BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY

SATELLITE CENTRE, AMETHI (227413)

(A CENTRAL UNIVERSITY)

MINOR PROJECT REPORT

ON

INTELLIGENT WALKING SHOES FOR BLIND & DEAF

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Submitted to:

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DECLARATION

I hereby declare that the minor project & community engagement entitled "Intelligent Walking Shoes for Blind & Deaf" submitted by Ranjit Kumar Chauhan, Rajawant Yadav and Sudhir kharwar to the Babasaheb BhimraoAmbedkar University Satellite center, Amethi in partial fulfilment of the requirements for the award of the degree of Bachelor of Computer Application is a record of work carried out by us, under the supervision of Dr. Aditya Khamparia. I further declare that the work reported in this project has not been submitted and will not be submitted either in part or in full, for the reward of any other degree or diploma of this university or any other institute or university.

Signature of student

Ranjit Kumar Chauhan

Rajawant Yadav

Sudhir Kharwar

Date…….

Certified that the above statement made by the student is correct to the best of our knowledge and belief

CERTIFICATE

The minor project & community engagement entitled "**Intelligent Walking Shoes for Blind & Deaf "is** prepared and submitted by Ranjit Kumar Chauhan, Rajawant Yadav and Sudhir Kharwar who has partially completed the Minor Project & Community Engagement during semester from January 2022 to May 2022 of Academic session 2022. It has been found satisfactory in terms of scope, quality and presentation as partial fulfilment of the requirement for the award of the degree of Bachelor of Computer Application in Babasaheb Bhimrao Ambedkar University Satellite Center, Amethi, India.

Signature of Examiner

ACKNOWLEDGMENT

I express my sincere thanks and indebtedness to our esteemed institution, Department of Computer Science, BBAU Satellite Center, Amethi which provides us with opportunity to fulfill our desire and reach our goal. First, I would like to express our sincere appreciation and deep debt to respected head of department Dr. Aditya Khamparia my internal project supervisor and other teacher of department for their astute guidance, constant encouragement and sincere support for this project work. Last but not least, I wish to thank my parents for financing our studies in this collage as well as for constantly us to learn the knowledge. Their personal sacrifice in providing this opportunity to learn is greatly acknowledge.

Ranjit Kumar Chauhan

Rajawant Yadav

Sudhir Kharwar

PREFACE

We are develop to this project to take that my good this opportunity to express my honorable to all those people who have been to communicate directly and indirectly with me during the completion of this project. We are paying a very great thanks to my guide Dr. Aditya Khamparia, who has given guidance and a light to us during this project session. We acknowledge here out debt to those who contributed significantly to one or more steps. We take full responsibility for any remaining sins of omission and commission.

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MINOR PROJECT

Abstract

Eyes play important role in our day to day lives and are perhaps the most valuable gift we have. This world is visible to us because we are blessed with eyesight. But there are some people who lag this ability of visualizing these things. Due to this, they will undergo a lot of troubles o move comfortably in public places. Hence, wearable device should design for such visual impaired people. A smart shoe is wearable system design to provide directional information to visually impaired people. To provide smart and sensible navigation guidance to visually impaired people, the system has great potential especially when integrated with visual processing units. During the operation, the user is supposed to wear the shoes. When sensors will detect any obstacle, user will be informed through Buzzer and motor.

Advancement in wearable devices, with many new inventions and development in technology, has revolutionized smart shoe technology. These smart shoes sometimes referred to as intelligent shoes or computer-based shoes. Some of the smart shoes are also capable of recognizing and recording the day-to-day activities of the user. Such smart shoes are designed with Ultrasonic sensors, vibrating motors, Button Switch, Buzzer, Arduino Nano and Battery unit for the comfort and convenience of the shoe user.

Components are using Arduino Nano, Ultrasonic Sensors, vibrating motors, Button Switch, Buzzer

CHAPTER - 01
INTRODUCTION

1. Introduction

285 million people are estimated to be visually impaired worldwide: 39 million are blind and 246 have low vision, about 90% of the world's visually impaired live in low-income settings. where 82% of people living with blindness are aged 50 and above. Globally, uncorrected refractive errors are the main cause of moderate and severe visual impairment; cataracts remain the leading cause of blindness in middle- and low-income countries. The number of people visually impaired from infectious diseases has reduced in the last 20 years according to global estimates work and 80% of all Visual impairment can be prevent or cured. (World Health Organization, 2017) (Parentcenterhub.org, 2017)The main objective of this project is to create an inexpensive smart shoe system when sensors will detect any obstacle, user will be informed through Buzzer and motor.

1.1 Statement of problem

The statistics by the World Health Organization (WHO) in 2014 estimates that there are 285 billion people in world with visual impairment, 39 billion of people which are blind and 246 with low vision. The oldest and traditional mobility aids for persons with visual impairments are the walking cane (also called white cane or stick) and guide dogs. The drawbacks of these aids are range of motion and very little Information conveyed. With the smart shoes advances of modern technology, both in hardware and software front have brought potential to provide intelligent navigation capabilities. Sometime the ultrasonic sensor, motor and buzzer will not give accurate result to the blind people, the problem associated with these reasons and less efficiency and loss the accuracy to detect object and one more problem is it will not provide clean information to blind people.

1.2 Solution to the problem

With the smart shoes advances of modern technology, both in hardware and software front have brought potential to provide sound and vibration. In this project, an effort has been made to improve the quality of the system to be more helpful for the blind people. In this project, the system is has been made as a part of the blind person's shoe. And in this project we are using Arduino Nano, ultrasonic sensor buzzer and vibrating motor which provide more accuracy of object detection and given clean information to blind people respectively.

1.3 Objective

Intelligent Walking Shoes for Blind & Deaf is to provide a safety to the user. the system to be more helpful for the blind people. In this project, the system is has been made as a part of the blind person's shoe. And in this project we are using Arduino Nano, ultrasonic sensor buzzer and vibrating motor which provide more accuracy of object detection and given clean information to blind people respectively. The main objective of this project is

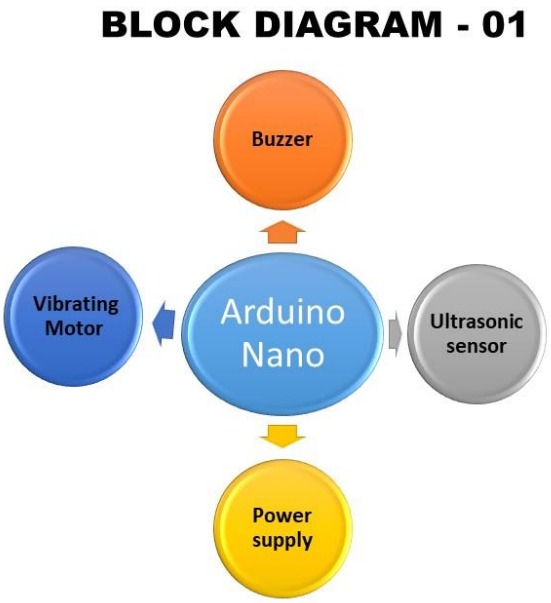
to create an inexpensive smart shoe system when sensors will detect any obstacle, user will be informed through Buzzer and motor.

1.4 Importance of this Project

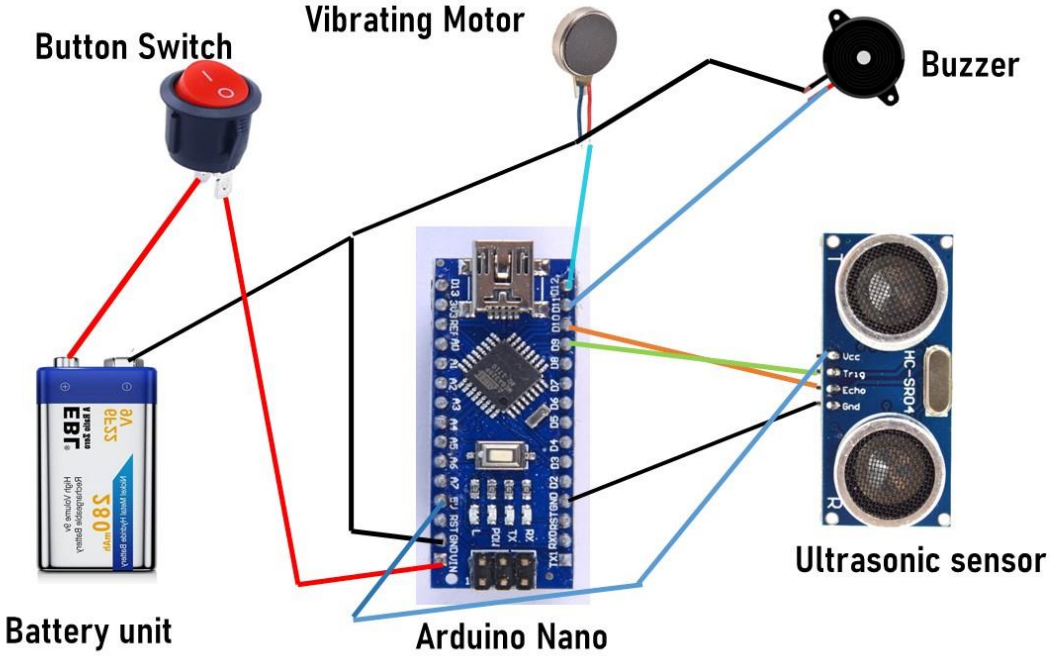
Intelligent Walking Shoes for Blind & Deaf is protect to form any type of object for the blind and deaf people who are unable to walk without the help of any person. Ultrasonic transmitter reduce ultrasonic wave and it is hit the object and reflect from the object, after that transmitter receiver receive the wave after that through Arduino Nano it inform the buzzer and motor after that buzzer reduce sound and motor reduce vibrating which blind and deaf people are known front of them any type of object after that they are change the way.

The main purpose of this project is to create an inexpensive smart shoe system when sensors will detect any obstacle, user will be informed through Buzzer and motor.

CHAPTER - 02
BLOCK DIAGRAM



Block diagram 2.0



Block diagram (Connection) – 2.1

2.1 Working Concept

This project is intended to be developed as tool or aid that will help blind people in moving or travelling. The dependency on others is reduced and these people can become more self-reliant. The project is built around ARDUINO NANO controller. The project has features to detect obstacles using ultrasonic sensor. These sensor are mounted on the shoes of the blind person. The person is alerted and will information on the surroundings. Buzzer will inform the person from reduce sound about the movement of the person who is wearing the shoe. Vibration is used to alert the blind person if there are any obstacles in his path.

2.2 Circuit Description

The project mainly consists of many important electronic components, and has the PIC Microcontroller. These main components are explained in brief followed by their internal working of the used components in the forthcoming sections. The circuit diagram consists of the following.

