

VEHICLE THEFT ALERT AND ENGINE LOCK SYSTEM USING GSM & GPS

Submitted in partial fulfillment of the requirements for the award of Bachelor of
Engineering degree in Electronics and Instrumentation Engineering

by

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ENGINEERING**

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(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A" by NAAC

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **P.HRUTHIK KUMAR REDDY** (37180702) and **U. MOHAN VENKATESH** (37180703) who carried out the project entitled "**VEHICLE THEFT ALERT AND ENGINE LOCK SYSTEM USING GSM & GPS** " under my supervision from October 2020 to April 2021.

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DECLARATION

We **PALUGULLA HRUTHIK KUMAR REDDY (Reg. No. 37180702)** and **UDDANTI MOHAN VENKATESH (Reg. No. 37180703)** here by declare that the Project Report entitled “**VEHICLE THEFT ALERT AND ENGINE LOCK SYSTEM USING GSM & GPS**” done by us under the guidance of **Ms. G. Rajalakshmi, M.E., (Ph.D)** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering in Electronics And Instrumentation Engineering

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1.

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ABSTRACT

Vehicle tracking today is getting tougher with the passage of time, and it is getting difficult to keep track of these vehicles for security and safety purposes. People are today more concerned to keep them safe using the latest technology. We need to ensure the vehicle condition and location of the vehicle.

In this project, the location of the vehicle can be monitored and notification can be sent to the respective person if met with an accident. When an anonymous person tries to drive or start the vehicle an intimation will be has been send to owner's mobile as a message. The vibration sensor detects the vibration above the threshold range when the vehicle is met with an accident and the message will be sent to respective person along with GPS location.

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LIST OF ABBREVIATIONS

RTOS	Real-Time Operating System
RFID	Radio-Frequency Identification
TDM	Time-division multiplexing
GPS	Global Positioning System
ITS	Intelligent Transportation System
EU	European Union
MSD	Minimum Set of Data
DENM	Decentralized Environmental Notification Message
FSR	Force Sensing Resistor
GSM	Global System for Mobile Communication
USB	Universal Serial Bus
EEPROM	Electrically Erasable Programmable Read-Only Memory
GIS	Geographic Information System
WAAS	Wide Area Augmentation System
ISO	International Standards Organization
MMV	Monostable Multivibrator
TDMA	Time-division multiple access
IMEI	International Mobile Equipment Identity
IDE	Integrated Development Environment

CHAPTER-1

INTRODUCTION

Roads in India are a well-liked for both passenger and goods movement. locomote road provides lots of flexibility, convenience, speed, and reliability, particularly at short distances in cities and towns. Therefore, it's the foremost liked medium of transport. But Indian roads are during a very poor condition. Their development and maintenance haven't kept pace with the expansion in vehicular population. Also, India has become so crowded that there are increased traffic levels in any respect times. Urbanization has increased to such an extent that life has become fast-paced. the necessity to deal with such a life has led to rash driving among many of its adverse effects. Consequently, because of these reasons, there are accidents, serious injuries, and deaths all around. Hence, the necessity for a technology to avoid such mishaps, arises. Hence, sensors are employed within the hardware to detect accidents and consequently inform the concerned authority about the identical. Secondly, vehicles are always at a risk of getting stolen. For these reasons, the project hardware is fitted on to the vehicle in such a fashion that it's not visible to anyone who is inside or outside of the vehicle. Thus, it is used as a convert unit which continuously or by any interrupt to the system, sends the situation data to the monitoring unit. this provides a grip over other pieces of technology for the identical purpose.

1.1 EMBEDDED SYSTEM

An embedded system may be a controller programmed and controlled by a real-time OS (RTOS) with an infatuated function within a bigger mechanical or electrical system, often with real-time consumption of embedded systems computing constraints.

It is embedded as a part of an entire device often including hardware and mechanical parts. Embedded systems management several devices in common use nowadays. Ninety-eight percent of all microprocessors are manufactured to function embedded system component.

Samples of properties of typical embedded computers compared with general-purpose counterparts are low power consumption, small size, rugged operating ranges, and low

per-unit cost. This comes at the value of limited processing resources, which make them significantly tougher to program and to interact with.

However, by building intelligence mechanisms on top of the hardware, taking advantage of possible existing sensors and also the existence of a network of embedded units, one can both optimally manage available resources at the unit and network levels further as provide augmented functions, well beyond those available. for instance, intelligent techniques are often designed to manage power.

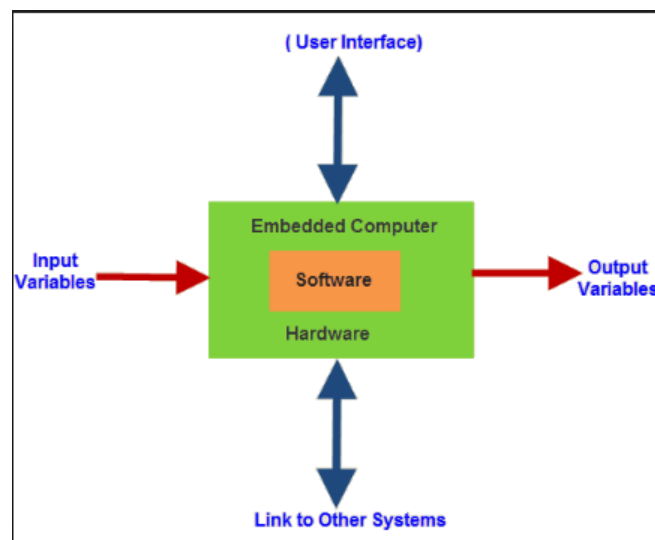


Fig: 1.1 Embedded system

Embedded Computer Sub-Assembly for Electronic robot. Embedded systems are commonly found in consumer, industrial, automotive, medical, commercial and military applications.

Telecommunications systems use various embedded systems from telephone switches for the network to cell phones at the foremost effective user. laptop networking uses dedicated routers and network bridges to route information.

Consumer electronics include MP3 players, mobile phones, game consoles, digital cameras, GPS receivers, and printers. Household appliances, like microwave ovens, washing machines and dishwashers, include embedded systems to produce flexibility, efficiency and features.

1.2 CLASSIFICATIONS OF EMBEDDED SYSTEMS

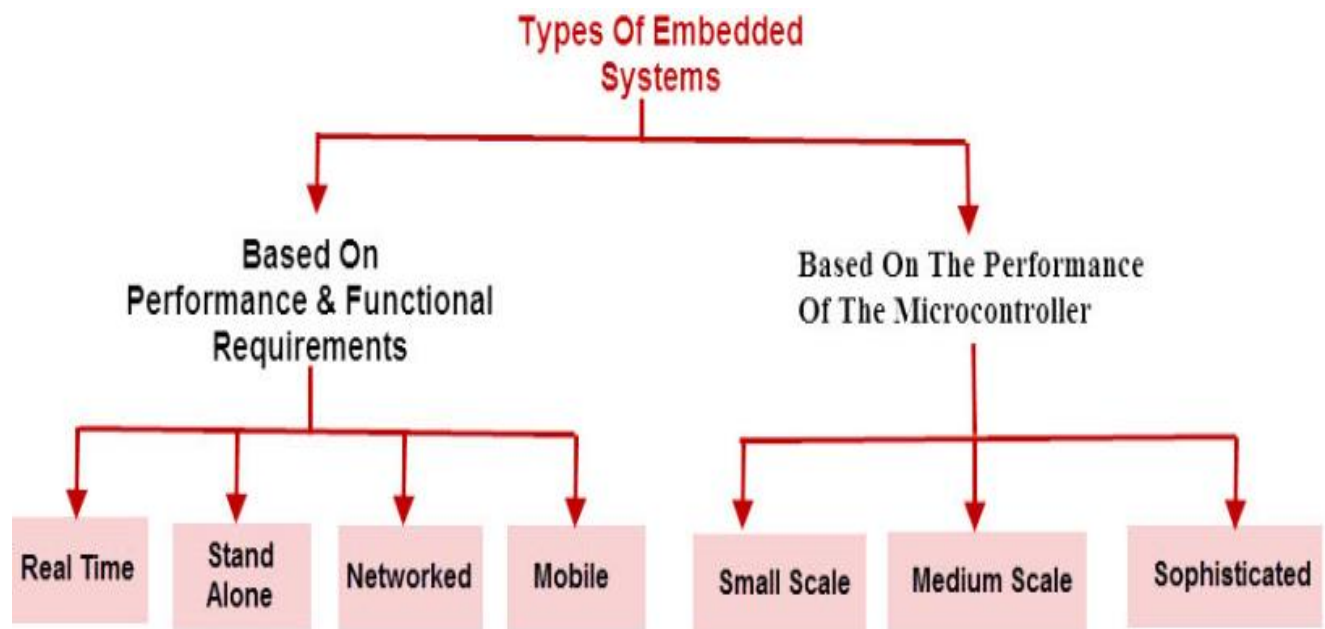


Fig: 1.2 Classification of Embedded system

Advanced HVAC systems use networked thermostats to more accurately and efficiently control temperature which will change by time of day and season. Home automation uses wired- and wireless-networking which will be accustomed control lights, climate, security, audio/visual, surveillance, etc., all of which use embedded devices for sensing and controlling, like traffic lights, factory controllers, and largely complex systems like hybrid vehicles, MRI, and avionics Embedded systems range from portable devices like digital watches and MP3 players, to large stationary installations.

1.3 Block diagram of an Embedded system

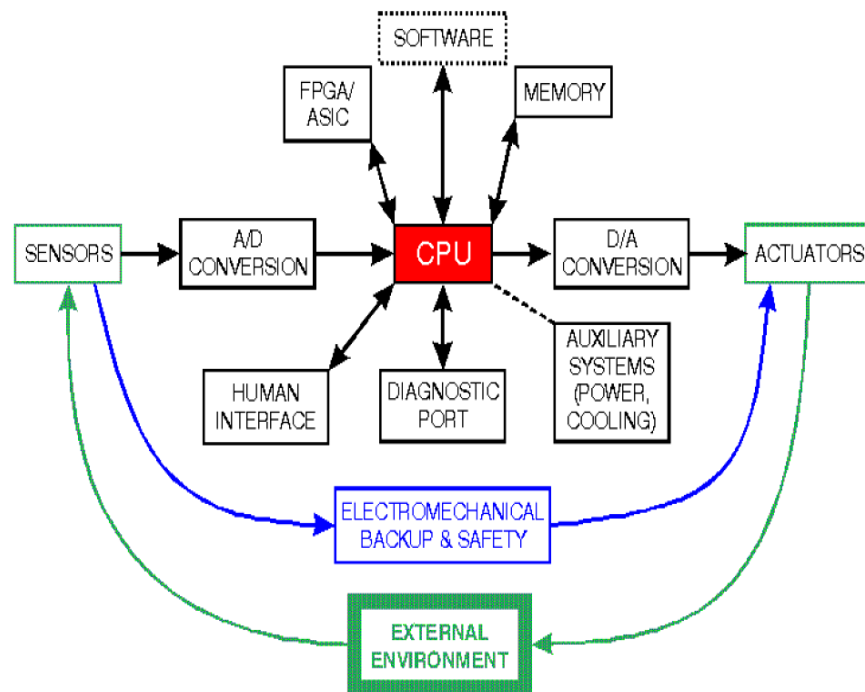


Fig: 1.3 Block diagram of an Embedded system

An embedded system usually contains an embedded processor. Many appliances that have a digital interface microwaves, VCRs, cars utilize embedded systems. Some embedded systems include a software system. Others are very specialized leading to the whole logic being implemented as one program. These systems are embedded into some device for a few specific purpose aside from to supply general purpose computing.

