is controlling. When compared to a \computer, such as a laptop, an embedded system focuses on a single or limited set of functions, often with highly particular specifications.. Design engineers can decrease the product's overall cost by optimising the system's unique tasks. In order to take advantage of economies of scale, many embedded systems are mass produced. High-end embedded systems have seen a significant increase in the utilisation of PC hardware in recent years. As a result of this downward trend in high-end system hardware costs, formerly unfeasible projects involving non-PC-based embedded hardware are now viable options for development.. However, the software options for the embedded PC platform do not match the hardware in terms of attractiveness.

Embedded systems typically consist of a single CPU board with ROM storing all of the software. embedded systems are used in almost all digital devices, such as watches, microwaves and VCRs. Many embedded systems do not require an operating system because their logic is so narrowly focused.

Smaller gadgets like digital watches and MP3 players, as well as big stationary installations such as traffic lights, factory controls and nuclear power plant systems are all examples of embedded systems.

An embedded system can be as simple as a single microcontroller, or it can be as complicated as a massive chassis or enclosure containing several components, peripherals, and networks.

1.2 Definition of an Embedded System

For a specific/targeted application, an embedded system implements the software code directly with the hardware that we designed. Features and flexibility are provided by software while performance is provided by hardware (e.g. processors, ASICs) (& sometimes security)

An embedded system can be defined in various ways, but they can all be merged into an unified notion. In computing, an embedded system refers to a computer specifically designed to do a single task.

1.3 Features of Embedded Systems

The embedded computer system's adaptability makes it useful in a wide range of businesses, from streamlining the creation of deliverable products to lowering the expenses associated with their development and production. It is common for embedded devices to use operating systems that are tailored to their specific needs. With a small footprint, embedded operating systems can mimic real-time operating system specifications.

Generally speaking, embedded systems are less powerful than general-purpose systems, however there are some hopes that they could be extremely powerful and complex. Embedded systems typically utilise a CPU with a small amount of memory and a low power consumption. Small operating systems are common in embedded devices, and most of these only offer a few basic features.

Embedded systems can be optimised for specific activities, or boosting the reliability and performance. Some embedded systems are mass-produced, allowing them to take advantage of lower costs.

Some embedded systems are required to operate in harsh environments, such as high temperatures and humidity.

Minimizing costs is frequently the most important design factor for complex systems like portable Android devices. As a general rule, engineers like to use gear that is just "good enough" to accomplish the tasks at hand.

By reducing applications, general purpose computers can be adapted for low-volume embedded systems.

1.4 Characteristics of Embedded Systems

It is commonplace for CPUs to be incorporated into embedded computing systems because of the complexity of the system's functions. It's not just the functional requirements that make this a difficult task:

Multiple rates of operation; • Real-time deadlines that can cause system failure if not met

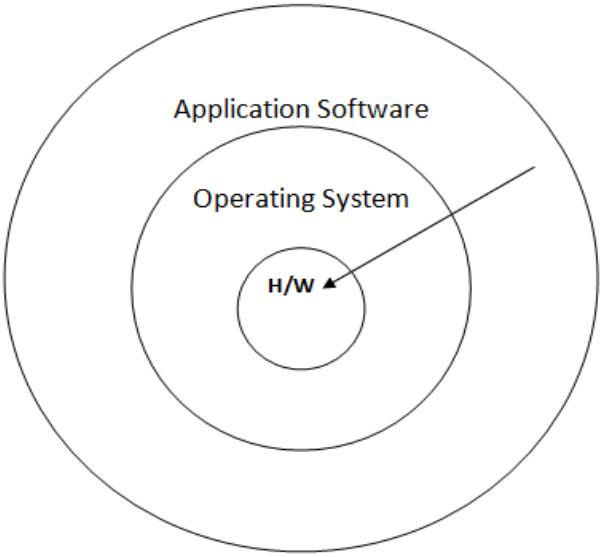
low power usage in many applications;

It's less expensive to produce, therefore there's less room for customization.

Programmers for workstations frequently focus on functionality. A few computing kernels in their software may be scrutinised for performance, but the entire application is almost never examined. When it comes to power consumption and production costs, they hardly give it a thought. As a result of these requirements, embedded system programming is extremely difficult and requires an understanding of computer architecture.

Overview of an Embedded System Architecture

In every Embedded system, a core processing unit is surrounded by custom-built hardware. Memory chips are used to store the software on this device.



Software runs on top of hardware, with the operating system being the last layer. Any computer, from a laptop to a desktop, can use the same architecture. It's hard to ignore the fact that these are important distinctions. Every embedded system is not required to have an operating system. Remote controls, air conditioners and other small devices are good examples of small applications.

1.5 Applications of Embedded Systems

Some of the most common embedded systems used in everyday life are

Small embedded controllers: 8-bit CPUs dominate, simple or no operating system

(e.g., thermostats)

Control systems: Often use DSP chip for control computations

(e.g., automotive engine control)

Distributed embedded control: Mixture of large and small nodes on a real-time

Embedded networks

(e.g., cars, elevators, factory automation)

System on chip: ASIC design tailored to application area

(e.g., consumer electronics, set-top boxes)

Network equipment:	Emphasis on data movement/packet flow (e.g., network switches; telephone switches)
Critical systems:	Safety and mission critical computing (e.g., pacemakers, automatic trains)
Signal processing:	Often use DSP chips for vision, audio, or other signal Processing (e.g., face recognition)
Robotics:	Uses various types of embedded computing (especially Vision and control) (e.g., autonomous vehicles)
Computer peripherals:	Disk drives, keyboards, laser printers, etc.
Wireless systems:	Wireless network-connected "sensor networks" and "Motes" to gather and report information
Embedded PCs:	Palmtop and small form factor PCs embedded into Equipment
Command and control:	Often huge military systems and "systems of systems" (e.g., a fleet of warships with interconnected Computers)

1.6 TYPES OF EMBEDDED SYSTEMS

based on how well it does what it is supposed to There are four distinct types of embedded systems.

embedded systems that operate independently of a host system

Embedded systems that operate in real time

Information appliances that are connected to a network

4. Smartphones, tablets, and other mobile devices.

1.6.1 Stand-alone embedded systems:

Stand-alone systems, as the name suggests, operate alone. As a result of the i/p processing, the desired o/p can be generated. Transducer signals, temperature signals, and human orders are all examples of i/p. It is possible to use the o/p as an electrical signal to operate an LED or LCD display.

in the case of electronic devices like a digital camera or an air conditioner

1.6.2 Embedded real-time systems:

To function properly, an embedded system must do a certain task within a predetermined timeframe.

Hard real-time systems: - embedded real-time utilised in missiles.

DVD players are examples of soft real-time systems.

Information appliances that are connected to the Internet:

Systems that can be accessible via n/w, such as the local area network (LAN) or the internet, are referred to as Network Information Appliances (NIAs).

Ex There is a webcam attached to the internet. Any computer with an internet connection can receive photographs taken by the camera in real time.

This section focuses on mobile devices:

It's a hybrid of VLSI and an Embedded System, indeed.

CHAPTER 2

INTRODUCTION TO BLIND STICK

The visual system's organs, the eyes, may take in information about changes in the surrounding environment. It is difficult for blind people to interact and sense the surroundings. They don't interact much with their environment. Physical movement can be difficult for blind or visually impaired since it is difficult to tell where they are and how to travel from one place to another. Blind and visually impaired people are often relying solely on hearing for navigation assistance, but this may be harmful, thus the development of an technologically advanced stick was necessary to help blind people avoid hurdles and provide information about their current location. The closest relative's Android phone or tablet can be used to power this blind stick, which incorporates a heart-beat sensor and other electronic modules. In order to assess a person's overall health, pulse heart sensors measure how fast their heart beats each minute. There are various things that will happen if someone is anxious, in addition to the heart or pulse racing:

Stress, agitation, apprehension, and disbelief are some of the more common psychological symptoms.

Frequency and tension in dreams are symptoms of sleep disorders and Inability to focus and remember information

Physical symptoms include muscular and bone pain, heart attack, asthma, stomach-ache, urinary tract problems, and cold hands. The device's structure is reminiscent of a white cane. A long cane and a folding cane are both available. Designed primarily for movement, this cane has a long handle for detecting obstacles in the user's route. It is typical for a cane's length to be measured based on user's height. The most common alternative is to use a cane that is significantly longer, however this is not always the case. Taking a folding cane with you wherever you go is a useful option. However, the conductivity of this stick type is less sensitive and weaker when employed . The ultrasonic sensor, microprocessor ATMega 8535, buzzer, and vibration DC motor were used by Sutarsi Suhaeb to create a smart cane for blind persons.

Many blind persons have difficulty crossing the street or finding their way about without assistance from others. Path clearing assistance and collision detection are made easier thanks to the work of this project. We can utilise a voice stick that can also be used to read the written text. When an obstruction or hazard is recognised, an alarm sounds to let the driver know. In both day and night, the proposed gadget is extremely reliable and effective.

It is possible that a walking stick for the blind could be useful in situations when ad-hoc network control and monitoring is necessary. An alarm will sound whenever any obstacle is detected within the given range. This will help the visually impaired during their walk. The Intelligent Voice Stick depicted in Fig. 1 has input and output options as depicted in it. When a situation is detected, the CPU will update its inputs and access the output devices in reaction to the input. There are five sensors, including ultrasonic, infrared, water, fire, and LDR (light detection and ranging). Different input states activate the system's four output devices, including a speech teacher, vibrator, a buzzer, and a floodlight, in a variety of ways. When a blind person is walking down the street, he or she may run into a variety of hazards, such as people, animals, walls, pits, muddy surfaces, fire, and more, all of which can lead to accidents or injuries. This is true even if the blind person is using standard walking sticks. While walking, a person can better guard against these dangers by using an electronic voice stick. This device could make use of a simple pathfinding technology . These requirements necessitate the adoption of a low-cost microprocessor.

In recent years, monitoring has become a major concern. There is a direct correlation between asset tracking failure and the loss of both money and time. Keeping tabs on the whereabouts of parcels and commodities, an animal, or a person of interest is what we call "tracking." We'll go into the ethical and economic significance of tracking in the next paragraphs, based on this wide definition. Currently, only bar-code tracking is used to keep track of items and packages. As soon as the item has been packaged, a barcode sticker has been attached to the packing. Every time the parcel passes through a checkpoint in the system, the barcode is manually scanned and the parcel's location is entered into the system. However, there are two major drawbacks to this strategy. This system relies heavily on user enthusiasm to make a record in the online database as a result of human involvement in the system. Second, no one outside of the checkpoint has any idea where the parcel is or will be. In the case of endangered wild species, high-resolution cameras are used to track their movements. However, the precise location is only known at random times. In the event of an animal's death, it may take a long time to discover the cause. Human tracking has also been a topic of interest. Tracking is especially vital for the elderly, who often require extra care. Our Personal Tracker has been tailored specifically. Using GPS trackers has become commonplace in public transportation. However, tracking specific people or assets, as previously noted, has not yet been made feasible. We are convinced that this is the case since no system has been developed to be both robust and diversified enough to address all of the issues raised above. The OpenCPU platform we use for personal tracking applications is a completely new approach. With the help of the OpenCPU platform, we've developed a

1.5" x 3.75" Personal Tracker that can pinpoint the exact location of the target within 30 metres (CEP).