- Microcontroller ARDUINO NANO.
- Ultrasonic sensor (Distance measurement)
- Vibration Motor (For Vibrating)
- Buzzer (For sound)
- Switch (Power Supply Control)
- Battery (Power Supply)

2.3 Arduino Nano

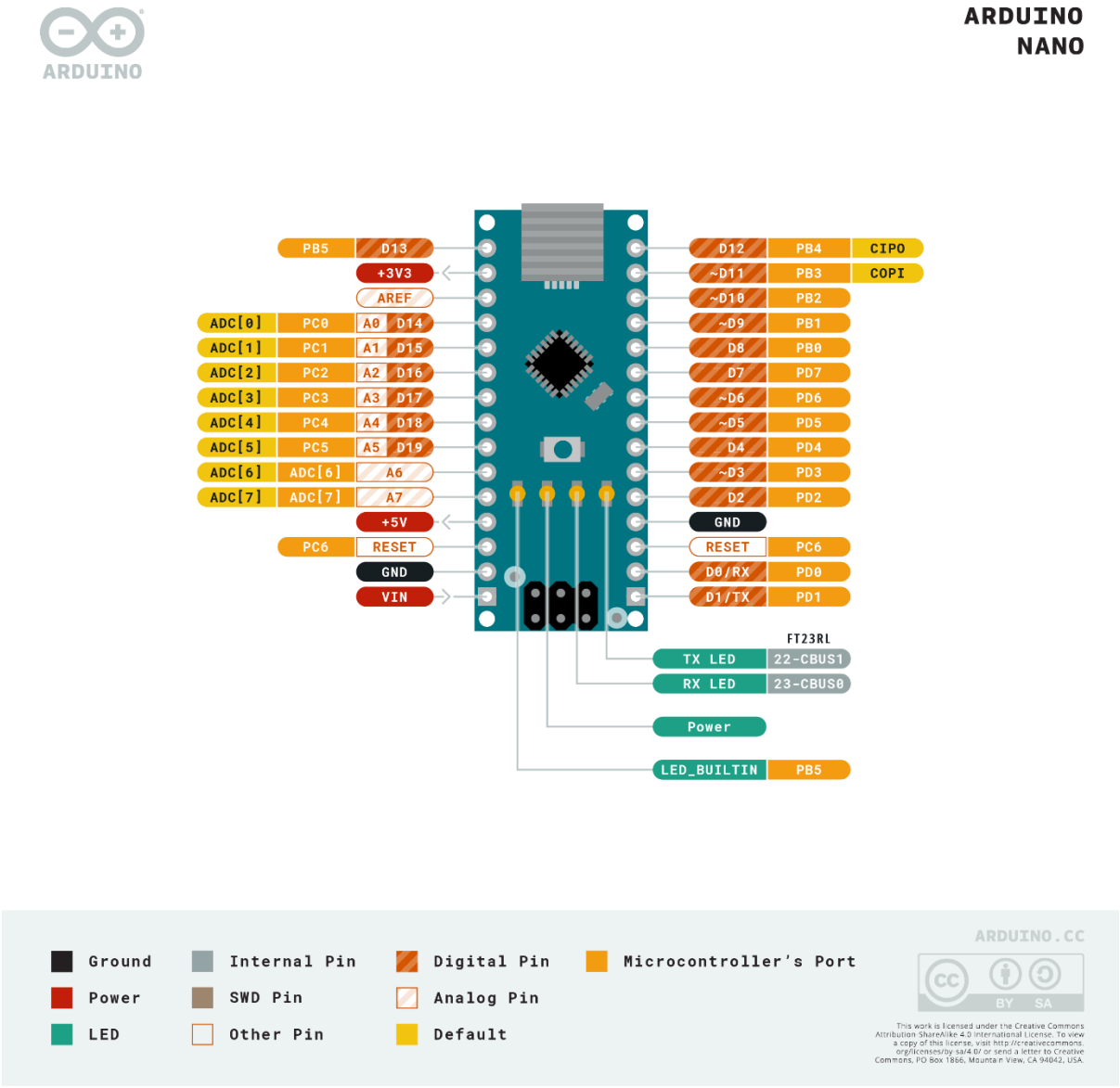
The **Arduino Nano** is a small, complete, and breadboard-friendly board based on the ATmega328P (Arduino Nano 3.x) released in 2008 It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one.

The Arduino Nano is equipped with 30 male I/O headers, in a DIP-30-like configuration, which can be programmed using the Arduino Software integrated development environment (IDE), which is common to all Arduino boards and running both online and offline. The board can be powered through a type-B mini-USB cable or from a 9 V battery.

Tech specs

Microcontroller	ATmega328
Architecture	AVR
Operating Voltage	5 V
Flash Memory	32 KB of which 2 KB used by bootloader
SRAM	2 KB

Clock Speed	16 MHz
Analog IN Pins	8
EEPROM	1 KB
DC Current per I/O Pins	40 mA (I/O Pins)
Input Voltage	5-20V
Digital I/O Pins	22 (6 of which are PWM)
PWM Output	6
Power Consumption	19 mA
PCB Size	18 x 45 mm
Weight	7 g
USB	Mini-USB Type-B



Input Diagram 2.2

Communication

The Arduino Nano has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX).

An FTDI FT232RL on the board channels this serial communication over USB and the FTDI drivers (included with the Arduino firmware) provide a virtual com port to software on the computer. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board flash when data is being transmitted via the FTDI chip and the USB connection to the computer (but not for serial communication on pins 0 and 1). A SoftwareSerial library allows for serial communication on any of the Nano's digital pins. The ATmega328 also supports I2C and SPI communication. The Arduino software includes the Wire library to simplify use of the I2C bus.

Automatic (software) reset

Rather than requiring a physical press of the reset button before an upload, the Arduino Nano is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the FT232RL is connected to the reset line of the ATmega328 via a 100 Nano farad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip.

This setup has other implications. When the Nano is connected to a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the bootloader is running on the Nano. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened

2.4 Ultrasonic sensor

WHAT IS ULTRASONIC SENSOR: WORKING PRINCIPLE?

The ultrasonic sensor is an electronic device used to measure distances. Because, measuring distance is an essential factor in many applications such as robotic control, vehicle detection etc. Sensors such as optical and sound are the most helpful.

Ultrasonic sensor 2.3

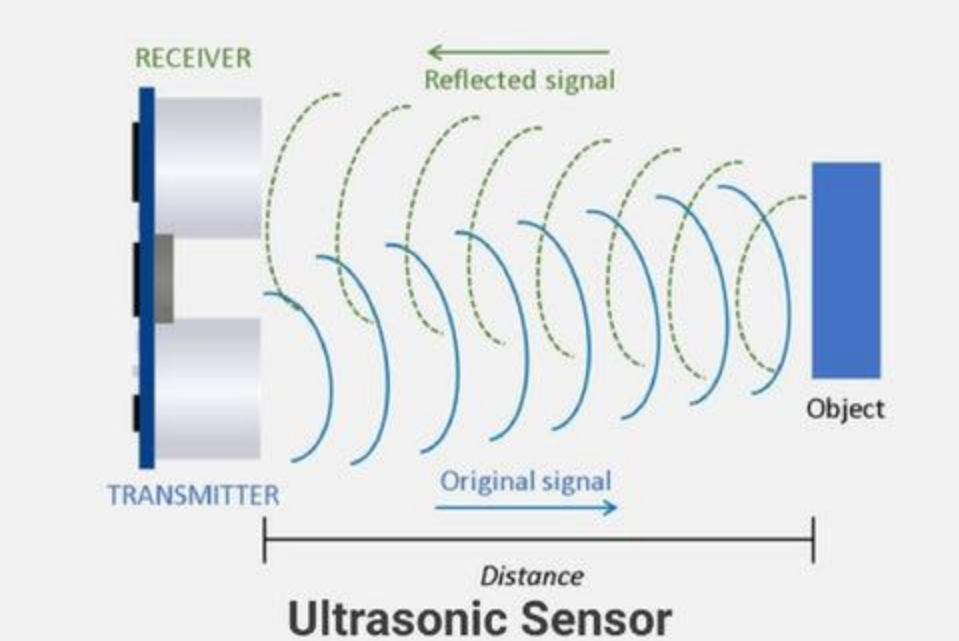
Ultrasonic sensors are used as proximity sensors. They can be found in parking technology and anti-collision safety systems. Ultrasonic sensors are also used in robotic obstacle detection systems and manufacturing engineering. Compared to infrared (IR) sensors in proximity sensing applications, ultrasonic sensors are less susceptible to interference from smoke, gases, and other airborne particles (although the physical component is subject to variables such as heat).

Ultrasonic sensors are also used as level sensors to detect, monitor, and control liquid levels in closed vessels (such as chemical plant drums). Most notably, ultrasound technology has enabled the medical industry to image internal organs, identify tumours, and ensure the health of babies in the womb.

PRINCIPLE OF ULTRASONIC SENSOR

The principle of ultrasonic rangefinders is to measure the time it takes the signal sent by a transmitter and propagated back to the receiver. As the name implies ultrasonic sensor operates on ultrasonic frequencies. Frequencies beyond our hearing range are known as ultrasonic frequencies. Those frequencies are above 20k Hertz.

They are the all-rounders of sensor technology and can be used in any industrial application. There are several types of objects that can be detected, including solids, liquids, granules, and powders. They reliably detect transparent or glossy objects, as well as objects whose colors change



Ultrasonic transmitter and receiver 2.4

HOW ULTRASONIC SENSOR WORKS?

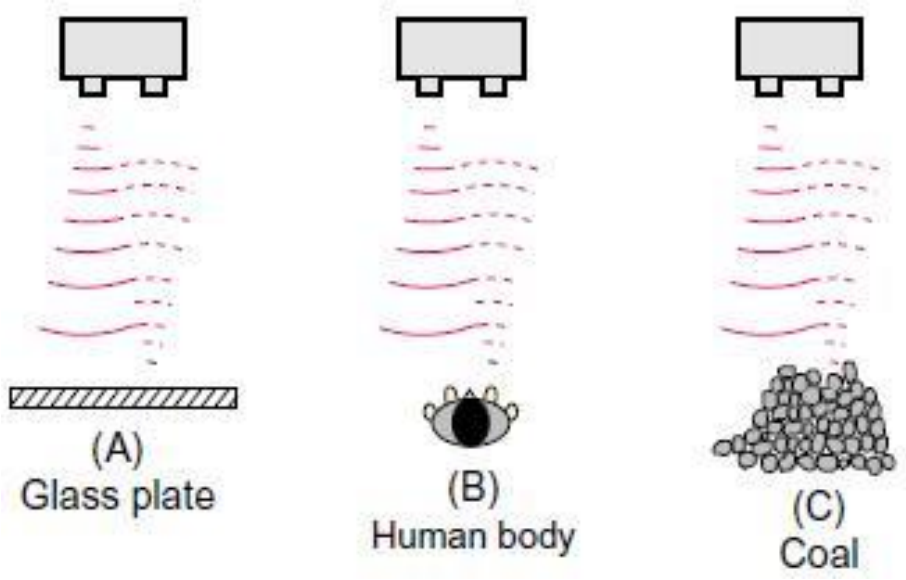
An ultrasonic sensor is an electronic device that measures the distance to an object by emitting ultrasonic waves and converting the reflected sound into electrical signals. Ultrasound travels faster than audible sound (that is, sound that humans can hear). An ultrasonic sensor consists of two main components: a transmitter (which uses a piezoelectric crystal to emit sound) and a receiver.

While some sensors use separate sound emitters and receivers, it is also feasible to merge both functions into a single device by using an ultrasonic element to switch between sending and receiving signals in a continuous cycle. The transmitter of the module transmits an ultrasonic sound. This sound will be reflected if an object is present in front of the ultrasonic sensor. The reflected sound is received by the receiver present in the same module. An ultrasonic signal is propagated by a wave at an angle of 30°. The above-depicted Figure illustrates how the ultrasonic signal propagates from the transmitter. Measuring angles should be at least 15° for maximum accuracy. In this case, external objects that fall under this measurement angle interfere with determining the distance to the desired object.

The distance is determined by measuring the travel time of ultrasonic sound and its speed.