1.4 EMBEDDED SYSTEMS APPLICATIONS

Embedded systems in cars embrace control, control, body safety, engine safety, artificial intelligence in associate degree as line, automotive transmission, automotive amusement, E-com access, mobiles etc.

- Embedded systems in telecommunications include networking, mobile computing, and wireless communications, etc.
- Embedded systems in smart cards include banking, telephone and security systems.

- Embedded Systems in satellites and missiles include defense, communication, and aerospace
- Embedded systems in computer networking & peripherals include image processing, networking systems, printers, network cards, monitors and displays
- Embedded Systems in digital consumer electronics include set-top boxes, DVDs, high-definition TVs and digital cameras

CHAPTER-2

LITERATURE SURVEY

1 RFID BASED THEFT DETECTION SYSTEM FOR AUTOMOBILE PARTS by A Jayakody 2019

Vehicle elements felony is area of crime wherever less attention is being paid and weak countermeasures are being employed in Ceylon. A survey has been conducted to seek out the requirement of Associate in Nursing increased vehicle security system which might notice felony and credibleness of auto elements, and conjointly to spot that vehicle elements square measure being unremarkably taken in capital of Sri Lanka, Sri Lanka. In consonance with the results of the survey, it absolutely was obvious of the requirement for such vehicle security system. This analysis paper presents the look, implementation and testing of the example model that has been designed because the planned answer to forestall felony and credibleness of auto elements square measure detected victimization RFID technology within the developed example model. to create this vehicle security system a reasonable answer to the vehicle house owners, one cheap RFID reader is employed Associate in Nursing an anti-collision mechanism is constructed supported TDM and signal relaying, as a price cutting strategy to browse multiple RFID tags.

2 ANTI-THEFT DEVICE FOR CAR: ALERT SYSTEM USING RADIO WAVE by K Lappanitchayakul 2019

Currently, automobile stealing in Siam is one drawback that affects the economy and involves multinational criminals, though there are several anti-theft devices out there on the market. These mechanisms embody gear protection devices, device system, and GPS automobile chase devices. Of the mentioned devices the GPS chase devices are attention-grabbing as they use the principle of connecting to the telephone system to send, on-demand, the GPS location of the automobile to the owner's phone within the case that the vehicle is purloined. However, these devices don't seem to be well-liked within the marketplace as a result of the service fees are quite big-ticket. The researcher's instrumentality for once somebody tries to steal a vehicle is that the system can sight the movement within the automobile and send the GPS location to the

automobile owner instantly. to boot, the device was developed by mistreatment LoRa technology to transmit the info, giving a lower overhead than by employing a GPS chase device as oversubscribed on the market presently.

3 ANDROID BASED VEHICLE ANTI-THEFT ALARM AND TRACKING SYSTEM IN HAND-HELD COMMUNICATION TERMINAL by J Wei 2019

With the fast development of China's industry, the amount of cars is increasing apace. Automobile has developed into a very important suggests that of transportation for folks. However, whereas folks square measure enjoying the convenience and speed brought by the vehicle travel, the thievery of vehicles is inflicting additional and additional concern. during this paper, a vehicle anti-theft alarm and pursuit system supported humanoid software system in hand-held communication terminal is intended and developed. By mistreatment the constitutional sensors of the terminal supported humanoid software system (OS), like a wise phone, the abnormal info of a vehicle are sent to the owner's sensible phone through communication network. during this method, the long-distance remote alarm will be complete. additionally, the usage of the positioning perform of GPS or communication base station makes vehicle location pursuit into potential. Finally, a demo system is performed and it will effectively perform vehicle anti-theft alarm and pursuit.

4 A FRAMEWORK FOR VEHICULAR ACCIDENT MANAGEMENT USING WIRELESS NETWORKS by FM Abduljalil 2012

In this paper, a brand new framework for transport accident management victimization wireless networks is projected and mentioned. we have a tendency to gift integrated wireless spec for next generation all information science wireless networks that supports our framework. during this design we have a tendency to show that completely different wireless Networks will give web access for moving vehicles. a brand new distributed system is developed to manage vehicle accidents (anywhere, anytime) such it communicates accident data with traffic department of local government, hospital, and nondepository financial institution. The projected system is enforced employing a work. Then the results area unit mentioned.

5 CHARACTERIZING THE ROLE OF VEHICULAR CLOUD COMPUTING IN ROAD TRAFFIC MANAGEMENT by I Ahmad 2017

Vehicular cloud computing is pictured to deliver services that offer traffic safety and potency to vehicles. transport cloud computing has nice potential to vary the modern transport communication paradigm. Explicitly, the underutilized resources of vehicles are often shared with alternative vehicles to manage traffic throughout congestion. These resources embody however aren't restricted to storage, computing power, and net property. This study reviews current traffic management systems to research the role and significance of transport cloud computing in road traffic management. First, associate abstraction of the transport cloud infrastructure in associate urban situation is given to explore the transport cloud computing method. A taxonomy of transport clouds that defines the cloud formation, integration varieties, and services is given. A taxonomy of transport cloud services is additionally provided to explore the thing varieties concerned and their positions inside the transport cloud. A comparison of the present progressive traffic management systems is performed in terms of parameters, like transport circumstantial network infrastructure, net dependency, cloud management, quantifiability, traffic flow management, and rising services. Potential future challenges and rising technologies, like the net of vehicles and its incorporation in traffic jam management, also are mentioned. transport cloud computing is pictured to own a considerable role within the development of good traffic management solutions and in rising net of vehicles.

6 AUTOMATIC ACCIDENT DETECTION WITH MULTI-MODAL ALERT SYSTEM IMPLEMENTATION FOR ITS by B Fernandes 2016

The speedy technological growth is currently providing international opportunities to modify intelligent installation (ITS) to tackle road accidents that is taken into account one in every of the world's largest public injury interference drawback. For this purpose, eCall is associate degree initiative by world organisation (EU) with the aim to bring speedy help to associate degree accident location. This paper¹ presents HDy airplane pilot, associate degree application for automatic accident detection integrated with multimodal alert dissemination, via each eCall and IEEE 802.11p (ITS-G5). The projected accident detection algorithmic program receives inputs from the vehicle, via

ODB-II, and from the smartphone sensors, particularly the measuring instrument, the meter and also the rotating mechanism. associate degree mechanical man smartphone is employed as human machine interface, in order that the driving force will assemble the applying, receive road hazard warnings issued by alternative vehicles within the neck of the woods and cancel enumeration procedures upon false road vehicle crash detection. The HDy airplane pilot is developed for mechanical man OS because it provides ASCII text file Apis that enable access to its hardware resources. the applying is enforced, tested associate degree connected to an IEEE 802.11p primarily based model. The generated results show that the applying with success detects collisions, rollovers, performs the eCall beside causation Minimum Set of knowledge (MSD) and redistributed Environmental Notification Message (DENM).

7 SMART HELMET WITH SENSORS FOR ACCIDENT PREVENTION by K Shravya 2019

The impact once a traveller involves during a high-speed accident while not sporting a helmet is incredibly dangerous and might cause fatality. sporting a helmet will cut back shock from the impact and will save a life. There area unit several countries implementing a regulation that needs the motorbike's rider to wear a helmet once riding on their motorcycle, Malaya is AN example. With this reason, this project is specially developed on improve the protection of the motorcycle's rider. traveller are going to be afraid once the ordinance is exceeded. A Force Sensing electrical device (FSR) and BLDC Fan area unit used for detection of the rider's head and detection of motorcycle's speed severally. A 315 Mc frequency Module as wireless link that able to communicate between transmitter circuit and receiver circuit. PIC16F84a could be a microcontroller to regulate the whole part within the system. only the rider buckled the helmet then solely the motorcycle's engine can begin. A crystal rectifier can flash if the motor speed exceeds a hundred km/hour.

8 THE PROTOTYPE OF SMART HELMET WITH SAFETY RIDING NOTIFICATION FOR MOTORCYCLE RIDER by AR Budiman 2018

Motorcycle is that the highest contributor of a traffic accident in Republic of Indonesia that eighty three of it caused by human factors. These human factors embrace traffic signs violation and riding on top of the regulation. Besides that, road condition

additionally affects traffic accident, like a hollow, incumbrance and lack of traffic signs. within the case of a fatality, the best proportion of fatalities is twenty two.4% of the whole one hundred forty five,478 victims occurred in 2011. Head injury is that the main issue of casualties by seventieth. supported these statistics, the role of a helmet as a head defender should be worn by bike riders and certify the strap dead fast. to beat this downside, this study introduces a wise helmet system to warn the rider after they meet dangerous factors that risk inflicting traffic accident. These factors square measure once the rider has not worn the helmet and lock the strap and rushing on top of the regulation. aside from that, this study offers a replacement feature to warn the rider once passing through the obstacle like potholes or incumbrance at unsafe speed. This feature is obtainable as a result of the dangerous road condition in Republic of Indonesia contributes to traffic accidents. From the test's results, the good helmet system during this study has a median latency of one.4 seconds within the helmet use and strap lock detection system and zero.3 seconds in speed and shock detection system. additionally, the typical distinction of speed calculation between good helmets and GPS is three.3 km/hour.

9 INTELLIGENT TRANSPORTATION SYSTEM FOR ACCIDENT PREVENTION AND DETECTION by P Govindarajulu 2018

In a developing nation like Asian country, with advancement within the transportation technology and rise within the total range of vehicles, road accidents increase chop-chop. This advancement in technology conjointly augmented the traffic hazards. 2 wheelers' accounts for twenty fifth of total road crash death. therefore the quantitative relation of road accidents that manifest itself oft will increase inflicting huge loss of life because of poor emergency facilities. Main causes behind these road accidents area unit lack of coaching institutes, unskilled drivers, poor road conditions, use of telephone throughout driving, overwhelming alcohol whereas driving, over loading and poor governmental plans during this regard. many solutions are applied to stop these road accidents, like coming up with tight rules and rules. however most of them did not forestall accidents. This paper provides associate intelligent system for two-wheeler accident bar and detection for human life safety. The bar half involves, sensible Helmet, that mechanically checks whether or not the person is carrying the helmet and has non-

alcoholic breath whereas driving. The relay doesn't ON the engine if these 2 conditions don't seem to be glad. The microcontroller controls the operate of relay and so the ignition. The system conjointly allows detection of associate accident at anywhere and reports concerning the accident to predefined numbers with GSM module. The Microcontroller unceasingly records all the parameters of automobile for bar and detection of accident.

10 A NOVEL VIDEO PROCESSING BASED SMART HELMET FOR REAR VEHICLE INTIMATION & COLLISION AVOIDANCE by SR Rupanagudi 2015

The past few years have shown associate exponential rise within the total range of individuals travelling with their own personal vehicles. a rise in vehicles has conjointly statistically light-emitting diode to a rise within the range of road accidents additionally. although tons has been worked upon with relation to the security of cars, little or no has been done to safeguard the drivers of 2 wheelers. during this paper we tend to gift a completely unique methodology, that monitors in real time the traffic situation behind the motive force of a motorbike associated conjointly an intimation system to tell him regarding a similar. a cheap setup associated an correct rule employed in conjunction have conjointly been careful. Special cases like giving priority throughout turning have conjointly been highlighted. All algorithms were designed and developed exploitation MATLAB 2011b and a Spartan 3E FPGA was used to help in simulating a true time atmosphere.

CHAPTER-3

EXISTING & PROPOSED SYSTEM

3.1 EXISTING SYSTEM

- In existing system, algorithm-based technique is used to detect the vehicle location.
- The vehicle speed will be calculated and the vehicle location will be predicted by using algorithm-based technique.
- The existing techniques are not accurate, since RFID technology has been used for vehicle theft control.

Disadvantage:

- By using camera-based approach, the privacy is affected.
- Algorithm based approach is not must effective.