Many people have major visual problems that make it impossible for them to travel frequently. Thus, they need a wide range of instruments and procedures to carry out their journeys. One of these methods is the work of an orientation and quality specialist, a person who works with the blind and visually impaired to teach them how to move around on their own, safely and independently, using their remaining senses. When a blind person needs assistance moving about an area, a guide dog that has been trained to navigate around obstacles can be a useful tool. However, there are several drawbacks to this method, including the fact that these dogs are only good for around five years at a time. The expense of highly trained canines is prohibitive, and many blind and visually impaired people find it difficult to care for another living thing in the way that is required. The white cane with a crimson tip is a well-known symbol of the blind community, and it is widely used to promote awareness of the cause. The white cane, the excellent cane, and the laser cane are just a few of the many varieties that are available today. However, the cane has a number of drawbacks, including its great length, its inability to recognise impediments, and the difficulty of keeping it in public settings. New methods for improving the quality of life for blind persons who embrace sensor and signal processing technologies have emerged recently. ETAs, or electronic travel aids, allow the blind to move around easily in any environment, no matter how dynamic it may be. The signal travel time is used to measure the distance between the person and the barriers. All existing systems, on the other hand, alert the blind when an object is nearby or ahead of them. These specifics give the user the ability to modify their strategy. For the blind, this work provides an easy, efficient, and flexible electronic system. For the first time, a PIC micro controller is being used to define an obstacle. Because the suggested method can also determine two main features of the obstruction, which are substance and shape in addition to distance, it is a useful tool. Aside from that, there is no requirement for the user of the system to carry a cane or other identifying equipment. A hat and a small stick (about the size of a pen) will be all that distinguishes him or her from others. It has a high degree of resistance to the effects of ambient light and colour on the object. It has a typical response time of 39 milliseconds, which makes it ideal for real-time use.

Because 84% of all human information leaves the environment via sight, vision is crucial. World Health Organization (WHO) statistics show that 2.2 billion people worldwide have visual impairments, 397 million of which are blind and 246 of which are amblyopia. White canes and guide dogs are common walking aids for the elderly and visually impaired. Basic skills and preparatory phases, motion range, and lack of information are the most critical flaws of these aids. Both hardware and software can now provide intelligent navigation thanks to the tremendous advancements in modern engineering. When it comes to blind people's safety and independence, an electronic travel tool (ETA) has recently been developed.. There are people with low vision who come into contact with those who have visual impairments. They could be deaf or blind. As a result of these circumstances, many people are unable to carry out everyday duties or alter their mood. Blindness can be brought on by a variety of factors, including disease, trauma, or other impairments to vision. Legal blindness, according to the Iowa Department of the Blind, is defined as having a vision of 20/200 or less. At 20 feet, someone with a 20/200 view can pick up items, whereas someone with an ideal 20/20 view can pick up at 200 feet away. Visually impaired people can gain a better understanding of the difficulties that blind people endure by recognising the issues they confront. Blind or visually impaired people often find it challenging to move around in familiar surroundings. Every other day, we receive a complaint of a missing person, and the vast majority of them are persons who cannot see. Getting around on one's own when one lacks vision is quite difficult. If they go missing, it will be extremely difficult for their loved ones to locate them. The purpose of this paper is to provide assistance to visually impaired individuals so that they can safely navigate the hazards and barriers that they encounter on a daily basis.

Analysis of past systems allowed us to identify an improved system that could overcome the shortcomings of those earlier designs. So, given current technology, we are able to come up with a better solution to the stated issue. This could put lives at risk while travelling because so many blind individuals have difficulty doing the most fundamental things in life, such as getting out of bed and getting dressed. There is a pressing need to ensure the protection and security of blind individuals in the modern world. There are only a few aids for the blind that have been produced so far. Ultrasonic sensors, light sensors, and water sensors are all built into the blind stick. To begin, we propose to employ an ultrasonic sensor to detect potential obstructions using ultrasonic waves, rather than physically touching them. Data 8 is sent to a microcontroller by the sensor when it detects an impediment. Afterward, the microcontroller analyses this information and determines whether or not the impediment is

close enough. The circuit accomplishes nothing if the obstacle is too far away. A buzzer is activated when a signal from the microcontroller indicates that an impediment is nearby. Alerts the blind person whenever it detects water, and produces a distinct tone. Another benefit is that the blind person can tell if the room is lit or dark. One more cutting-edge function has been incorporated into the system to assist the blind person in locating their cane if they lose track of where they put it. A wireless RF-based remote is used to locate a misplaced stick by pressing the remote button, which activates a buzzer on the stick. As a result, visually impaired people can use this method to detect obstacles and to locate a lost stick. The obstruction in front of a blind person is detected using an ultrasonic sensor. When an object is detected within the range of 2cm-450cm, the device will notify the blind person. The presence of water can be detected with a water sensor. A buzzer will sound and the person will be able to see where the stick is located. In addition, a GPS device is available for tracking the whereabouts of a blind person.

CHAPTER 3

LITERATURE SURVEY

3.1 Smart Stick for Blind and Visually imparied People:

As a result of this article, blind and partially-sighted people will be able to cross the street and read more easily. Using the voice stick, they were able to cross the street and go to their destination unaided. A new method of reading printed text with an Android phone has been unveiled. As a smart blind stick, it is less expensive and more effective than the standard blind stick. An alarm will sound whenever any obstacle is detected within the given range. This will help the visually impaired during their walk.

3.2 Implementation of a GPS Tracking System:

In recent years, tracking-based applications have become increasingly popular. Vehicle tracking is one of the few commercial uses of these technologies (e.g tracking of a train etc). However, the design of a personal tracking system has received little attention. A personal tracking system is the goal of our research. A snapshot of our study has been shown in this paper. Our research project's goal is to build and develop a system that can track and monitor important people, things, or assets (called as target). The system employs GPS to pinpoint the target's exact location. In order to track the target, a small handheld gadget is used that includes a GSM modem and a GPS receiver. Using GPS satellites, a GPS receiver may determine its exact location (i.e. latitude and longitude). GSM modems are used to transmit the NMEA location data to the control station. There is no need for an external microcontroller because of the Open CPU development platform, which also results in a more compact device, shorter design & development time, and lower costs. It is thus possible to accurately locate the target with this method. Tracking elderly persons, tracking animals.in the wild, and tracking the transportation of goods are only some of the uses for this technology. A l.S"X3.7S" Tracker system with position accuracy inaccuracy is what we've come up with as a final design for our system.

According to the previous sections, tracking systems are not a new phenomenon. To begin, in 1973, the United States Department of Defense (USDoD) initiated the GPS project, initially with a target of 24 satellites. There are now 31 GPS satellites in use. There are numerous satellite-based systems, including Russian Glonass, Chinese BeiDou, Indian IRNSSand EU Galileo. Detailed information on the creation of the GPS system can be found in . An indoor position monitoring system is proposed in by E. Hammerle, P. Winton, and S. Fett. This method uses a radio-frequency (RF) transmitter to estimate the position using an estimating approach called as Partial Pulse Positioning. The location of the RF

emitter is identified by analysing the reflections from various reflectors in the indoor environment. Using WiFi signal strength assessments, F. Evennou and F. Marx have developed an aided dead-reckoning navigation system. Use of low-cost sensors is used to identify the position and orientation. After then, WiFi signal strength measurements are used to correct the mistakes. The drift can be corrected using signal processing algorithms. When combined with a WiFi positioning system, inertial navigation systems can deliver incredibly accurate real-time positioning for mobile devices. Multipath propagation is a common problem with GNSS/GPS-based navigation systems. The problem is exacerbated in densely populated urban areas with several tall structures. If a building or skyscraper blocks the direct line of sight to a satellite, its signal may reach the earth only after one or more reflections. Ranging errors occur as a result of the reflected signal's longer signal path, leading to inaccurate position predictions. Buildings can reflect light even when there is a clear line of sight. Meguro et al. suggest a method for precisely locating moving cars in densely populated locations. Multipath propagation is minimised by using an omni-directional infrared camera (IR). Only satellites with fewer multipath faults are considered when determining a precise location. There is no consideration given to "invisible satellites," even though signals can be received from all satellites. Positioning is made easier by deciding which signals should be taken into account thanks to the IR camera. A service robot tracking system has been presented by Kouji Murakami et al. Intelligent cabinet, floor sensing , and data management are all part of the package. The intelligent cabinet uses an RFID reader to track the position of an object on its own. Laser range finders are used in the floor sensing system. Laser range can be used to measure the position of an object on the floor and the position of a human in a room.. The data management system logs in the captured data to provide inputs to the service robot. Removing the reflected signals may result in a lack of satellites needed to fix the position when propagation is multipath. A cooperative relative positioning (CoReIPos) strategy is proposed by STang et al. Using correlated information, such as reflected signals, to determine relative position is common in this approach. M Fuzi et al. suggest a method for estimating pedestrian location by tracking their mobile devices as they move around. The absolute position of the mobile device is determined using GPS, while the relative movement of the mobile device is determined through dead reckoning methods utilising the mobile's built-in sensors.

3.3 Safety Stick For Blind People Using Microcontroller:

Blindness could be a condition in which one is unable to perceive the world around them because of physiological or physical reasons. Total blindness is the absence of all visual light perception, while partial blindness is the lack of integration within optic nerve or visual centre growth. In order to improve the quality of life for blind and visually impaired individuals in a very specific location, a simple, affordable, friendly user, smart blind system is designed and implemented.

3.4 Sensor Based Stick for Visually imparied People Navigation:

The way God sees us is crucial to how we spend our lives. Only in this way can we tell the difference between those who are blessed and those who are cursed. When it comes to transportation and other bodily needs, blind persons have little choice but to rely on others for assistance. It is the goal of this study to give a theoretical and physical model that integrates the most recent technologies to provide intelligent and effective electronic assistance to persons who are blind. Ultrasonic sensors identify impediments around the blind person, while colour detection sensors determine the precise route they will take. A Bluetooth module that uses GPS technology and the blind Android mobile app will provide the location and send an SMS alert to the registered contact number in the event of a crisis. The technology will aid the visually impaired by providing them with practical and easy-to-use navigation aids.

The blind stick is a growing and evolving project with significant sway. Due of their high price and lack of transparency, commercially marketed blind sticks are currently ineffective. One of the first projects to explore comparable ideas offered a means for blind individuals to use smart keys to detect impediments, create an illusion of vision, and receive real-time GPS help. In the comparison activities for blind persons, pulse echo technology is used, which emits a warning sound when objects are detected. The US Army utilised this technology to find submarines. The ultrasonic range of these pulses is 22 kHz to 51 kHz, but the power needs are rather high. When you beat the rough surface, they produce echoes. Blind people's movement can be improved by signal processing and sensor technology at this time . People who are visually impaired can use electronic travel assistance (ETAs) to navigate the environment, no matter how much they change it. ETAs are termed Electronic Travel Assistance (ETAs) . Using the information in this publication, we learned about new technologies such as GPS and GSM . This will assist in locating the device and be included into a smart stick module for those with visual impairments, as well as providing insight into text messages sent from an Android phone to a blind person . In this study, we found inspiration for a text message and vibration alert system in which a person using a smart

stick detects an obstruction, and a blind person uses a vibrator to determine whether or not the right vibrator is vibrating when the obstacle is on the right . We learned about GSM, GPS, and sensors like the Ultrasonic sensor from this paper. In which case, which one is better, and how do they work and how do they detect obstacles?