Distance = Time x Speed of sound/2

Reflection of the sensing sound varies with configuration, for example



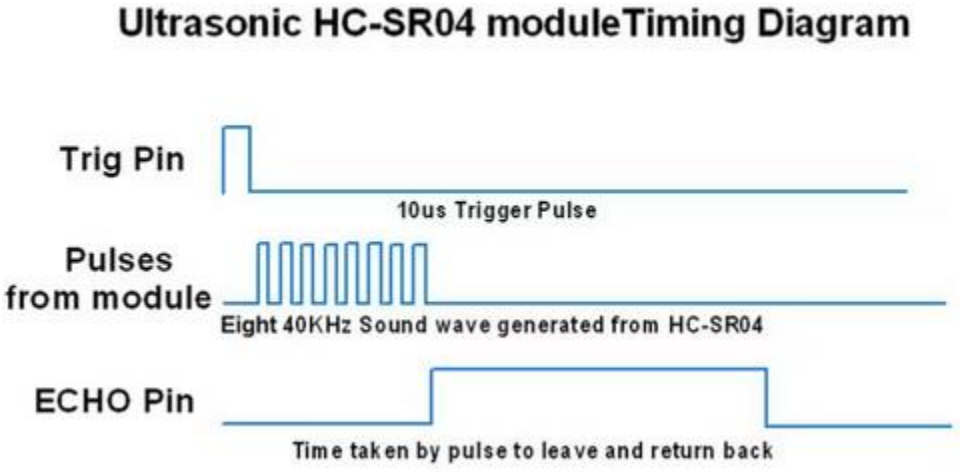
Transmission detection object 2.5

(A) Flat objects: liquid, box, plastic sheet,

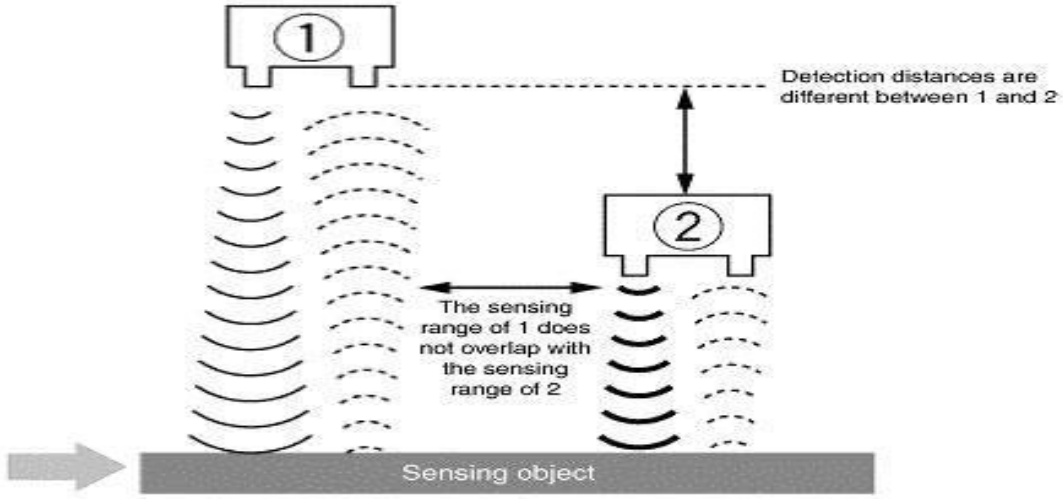
(B) Columnar objects: can, bottle, the human body,

(C) Granular objects: ores, rock, coal, coke, plastic pellet,

To generate the ultrasonic sound, need to trigger the trigger pin as high for a minimum of 10us. Then the module will start sending 8 sonic burst ultrasounds from the module at 40 KHz. It will receive by the receiver called Echo pin and it will calculate the output time to measure the distance.



To prevent mutual interference between Ultrasonic Sensors, the synchronous operation can be used by emitting the ultrasonic waves from each Sensor simultaneously.



Transmission detection object 2.6

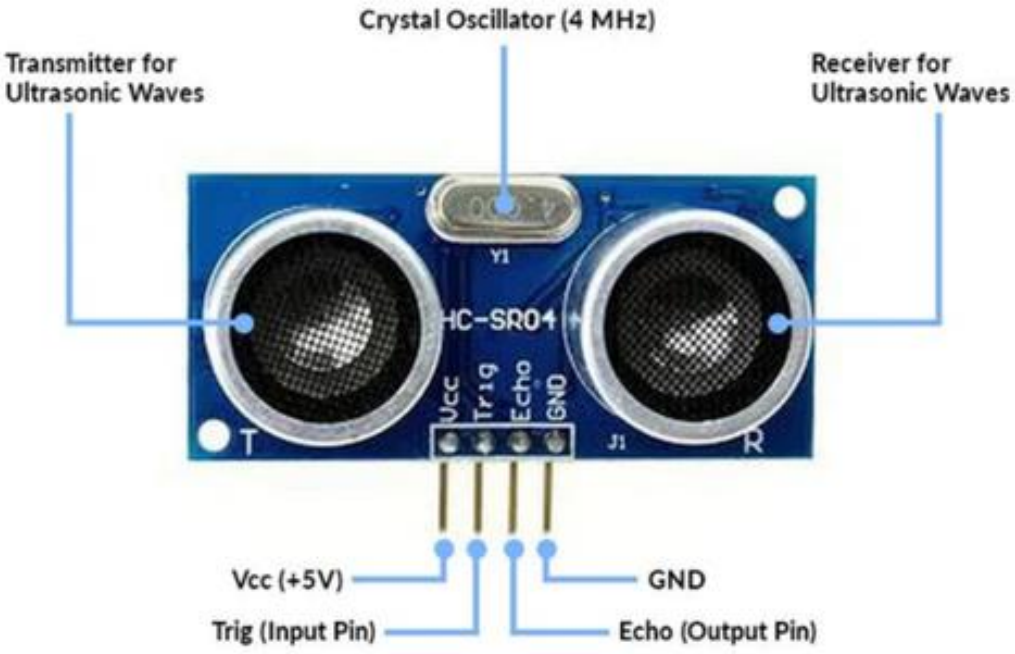
SPECIFICATIONS:

- Supply voltage +5 V;
- Consumption in silent mode 2 mA;
- Consumption at work of 15 mA;
- Measurement range - 2 to 400 cm;
- Effective measuring angle 15°;
- The dimensions are 45x20x15 mm.

HOW ARE ULTRASONIC SENSORS USED?

With microcontroller platforms like the Raspberry Pi, ARM, PIC, Arduino, Beagle Board, and many more, our ultrasonic proximity level and distance sensors are often employed. Ultrasonic sensors will send sound waves in the direction of the target and calculate its distance by timing how long it takes for the waves to bounce back to the sensor. In addition, to collision avoidance systems also employ ultrasonic sensors.

Here, implemented ultrasonic sensor with Arduino. Before interfacing let us see the pinout of the ultrasonic sensor,



Ultrasonic parts 2.7

FOUR PINS IN THE ULTRASONIC SENSOR

Vcc	power supply +5 V
Gnd	Common ground
Trigger pin	To start the sensor
Eco pin	Receive the signal

LIMITATIONS OF ULTRASONIC SENSORS

Ultrasonic sensors like the HC-SR04 can efficiently measure distances up to 400cm with a tight tolerance of 3mm. However, if the target is positioned in such a way that the ultrasonic signal is deflected rather than reflected to the ultrasonic sensor, the calculated distance may be incorrect. In some cases, the object is too small to detect enough reflected ultrasound signals to accurately measure distance. Additionally, objects such as fabrics and carpets can absorb acoustic signals. If the signal is absorbed at the edge of the target, it cannot be reflected to the sensor, so range cannot be measured.

2.5 Vibration Motor

What is Vibration Motor?

Definition:

Vibrator Motors are the mechanical devices used to develop vibrations. The generation of vibration has happened with the support of an electric motor having an inequitable mass on its driveshaft. It is a miniature sized DC motor that lets the user know the sound

through vibrations. The foremost feature that has to be noted in this is its magnet coreless DC motor which is permanent where it means that it possesses magnetic properties (performs like a magnet only when the electric current is passed through the device).

Coin vibrating motor

Micro motor 2.8

The need for smaller, thinner designs led to the adaptation of brush motor technology into the coin-type vibration motor.
Due to their small size and enclosed vibration mechanism, coin vibrating motors are a popular choice for many applications. A coin vibration motor may be used in applications such as the smart watches, fitness trackers (as shown in the right gif) and other wearable devices. They are widely used to provide the user with discrete alerts, precision alarms or haptic feedback. Referring to the figures on the below of the page, NFP supply our coin motor with a variety of connectors, spring contacts, FPC or with bare contact pads. If the quantity merits, we can design a custom FPC for your application. The Horizontal direction Vibration through losing body balance by eccentric weight Rotating. Eccentric Rotating Mass Coin Rotating eccentric weight is to lose body balance while the motor vibration occurs in the Horizontal direction. Indicating the received signal into vibrations in the Mobile device is a rotary type with a small motor. The operation is possible with DC Power On/Off, does not require a separate Drive IC. General Features - High Vibration Force, Smooth Rotation, and Easy build up Smartphone, Tablet PC, Wearable, Toy, Game Consoles and Others.

NFP motor currently produces coin vibration motors, also known as shaftless or pancake vibrator motors. Pancake coin motor are compact and convenient to use. They integrate into many designs because they have no external moving parts, and can be affixed in place with a strong permanent self-adhesive mounting system. Pancake coin vibration motors can easily be moulded to accept the coin motor form of our shaft less vibration motors. Within the coin motor range, we offer both leaded and spring & pad PCB motors & other mountable versions. Like all of our coin vibration motors, we are happy to quote for

micro coin vibration motor to the base design such as a modification to the lead length and pancake coin motor connectors.

Coin motor or 'pancake' motors use the same operating principle as pager motor (ERM), however their eccentric mass is kept in their small circular body (which is where they get their names from). Brushed coin vibration motors are constructed from a flat PCB on which the 3-pole commutation circuit is laid out around an internal shaft in the Centre. They are restricted in amplitude because of their size with extremely low profiles (only just a few mm!) which make them popular in applications which space is restricted. Coin vibration motors have a relatively high start voltage (compared to cylinder pager vibration motors) which must be considered in designs. Typically this is around 2.3v (all coin motor have a nominal voltage of 3v), and failure to respect this could result in coin motor not starting when the application is lying in certain orientations. This problem arises because in the vertical orientation, the coin motor must force the eccentric mass over the top of the shaft on the initial cycle

2.6 Buzzer

What is Buzzer and its working?

There are many ways to communicate between the user and a product. One of the best ways is audio communication using a buzzer IC. So during the design process, understanding some technologies with configurations is very helpful. So, this article discusses an overview of an audio signaling device like a beeper or a buzzer and its working with applications

What is Buzzer?

An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren.

Buzzer 2.9

The **pin configuration of the buzzer** is shown below. It includes two pins namely positive and negative. The positive terminal of this is represented with the '+' symbol or a longer terminal. This terminal is powered through 6Volts whereas the negative terminal is represented with the '-'symbol or short terminal and it is connected to the GND terminal.

History

The history of an electromechanical buzzer and piezoelectric is discussed below.

Electromechanical

This buzzer was launched in the year 1831 by an American Scientist namely Joseph Henry but, this was used in doorbells until they were eliminated in 1930 in support of musical bells, which had a smooth tone.