3.2 PROPOSED SYSTEM

- In proposed system, GPS system is used to detect the exact vehicle location.
- The alert message will be sent to owner whenever the vehicle is started.
- When the accident occurs, the vibration sensor and MEMS sensor will detect the signal and the message will be sent to respective person.
- So, the accident notification will be implemented in the proposed model.

Advantage:

- By using biometric, the vehicle is more secured.
- Message can be immediately sending the respective person, so that the death can be reduced.

3.3 BLOCK DIAGRAM

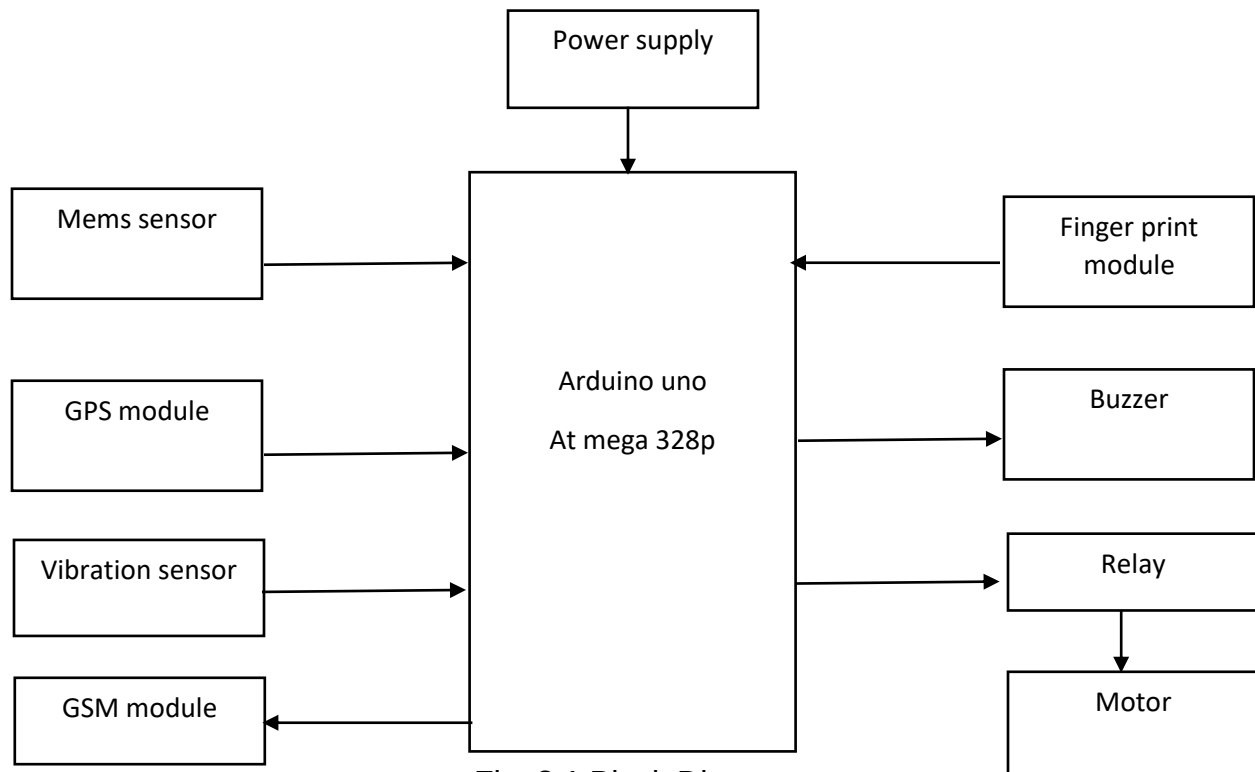


Fig: 3.1 Block Diagram

3.3.1 HARDWARE REQUIREMENTS

- Arduino UNO.
- GPS module.
- Vibration sensor.
- GSM module.
- Mems sensor.
- Finger print module.
- Buzzer.
- Relay
- Motor.

3.3.2 SOFTWARE REQUIREMENTS

- Arduino IDE.
- Embedded C.

CHAPTER - 4

HARDWARE COMPONENTS AND SOFTWARE REQUIREMENTS DETAILS

4.1 ARDUINO UNO

The Arduino Uno is also a microcontroller board supported the ATmega328 (datasheet). it's 14 digital input/output pins (of which 6 is employed as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, an influence jack, an ICSP header, and a button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to induce started. The Uno differs from all preceding boards during this it doesn't use the FTDI USB-to-serial driver chip. Instead, it options the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial device. Revision 2 of the Uno board incorporates a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode. Revision three of the board has the subsequent new features:

- one.0 pinout: added SDA and SCL pins that square measure virtually the AREF pin and 2 alternative new pins placed with relevance the RESET pin, the IOREF that enable the shields to adapt to the voltage provided from the board. In future, shields are compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second could also be a not connected pin, that's reserved for future purposes.
- Stronger RESET circuit.
- At mega 16U2 replace the 8U2. "Uno" means one in Italian and is understood on mark the upcoming release of Arduino 1.0. The Uno and version 1.0 are the reference versions of Arduino, moving forward. The Uno is that the newest in a series of USB Arduino boards, and also the reference model for the Arduino platform; for a comparison with previous versions, the index of Arduino boards can be verified.

4.1.1 POWER

VIN. The input voltage to the Arduino board once it's mistreatment associate external power supply (as vital five volts from the USB association or alternative regulated power source).

- 5Volts This pin outputs a regulated 5Volts from the regulator on the board. The board could also be given power either from the DC power jack (7 - 12Volts), the USB connector (5Volts), or the VIN pin of the board (7-12V). Supplying voltage via the 5Volts or 3.3Volts pins bypasses the regulator, and might damage the board.
- 3Volts 3. A 3.3-volts supply generated by the on-board regulator. Maximum current draw is 50 mA.
- GND. Ground pins.

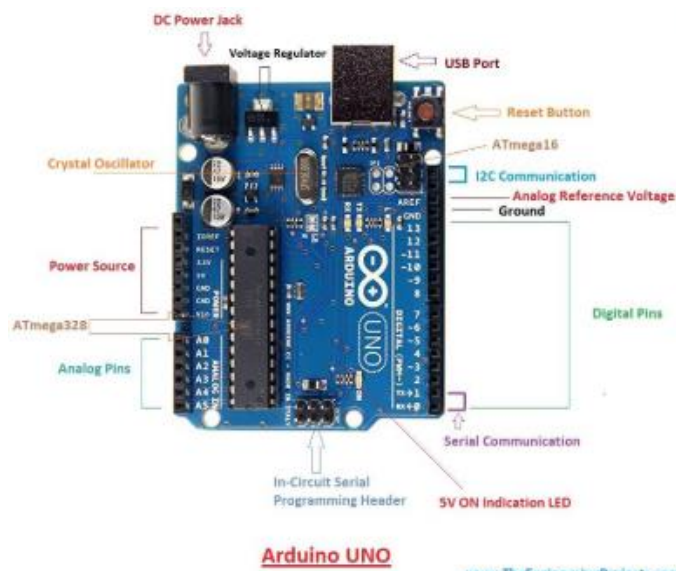


Fig: 4.1 ARDUNO UNO

4.1.2 Memory

The ATmega328 has 32 KB (with 0.5 KB used for the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which will be read and written with the EEPROM library). Input associated Output every of the fourteen digital pins on the Uno is employed as an input or output, mistreatment pin Mode (), digital Write (), and digital scan () functions. They operate at 5 V. Each pin can provide or receive a maximum of 40 mA and has an enclosed pull-up resistor (disconnected by default) of 20-50 kilo Ohms.

4.1.3 Since- Specialized functions

- Serial: 0 (RX) and 1 (TX). Is Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the respective pins of the ATmega8U2 USB-to-TTL Serial chip.
- External Interrupts 2 and 3: These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. The attach Interrupt () function for details.
- PWM: 3, 5, 6, 9, 10, and 11. Offer 8-bit PWM output with the analog Write () Operates.
- SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.
- LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off. The Uno has 6 analog inputs, labeled A0 through A5, every of that offers 10 bits of resolution (i.e., 1024 Totally different values). By default, 5 Volts is measured from ground, though it is possible to alter the upper end of their range using the AREF pin and the analog Reference () function. Additionally, some pins have specialized functionality:
- TWI: A4 or SDA pin and A5 or SCL pin. There square measure one or two of alternative pins on the board:
- AREF. Reference voltage for the analog inputs. Used with analog Reference ().
- Reset. Bring this line LOW to reset the microcontroller. Usually accustomed add a push button to shields that block the one on the board. cf the mapping between Arduino pins and ATmega328 ports. The mapping for the Atmega8, 168, and 328 is identical. Communication the Arduino Uno has a variety of facilities for communicating with a computer, another Arduino, or other microcontrollers.

The ATmega328 provides UART TTL (5V) serial communication, that is accessible on digital pins zero (RX) and one (TX). Associate in Nursing ATmega16U2 on the board channels this serial communication over USB and seems as a virtual com port to code

on the computer. The '16U2 code uses the quality USB COM drivers, and no external driver is required. However, on Windows, a .inf file is needed. The Arduino code includes a serial monitor that permits straightforward matter information to be sent to and from the Arduino board. The RX and TX LEDs on the board can flash once information is being transmitted via the USB-to-serial chip and USB association to the computer (but not for serial communication on pins zero and 1). A code Serial library permits for serial communication on any of the Uno's digital pins. The ATmega328 conjointly supports I2C (TWI) and SPI communication. The Arduino code includes a Wire library to change use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library.

4.1.4 PIN CONFIGURATION

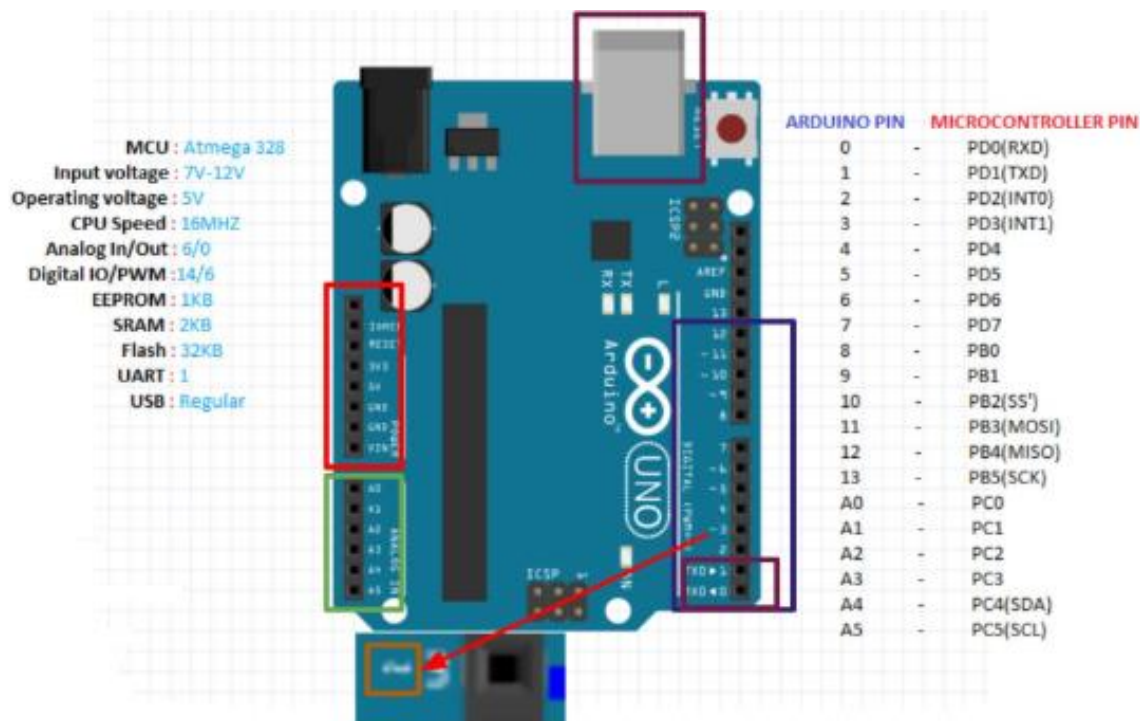


Fig: 4.2 ARDUNO UNO Pin Configuration

4.1.5 USB Overcurrent Protection

The Arduino Uno incorporates a resettable poly fuse that protects your computer's USB ports from shorts and overcurrent. though most computers give their own internal protection, the fuse provides an additional layer of protection. If quite 500 mA is applied to the USB port, the fuse can mechanically break the association till the short or overload is removed.