3.5 Ultrasonic Blind Stick with GPS System:

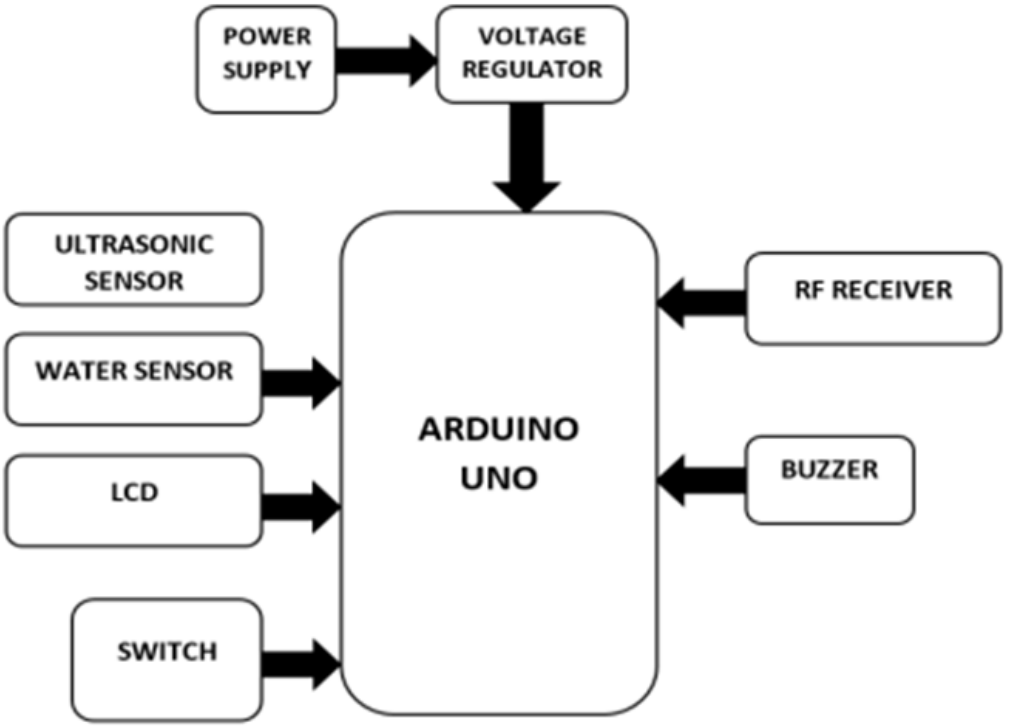
An ultrasonic blind stick with GPS tracking is described in detail in the paper's abstract. A stick was traditionally used by sight challenged people to see if there were any obstructions in their path. However, this stick is ineffective in a number of ways, and its user must deal with a number of issues. The goal of this research is to help the vision impaired navigate more effectively. The inclusion of sensors in the ultrasonic blind walking stick makes object recognition much easier than with a regular walking stick. The GPS system tells him where he is at any given time. The system includes an additional feature that helps the visually impaired locate their stick if they lose it. By pressing the remote's button and hearing the buzzer on the stick, a wireless RF-based remote can be used to locate a misplaced stick. As a result, visually impaired people can use this method to detect obstacles and to locate a lost stick. This stick can also detect water on the ground as an additional feature. For blind people, this stick can also show if they have good or bad vision in the day or night. This study explains how this stick is made and how it will benefit the blind. We're drawing on ideas from a variety of papers to aid us along the way.

Using GPS technology and social networking, S.Chew (2012) developed the Blind Spot, a smart white stick that helps visually impaired persons navigate public settings. The ultrasonic sensor identifies the impediment and warns the blind person to avoid it. GPS, on the other hand, was unable to pinpoint the exact location of the obstructions since ultrasonics measure distance. Ultrasonic sensors, according to Osama Bader AL-Barrm and JeenVinouth , could be used to identify obstructions in the path of a blind person. A buzzer, DC vibration motor, and microcontroller are all included in the system. Obstacles are sounded and vibrations are sent through the speaker and motor. GPS and SMS message systems are also included in the stick. Other researchers have developed a "smart stick" that can assist visually impaired people with their mobility. Ultrasonic sensors and an ATMEL microprocessor serve as the system's foundation. Powered by two rechargeable batteries, this device can be powered up via USB connection or an AC adapter (not included). ATMEL AVR and ATME GA328P microcontrollers are used to programme the control unit. Vibration and a buzzer will go off to warn the user if any obstructions are identified. This is an easy-to-use system. It has a rechargeable battery and can travel a distance of up to 3 metres. It is also foldable so that the user can conveniently transport it. This technology, on

the other hand, only detects obstructions in one direction at a time and is therefore erroneous. Paper describes an ultrasonic blind walking stick created for visually impaired people to help them go around. Ultrasonic blind walking stick with GPS tracking is an improved blind stick that uses new technologies to assist visually impaired individuals in their daily lives A built-in ultrasonic sensor allows the blind stick to detect light and water. An impediment is detected utilising ultrasonic waves from the sensors in this system. When the sensor detects an impediment, it sends the received data to the microcontroller, which then evaluates the information and determines whether or not the obstacle is too close to the user. The circuit accomplishes nothing if the impediment is too far away from the microcontroller. The microcontroller sends a signal to blast a buzzer if the obstacle is close enough. It also detects water and emits a variety of sounds to inform the visually impaired to its presence. Additionally, the device allows the blind person to tell if the room is lit or dark. It was developed by Benjamin and his colleagues in 2011 to identify impediments and down curbs using laser sensors. A high-pitched 'BEEP' was used as a signal for obstacle detection. The laser cane's design is straightforward and easy to use. It is impossible for the stick to provide cognitive or psychological support; it can only detect obstacles. There is simply a beep sound that activates any impediment, and no aid is available to lead them. For the visually impaired, Central Michigan University (2009) created an electronic cane that provides contextual information on the surroundings around the user. When the cane picks up the RFID chips that are embedded in street signs and other places, it returns the information to the user. In addition to the stick's tip, the device has an ultrasound sensor that helps to identify items ahead of it.

CHAPTER 4

BLOCK DIAGRAM



4.1 Hardware requirements:

Power supply

Arduino

Ultrasonic sensor

Fire sensor

Water sensor

Vibration sensor

Gsm

Gps

Bluetooth

Buzzer

4.1.1 Power supply:

Regulated power supply section

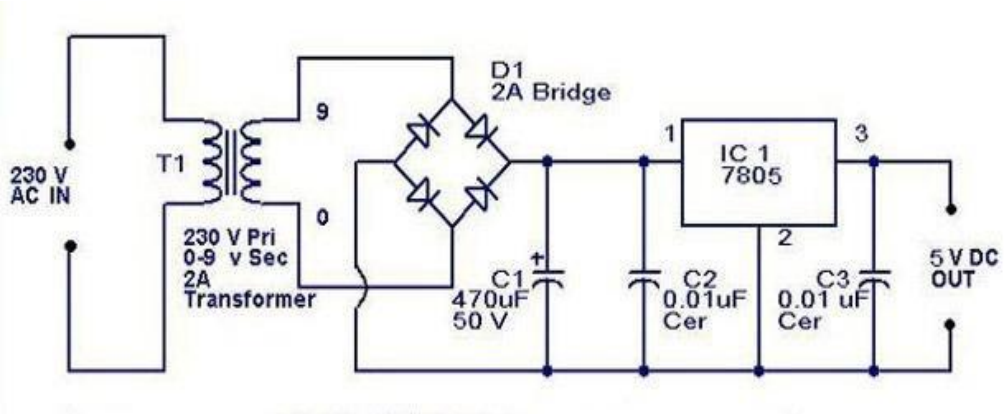
The AC input voltage in mains-supplied converted into a DC voltage with the correct stability. The peak voltage across the load is equal to the peak value of the AC voltage delivered by the secondary winding of transformer's in these basic configurations. In most cases, this circuitry's output ripple is too great for the intended use. However, they are enough for some tasks, such as powering small motors or lamps. The output voltage waveform improves significantly. A capacitor is put after the rectifier diodes. B-C is a straight line from A to B. As the current increases, the slope of this line steepens, lowering point c. When the diode conduction time (c-d) increases, the ripple in the output is also increased. In a no-load condition, the rectified AC voltage is equal to the DC output voltage. The figure shows how to get both positive and negative outputs based on the same ground. The voltage ripple for a given load current and filter capacitor value can be determined using these tools. Voltage ripple is inversely proportional to filter capacitor value and directly proportional to load current. Supply performance in audio amplifiers, which is extensively utilised in consumer electronics.

There are times when a stabiliser is required since the above circuits aren't able to offer the required level of stability. Higher output current can be obtained by applying this circuit's reference voltage to the base of a transistor or the input of an op amp. Figure depicts the simplest form of a series regulator. The transistor is linked as a voltage follower in this circuit, and the output voltage is between 600 and 700mV lower than the zener voltage.

They must have an appropriate value so that the zener is correctly biassed and Q1 receives an adequate amount of the Q1 base current. A Darlington can be used in place of a transistor to ensure that the zener's current does not drop to the point where effective regulation is impossible. The op amp circuit depicted in Figure is recommended when improved performance is required. The op amp's output voltage is set to be the same as the input reference voltage in this circuit. Higher currents can be achieved with the use of an appropriate output buffer. In Figure 14, the output voltage can be adjusted by connecting a variable divider in series with the zener diode and its wiper to the input of the op amp.

Regulators like the L78xx and L79x have made it much easier to build stabilised supplies that produce a very stable output and contain current limiters and thermal protection functions. A regulated power supply is the primary source of electricity for this

project since it converts 220v ac power into 5v, 9v, 12v, 15v, etc. of regulated dc power. Step-down transformer and bridge rectifier, a combination of four diodes coupled in a bridge configuration, make up a regulated power supply. Because it is more efficient than any other type of rectifier, the bridge rectifier is our preferred choice. Rectifier that converts AC to DC pulses. A capacitor in parallel or a series of inductors can be utilised as a filter after the rectifier filter circuit has been implemented. Because we needed dc at the o/p, all of these filters are low pass. After that, a voltage regulator with a capacitor serves as a pure dc output point observer. We favour 78xx series voltage regulators because they are simpler, cheaper, and easier to use than other voltage regulators for getting pure dc o/p voltage.



1) AC Input: This is the public utility's input supply, through which the device will be powered. This power can also be delivered directly to the relay contacts in the device connecting the load to the power source when the power source is between 200 and 240 volts (V).

The secondary side of the step-down transformer reduces the AC supply to 5 volts. It is a 230/5 volt transformer, as a result. The secondary of a transformer reacts to changes in the main. As a result, all changes in input are mirrored in the output.

Full-wave rectification is achieved using a centre tapped transformer, with four diodes for full-wave rectification. A filter, consisting of a capacitor to smooth out (filter) the pulsation, follows. The microcontroller receives a sample of the output voltage after it has been rectified and smoothed. Because it is not regulated, the output voltage changes with the input mains voltage. The transformer was built and the windings were chosen in such a way that the device could detect and tolerate input mains voltage of up to 600Vac because the system was designed to prevent over voltage.