Piezoelectric

These buzzers were invented by manufacturers of Japanese & fixed into a broad range of devices during the period of 1970s – 1980s. So, this development primarily came due to cooperative efforts through the manufacturing companies of Japanese. In the year 1951, they recognized the Application Research Committee of Barium Titanate that allows the corporations to be cooperative competitively & bring about numerous piezoelectric creations.

Specifications

The **specifications of the buzzer** include the following.

- Color is black
- The frequency range is 3,300Hz

- Operating Temperature ranges from – 20° C to +60°C
- Operating voltage ranges from 3V to 24V DC
- The sound pressure level is 85dBA or 10cm
- The supply current is below 15mA

Types of Buzzer

A buzzer is available in different types which include the following.

- Piezoelectric
- Electromagnetic
- Mechanical
- Electromechanical
- Magnetic

Piezoelectric

As the name suggests, the piezoelectric type uses the piezoelectric ceramic's piezoelectric effect & pulse current to make the metal plate vibrate & generate sound. This kind of buzzer is made with a resonance box, multi resonator, piezoelectric plate, housing, impedance matcher, etc. Some of the buzzers are also designed with LEDs.

The multi resonator of this mainly includes ICs and transistors. Once the supply is given to this resonator, it will oscillate and generates an audio signal with 1.5 to 2.kHz. The impedance matcher will force the piezoelectric plate to produce sound

Mounting Configurations

The mounting configurations of buzzers include the following.

- Panel Mount
- Wire Leads
- Screw Terminals
- Through Hole
- Spring Contact
- Surface Mount

How to use a Buzzer?

A buzzer is an efficient component to include the features of sound in our system or project. It is an extremely small & solid two-pin device thus it can be simply utilized on breadboard or PCB. So in most applications, this component is widely used.

There are two kinds of buzzers commonly available like simple and readymade. Once a simple type is power-driven then it will generate a beep sound continuously. A readymade type looks heavier & generates a Beep. Beep. Beep. This sound is because of the internal oscillating circuit within it.

This buzzer uses a DC power supply that ranges from 4V – 9V. To operate this, a 9V battery is used but it is suggested to utilize a regulated +5V/+6V DC supply. Generally, it is connected through a switching circuit to switch ON/OFF the buzzer at the necessary time interval.

How to choose a Buzzer?

While choosing a buzzer or speaker, many principles need to consider like the following.

- Size of the product
- Consumption of Current
- Type of terminal
- Frequency Voltage
- Volume
- Type
- AC/DC Voltage
- The tone is Continuous/Pulsed
- Fixing – Pins, Leads/Surface Mount
- Output of Sound
- Feedback Option
- Piezo Elements

Advantages

The **advantages of a buzzer** include the following.

- Simply Compatible
- Frequency Response is Good
- Size is small
- Energy Consumption is less
- The Range of Voltage usage is Large
- Sound Pressure is high

Disadvantages

The **disadvantages of the buzzer** include the following.

- Controlling is a little hard
- Generates Annoying Sound
- Training is necessary to know how to repair the condition without just turning off.

2.7 Electronic Switch

Electronic Switch 2.10

An electric switch is a device – usually electromechanical – used to open and close an electric circuit. This disables and enables the flow of electric current, respectively. Switches are synonymous with the interruption, or some form of manipulation, of the flow of electric current or, more elementarily, the flow of electrons.

The appreciation of the underlying principle behind a switch comes along with electricity and the use of conducting material for electric current to flow. A discontinuity in the conductor implies the current does not flow. Switches are as old as the discovery of the first practical application of electricity and the construction of the first electrical circuit.

As inferred, a switch effectively puts an air gap between some parts of the circuit. The air gap has different electrical properties to the conducting material building the circuit and will stop the current flow if it is big enough. That is the fundamental purpose of a switch i.e. to alter the electrical properties of some part of a circuit to alter the flow of electrons in that circuit. By contrast, the operation of some switches never involves physical movement.

2.8 9 Volt-Battery

9 volt Battery 2.11

The **nine-volt battery**, or **9-volt battery**, is an electric battery that supplies a nominal voltage of 9 volts. Actual voltage measures 7.2 to 9.6 volts, depending on battery chemistry. Batteries of various sizes and capacities are manufactured; a very common size is known as PP3, introduced for early transistor radios. The PP3 has a rectangular prism shape with rounded edges and two polarized snap connectors on the top. This type is commonly used for many applications including household uses such as smoke and gas detectors, clocks, and toys.

The nine-volt PP3-size battery is commonly available in primary zinc-carbon and alkaline chemistry, in primary lithium iron disulfide and lithium manganese dioxide (sometimes designated CRV9), and in rechargeable form in nickel-cadmium (Ni–Cd), nickel-metal hydride (Ni–MH) and lithium-ion. Mercury batteries of this format, once common, have been banned in many countries due to their toxicity. Designations for this format include *NEDA 1604* and *IEC 6F22* (for zinc-carbon) or *MN1604 6LR61* (for alkaline). The size, regardless of chemistry, is commonly designated **PP3**a designation originally reserved solely for carbon-zinc, or in some countries, *E* or *E-block*. A range of PP batteries was produced in the past, with voltages of 4.5, 6, and 9 volts and different capacities; the larger 9-volt PP6, PP7, and PP9 are still available. A few other 9-volt battery sizes are available: A10 and A29.

Most PP3-size alkaline batteries are constructed of six individual 1.5 V LR61 cells enclosed in a wrapper. These cells are slightly smaller than LR8D425 AAAA cells and can be used in their place for some devices, even though they are 3.5 mm shorter. Carbon-zinc types are made with six flat cells in a stack, enclosed in a moisture-resistant wrapper to prevent drying. Primary lithium types are made with three cells in series.

9-volt batteries accounted for 4% of alkaline primary battery sales in the United States in 2007, and 2% of primary battery sales and 2% of secondary (rechargeable) battery sales in Switzerland in 2008

CHAPTER - 03
SYSTEM REQUIREMENTS

3.1 Hardware requirements

Arduino Nano

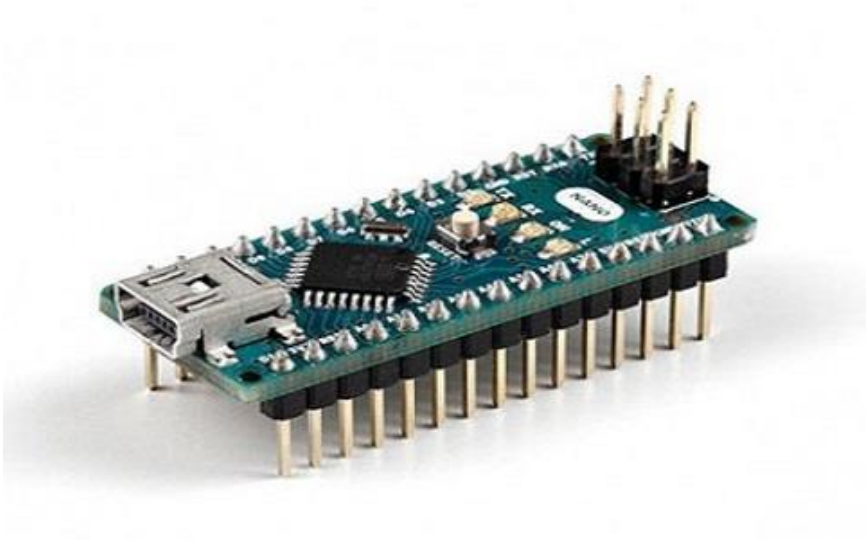
This article gives detailed information about an Arduino Nano board, and it is one kind of microcontroller board which is designed by the Arduino team. This microcontroller is based on Atmega168 or Atmega328p. It is fairly similar to Arduino Uno board but when it comes to pin-configuration and features, this Nano board has replaced Arduino Uno due to small in size. As we know that while designing an embedded system small size components are preferred. Arduino boards are mainly used to build electronic projects. embedded systems, robotics, etc. But the Nano boards are mainly introduced for the beginners who are not from the technical background.

What is an Arduino Nano Board?

Arduino Nano is one type of microcontroller board, and it is designed by Arduino.cc. It can be built with a microcontroller like Atmega328. This microcontroller is also used in Arduino UNO. It is a small size board and also flexible with a wide variety of applications. Other Arduino boards mainly include Arduino Mega, Arduino Pro Mini, Arduino UNO, Arduino YUN, Arduino Lilypad, Arduino Leonardo, and Arduino Due. And other development boards are AVR Development Board, PIC Development Board, Raspberry Pi, Intel Edison, MSP430 Launchpad, and ESP32 board.
This board has many functions and features like an Arduino Duemilanove board. However, this Nano board is different in packaging. It doesn't have any DC jack so that the power supply can be given using a small USB port otherwise straightly connected to the pins like VCC & GND. This board can be supplied with 6 to 20volts using a mini USB port on the board.

Arduino Nano Features

The features of an Arduino Nano mainly include the following.

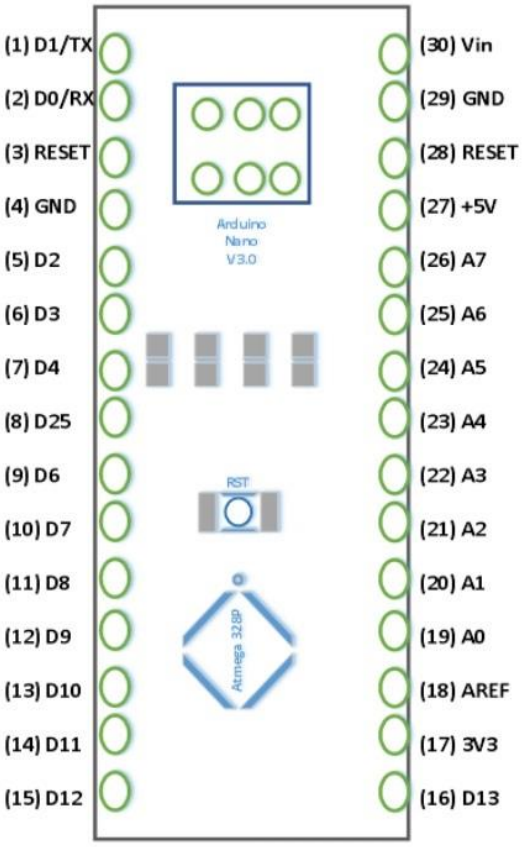


Arduino Nano 3.0

- ATmega328P Microcontroller is from 8-bit AVR family
- Operating voltage is 5V
- Input voltage (Vin) is 7V to 12V
- Input/output Pins are 22
- Analog i/p pins are 6 from A0 to A5
- Digital pins are 14
- Power consumption is 19 mA
- I/O pins DC Current is 40 mA
- Flash memory is 32 KB
- SRAM is 2 KB
- EEPROM is 1 KB
- CLK speed is 16 MHz
- Weight-7g
- Size of the printed circuit board is 18 X 45mm
- Supports three communications like SPI, IIC, & USART

Arduino Nano Pinout

Arduino Nano pin configuration is shown below and each pin functionality is discussed below



Arduino Nano pinout 3.1

Power Pin (VIN, 3.3V, 5V, GND):

These pin are power pins

- VIN is the input voltage of the board, and it is used when an external power source is used from 7V to 12V.
- 5V is the regulated power supply voltage of the Nano board and it is used to give the supply to the board as well as components.
- 3.3V is the minimum voltage which is generated from the voltage regulator on the board.
- GND is the ground pin of the board

RST Pin (Reset): This pin is used to reset the microcontroller

Analog Pins (A0-A7): These pins are used to calculate the analog voltage of the board within the range of 0V to 5V

I/O Pins (Digital Pins from D0 – D13): These pins are used as an I/p otherwise o/p pins. 0V & 5V

Serial Pins (Tx, Rx): These pins are used to transmit & receive TTL serial data.