4.1.6 Physical Characteristics

The maximum length and dimension of the Uno PCB square measure a pair of 0.7 and 2.1 inches severally, with the USB connecter and power jack extending on the far side the previous dimension. Four screw holes enable the board to be connected to a surface or case. Note that the gap between digital pins seven and eight is one hundred sixty mil (0.16"), not a fair multiple of the 100-mil spacing of the opposite pins.

4.2 GPS

GPS Stands for "Global Positioning System." GPS may be a satellite navigation system accustomed verify the bottom position of AN object. GPS technology was 1st employed by the u. s. military within the Nineteen Sixties and enlarged into civilian use over future few decades. Today, GPS receivers square measure enclosed in several industrial product, like cars, smartphones, exercise watches, and GIS devices. The GPS system includes twenty four satellites deployed in area concerning twelve,000 miles (19,300 kilometers) higher than the Earth's surface. They orbit the world once each twelve hours at a very quick pace of roughly seven,000 miles per hour (11,200 kilometers per hour). The satellites square measure equally unfolded in order that four satellites square measure accessible via direct line-of-sight from anyplace on the world. Each GPS satellite broadcasts a message that has the satellite's current position, orbit, and precise time. A GPS receiver combines the broadcasts from multiple satellites to calculate its precise position employing a method known as triangulation. 3 satellites square measure needed so as to see a receiver's location, although a affiliation to four satellites is good since it provides larger accuracy.

4.2.1 GPS WORKING ON MOBILE

In order for a GPS device to figure properly, it should 1st establish a association to the specified variety of satellites. This method will take anyplace from a number of seconds to a number of minutes, reckoning on the strength of the receiver.

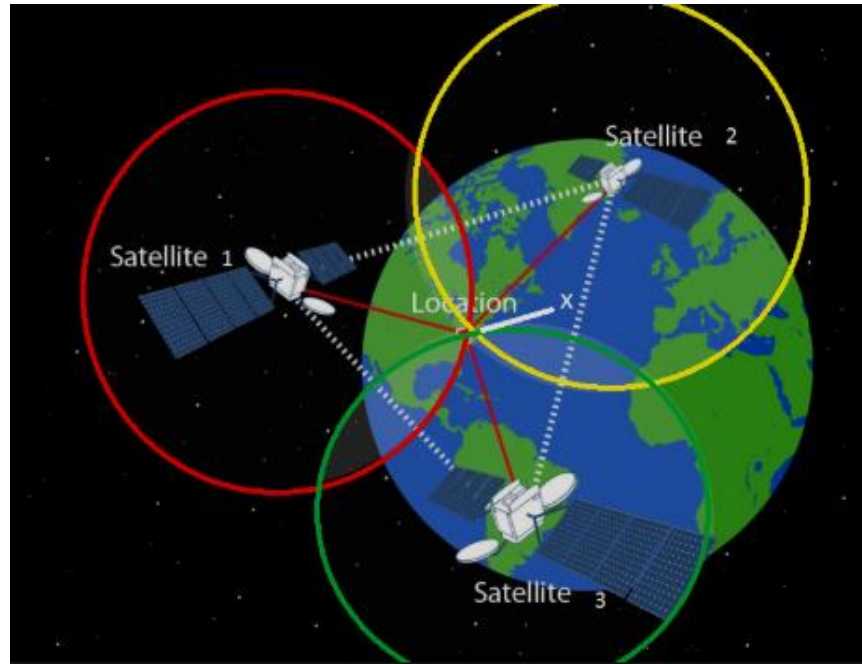


Fig 4.3 Working of GPS

For example, a car's GPS unit can generally establish a GPS association quicker than the receiver in an exceedingly watch or smartphone. Most GPS devices additionally use some form of location caching to hurry up GPS detection. By memorizing its previous location, a GPS device will quickly confirm what satellites are obtainable following time it scans for a GPS signal.

4.2.2 WORKING of GPS

GPS satellites circle the planet doubly on a daily basis in an exceedingly precise orbit. every satellite transmits a singular signal and orbital parameters that enable GPS devices to rewrite and figure the precise location of the satellite. GPS receivers use this info and trilateration to calculate a user's actual location. primarily, the GPS receiver

measures the space to every satellite by the number of your time it takes to receive a transmitted signal. With distance measurements from a number of additional satellites, the receiver will confirm a user's position and show it electronically to live your running route, map a course, notice the simplest way home or journey anyplace.

To calculate the 2-D position (latitude and longitude) and track movement, a GPS receiver should be secured on to the signal of a minimum of three satellites. With four or additional satellites in sight, the receiver will confirm your 3-D position (latitude, line of longitude and altitude). Generally, a GPS receiver can track eight or additional satellites, however that depends on the time of day and whichever place on the planet. Some devices will do all of **that from your articulation plana**. Once your position has been determined, the GPS unit will calculate alternative info.

4.2.3 ACCURACY

Today's GPS receivers square measure very correct, because of their parallel multi-channel style. Our receivers square measure fast to lock onto satellites once 1st turned on. They maintain a pursuit lock in dense tree-cover or in urban settings with tall buildings. bound atmospherical factors and alternative error sources will have an effect on the accuracy of GPS receivers. Garmin GPS receivers square measure generally correct to among ten meters. Accuracy is even higher on the water.

Some Garmin GPS receiver accuracy is improved with WAAS (Wide space Augmentation System). This capability will improve accuracy to raised than three meters, by providing corrections to the atmosphere. No extra instrumentation or fees square measure needed to require advantage of WAAS satellites. Users also can recuperate accuracy with Differential GPS (DGPS), that corrects GPS distances to among a median of one to three meters. The U.S. Coast Guard operates the foremost common DGPS correction service, consisting of a network of towers that receive GPS signals and transmit a corrected signal by beacon transmitters. so as to induce the corrected signal, users should have a differential beacon receiver and beacon antenna additionally to their GPS.

4.3 VIBRATION SENSOR

Vibration sensors are unit sensors for measurement, displaying, and analyzing linear rate, displacement and proximity, or acceleration.

Vibration but delicate and ignored by human senses may be a telltale sign of machine condition. Abnormal vibration indicative of issues with associated degree industrial machine are often detected early and repaired before the event of machine failure; as a result of such a failure is doubtless expensive in terms of your time, cost, and productivity, vibration measure permits industrial plants to extend potency and save cash. Therefore, vibration analysis is employed as a tool to see instrumentality condition likewise because the specific location and kind of issues.

The severity of machine vibration is standardized by the International Standards Organization (ISO) within the publication. The quality describes acceptable vibration levels for four totally different categories of machines. This data, as set go into the chart below, proves helpful as a reference once analyzing vibration measurements.

- Vibration devices are unit merely prepacked as a raw sensor.
- Vibration transducers are a unit slightly additional complicated sensors that output a voltage or current signal.
- Vibration transmitters are a unit sensors prepacked with the suggests that (such as integral signal conditioners) to transmit a additional complicated output.
- Vibration switches use associated degree integral device to form or break contact once sure vibration levels are unit detected.

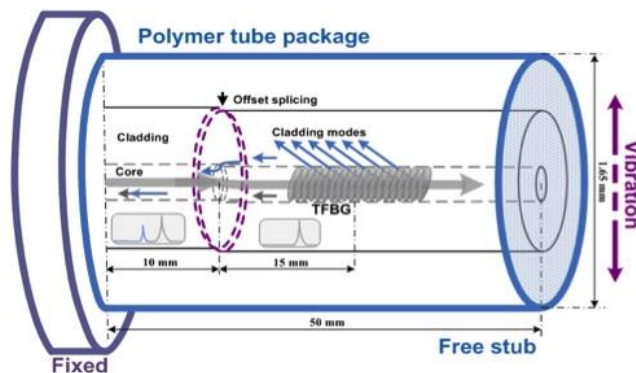


Fig: 4.4: Vibration Sensor

Before measuring the vibration, the device is to be connected which will notice vibration behavior to the machine that's being measured. numerous kinds of vibration sensors area unit offered, however a kind known as measuring system is often used because it offers blessings over different sensors. associate degree measuring system may be a device that produces associate degree electrical signal that's proportional to the acceleration of the vibratory part to that the measuring system is connected.

The acceleration signal created by the measuring system is passed on to the instrument that successively converts the signal to a rate signal. reckoning on the user's alternative, the signal are often displayed as either a rate wave or a rate spectrum. A rate spectrum springs from a rate wave by suggests that of a mathematical calculation referred to as the Fast Fourier Transform or FFT.

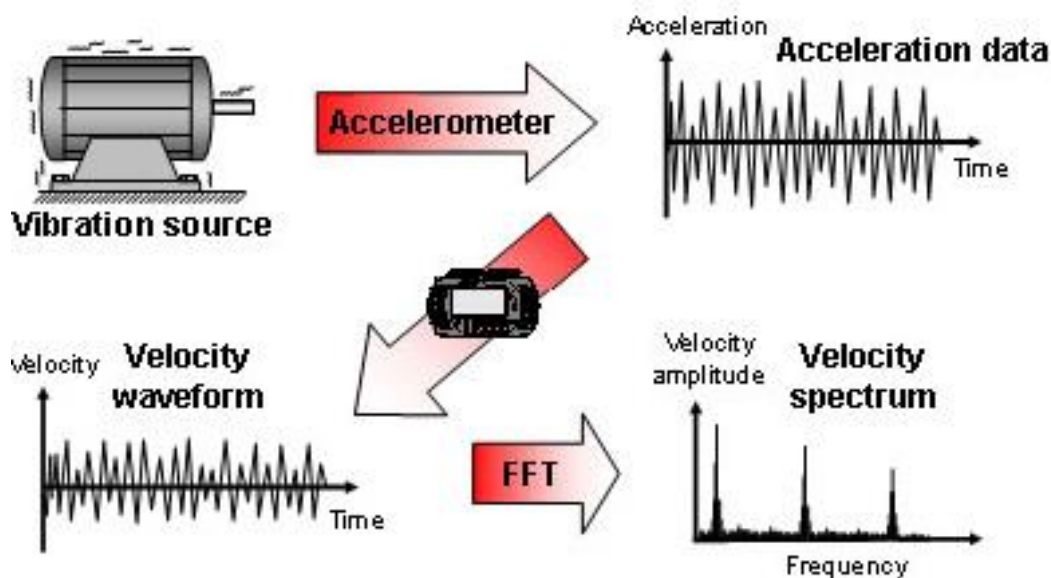


Fig: 4.5 Vibration sensor Working

With the assistance of an easy ceramic piezo-electric detector potential to assemble a noteworthy and helpful Impact device unit, which might be accustomed notice impact and vibration on doors, showcases, windows etc. The shock device (Ceramic piezo-electric detector) uses a “unimorph” diaphragm, that consists of a piezo-electric ceramic disk laminated to a metal disk. The device provides a voltage proportional to the

acceleration of the impact or vibration, as an example 40mV/G. The output is close to 2V to 60G impact.