4.1.2 Arduino:

Introduction to the Arduino Board

In order to make electronic design, prototyping, and experimentation more accessible to a wider range of people, the Arduino microcontroller family was created. People use it to develop robot brains, to create new digital instruments, or to create a system that allows your house plants tweet you when they're thirsty. A single ATmega microcontroller, which includes a CPU, RAM, Flash memory, and I/O ports, powers all Arduinos (we use the standard Arduino Uno). In contrast to a Raspberry Pi, it has pins for sensors, LEDs, tiny motors, and speakers, as well as servos and gyroscopes, which may all be connected directly to these ports. A USB cable connects the Arduino to your computer, where it may be programmed in a basic language (akin to Java) using the free Arduino IDE. Once it's been programmed, the Arduino can be used as a stand-alone device or in conjunction with a computer through USB.

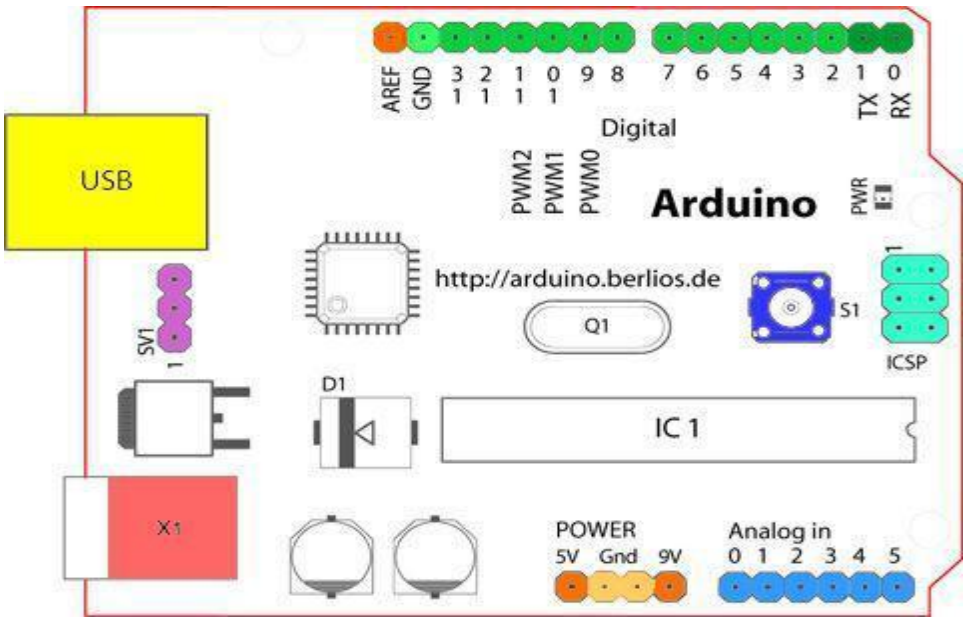


Figure: Structure of Arduino Board

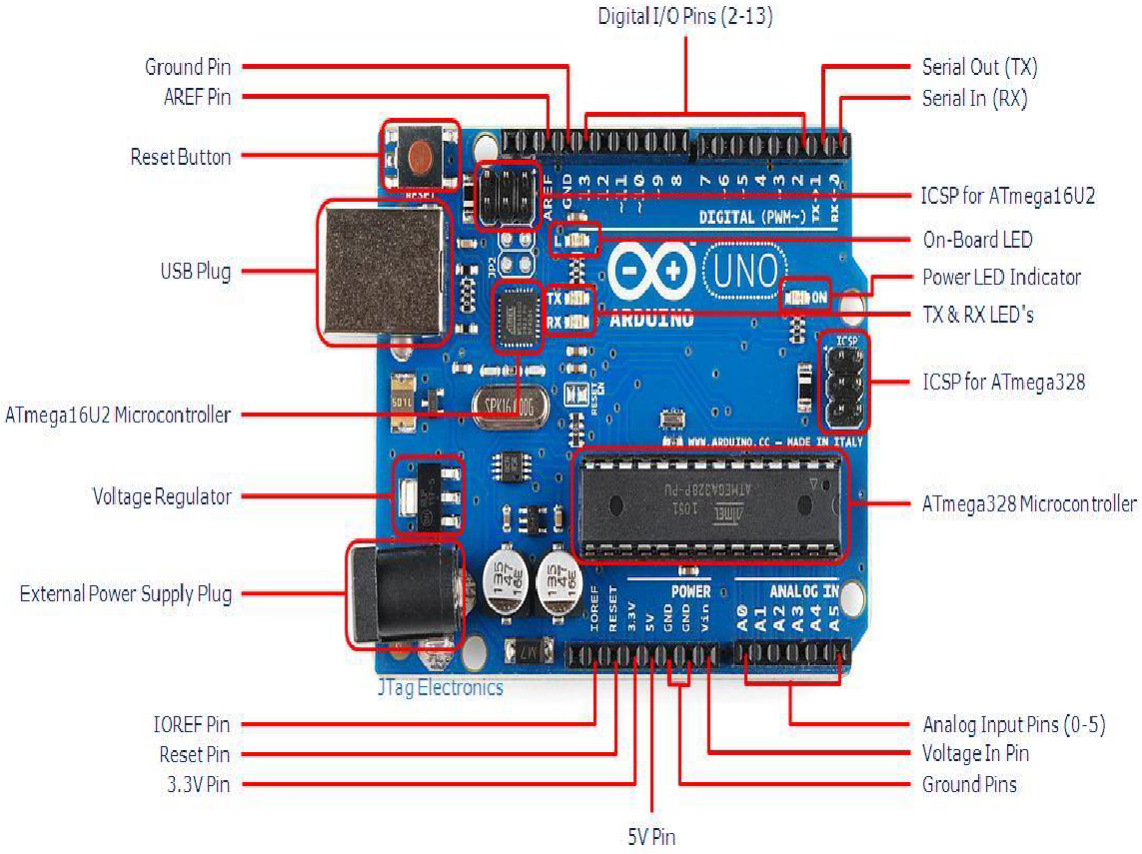


Figure: Arduino Board

➢ This is a general idea of what you'll see if you look at the board from the top down

➢ In a clockwise direction, starting at the centre, from the top:

➢ The Digital Base (light green)

➢ Pins 2-13 of the Digital Pin Set (green)

➢ There is no way to use the digital IO (DigitalRead and DigitalWrite) on the serial in/out pins (dark green) if serial communication is simultaneously being used (e.g. Serial.begin).

➢ Pressing the S1 reset button returns you to the home screen (dark blue)

➢ The In-circuit Serial Programming Device (blue-green)

➢ The following are the pin numbers for the analogue input: 0-5 (light blue)

➢ Pins for supplying power and providing a ground

➢ External and USB power are switched using this button

➢ It is also possible to power the board through USB

Digital Pins

Pin Mode(), Digital Read() and DigitalWrite() commands can be used for general-purpose input and output on an Arduino board in addition to the specialised functions indicated below. Using digitalWrite()

PWM: 3, 5, 6, 9, 10, and 11 Use the analogue Write() function to generate an 8-bit PWM signal. Pins 9, 10, and 11 are the only places where an ATmega8 may produce PWM on a board.Reset your Bluetooth device to its factory settings by dialling the following number: 7. (Arduino BT-only) The Bluetooth module's reset line is connected to this port.

It has an SPI of 10, 11, 12, and 13 (SS, MOSI, and MISO) (SCK). SPI communication is supported by these pins, however it is not part of the Arduino language at this time.

Pins That Look Like Analog Dials

With the Analog Read() function, Analog inputs 0 through 5 can all be used as digital pins, as can all of the other analogue inputs. It is not possible to use the Mini and BT's analogue inputs, 6 and 7, as digital pins.

Connectors:

VIN is external power source input voltage (also referred to as "9V") .This pin can be used to deliver electricity or, if using the power jack, to access it. Also, keep in mind that the Lily Pad does not have a VIN pin and only accepts a regulated input for its power. This can be sourced from the VIN via an on-board regulator or from a regulated 5V supply such as USB or another.

3-volt power supply produced by the onboard FTDI chip on the Diecimila alone.

GND: Grounding pins.

Various Other Pins

AREF: Analog input reference voltage. Utilized in conjunction with analogue reference ().

To begin over, simply press the reset button (Diecimila-only) Reset the microcontroller by lowering this line. In most cases, this is utilised to add a reset button to a shield that would otherwise block the one on the board.

4.1.3 Ultrasonic sensor:

Ultrasonic sound waves are used by ultrasonic sensors to determine a distance to an item. Transducers are used in ultrasonic sensors to emit and receive ultrasonic pulses that

provide information about the proximity of an item.. In high-frequency sound, boundary reflections form different echo patterns.

You can think of sound waves as mechanical waves that flow across different mediums. The propagation medium determines the exact velocity at which sound waves can travel. Spectacular echo patterns are created by high-frequency sound waves reflecting off of barriers.

Sound wave laws of physics

There are specified frequencies or oscillations per second that make up sound waves. Around 20Hz to 20KHz is the audible range for humans. In ultrasonic detection, the frequency range is typically between 100 kHz and 50 MHz. In a medium, ultrasound travels at a fixed speed and temperature.

Particle and Wave Propagation Transducers

Ultrasonic transceivers, or transducers, will be used to send and receive sound waves. These devices operate in a manner similar to radar.

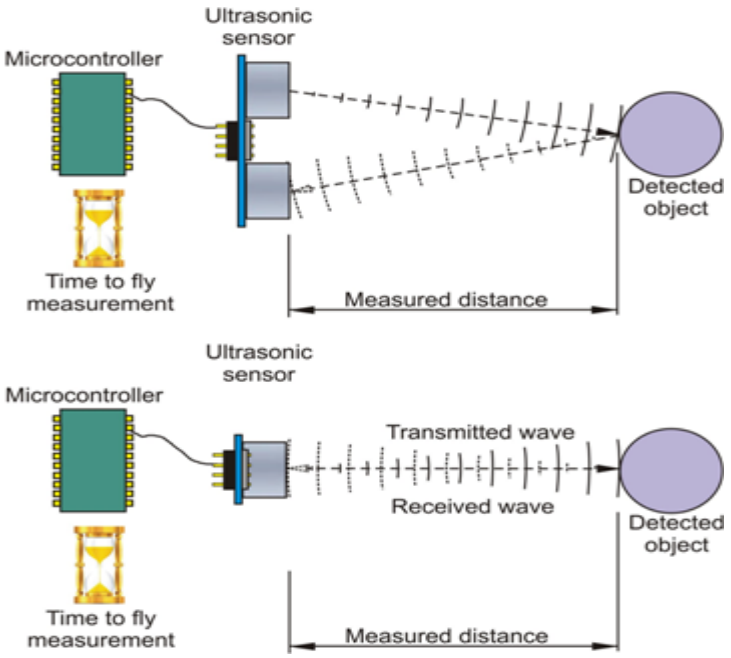
When it comes to sensors, transducers are a typical choice. There are many different types of transducers that can be employed. To find cavities and cracks on an object's outside surface and to measure its thickness.