External Interrupts (2, 3): These pins are used to activate an interrupt.

PWM (3, 5, 6, 9, 11): These pins are used to provide 8-bit of PWM output.

SPI (10, 11, 12, & 13): These pins are used for supporting SPI communication.

Inbuilt LED (13): This pin is used to activate the LED.

IIC (A4, A5): These pins are used for supporting TWI communication.

AREF: This pin is used to give reference voltage to the input voltage.

Arduino Nano Communication

The communication of an Arduino Nano board can be done using different sources like using an additional Arduino board, a computer, otherwise using microcontrollers. The microcontroller using in Nano board (ATmega328) offers serial communication (UART TTL). This can be accessible at digital pins like TX, and RX. The Arduino software comprises of a serial monitor to allow easy textual information to transmit and receive from the board.
The TX & RX LEDs on the Nano board will blink whenever information is being sent out through the FTDI & USB link in the direction of the computer. The library-like Software Serial allows serial communication on any of the digital pins on the board. The microcontroller also supports SPI & I2C (TWI) communication.

Arduino Nano Programming

The programming of an Arduino Nano can be done using the Arduino software. Click the Tools option and select the Nano board. Microcontroller ATmega328 over the Nano board comes with preprogrammed with a boot loader. This boot loader lets to upload new code without using an exterior hardware programmer. The communication of this can be done with the STK500 protocol. Here the boot loader can also be avoided & the microcontroller program can be done using the header of in-circuit serial programming or ICSP with an Arduino ISP.

Application of Arduino Nano

These boards are used to build Arduino Nano projects by reading inputs of a sensor, a button, or a finger and gives an output by turning motor or LED ON, or and some of the applications are listed below.

- Samples of electronic systems & products
- Automation
- Several DIY projects
- Control Systems
- Embedded Systems
- Robotics
- Instrumentation

Thus, this is all about an overview of Arduino Nano datasheet. From the above information finally, we can conclude that for the beginners who are new to electronics, this Nano board is extremely suggested to go for this board due to its features like low cost and very simple to use in different applications. This board can simply connect to any computer throughout its mini USB port. Here is a question for you, what is an Arduino Nano driver?

3.2 Software requirements

- CH341SER
- Arduino IDE software

Arduino IDE Software

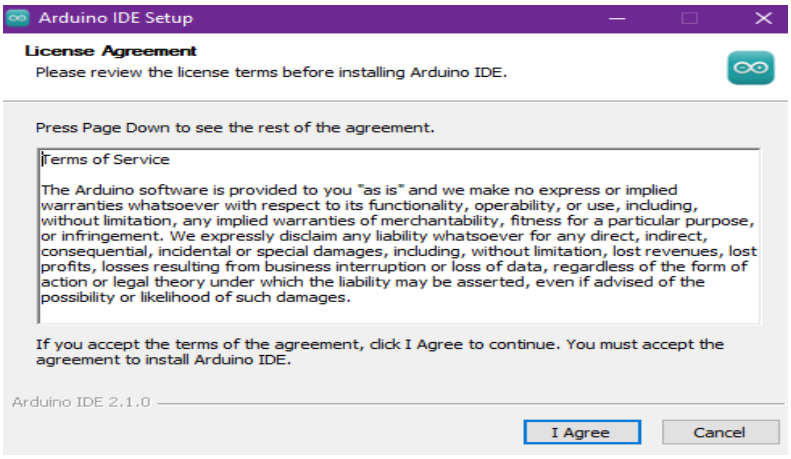
Arduino IDE Installation

Download the Arduino Software (IDE)

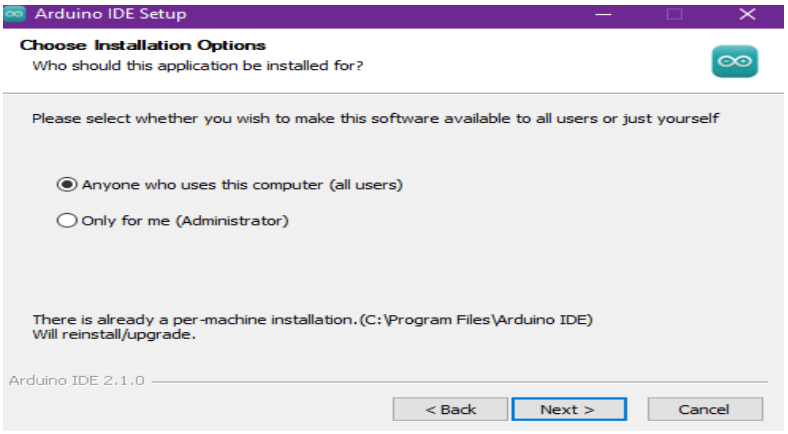
Get the latest version from the download page. You can choose between the Installer (.exe) and the Zip packages. We suggest you use the first one that installs directly everything you need to use the Arduino Software (IDE), including the drivers. With the

Zip package you need to install the drivers manually. The Zip file is also useful if you want to create a portable installation

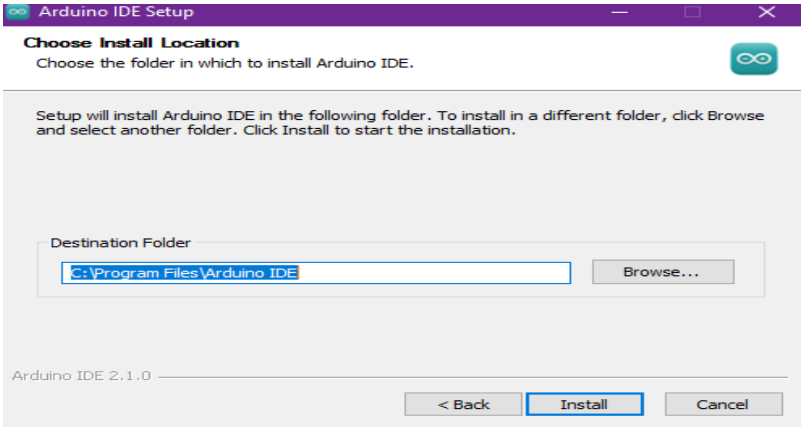
When the download finishes, proceed with the installation and please allow the driver installation process when you get a warning from the operating system.



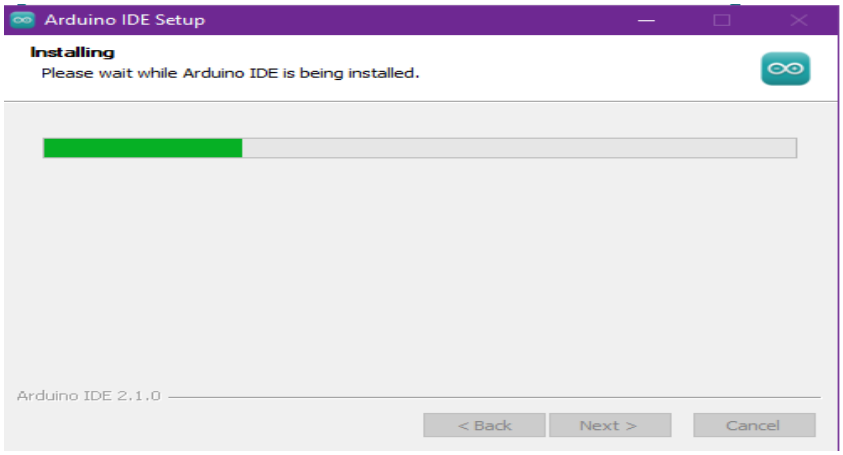
Click the Agree option



Click the Next option



Click the Install Option



Arduino IDE Installation Process 3.2

The process will extract and install all the required files to execute properly the Arduino Software (IDE)

CH341SER

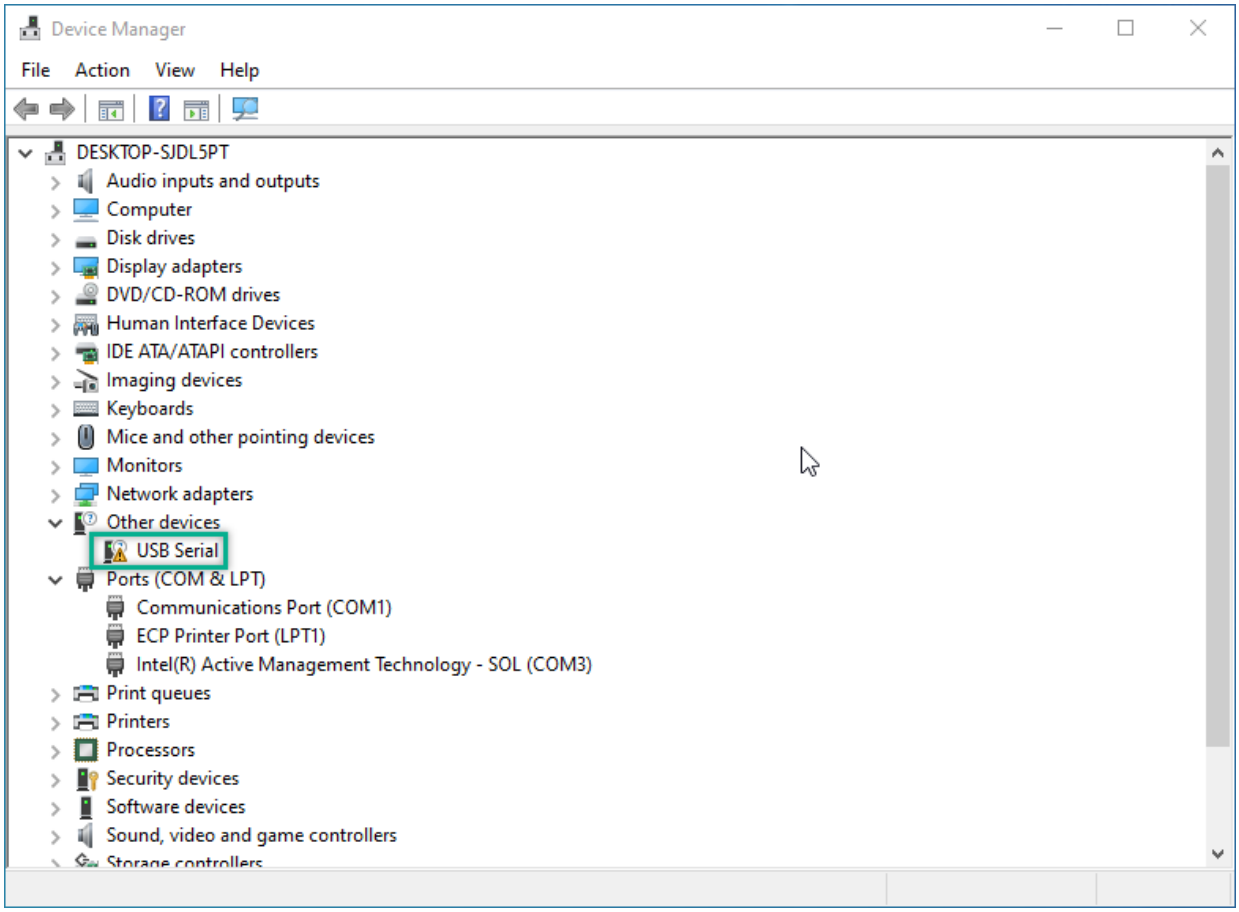
Introduction

CH341SER.exe is known as **Driver Pack Solution**, it also has the following name or Setup.exe or Install Shield and it is developed by **<u><=”” a=”” style="box-sizing: border-box; background-color: transparent; color: yellow; text-decoration: none;">Kuzyakov Artur</u>** , it is also developed by Macrovision Corporation. We have seen about 18 different instances of CH341SER.exe in different location. When a hardware device is inserted into the computer, the system automatically identify the device and include it in the device manager. We can view the serial port in the device manager by performing the following steps:

Installing CH341SER Driver on Window

If you connect your board to the computer before installing the driver, your computer will not recognize the board correctly and you will see following image in Device Manager.