Here a low voltage, low current Impact device unit is complete employing a normal ceramic piezo-electric detector that drives a monostable multivibrator (IC1) circuit to activate a npn atomic number 14 semiconductor unit (T1). Open collector output of this semiconductor unit switch are often interfaced to associate degree external alarm/switch circuit for more process. Since current consumption of the circuit is incredibly low (from five to six mA only) any common 3V button cell can be used to power the sensor unit. once a sway is perceived, the monostable drives the semiconductor unit switch to ON, for a finite length determined by the in circuit values of RC temporal arrangement elements R3 and C2.

4.3.1 Vibration/Impact Sensor Circuit Schematic

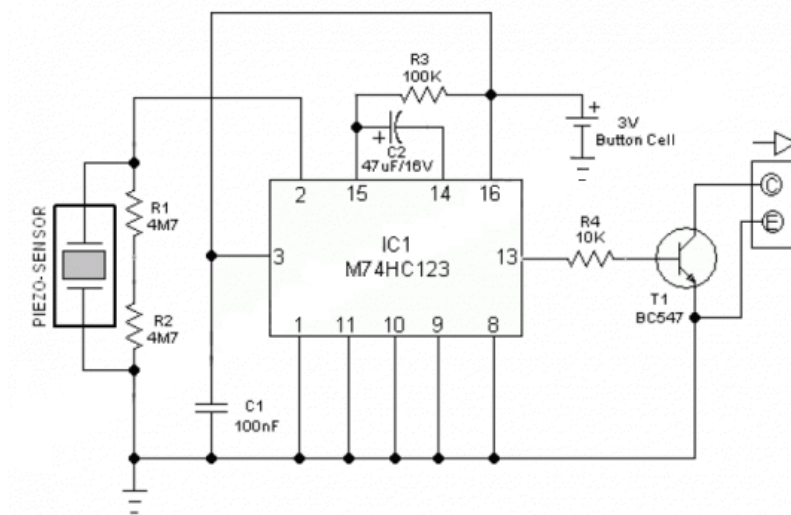


Fig: 4.6 Vibration Sensor Circuit Schematic

The M74HC123 (IC1) may be a high-speed twin retriggerable CMOS MONOSTABLE MULTIVIBRATOR (MMV) made-up with semiconducting material gate C2MOS technology, with all inputs protected against static discharge and transient excess voltage. There square measure 2 trigger inputs, negative edge and positive edge. Here, just one monostable dispense with positive edge triggering (pin 2) is employed. when

triggering, the output maintains the monostable state for the fundamental quantity determined by the external electrical device R3 and condenser C2.

4.4 GSM

GSM is a mobile communication modem; it stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.

GSM may be a mobile communication modem; it's stands for world system for mobile communication (GSM). the concept of GSM was developed at Bell Laboratories in 1970. It is wide used mobile communication system within the world. GSM is Associate in Nursing open and digital cellular technology used for transmission mobile voice and knowledge services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands

GSM system was developed as a digital system victimization time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the info, then sends it down through a channel with 2 completely different streams of consumer knowledge, every in its own specific interval. The digital system has a capability to hold 64 kbps to one hundred twenty Mbps of knowledge rates. There square measure numerous cell sizes in a very GSM system like macro, micro, pico and umbrella cells. every cell varies as per the implementation domain.



Fig: 4.7 GSM Modem

There square measure 5 completely different cell sizes in a very GSM network macro, micro, pico and umbrella cells. The coverage space of every cell varies in keeping with the implementation surroundings.

4.4.1 Time Division Multiple Access

TDMA technique depends on assignment completely different time slots to every user on constant frequency. It will simply adapt to knowledge transmission and oral communication and might carry 64kbps to 120Mbps of information rate.

4.4.2 GSM Architecture

A GSM network consists of the following components:

- A Mobile Station: it's the mobile that consists of the transceiver, the show and therefore the processor and is controlled by a SIM card operative over the network.
- Base Station Subsystem: It acts as AN interface between the mobile station and therefore the network scheme. It consists of the bottom Transceiver Station that contains the radio transceivers and handles the protocols for communication with mobiles. It additionally consists of the bottom Station Controller that controls the bottom Transceiver station and acts as a interface between the mobile station and mobile shift centre.
- Network Subsystem: It provides the fundamental network association to the mobile stations. The fundamental a part of the Network scheme is that the Mobile Service shift Centre that provides access to completely different networks like ISDN, PSTN etc. It additionally consists of the house Location Register and therefore the traveler Location Register that provides the decision routing and roaming capabilities of GSM. It additionally contains the instrumentation Identity Register that maintains AN account of all the mobile equipments whereby every mobile is known by its own IMEI range. IMEI stands for International Mobile instrumentation Identity.

Features of GSM Module

- Improved spectrum efficiency
- International roaming
- Compatibility with integrated services digital network (ISDN)
- Support for new services.
- SIM phonebook management
- Fixed dialing number (FDN)
- Real time clock with alarm management
- High-quality speech
- Uses encryption to make phone calls more secure
- Short message service (SMS)

The security methods customary for the GSM system build it the foremost secure telecommunications standard presently accessible. though the confidentiality of a decision and secrecy of the GSM subscriber is simply ensured on the radio channel, this can be a serious step in achieving finish-to- end security.

4.4.3 GSM Modem

A GSM electronic equipment may be a device which might be either a portable or an electronic equipment device which might be used to build a pc or the other processor communicate over a network. A GSM electronic equipment needs a SIM card to be operated and operates over a network vary signed by the network operator. It will be connected to a pc through serial, USB or Bluetooth affiliation.

A GSM electronic equipment also can be a typical GSM portable with the acceptable cable and software system driver to attach to a port or USB port on the pc. GSM electronic equipment is typically desirable to a GSM portable. The GSM electronic equipment has big selection of applications in group action terminals, offer chain management, security applications, weather stations and GPRS mode remote knowledge work.

4.4.4 Working of GSM Module

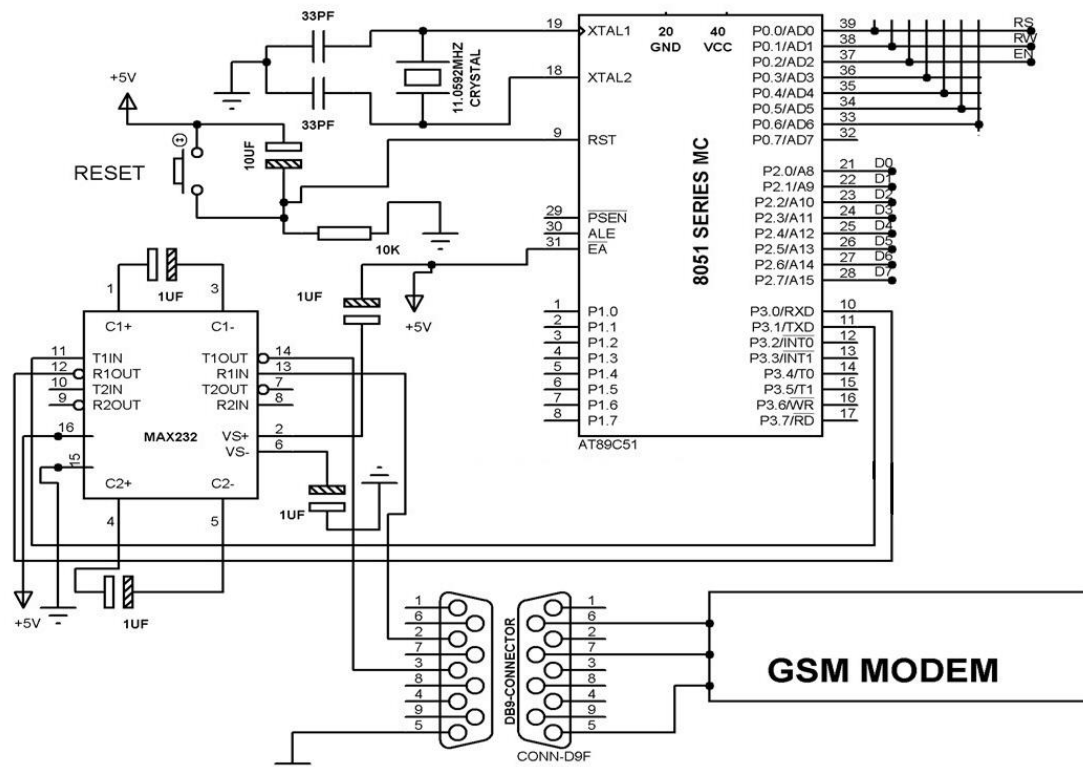


Fig: 4.8 GMS Modem Circuit

From the higher than circuit, a GSM electronic equipment punctually interfaced to the megahertz through the extent shifter IC Max232. The SIM card mounted GSM electronic equipment upon receiving digit command by SMS from any mobile phone send that knowledge to the megahertz through serial communication. whereas the program is executed, the GSM electronic equipment receives command 'STOP' to develop output at the megahertz, the contact purpose of that area unit wont to disable the electrical switch. The command therefore sent by the user relies on intimation received through the GSM electronic equipment 'ALERT' a programmed message providing the input is driven low. the entire operation is showed over 16×2 alphanumeric display display.

4.4.5 Intelligent GSM Device for Automation and Security

In currently, the GSM mobile terminal has become one among the things that area unit perpetually with US, rather like our wallet/purse, keys or watch, the GSM mobile

terminal provides US a communicating that allows US to speak with the planet. the necessity for someone to be accessible or to decision anyone at any time is incredibly appealing.

In this project, because the name says project relies on GSM network technology for transmission of SMS from sender to receiver. SMS causing and receiving is employed for present access of appliances and permitting breach management reception. The system proposes 2 sub-systems. Appliance management scheme permits the user to regulate home appliances remotely and also the security alert scheme provides the automated security observation.

The system is capable enough to instruct user via SMS from a selected cell variety to vary the condition of the house appliance per the user's wants and needs. The second facet is that of security alert that is achieved in a very means that on the detection of intrusion, the system permits automatic generation of SMS so alerting the user against security risk.

4.5 MEMS SENSOR

Micro-Electro-Mechanical Systems, or MEMS, may be a technology that in its most general type is outlined as miniaturized mechanical and electro-mechanical components (i.e., devices and structures) that area unit created victimization the techniques of microfabrication. The vital physical dimensions of MEMS devices will vary from well below one metric linear unit on the lower finish of the dimensional spectrum, all the thanks to many millimeters. Likewise, the kinds of MEMS devices will vary from comparatively straightforward structures having no moving components, to very advanced mechanical device systems with multiple moving components beneath the management of integrated electronics. The one main criterion of MEMS is that there are a unit at minimum of some components having some variety of mechanical practicality whether or not or not these components will move. The term accustomed outline MEMS varies in numerous elements of the globe. within the us they're preponderantly referred to as MEMS, whereas in another elements of the globe they're referred to as "Microsystems Technology" or "micromachined devices".

While the purposeful components of MEMS area unit miniaturized structures, sensors, actuators, and electronics, the foremost notable (and maybe most interesting) components area unit the small sensors and micro actuators. Microsensors and small actuators area unit fittingly categorised as “transducers”, that area unit outlined as devices that convert energy from one type to a different. within the case of microsensors, the device generally converts a measured mechanical signal into associate degree electrical signal.

4.5.1 WORKING of Mems sensor

MEMS inclinometers and accelerometers are cheap, high preciseness mechanical phenomenon sensors that serve a large style of industrial applications.

It is a chip-based technology, called a small Electro-Mechanical System, that is composed of a suspended mass between a combine of electrical phenomenon plates.

When tilt is applied to the sensing element, the suspended mass creates a distinction in potential difference that is measured as a modification in capacitance.

That signal is then amplified to supply a stable signaling in digital, 4-20mA or VDC. These sensors are fine solutions to applications that don't demand the very best accuracy like industrial automation, platform leveling, position management and pitch and roll measure.