There are two types of delay line transducers: those with a single element longitudinal wave transducer and those that have a replaceable delay line. Improved near-surface resolution is one of the benefits of using a delay line transducer. Allows the element to stop vibrating before receiving a return signal from the reflector.

The Operation of Ultrasonic Sensors.

The frequency of ultrasonic sound vibrations exceeds that of human hearing. Ultrasonic sound is transmitted and received by the use of transducers, which are special

microphones. A single transducer is used by our ultrasonic sensors, like many others, to both send a pulse and receive the echo.

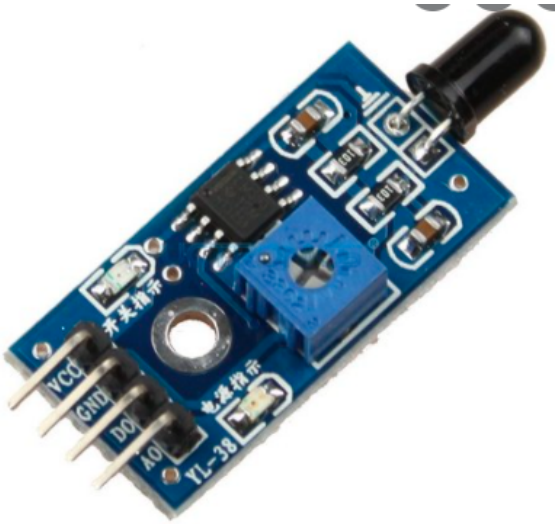


To what end are ultrasonic sensors employed?

It is possible to use ultrasound inside or outside, regardless of the lighting conditions. As long as the movement isn't too quick, ultrasonic sensors can manage robot collision avoidance. For example, ultrasonic sensors can reliably be utilised in grain bin sensing, water level sensing, drones and the drive-thru of your local restaurant or bank. Collision detection with ultrasonic rangefinders is quite popular.

4.1.4 Fire sensor:

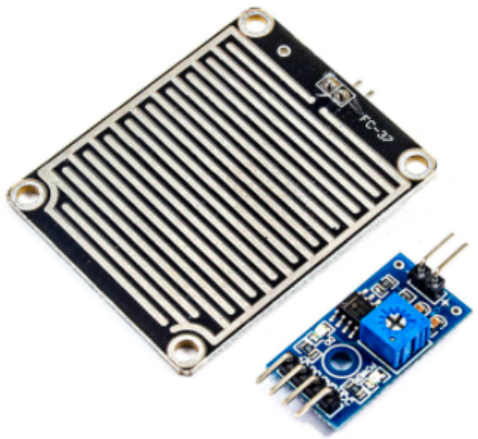
In the event that your furnace fails to light, the flame sensor will automatically shut off the gas supply. To avoid gas buildup or catastrophic explosions, such a functioning concept is necessary.



4.1.5 Rain sensor:

Using the principle of total internal reflection, the rain sensor detects raindrops. The sensor in the car fires an infrared beam at a 45-degree angle at a clear portion of the windshield. It's raining and the wet glass scatters the light so less of it reaches the sensor.

Switching devices, such as rain sensors, are commonly used to monitor rainfall. When there is rain, the switch is generally closed, and this sensor works in the same way.

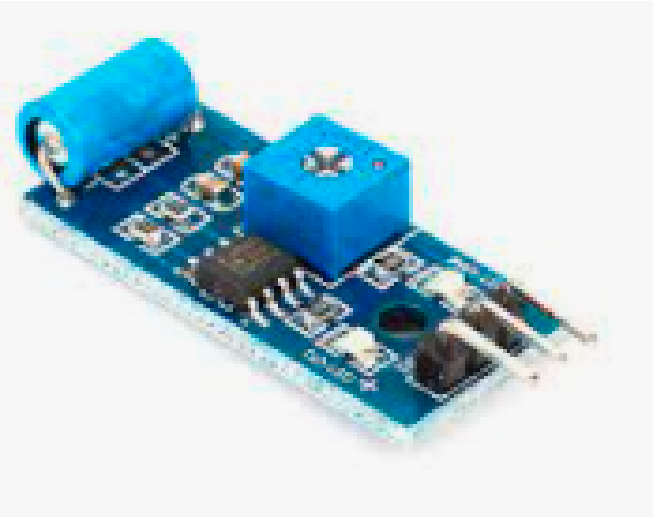


4.1.6 Vibration sensor:

In a machine or system, a vibration sensor is a device that measures the amount and frequency of vibration. These metrics can be used to identify potential problems with the asset, such as imbalances, and to foretell when it will fail in the future.

A piezoelectric sensor is a type of vibration sensor.. These sensors can be used to monitor a wide range of operations because of their adaptability. Piezoelectric effects are employed in

this sensor to convert the changes in acceleration or pressure to an electrical charge that can be used to measure changes in acceleration, temperature, force, or strain.



4.1.7 Gsm:

The acronym GSM, or "global system for mobile communication," refers to a particular type of cellphone . In the world, it is the most frequently utilised system of mobile communication An open and digital cell technology, GSM operates in the 850, 900, 1800, and 1900 MHz frequency bands to carry mobile voice and data services.

The TDMA (time division multiple access) technique was used in the development of the GSM system, which is a digital system. There are two distinct time slots for each stream of client information on a GSM channel, which is why the data is digitised and

reduced before being transmitted. The digital system can handle data speeds ranging from 64 kbps to 120 Mbps.

It's possible to use a GSM system with a variety of different cell sizes. The implementation domain determines the specifics of each cell. Macro, micro, pico, and umbrella cells are the five sizes of GSM cell that make up a network. Each cell's coverage area varies depending on the location in which it is installed.

Multiple Access based on Time Division

The TDMA method utilises a shared frequency to divide up the available time slots amongst the users. In addition to voice and data transmission, it can transport data rates of 64kbps to 120Mbps.

Architecture of the Global System for Mobile Communications

This is what you'll find in a GSM network

If you're talking about a "mobile station," you're talking about a phone with a transceiver, display, and processor all in one.

• Base Station: Transceivers are housed in a central station that manages the protocols necessary to communicate with mobile devices, known as the Base Transceiver Station (BTS). The Base Station Controller is also part of the system, and it controls the Base Transceiver Station and serves as a conduit between the mobile station and the mobile switching centre.

• **Network Subsystem**: It serves as the primary link between mobile stations and the Internet. Access to various networks, such as ISDN, PSTN, and so on. GSM also includes the Home Location Register and the Visitor Location Register, which are used to route and roam calls. There's also an Equipment Identity Register there, which keeps track of all the mobile devices and their unique IMEI numbers. The abbreviation IMEI refers to the unique identification number assigned to each piece of mobile equipment.

GSM Module Specifications:

• Enhanced utilisation of radio frequency spectrum

• Roaming across borders

• Compatibility with a digital network of integrated services (ISDN)

• The ability to utilise new services.

• Management of the SIM's phonebook

• A predetermined phone number (FDN)

• Alarm clock with real-time display and programmability

• High-quality communication

• Encrypts phone calls to make them more secure.

• Messaging service via SMS (SMS)

Standardized GSM security measures make it the most secure telecommunications standard currently accessible.. End-to-end security can now be achieved while still maintaining call confidentiality and GSM subscriber privacy on the radio channel.

A GSM modem is utilised.

It is possible to use a GSM modem to connect between a mobile phone and a computer or any other processor across a network. To use a GSM modem, you'll need a SIM card and access to the network range that the network provider has subscribed to. Serial, USB, or Bluetooth connections are all options for connecting it to a computer. with the right connection and software, you may connect a GSM modem to a serial or USB port on your computer using a regular GSM phone.

How the GSM Module Works:

The GSM modem is connected to the MC through the level shifter IC Max232 in the circuit below. The SIM card-mounted GSM modem sends serial data to the MC when it

receives a digit command through SMS from any cell phone. In order to disengage the ignition switch, the GSM modem gets a command 'STOP' while the application is running, which causes the MC to generate an output. The user's instruction is based on a GSM modem 'ALERT' intimation that a preset message will be transmitted only if the input is driven low. 16x2 LCD display shows the entire process.

Intelligent GSM Device for Automation and Security

GSM mobile terminals have become an essential part of our daily lives in recent years. GSM mobile terminals, like our wallets, purses, keys, and watches, allow us to communicate with the rest of the world. It's enticing to be able to phone or text anyone at any given time.

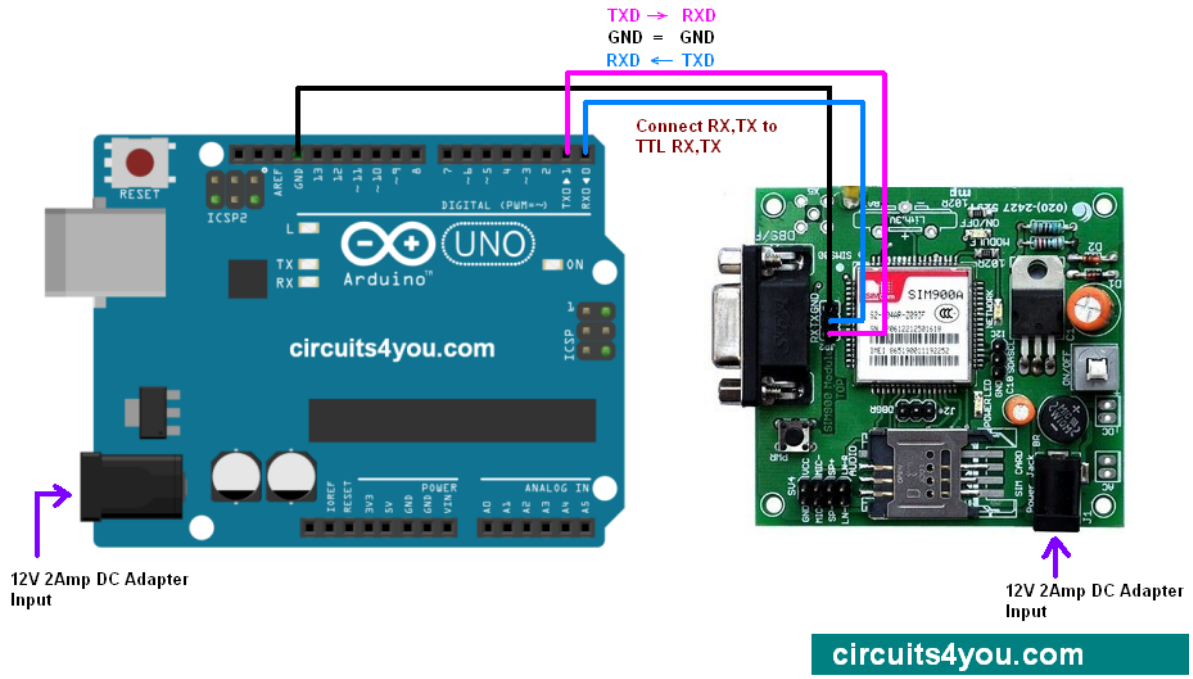
GSM network technology is used to transmit SMS messages from the sender to the recipient in this project, as the name implies. Sending and receiving SMS messages is a common method of gaining unauthorised access to home gadgets and compromising security. For the system, two subsystems are offered. Home appliances can be controlled from afar thanks to the appliance control subsystem and the security alert subsystem.