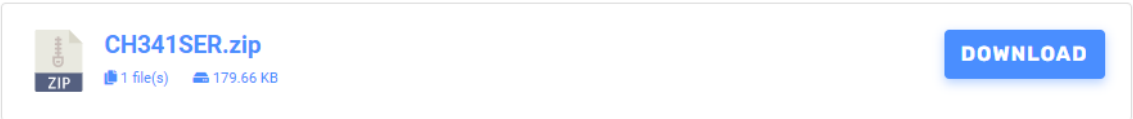
To open Device Manager, search for it in the Windows Start menu



Device Manager 3.3

Follow the steps below to install the CH340 driver:

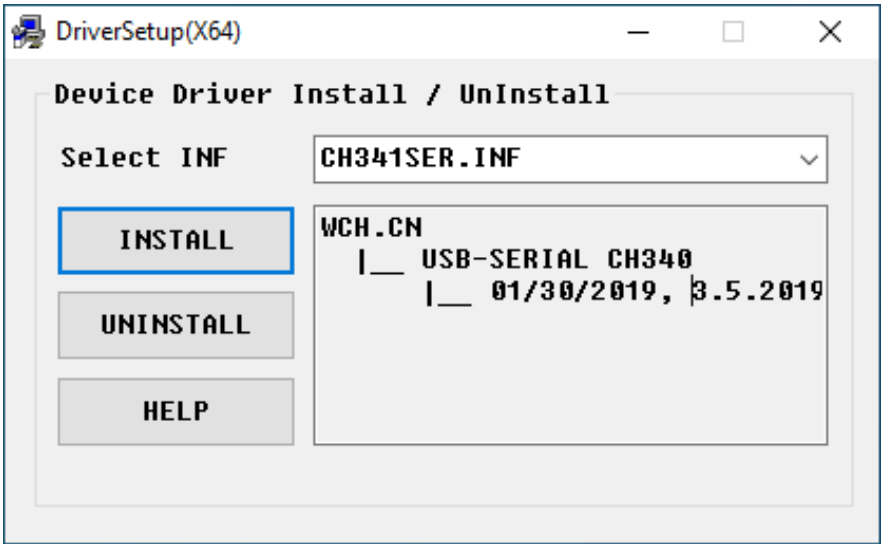
Step 1: Downloading the Driver



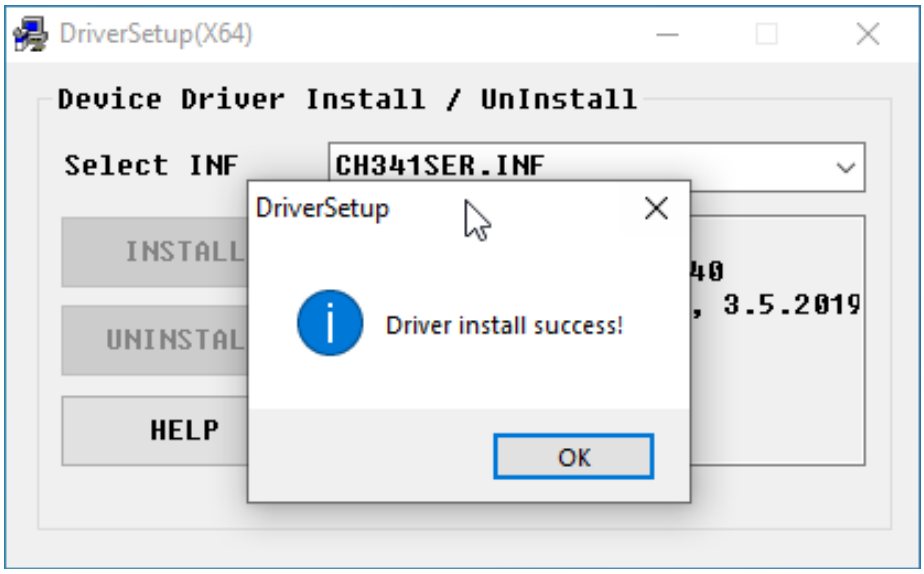
CH341 drive 3.4

Step 2: Install the Driver

After downloading the driver, open it and click **Install**.



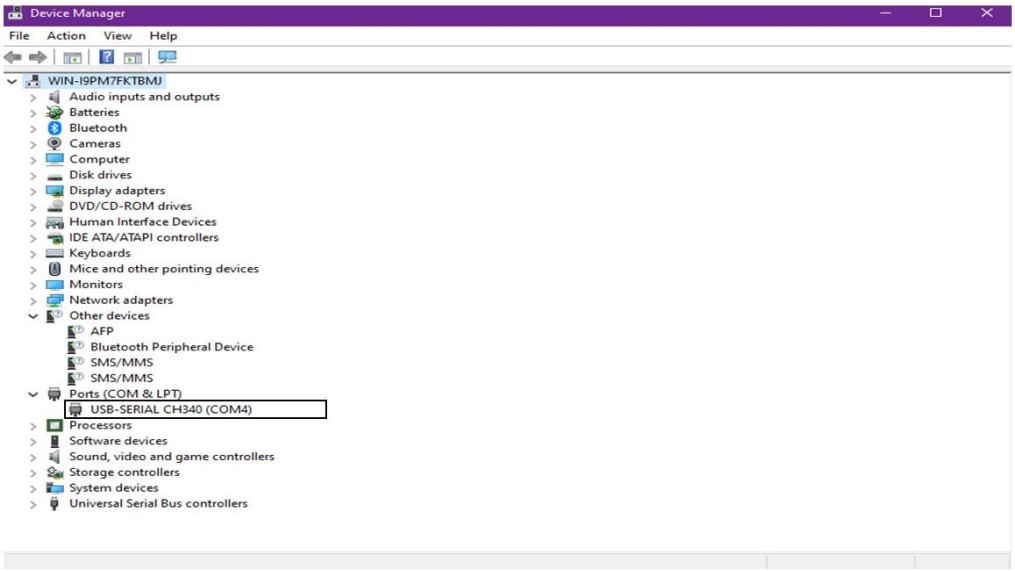
After successful installation you should see this message.



CH341 3.4 installation complete 3.5

Step3: Checking Correct Driver Installation in Device Manager

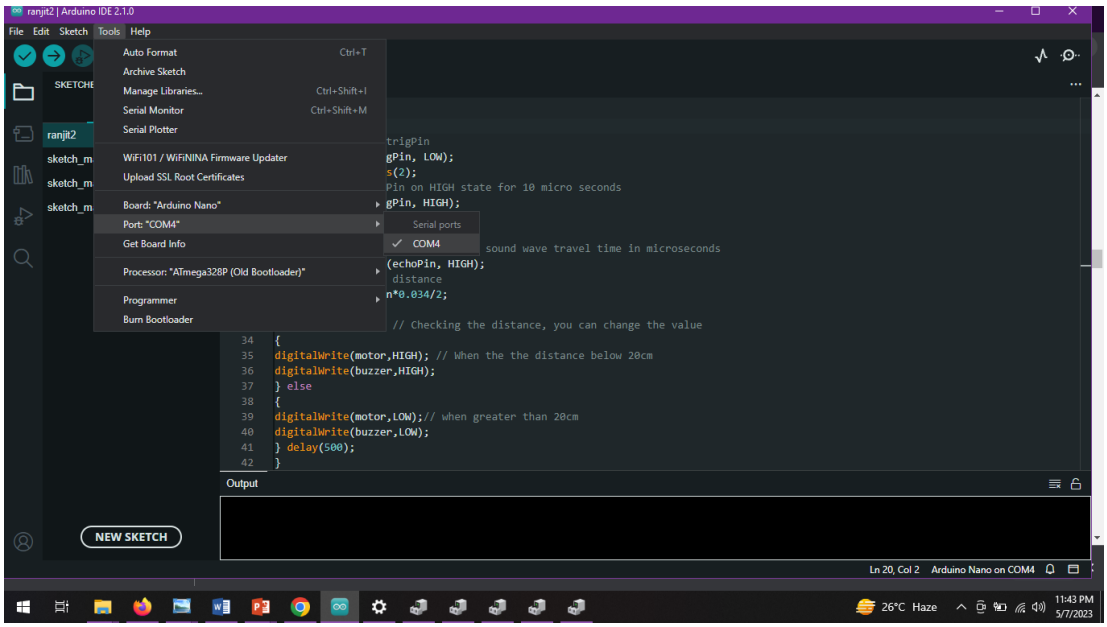
If your driver has been installed correctly, and if you connect your board to a computer, then you can see its name and port number in the Port section. For example, my Arduino board is connected to **COM4**.



Device Manager showing CH341 3.6

Step-4: Checking Correct Driver Installation in Arduino IDE

Open the Arduino IDE software. Go to the Tools menu and from the **Port** section, select the port number appropriate port that your board is connected to. Note that this port number must be the same as the number you saw in the previous step.



CH341 Port showing in Arduino nano 3.7

Success

At this point, you have successfully installed the IC driver correctly and from now on you can easily upload the code you have written to your board.

CHAPTER- 04
IMPLEMENTATION
&
RESULT

4.1 Source Code

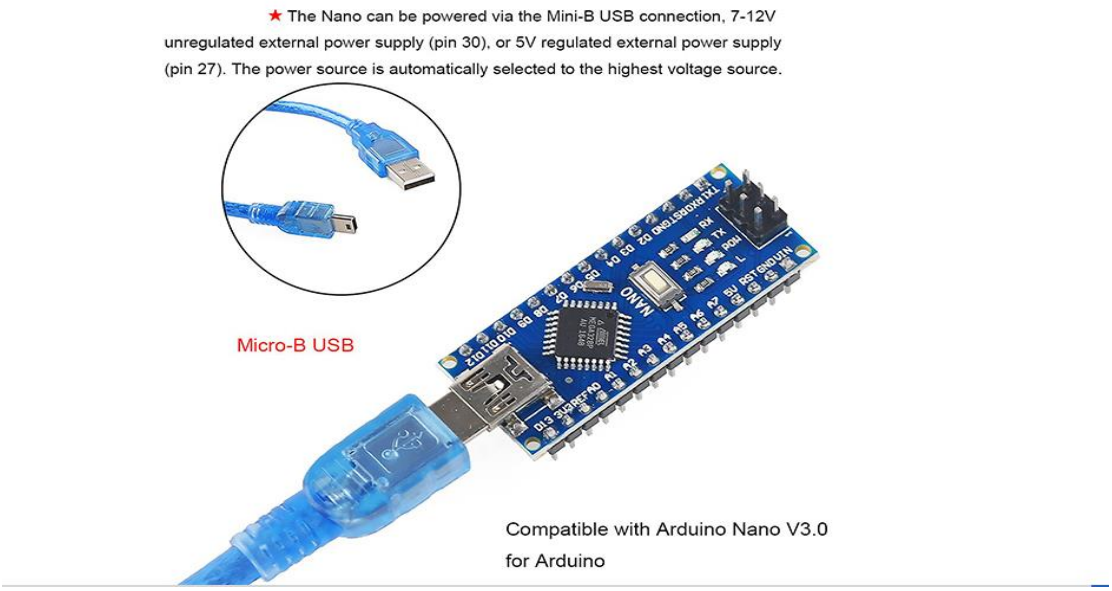
```
// defines pins numbers

const int trigPin=9;
const int echoPin=10;
const int motor=12;
const int buzzer=11;

// define the duration and distance variables

long duration, distance;
void setup()
{
 pinMode(trigPin, OUTPUT);  // Sets the trigPin as an Output
 pinMode(echoPin, INPUT);   // Sets the echopin as an Input
 PinMode(motor, OUTPUT);   // Sets the motor as an Output
 pinMode (buzzer, OUTPUT);    // Sets the buzzer as an Output
}

void loop()
{
   // Clears the trigPin
 digitalWrite(trigPin, LOW);
 delayMicroseconds(2);
 // Sets the trigPin on HIGH state for 10 micro seconds
 digitalWrite(trigPin, HIGH);
 delayMicroseconds(10);
 digitalWrite(trigPin, LOW);
// Reads the echoPin, returns the sound wave travel time in microseconds
duration = pulseIn(echoPin, HIGH);
// Calculating the distance
distance = duration*0.034/2;

if (distance < 20) // Checking the distance, you can change the value
{
digitalWrite(motor,HIGH); // When the the distance below 20cm
digitalWrite(buzzer,HIGH);
} else
{
digitalWrite(motor,LOW);// when greater than 20cm
digitalWrite(buzzer,LOW);
} delay(500);
}
```