A MEMS sensing element provides the convenient options that you can get with any other sensor line such as analog voltage, current and digital output choices. You do not have to be compelled to concern yourself with house constraints as MEMS utilizes terribly compact small machine elements in order that every sensing element will work into the palm of your hand. they need AN IP67 seal and since the operative temperature vary is -40° to $+85^{\circ}\text{C}$, they're going to stand up to some intense conditions. whereas electrolytic sensors have a lot of higher accuracy, a number of them may be sensitive to temperature.

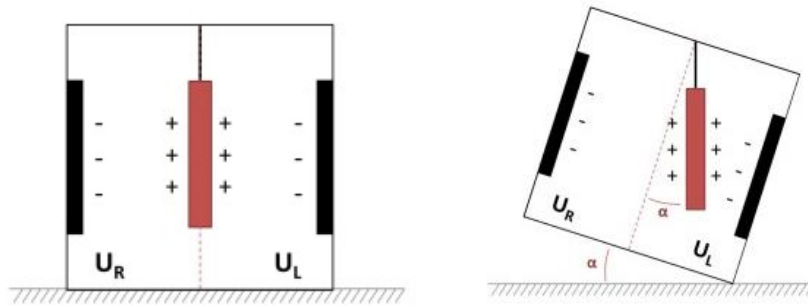


Fig: 4.9 MEMS Sensor at different positions

4.5.2 MEMS Sensor types

Gyro sensors and Accelerometers: These form of MEMS sensors are used for calculation of angular motion or displacement. the most principle behind these sensors is mensuration of angular movement with respect to time (i.e. X-Y-Z axial measurements). These sensors conjointly act as temperature sensors. These sensors are utilized in many various applications like digital compass, as gravity device, GPS trailing etc.

Humidity Sensors: These form of MEMS sensors are wide utilized in mines, power plants, dockyards and inexperienced homes, wetness sensors work on the principle of absorption of gas in encompassing air. this can bend microscopic cantilever which is able to cause modification within the doped resistance within the abscense of gravity. this can be perceived electrically so as to utilize the practicality. Refer wetness device for definition of wetness and varied styles of wetness devices that embody electrical phenomenon sensor, electrical physical phenomenon device, thermal physical phenomenon device, optical measuring device, oscillatory measuring device etc.

Force Sensors: Refer force device that covers spring loaded force device with LVDT, force device with pressure electrical device and gage.

Pressure Sensors: Refer pressure device for basic functions and kinds of pressure sensors e.g, Mercury pressure device, Piezoresistive pressure device, electrical phenomenon pressure device, Optoelectronic pressure device etc.

4.6 FINGER PRINT SENSOR

Fingerprint scanners are security systems of biometry. they're wont to unlock doors and in alternative security applications. throughout the 2010s fingerprint scanners became commonplace on mobile phones.

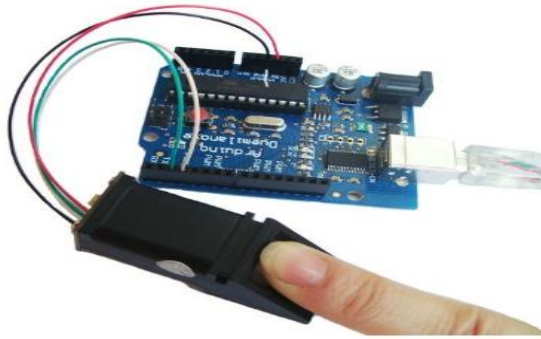


Fig: 4.10 Finger print sensor image

4.6.1 TYPES OF FINGER PRINT SENSOR

Optical reflexive: They are supported the oldest technique, that consists of inserting your finger on a glass surface or a prism that's lit by a semiconductor diode diode. once the ridges of fingerprints bit the surface, the sunshine is absorbed, whereas between these crests a complete reflection happens. The ensuing light-weight and dark square measures are recorded in a picture detector. In follow there square measure some difficulties with this technique: the pictures obtained with wet and dry fingers square measure terribly completely different and, additionally, the system is sensitive to dirt and dirt on the surface. The unit includes a goodish size, impractical and overpriced. this technique is straightforward to cheat and if the skin is broken, the fingerprint isn't recognized properly. the popularity of the fingerprint of older individuals is additionally tough to try as a result of the skin isn't elastic enough. In some circumstances this could end in false recognition. If the hold on fingerprint was infatuated less pressure, false acceptances might occur.

Capacitive: The device could be a variety of chemical element semiconductor semiconducting material} microcircuit with a surface that's lined by an oversized number of electrical device parts (or pixels), with a typical resolution of five hundred dpi. every part contains 2 adjacent metal electrodes. The capability between the electrodes, that forms a feedback path for an inverting electronic equipment, is reduced once the finger is applied to aforesaid surface: it's more reduced once it detects ridges and fewer reduced once it detects the house between them. The device is vulnerable to static discharge. These sensors solely work with traditional healthy skins, they're not operative getting used on skins with exhausting areas, calluses or scars. Moisture, grease or mud also can have an effect on its operation.

Mechanical: It consists of tens of thousands of little pressure transducers that square measure mounted on the surface of the device. an alternate style uses switches that square measure closed once ironed by a ridge, however that keep open after they square measure below a natural depression. This solely provides one little bit of info per component, rather than operating with a grey scale.

Thermal: In this case the warmth driven by the finger is detected, that is bigger once there's a ridge than once there's a natural depression. A element has been developed with a matrix of pixels referred to as "Finger Chip", that is, "finger integrated circuit", every of that is roofed with a layer of electrical phenomenon material within which a modification in temperature interprets into a modification within the load distribution of its surface. The image is within the grey scale that has the proper quality even with the finger worn, with dirt, with grease or with humidness. The device encompasses a sturdy protecting layer and might offer a dynamic output.

4.6.2 Dynamic output

Most of the sensors delineated are altered within the past. To avoid this, a brand new in operation mode has been side. rather than merely inserting your finger statically on the detector, the finger moves slowly on it. The detector solely includes a slim sensitive space, and generates an entire sequence of pictures, which may be reassembled, by

means that of a processor, in a very complete image. the advantages area unit improved appreciably and therefore the elimination of any residual grease is bonded.

4.6.3 Uses of finger print sensor

The most vital use space is in access management for computers. this is often particularly vital for laptops and PDAs. due to the worth falling, additional and additional devices ar equipped with sensors. different devices with constitutional fingerprint sensors embrace USB laborious drives, USB memory modules and card readers. they're additionally on the market in mice and keyboards.

Sensors are more and more wont to secure money transactions and alter machines for "online" banking. within the future, the owner's fingerprint are hold on firmly on identity cards and credit cards and will even be used for authentication of emails mistreatment digital signatures.

Direct physical access to rooms and devices can even be ensured by coupling fingerprint sensors with door gap systems.

4.7 BUZZER

A buzzer or electronic device is AN audio device, which can be mechanical, mechanical device, or electricity (piezo for short). Typical uses of buzzers and beepers embody alarm devices, timers, and confirmation of user input like a depression or keystroke.



Fig: 4.11 Buzzer image

4.7.1 TYPES of Buzzer

Electromechanical

Early devices were supported AN mechanical device system a dead ringer for an electrical bell while not the metal gong. Similarly, a relay could also be connected to interrupt its own causative current, inflicting the contacts to buzz, typically these units were anchored to a wall or ceiling to use it as a sounding board. The word "buzzer" comes from the rasping noise that mechanical device buzzers created.

Mechanical

A joy buzzer is AN example of a strictly mechanical buzzer and that they need drivers. different samples of them are doorbells.



Fig: 4.12 Mechanical Buzzer image

Piezoelectric

A electricity component could also be driven by AN oscillatory electronic circuit or different audio signal supply, driven with a electricity amplifier. Sounds normally won't to indicate that a button has been ironed are a click, a hoop or a beep.

A electricity buzzer/beeper conjointly depends on acoustic cavity resonance or Baron Hermann Ludwig Ferdinand von Helmholtz resonance to supply AN loud beep

APPLICATIONS

While technological advancements have caused buzzers to be impractical and undesirable, there are still instances in which buzzers and similar circuits may be used. Present day applications include:

- Novelty uses
- Judging panels
- Educational purposes
- Annunciator panels
- Electronic metronomes
- Game show lock-out device
- Microwave ovens and other household appliances
- Sporting events such as basketball games
- Electrical alarms
- Joy buzzer (mechanical buzzer used for pranks)

4.7.2 Simple Piezo Buzzer

Piezo buzzers are unit one in every of the foremost common buzzers out there around, they got their name from the electricity material used because the active component. These buzzers are unit sometimes driven at a comparatively higher voltage however low current, consumes a touch power, however still capable of manufacturing terribly high sound. The Piezo component should be a 3 terminal one, like within the image.

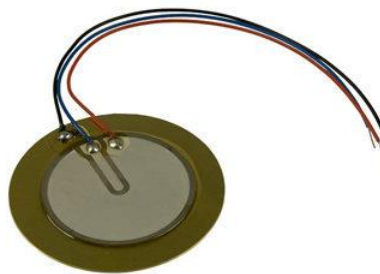


Fig: 4.13 Simple Piezo Buzzer image

The blue wire is connected to feedback(F) terminal, red wire to the most (M) terminal and also the black wire to the piezo element's ground(G) plate.

The inductance coil's worth and form isn't crucial. you'll use any coil from 1mH to 10mH or additional, or perhaps no measured worth the least bit. I used a forty flip coil on a little solid solution toroid within the final style.

4.7.3 Circuit diagram and construction

Let's have a look at the circuit diagram,

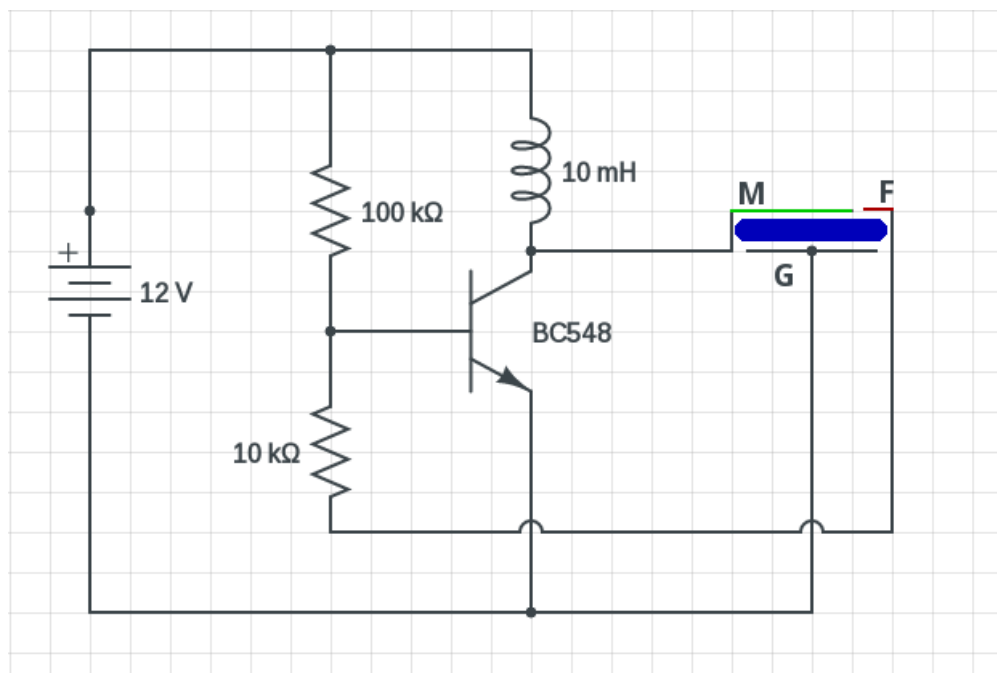


Fig: 4.14 Piezo Buzzer circuit diagram

Note the electricity element's pinout, M is that the main terminal, F is that the feedback terminal and G is that the ground plate.