The system is capable of sending SMS instructions to a specific cell phone number, instructing it to modify the settings on a home appliance to meet the demands of the user. Security alerts are handled in such a way that when an intrusion is detected, the system automatically generates SMS messages to warn the user of a potential security risk.

GSM will make it possible to communicate with anyone, anywhere, at any time. To achieve a truly personal communication system with sufficient standardisation to maintain

compatibility, the GSM functional design and ideology apply intelligent networking principles.

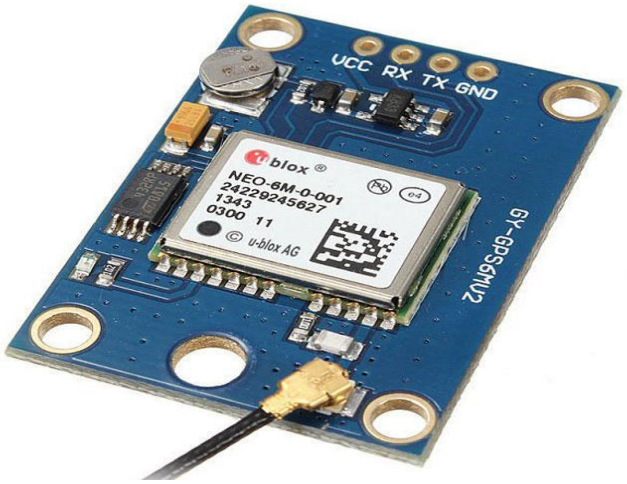
Interface GSM with Arduino



4.1.8 GPS

What is GPS?

GPS, or the Global Positioning System, is a satellite navigation system that provides users with precise time and location data in any weather. In addition to planes, ships, and cars and trucks, GPS is utilised for navigation. GPS enables real-time, three-dimensional positioning, navigation, and timing throughout the world in real-time and in real-time.



How does GPS System Work

• In order to use GPS, you need to have three things:

• The GPS satellites are part of the space section.

The number of satellites in the constellation is known as the space segment. 29 satellites travel 12,000 miles in the sky every 12 hours in a ring around the globe. Using the space segment's routing/navigation function, the control segment sends a message to the space segment, which then stores and retransmits the message. The satellites' atomic clocks ensure that these transmissions stay on time. There are enough satellites in the GPS constellation to ensure that GPS users always have at least four satellites visible in their field of view, no matter where they are on Earth's surface.

Assistive Technology

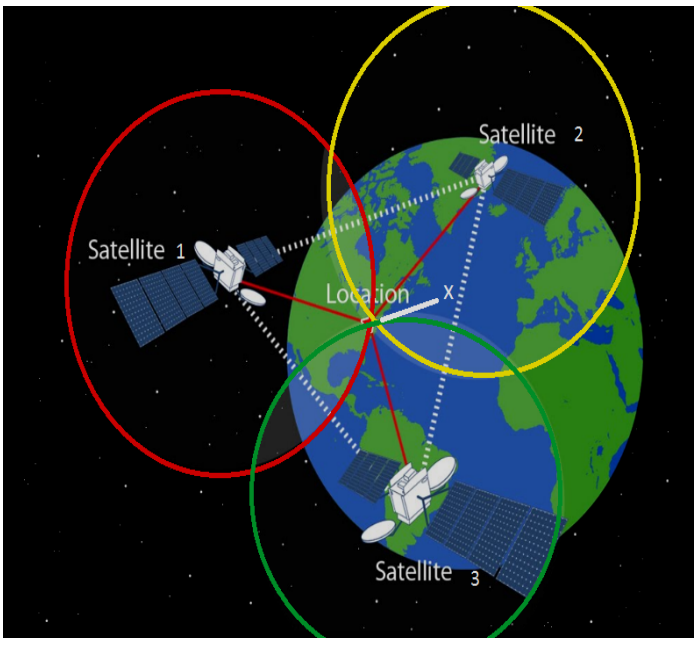
A central each with an atomic clock, make up the section's control segment. This information is relayed to the master control station, where it is reviewed for irregularities and delivered back GPS. The five monitoring stations keep an eye on the signals from the GPS satellites. It's also known as a monitoring station.

Group of People Who Use a Product or Service:

User portion includes the GPS receiver, which is responsible for receiving signals. Most of this sector is used by the United States military for missile guidance systems and civilian GPS applications in nearly every field. Survey, transportation, natural resources, agriculture, and mapping are just a few of the many uses for this technology among the general public.

This is how GPS figures out where you are:

In order for GPS to function, a mathematical principle known as "trilateration" must be applied. Distances to satellites are used to determine a person's location. The earth's receiver can be located using the four satellites shown in the diagram. The 4th satellite confirms the position of the target. To pinpoint the exact location, three satellites are employed in the process. Spacecraft's intended locations are confirmed by a fourth satellite. Satellites, control stations, monitor stations, and receivers make up the GPS system. Triangulation is used by the GPS receiver to determine a user's exact location from satellite data.



GPS is used on some incidents in several ways, such as:

• Navigating between locations, such as a lookout and the fire perimeter, is necessary.

• The distance between two places can be calculated using this method.

• GPS has three advantages:

• The Global Positioning System (GPS) is an essential tool for military, civilian, and commercial users.

• systems that monitor the movement of a vehicle Turn-by-turn directions can be provided by GPS-based navigation systems.

• Extremely fast

• GPS has two drawbacks:

When compared to phone signals, GPS satellites are too weak to work effectively indoors, underwater, or under trees.

Line-of-sight to the satellite is required for maximum accuracy, which is why GPS does not perform well in densely populated areas.

GPS receivers come in a variety of shapes and sizes. With a GPS receiver, it is essential to have the following:

• A compass and a map for navigating.

GPS cable that has been downloaded

A few extra batteries might also be helpful here.

• Knowledge of the GPS receiver's memory capacity helps avoid data loss, accuracy decreases or other issues.

Whenever feasible, use an external antenna, such as among trees, canyons, or while driving.

Setup of a GPS receiver according to incident or agency standard regulation; a coordinating mechanism.

There was a problem with the GPS system.

It is conceivable for GPS receivers to suffer from a wide range of inaccuracies, which will affect the accuracy of their outputs. As the GPS signal travels through the ionosphere and troposphere, it is refracted, causing the signal to move at a different speed from the speed of a GPS signal that travels in space. Noise, or distortion of the signal, which produces electrical interference or inaccuracies inherent in the GPS receiver, is another source of mistake.

Small changes in the atomic clocks aboard the satellites can result in huge positional mistakes; a clock error of 1 nanosecond translates to a ground inaccuracy of 1 foot or.3 metres. The receiver receives the signal in both straight-line and delayed-line form throughout this procedure (multiple paths). It's eerily reminiscent of a ghostly or distorted image on a television screen.

Dilution of Precision by Geometric Means (GDOP)

GPS placement can also be affected by the shape of the satellites. Geometric Dilution of Precision is the name given to this phenomena (GDOP). In other words, it's a metric for how well a constellation of satellites is laid out in relation to one another. Other GPS mistakes may be corrected with its help. Most GPS receivers choose a constellation of satellites that provides the least ambiguity, the most accurate satellite geometry.

Position Dilution of Precision, or PDOP, is a measurement used by GPS receivers to describe the precision loss caused by a faulty satellite geometry. Horizontal and vertical PDOP readings are available (latitude, longitude and altitude). The PDOP number can be used to determine how accurate the receiver's satellite location currently is. An increase in accuracy is more likely when the DOP is low, while a decrease in accuracy is more likely when the DOP is high, PDOP is also known as TDOP (Time Dilution of Precision). When we talk about satellite clock offset, we say TDOP. The PDOP mask can be configured on a GPS receiver. The receiver will disregard satellite configurations with a PDOP greater than the specified limit if this option is enabled.

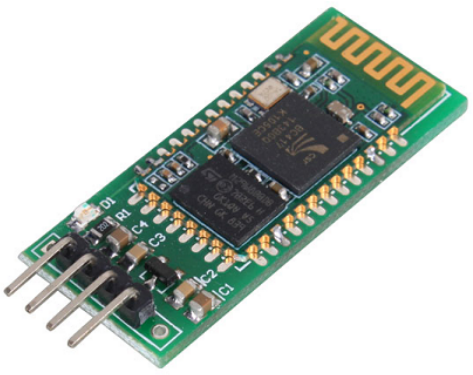
SA (selective accessibility):

Selective Availability happens when the DOD deliberately degrades the accuracy of GPS transmissions, introducing fake clock and ephemeris faults into the system. Selective availability It was the most significant source of GPS error during SA's implementation, resulting in errors of up to 100 metres. The Standard Positioning Service includes SA (SPS).

WIRELESS COMMUNICATION MODULES

4.1.9 BLUETOOTH

The HC-05 module is a simple Bluetooth SPP (Serial Port Protocol) module that allows for the construction of a transparent wireless serial connection. Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation serial port Bluetooth module with complete 2.4GHz radio transceiver and baseband. It has a CSR Bluecore 04-External single chip Bluetooth system with CMOS and AFH technology.



• Specifications The hardware features

• Typical sensitivity of -80dBm

• RF transmission power of up to +4dBm

• The PIO is under the control of the user.

• A customizable baud rate for a UART port.

• Antenna already built in

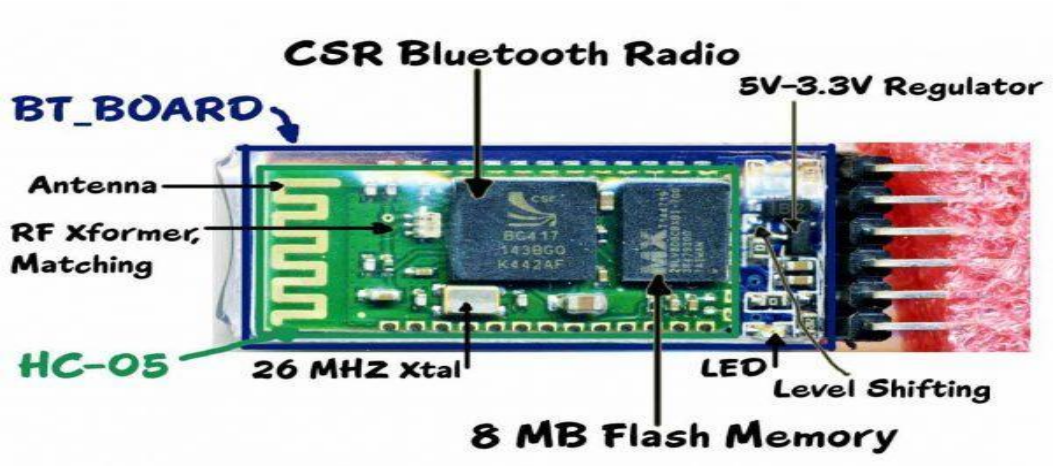
• Using an edge connector, of course!

• The characteristics of the software programme

• Default Data bits: 8, Stop bit: 1, Baud rate 38400 Data control: has, no parity. 9600,19200,38400,57600,115200,230400,460800 supported baud rates.

• The device will be disconnected if PIO0 detects a rising pulse.