4.2 Code Implementation

Mini-USB Type-B

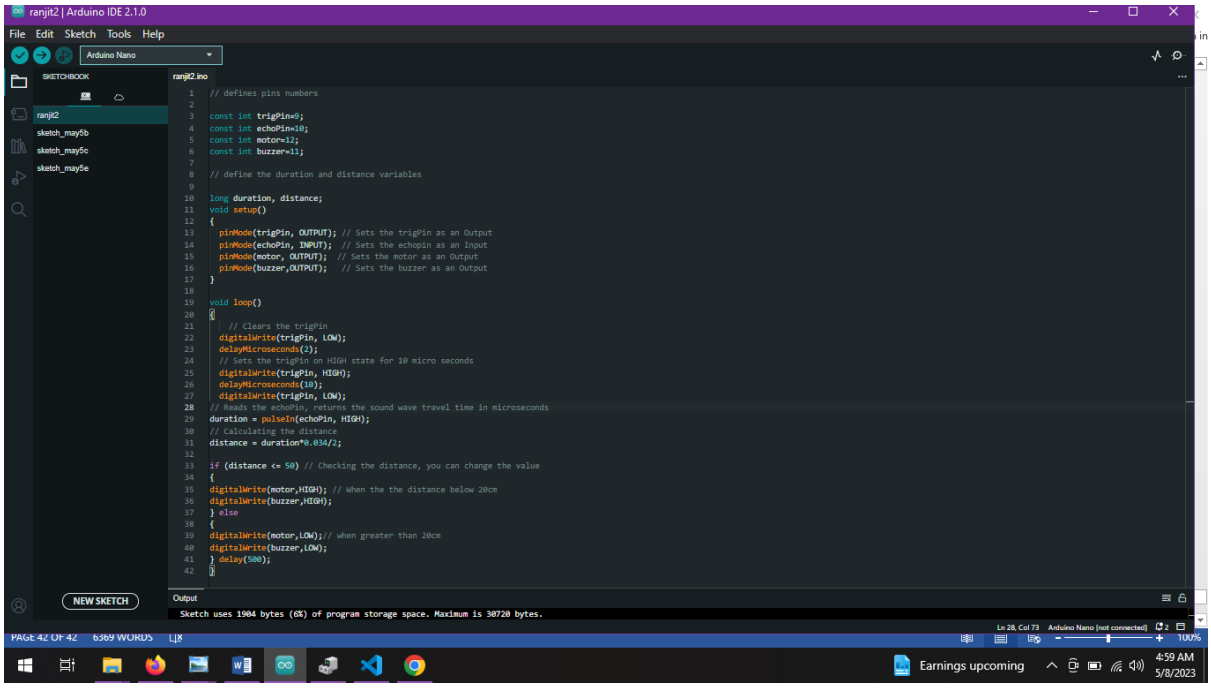
USB 2.0 A to USB 2.0 Mini B is used for Uploading code in Arduino Nano or giving power supply to the Arduino Nano

Step-1: First of all we connect the Mini-USB to Arduino Nano

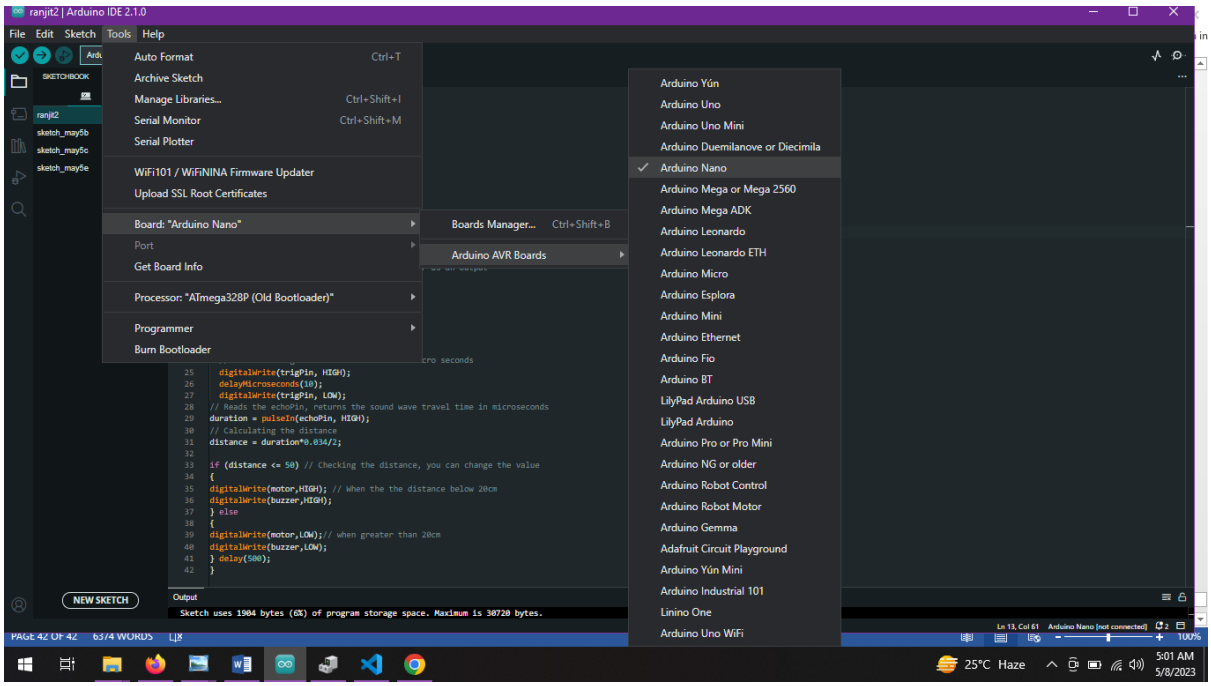


Uploading code in Arduino Nano 4.0

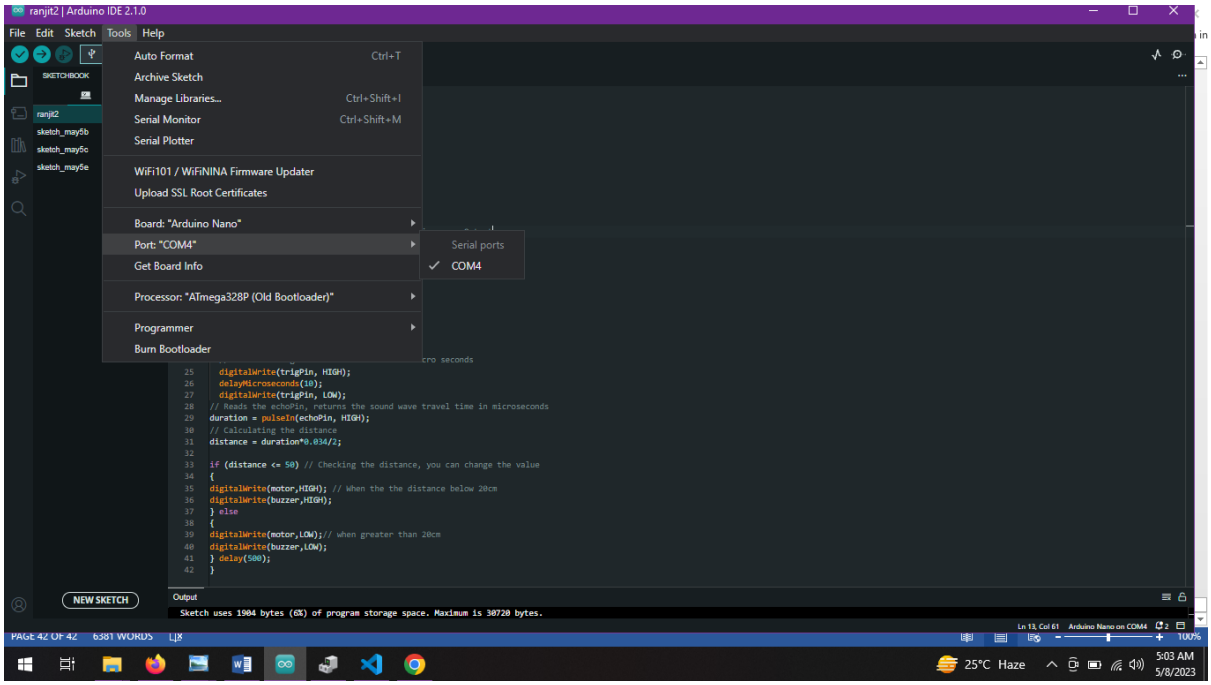
Step-2: Again we start to writing code in Arduino IDE