The circuit is fairly straightforward, you'll be able to use a touch piece of strip board to create it. As this piezo buzzer circuit uses only a few parts, thus it conjointly might be created by fastening the parts to every different.

When A voltage is applied to the electrodes of the piezo component, they produces flex in either approach. This flex force bends the bottom plate up and down.

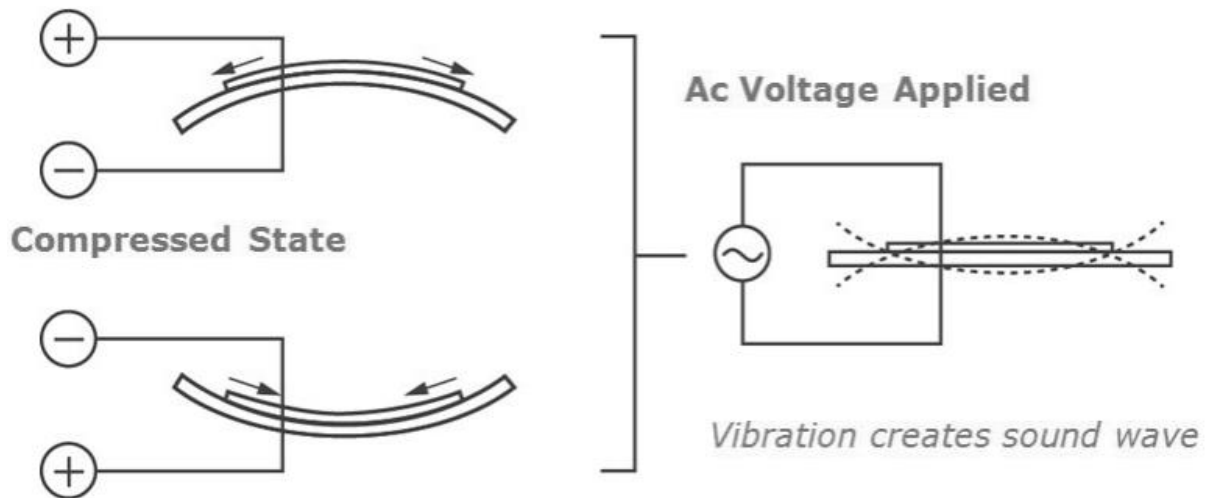


Fig: 4.15 Piezo Buzzer Working

The exact opposite factor happens too, once an electricity component is subjected to variable pressure, it produces voltage.

As you've seen before, car rental piezo buzzers square measure created with an additional electrically isolated feedback conductor. The voltage created by the flex force is out there within the feedback terminal.

The piezo buzzer is placed in a very resonant cavity, there is a hole within the opposite aspect of the resonant cavity from wherever the noisy sound comes out.

The driver circuit and piezo buzzer co-operates shortly between themselves and that they begin periodic on the resonant frequency of the piezo buzzer.

4.7.4 Piezo Buzzer Characteristics

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

4.7.5 STRUCTURE OF PIEZO BUZZER

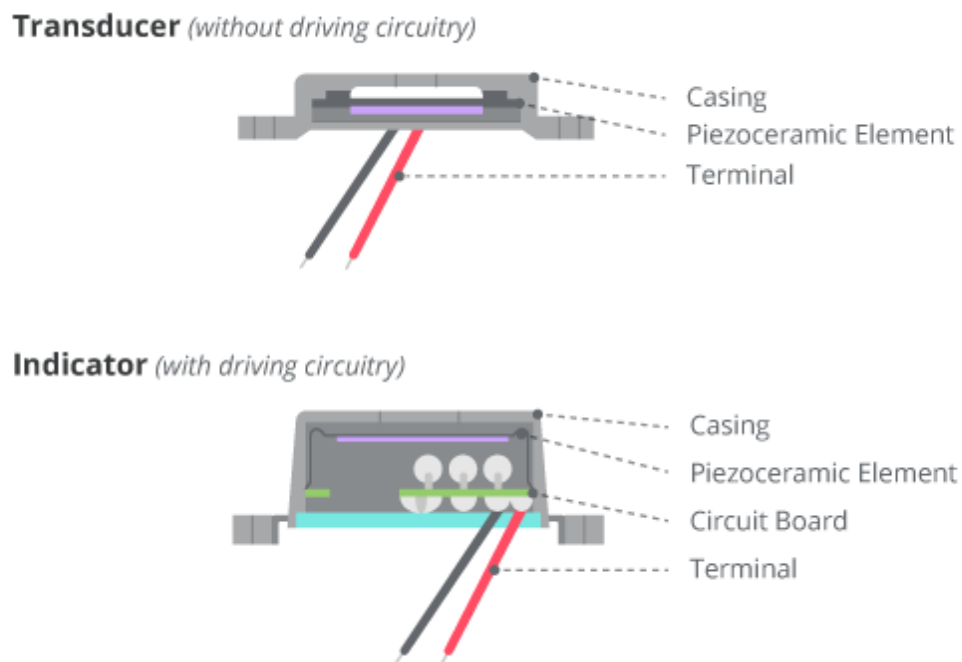


Fig: 4.16 STRUCTURE OF PIEZO BUZZER

There are 2 forms of piezo buzzers - transducers and indicators. Transducers contain a casing, a piezoceramic part and a terminal. So as to work an electrical device, the user should send a square wave signal to the buzzer. Indicators contain a casing, a

piezoceramic part, a card and a terminal. so as to work AN indicator, the user should send the buzzer a nominative dc voltage.

4.8 RELAY

A relay is an electrically operated switch. several relays use an electro magnet to automatically operate a switch, however different operational principles are used, like solid-state relays. Relays are used wherever it is necessary to manage a circuit by a separate low-power signal, or wherever many circuits should be controlled by one signal. the primary relays were utilized in long distance telegraph circuits as amplifiers: they recurrent the signal returning in from one circuit and re-transmitted it on another circuit. Relays were used extensively in phone exchanges and early computers to perform logical operations.

A type of relay that may handle the high power needed to directly management an electrical motor or different masses is named a contactor. Solid-state relays management power circuits with no moving components, instead employing a conductor to perform change. Relays with graduated operational characteristics and generally multiple operational coils ar accustomed shield electrical circuits from overload or faults; in fashionable electrical power systems these functions ar performed by digital instruments still referred to as "protective relays".

Magnetic latching relays need one pulse of coil power to maneuver their contacts in one direction, and another, redirected pulse to maneuver them back. recurrent pulses from an equivalent input don't have any impact. Magnetic latching relays are helpful in applications wherever interrupted power shouldn't be able to transition the contacts.



Fig: 4.17 RELAY MODULE

Magnetic latching relays will have either single or twin coils. On one coil device, the relay can operate in one direction once power is applied with one polarity, and can reset once the polarity is reversed. On a twin coil device, once polarized voltage is applied to the reset coil the contacts can transition. AC controlled magnetic latch relays have single coils that use steering diodes to differentiate between operate and reset commands.

4.8.1 BASIC DESIGN AND OPERATION

A simple magnetic attraction relay consists of a coil of wire wrapped around a soft iron core (a solenoid), Associate in Nursing iron yoke that provides an occasional reluctance path for magnetic flux, a movable iron coil, and one or additional sets of contacts (there are a unit 2 contacts within the relay pictured). The coil is hinged to the yoke and automatically connected to at least one or additional sets of moving contacts. The coil is control in situ by a spring so once the relay is de-energized there's Associate in Nursing air gap within the magnetic circuit. during this condition, one among the 2 sets of contacts within the relay pictured is closed, and therefore the alternative set is open. alternative relays might have additional or fewer sets of contacts looking on their perform. The relay within the image conjointly encompasses a wire connecting the coil to the yoke. This ensures continuity of the circuit between the moving contacts on the coil, and therefore the circuit track on the computer circuit board (PCB) via the yoke, that is soldered to the PCB.

When an electrical current is more experienced the coil it generates a field of force that activates the coil, and therefore the subsequent movement of the movable contact(s) either makes or breaks (depending upon construction) a reference to a set contact. If the set of contacts was closed once the relay was de-energized, then the movement opens the contacts and breaks the association, and the other way around if the contacts were open. once the present to the coil is shifted, the coil is came back by a force, about 0.5 as robust because the magnetism, to its relaxed position. Usually, this force is provided by a spring, however gravity is additionally used unremarkably in industrial motor starters. Most relays area unit factory-made to work quickly. in a very low-tension

application this reduces noise; in a very high voltage or current application it reduces arcing.

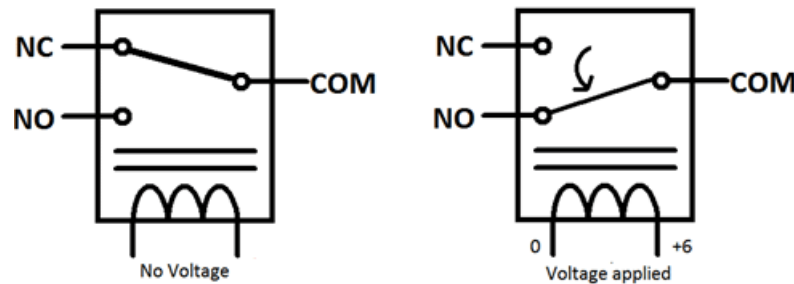


Fig: 4.18 SPDT Relay Working

When the coil is energized with electrical energy, a diode is usually placed across the coil to dissipate the energy from the collapsing field of force at deactivation, which might otherwise generate a voltage spike dangerous to semiconductor circuit elements. Such diodes weren't wide used before the appliance of transistors as relay drivers, however shortly became omnipresent as early chemical element transistors were simply destroyed by this surge. Some automotive relays embrace a diode within the relay case.

If the relay is driving an outsized, or particularly a reactive load, there could also be an identical drawback of surge currents round the relay output contacts. during this case a snubber circuit (a electrical device and electrical device in series) across the contacts might absorb the surge. appropriately rated capacitors and therefore the associated electrical device area unit oversubscribed as one prepacked element for this commonplace use.

4.8.2 Types of Relay

Coaxial relay

Where radio transmitters and receivers share one antenna, typically a coaxial relay is employed as a TR (transmit-receive) relay, that switches the antenna from the receiver to the transmitter. This protects the receiver from the high power of the transmitter.

Such relays are typically utilized in transceivers that mix transmitter and receiver in one unit. The relay contacts are designed to not replicate any frequency power back toward the supply, and to produce terribly high isolation between receiver and transmitter terminals. The characteristic ohmic resistance of the relay is matched to the cable ohmic resistance of the system, as an example, 50 ohms.

Contactor

A contactor could be a heavy relay with higher current ratings,[14] used for shift electrical motors and lighting hundreds. Continuous current ratings for common contactors vary from ten amps to many hundred amps. High-current contacts are created with alloys containing silver. The inevitable arcing causes the contacts to oxidize; but, silver compound continues to be an honest conductor.[15] Contactors with overload protection devices are typically accustomed begin motors.

Force-guided contact relay

A 'force-guided contacts relay' has relay contacts that are automatically coupled along, so once the relay coil is energized or de-energized, all of the coupled contacts move along. If one set of contacts within the relay becomes immobilized, no alternative contact of a similar relay are ready to move. The operate of force-guided contacts is to alter the security circuit to examine the standing of the relay. Force-guided contacts also are referred to as "positive-guided contacts", "captive contacts", "locked contacts", "mechanically coupled contacts", or "safety relays".

These safety relays have to be compelled to follow style rules and producing rules that are outlined in one main machinery normal nut 50205: Relays with forcibly target-hunting (mechanically linked) contacts. These rules for the security style are the one that are outlined in B standards like nut 13849-2 as Basic safety principles and tried safety principles for machinery that applies to any or all machines.