• This is the current status of the PIO1 instruction port.Red and blue LEDs can be used with PIO10 and PIO11, respectively. Red and blue LEDs light up 1 time every 2 seconds when the master and slave are coupled, and 2 times every 2 seconds when the master and slave are detached. As a default, connect to the last working device.Allow the paired device to connect as the default connection.As a default, PINCODE:"0000" automatically pairs When disconnected due to being outside the range of connection, the system will automatically reconnect in 30 minutes.



1.Default AT command: Setting the mode to master (server) is as follows: Use a high-level connection for PIO11. It's time to activate the module.

"AT+ROLE=1" was transmitted to module using baud rate 38400, with success indicated by "OK" at the end of the line.

For use as a server, re-energize the module and connect it to low level (master). AT instructions: (all end with \r\n)

The following command is a test: AT OK for Command-Response-Parameter—

2. AT+RESET OK for the reset command response parameter –

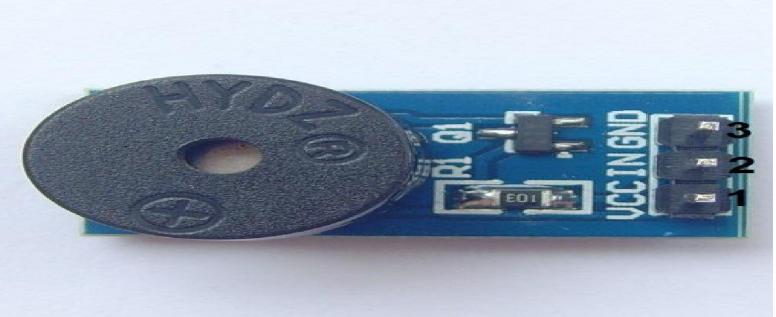
3. Obtain the firmware version Response to the AT+VERSION command parameter is OK. The firmware version is the parameter.

The following would be an example: AT+VERSION?rn OK
Command Respond Parameter AT+ORGL OK should be restored to its default value. - The default setting: H-C-2010-06-01 has a pin code of 1234 and the device name of H-C-2010-06-01.

Get the address of the module In response to the command, a parameter can be specified "AT+ADDR?" "OK" NAP: UAP: LAP is the Bluetooth module's address. +ADDR:123456:abcdef is an example of an AT+ADDR OK
The name of the module to be used for setting and checking: AT+NAME is the command response parameter. It is OK to use this.
The Bluetooth module's name is "Param" (Default :HC-05) Yes (/Fail): AT+NAME? +NAME Example: set the module name to "HC-05" by using AT+NAME=Hc-05.rn OK ITeadStudio is the correct name for the application. +NAME: ITeadStudio OK AT+NAME?rn
Get the Bluetooth device's name: In response to the command, a parameter can be specified What's the status of AT+RNAME?
FAILURE. The Bluetooth device's address is Param1 and Param2.
(Device address 00:02:72:od:22:24,name:ITead) is an illustration of this. AT+RNAME? 0002,72,od2224rn +RNAME:ITead is fine Configure and verify the module mode: 8. AT+ROLE=OK Command Response Parameter What is the role of AT+? Additional Role (ROLE): 0

4.1.10 Buzzer:

A mechanical, electromechanical, or piezoelectric buzzer or beeper is used to send an auditory signal. Buzzers and beepers are commonly used for alarms, timers, and confirmation of user input such as a mouse click or keyboard.



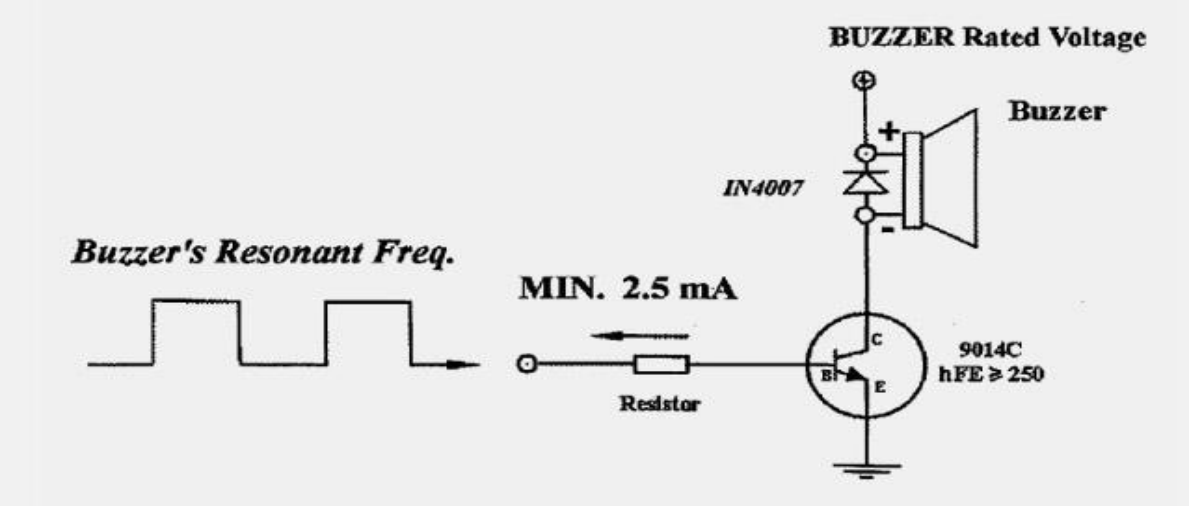
As an integrated structure of electronic transducers, a DC power supply, and other electronic components, the buzzer is widely employed in computers and other devices such as printers and copiers. Battery-powered buzzer For a "plug and play" setup, the board and sensor expansion module can be connected directly to the rated power source and play an uninterrupted sound.

Specifications:

- On-board passive buzzer
- On-board 8550 triode drive
- Can control with single-chip microcontroller IO directly
- Working voltage: 5V
- Board size: 22 (mm) x12 (mm)

Pin Configuration:

1. VCC
2. Input
3. Ground



How to test:

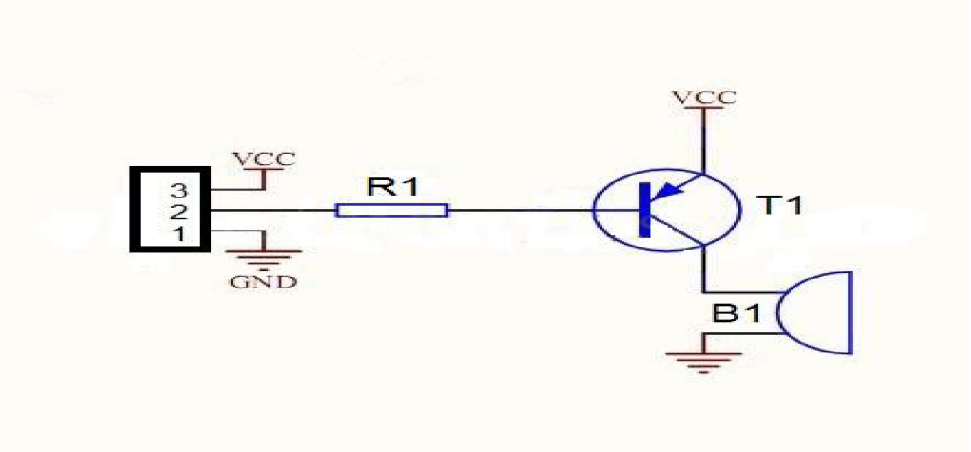
1. Connect your Arduino microcontroller to the computer.
2. Connect the VCC pin of your module to the to the 5V pin of your Arduino.
3. Connect the GND pin of your module to the GND pin of your Arduino.
4. Connect the Input pin of your module to the pin 13 of your Arduino.
5. Enter this program to your Arduino Integrated Development Environment (IDE):

```
int buzzer = 13;
void setup()
{
pinMode(buzzer, OUTPUT);
}
void loop()
{
digitalWrite(buzzer, HIGH);

delay(1000);
digitalWrite(buzzer, LOW);
delay(1000);
}
```

6. Lastly, click the Upload Button.

Schematic Diagram:



Frequency Response

Disturbance in atmospheric pressure generated by sound waves is known as Sound Pressure Level (SPL), and it is measured in decibel Pascals (dB-P). Increasing the distance from the buzzer reduces the output level by six decibels.

Resonant Frequency (Unit: F0 Hz)

Basically, all objects vibrate at a particular frequency. This frequency is known as the resonant frequency. A buzzer's resonance frequency determines how loud it will be.

Measure of resistance to flow (Unit: ohm)

The ratio of voltage to current is known as electrical impedance. Impedance changes depending on frequency.

A "plug and play" option is provided by piezo and magnetic indicators that have the driving circuitry integrated into the design. Engineers don't have to bother about creating a complex circuit to power the buzzer because of this. Cons: Indicators have a fixed frequency, making it difficult to switch to a different frequency if the application's needs change. Because the driving circuit isn't incorporated into transducers, engineers have more latitude in constructing their circuit. Cons: Transducers require an external driving signal to function properly, potentially increasing the design cycle's complexity and duration.

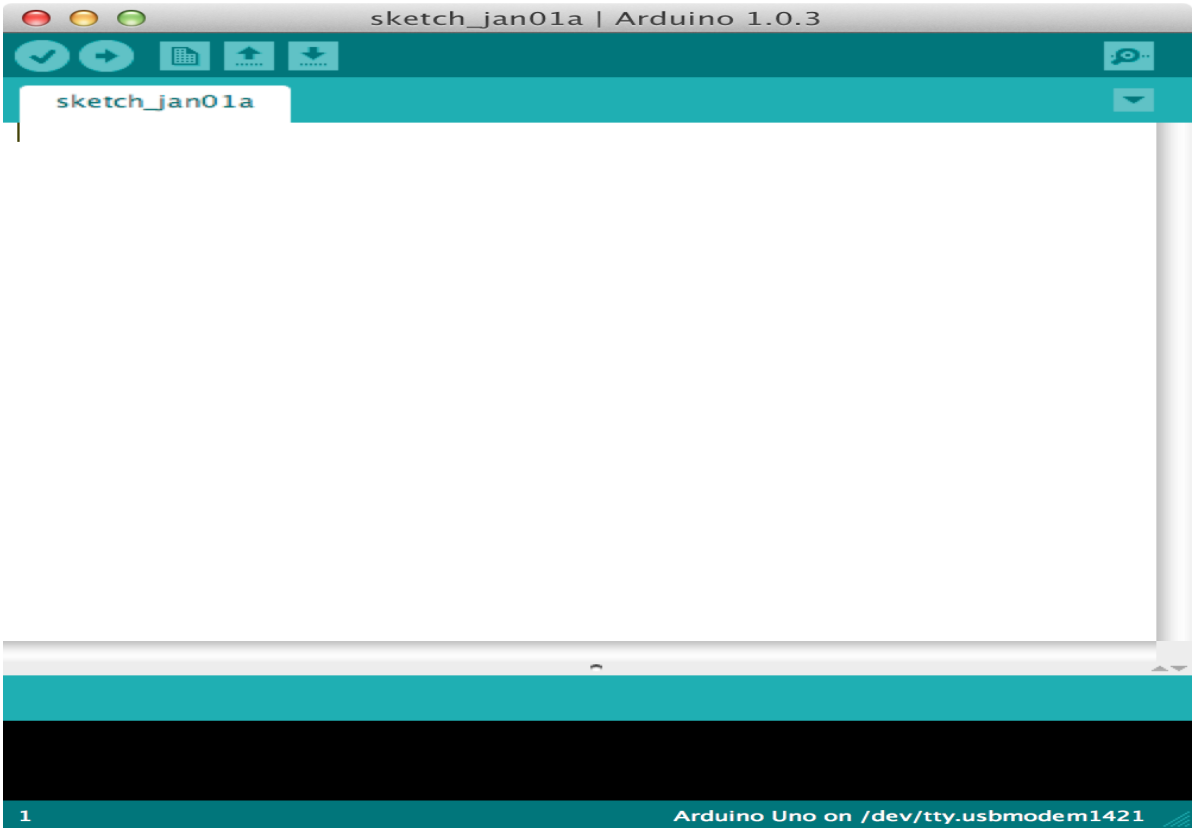
Numerous significant sectors rely on buzzers for both identifying and alarm reasons. Home appliances, automotive electronics, medical, security, industrial and office automation are just some of the industries that use buzzers for indication or alert purposes.