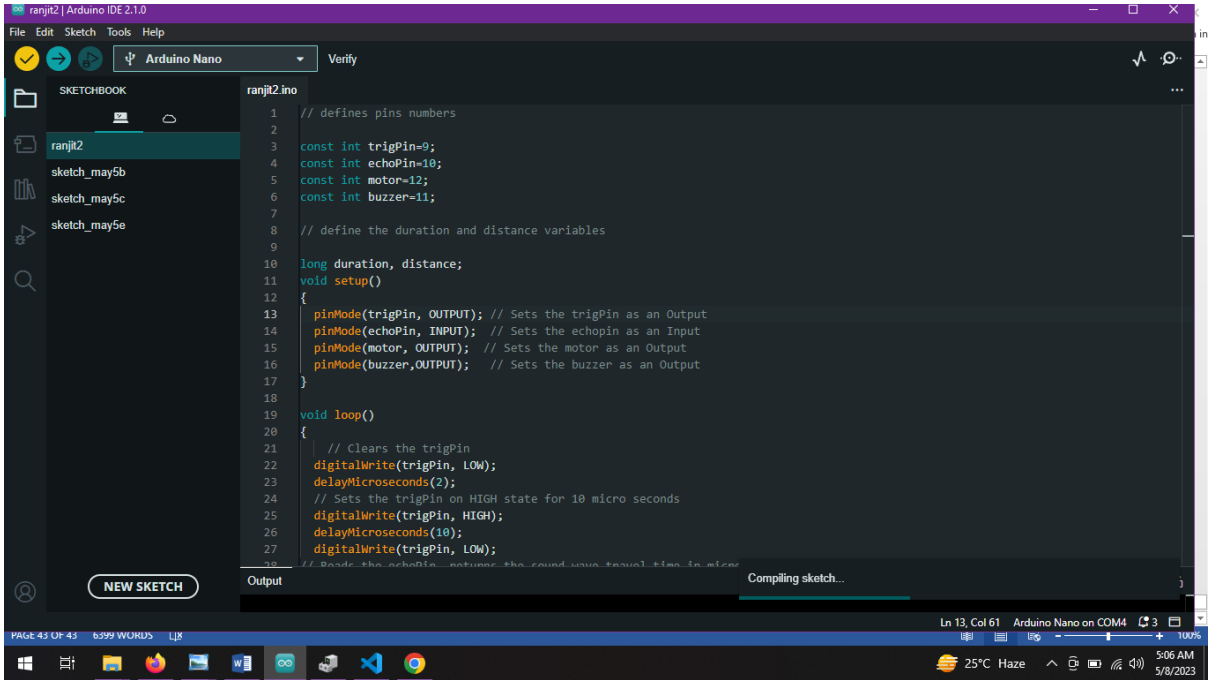
Step-3: Select the Arduino board



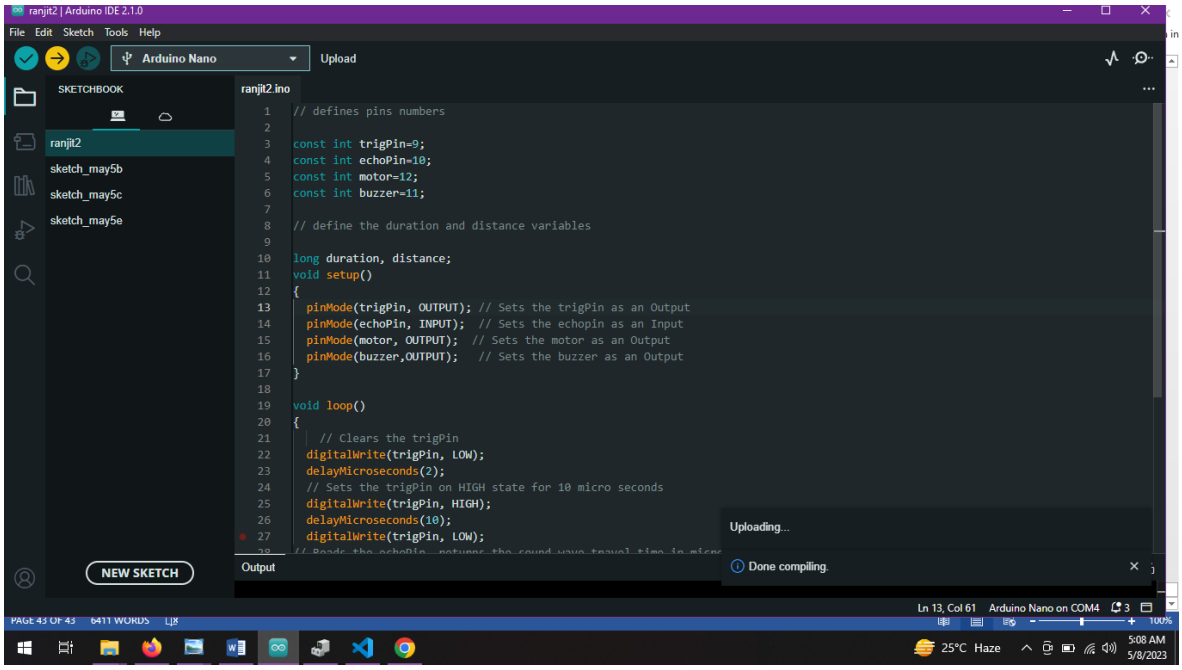
Step-4: After selecting Arduino board, select port.



Step-5: After selecting the port, verify the code (before upload code in Arduino Nano you should verify the Code)

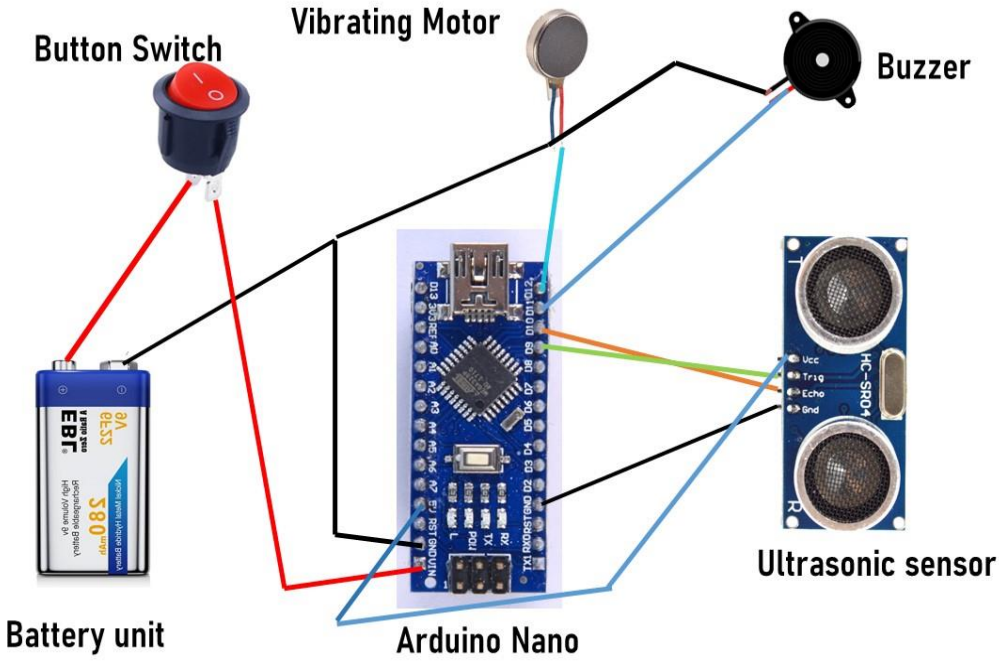


Step-6: After verify the code upload the code in Arduino Nano



Uploading code successfully 4.1

4.3 Hardware Connection



Every Component 4.2

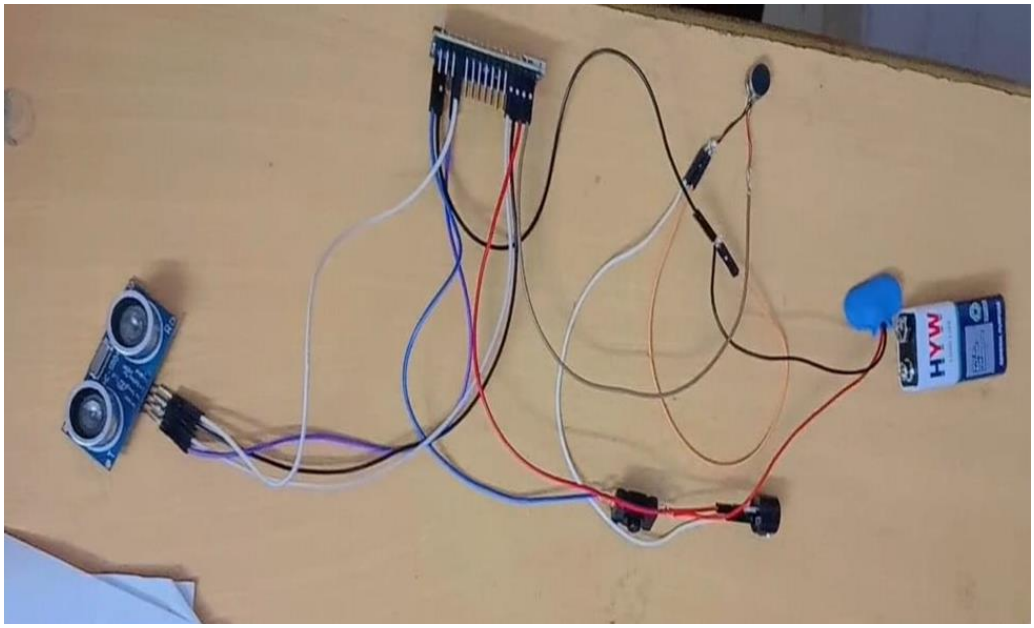
Here we use Digital pins 10 and 9(Arduino Nano) to connect the Echo Pins and Trigger pin (Ultrasonic sensor). VCC connect to V5, and GND is connected to the GND pin in Arduino Nano.

Next, we will connect the Buzzer, the Positive terminal of the Buzzer to Digital pin 11, and the Negative terminal to the ground

Next, we connect the Vibrating motor, the Positive terminal of the Vibrating motor to digital pin 12 and another pin to the ground

The battery connecter and switch module are connected separately. Arduino Nano Vin pin can take voltage from 9 to 12v, so we connect the pin for the Button switch to VIN and Negative terminal from battery to GND Nano

After that, I assembled these items in the shoes I created



Every Component Connect Successfully 4.3

Smart shoes ready 4.4

Smart shoes 4.5

Shows the prototype of "SMART SHOES", which is going to be wearied by the blind persons, and the prototype consists of as follows;

- ✓ Microcontroller ARDUINO NANO.
- ✓ Ultrasonic sensor (Distance measurement)
- ✓ Vibration Motor (For Vibrating)
- ✓ Buzzer (For sound)
- ✓ Switch (Power Supply Control)
- ✓ Battery (Power Supply)

CHAPTER – 05
ADVANTAGES AND LIMITATIONS

5.1 Advantage and Limitations

1) Low design time.
2) Low production cost.
3) This system is applicable for both the indoor and outdoor environment.
4) It is dynamic system.
5) Less space.
6) Low power consumption.

CHAPTER - 06
CONCLUSION AND FUTURE ENHANCEMENT

6.1 CONCLUSION

We would like to conclude that the proposed system completed successfully. As we stated earlier in a problem statement, the problem like a less information conveyed, poor efficiency and dependency on stick are overcome and successfully implemented with efficiency of object detection and with a clear information to a blind people for their guidelines. Hence, it can be concluded that this project is able to play a great contribution to the state of the art and will play a great role to assist the blinds to walk easily.

6.2 FUTURE ENHANCEMENT

Future work will be focused on enhancing the performance of the system and reducing the load on the user by adding the camera to guide the blind exactly. Images acquired by using web camera and NI-smart cameras helps in identification of objects as well as scan the entire instances for the presence of number of objects in the path of the blind person. It can also detect the material and shape of the object. Matching percentage has to be nearly all the time correct as there no chance for correction for a blind person if it is to be trusted and reliable one. The principles of mono pulse radar can be utilized for determining long range target objects. The other scope may include a new concept of optimum and safe path detection based on neural networks for a blind person.

CHAPTER – 07
REFERENCES

References

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5. https://kb.netgear.com/232/What-is-a-switch-An-introduction
6. https://www.nfpmotor.com/products-coin-vibration-motors.html
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8. https://www.iqsdirectory.com/articles/electric-switch.html
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10. https://www.elprocus.com/an-overview-of-arduino-nano-board/
11. http://www.kscst.iisc.ernet.in/spp/39_series/SPP39S/02_Exhibition_Projects/168_39S_BE_0939