Software requirements:

Download Arduino Software

From the Arduino download page, you'll need to obtain the appropriate software for your operating system.

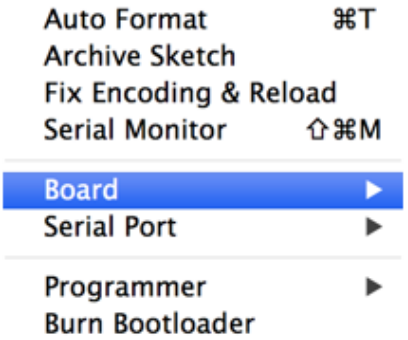
Your app should look something like this when it first launches:



This is where you type the code you want to compile and send to the Arduino board.

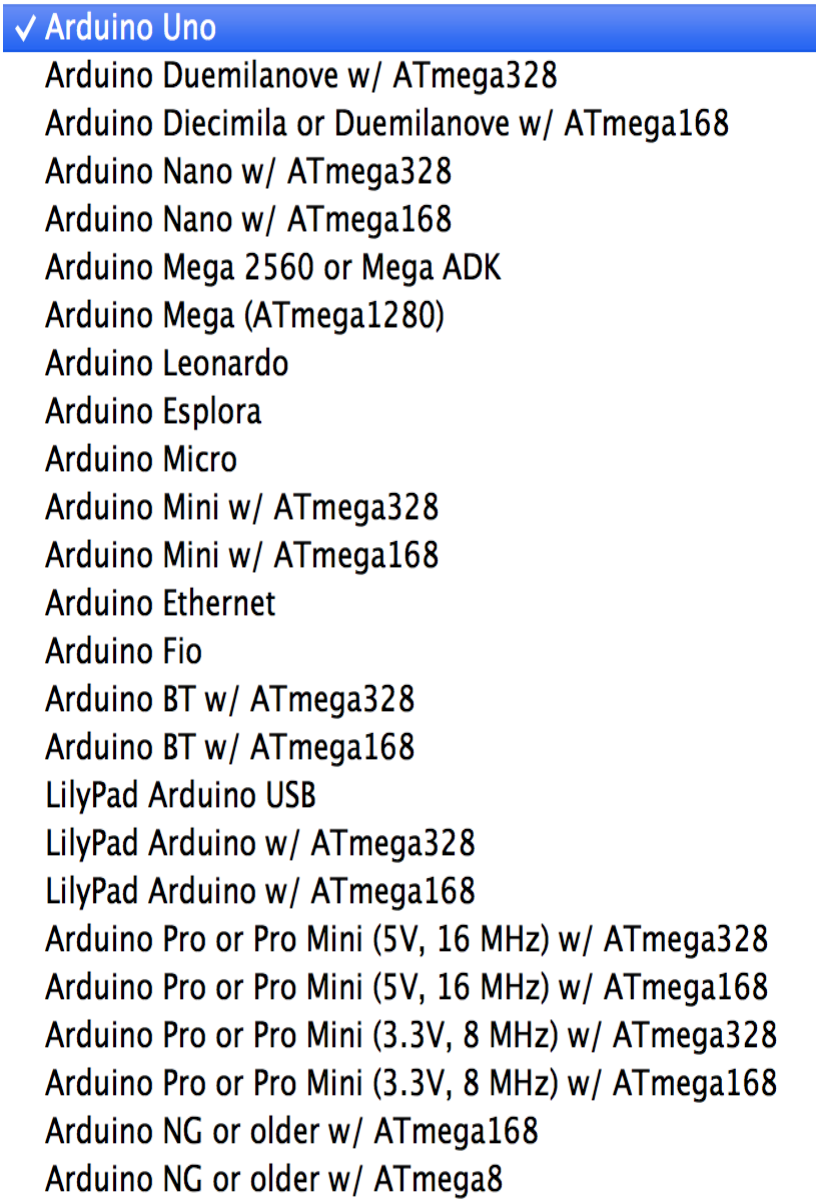
The Initial Setup

We need to setup the environment to **Tools** menu and select **Board**.



Tools Menu < Board

Then select the type of Arduino you want to program, in our case it's the **Arduino Uno**.



Arduino Uno

4.2.1 The Code

Sketches are the code you create for your Arduino. C++ is used to create them.

Setup() and loop() are the two void type functions in every sketch (). No value is returned by a void-type function.

A single call to setup() and a constant stream of calls to loop() follow immediately after powering on the Arduino. Any initialization steps should be done in setup(), and the code you want to run repeatedly should be done in loop().

As a result, your initial doodle or programme should resemble something like this:

Two black rectangles with numerous squares each may be found on the board's upper edge. Headers are what you're looking at. The Arduino's headers make it simple to connect external components. Pins refer to the points on the board where they are connected. Programming an Arduino necessitates knowing exactly which pins are connected to whicWe want to set the ledPin output mode in the setup() procedure. It's done by executing a specific method called pinMode(), which accepts the pin number and whether it's an input or an output pin, and returns either true or false for each pin. The constant OUTPUT must be used because we are working with an output. A sensor or input would use the name INPUT.

Next we want to compile to machine code and deploy or *upload* it to the Arduino.

Compiling the Code

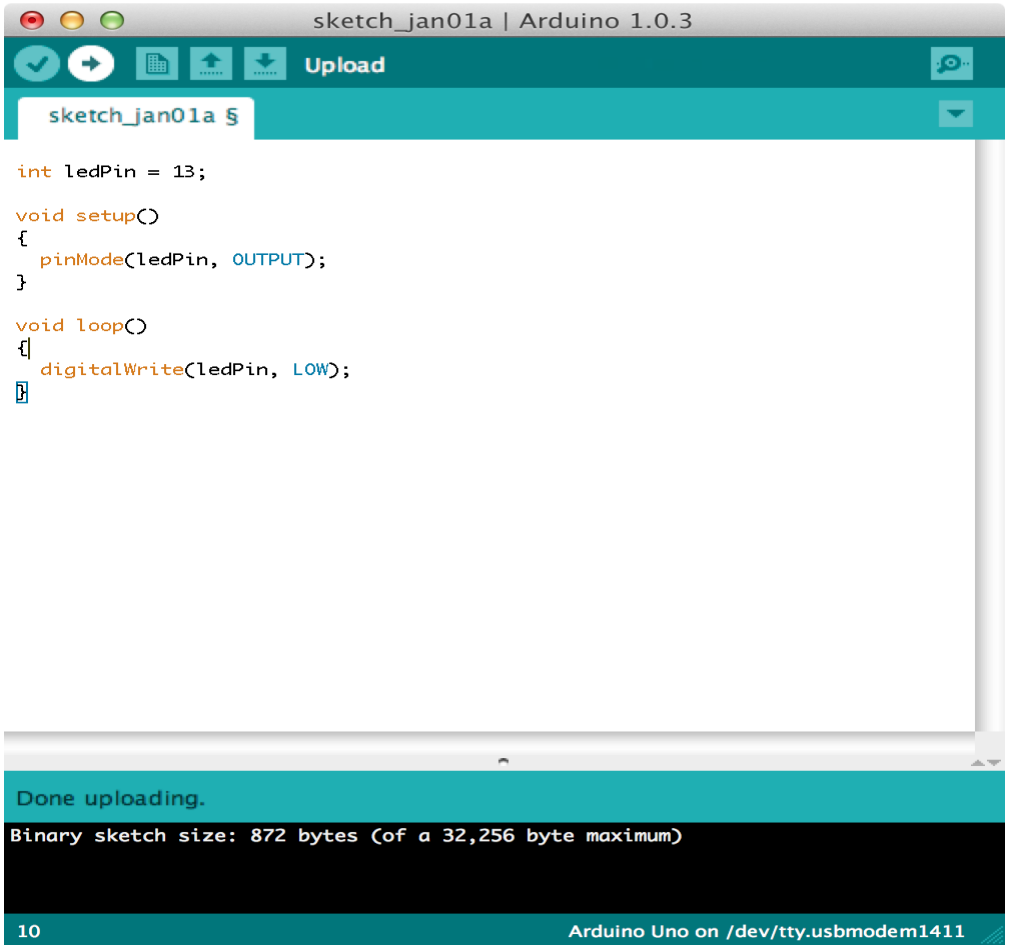
If this is your first time you've ever compiled code to your Arduino before plugging it in to the computer go to the **Tools** menu, then **Serial Port** and take note of what appears there.

Here's what mine looks like before plugging in the Arduino UNO:

/dev/tty.Bluetooth-PDA-Sync
/dev/cu.Bluetooth-PDA-Sync
/dev/tty.Bluetooth-Modem
/dev/cu.Bluetooth-Modem

Plug your Arduino UNO board in to the USB cable and into your computer. Now go back to the **Tools** > **Serial Portmenu** and you should see at least 1 new option. On my Mac 2 new serial ports appear.

/dev/tty.Bluetooth-PDA-Sync
/dev/cu.Bluetooth-PDA-Sync
/dev/tty.Bluetooth-Modem
/dev/cu.Bluetooth-Modem
✓ /dev/tty.usbmodem1411
/dev/cu.usbmodem1411



You should observe the TX and RX LEDs flashing below the L LED when this happens. This is how the PC and Arduino are communicating. In addition, the L may flutter. Your software should begin operating immediately after this dance is finished. Your LED should also be turned off at this point.

Using the HIGH constant, we can now turn it on.

CHAPTER 5

CODE AND RESULTS

Conclusion:

1. The ultrasonic sensor detection method works well and stable with two distance conditions, 1-90 cm and 90-180 cm.

2. The smart white cane can be used to test the system.

3.A smart stick can detect objects up to a distance of 200cm away.

4.If the neo6 m GPS module is located in a constrained area, the process of connecting it to a satellite can take up to five minutes.

5.On this smart stick, which is powered by an Arduino 5 volts, the SIM800l modules must monitor the voltage used. SIM800l will not be able to capture GSM signals if the voltage is below the specified level (no signal). In the DFplayer circuit, the usage of amplifier modules can reduce IC burning in the DFplayer module over time.

6. The pulse heart sensor is not as reliable. As a result of the pulse heart sensor's reliance on light as a working principle, the sensor's detection is affected by variations in the intensity of the light it receives.

After pressing the Emergency button, an SMS will be sent in around six to ten seconds.

References:

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