4.9 DC MOTOR

A DC motor is any of a category of rotary electrical machines that converts electrical energy electricity into energy. the foremost common sorts think about the forces made by magnetic fields. Nearly every type of DC motors have some internal mechanism,

either mechanical device or electronic, to sporadically modification the direction of current flow partly of the motor.

DC motors were the primary kind wide used, since they might be powered from existing direct-current lighting power distribution systems. A DC motor's speed are often controlled over a good vary, victimization either a variable offer voltage or by ever-changing the strength of current in its field windings. little DC motors square measure utilized in tools, toys, and appliances. The universal motor will care for electrical energy however may be a light-weight brushed motor used for moveable power tools and appliances. Larger DC motors square measure utilized in propulsion of electrical vehicles, elevator and hoists, or in drives for steel rolling mills. the appearance of power physics has created replacement of DC motors with AC motors potential in several applications.

4.9.1 WORKING of DC MOTOR

The DC motor could be a machine that transforms electrical energy into energy in variety of rotation. Its movement is created by the physical behavior of electromagnetism. DC motors have inductors within, that manufacture the field used to generate movement, however will this field changes if DC current is getting used

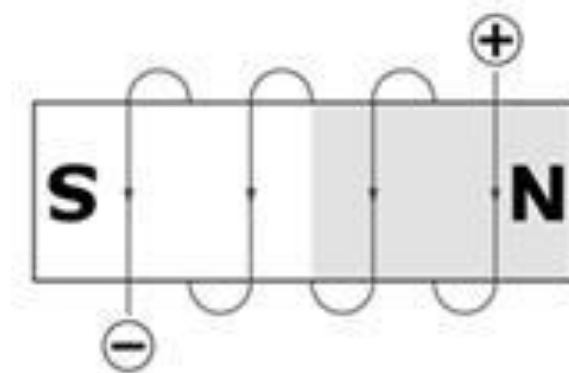


Fig: 4.19 DC motor circuit

An magnet, that could be a piece of iron wrapped with a wire coil that has voltage applied in its terminals. If 2 fastened magnets square measure other in either side of this magnet, the repulsive and enticing forces can manufacture a force.

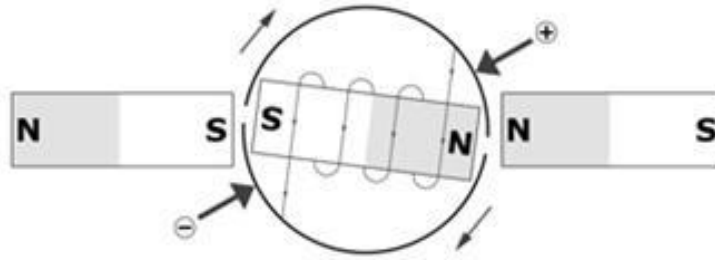


Fig: 4.20 DC motor working

Then, there square measure 2 issues to solve: feeding the present to the rotating magnet while not the wires obtaining twisted, and dynamical the direction of the present at the acceptable time. each of those issues square measure resolved victimisation 2 devices: a split-ring electric switch, and a try of brushes.

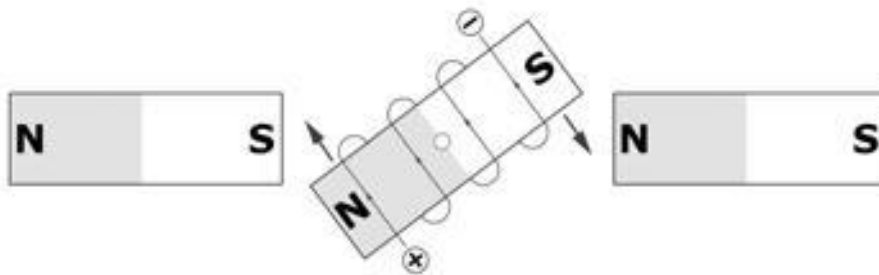


Fig: 4.21 DC motor working

As it are often seen, the electric switch has 2 segments that square measure connected to every terminal of the magnet, besides the 2 arrows square measure the brushes that apply current to the rotary magnet. In real DC motors it are often found 3 slots rather than 2 and 2 brushes.

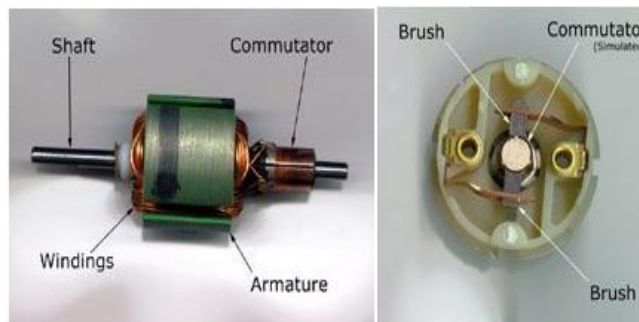


Fig: 4.22 DC motor images

This way, because the magnet is moving its polarity is dynamical and also the shaft might keep rotating. though it's easy and sounds that it'll work nice there square

measure some problems that build these motors energy inefficient and automatically unstable, the principal drawback is because of the temporal order between every polarity inversion.

Since polarity within the magnet is modified automatically, at some velocities polarity is dynamical ahead of time, that lead to reverse impulses and typically in dynamical too late, generating instant “stops” in rotation. regardless of the case, these problems manufacture current peaks and mechanical instability.

4.9.2 CONTROL OF DC MOTOR

DC motors have solely 2 terminals. If you apply a voltage to those terminals the motor can run, if you invert the terminals position the motor can amendment its direction. If the motor is running and you suddenly disconnect each terminals the motor can keep rotating however deceleration down till stopping. Finally, if the motor is running and you suddenly short-circuit each terminals the motor can stop. So there's not a 3rd wire to regulate a DC motor, however knowing the previous behaviors it is designed how to regulate it, and also the resolution is AN H-bridge.

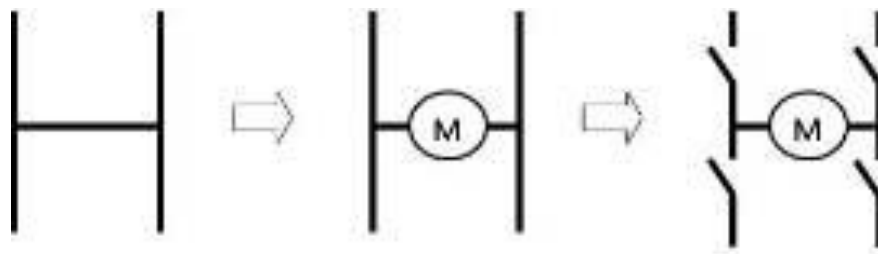


Fig: 4.23 Control of DC Motor

Look at the last evolution of the DC Motor on top of, you'll observe that there square measure four gates and a motor connected between them. this is often the best H-bridge, wherever the four gates represent for transistors. By manipulating these gates and connecting the higher and lower terminals to a voltage offer, you'll management the motor altogether the behaviors as below.

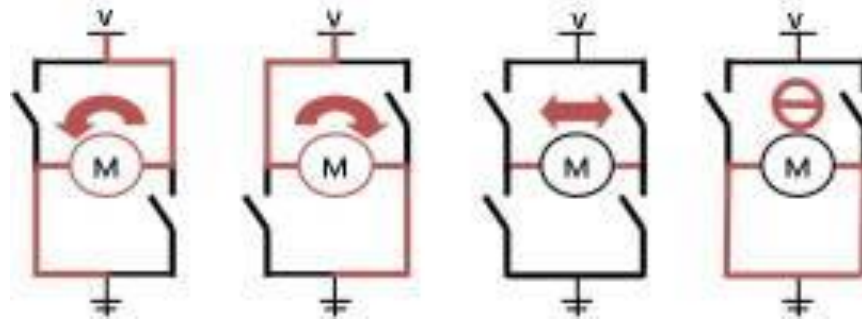


Fig: 4.24 Control and behaviors of DC Motor

4.9.3 Main Types of DC Motors

Understanding the various kinds of DC motors also will assist you perceive however they're used for various applications, and which sort could apply to your application.

There are four main kinds of DC motors:

1. Permanent Magnet DC Motors

The magnet motor uses a magnet to form field flux. this sort of DC motor provides nice beginning torsion and has smart speed regulation, however torsion is proscribed so that they are generally found on low HP applications.

2. Series DC Motors

In a series DC motor, the sphere is wound with a couple of turns of an outsized wire carrying the complete coil current. Typically, series DC motors produce an outsized quantity of beginning torsion, however cannot regulate speed and may even be broken by running with no load. These limitations mean that they're not an honest choice for variable speed drive applications.

3. Shunt DC Motors

In shunt DC motors the sphere is connected in parallel (shunt) with the coil windings. These motors provide nice speed regulation because of the actual fact that the shunt field will be excited one by one from the coil windings, that conjointly offers simplified reversing controls.

4. Compound DC Motors

Compound DC motors, like shunt DC motors, have a one by one excited shunt field. Compound DC motors have smart beginning torsion however could expertise management issues in variable speed drive applications.

4.10 ARDUINO IDE

Arduino is associate ASCII text file platform used for building physics comes. Arduino consists of each a physical programmable printed circuit (often stated as a microcontroller) and a bit of software system, or IDE (Integrated Development Environment) that runs on your laptop, accustomed write and transfer coding system to the physical board.

The Arduino platform has become quite popular individuals simply beginning out with physics, and permanently reason. not like most previous programmable circuit boards, the Arduino doesn't would like a separate piece of hardware (called a programmer) so as to load new code onto the board – you'll merely use a USB cable. in addition, the Arduino IDE uses a simplified version of C++, creating it easier to find out to program. Finally, Arduino provides a regular kind issue that breaks out the functions of the micro-controller into a a lot of accessible package.

The Arduino hardware and software system was designed for artists, designers, hobbyists, hackers, newbies, and anyone curious about making interactive objects or environments. Arduino will act with buttons, LEDs, motors, speakers, GPS units, cameras, the web, and even your smart-phone or your TV! This flexibility combined with the actual fact that the Arduino software system is free, the hardware boards are pretty low-cost, and each the software system and hardware are straightforward to find out has crystal rectifier to an outsized community of users World Health Organization have contributed code and discharged directions for a large style of Arduino-based comes.

There are many sorts of Arduino boards (explained on successive page) which will be used for various functions. Some boards look a small amount completely different from the one below, however most Arduinos have the bulk of those parts in common:



Fig: 4.25 Arduino Software

Programs written within the Arduino software system (IDE) are referred to as sketches. These sketches are written within the text editor and are saved with the file extension .ino. The editor has options for cutting/pasting and for searching/replacing text. The message space provides feedback whereas saving and compilation jointly displays errors. The console displays text output by the Arduino software system (IDE), together with complete error messages and different data. The righthand corner of the window displays the designed board and interface. The toolbar buttons enable you to verify and transfer programs, create, open, and save sketches, and open the serial monitor. The Arduino IDE is implausibly minimalistic, nevertheless it provides a near-complete surroundings for many Arduino-based projects. The highest menu bar has the quality choices, together with "File" (new, load save, etc.), "Edit" (font, copy, paste, etc.), "Sketch" (for collection and programming), "Tools" (useful choices for testing projects), and "Help". The center section of the IDE may be a straightforward text editor that is where you'll enter the program code. A very small section of the IDE is devoted to an output window that's accustomed to see the standing of the compilation, what proportion memory has been used, any errors that were found within the program, and numerous different helpful messages.

Projects created within the Arduino are referred to as sketches, and such sketches are sometimes written in an exceedingly cut-down version of C++ (a variety

of C++ options aren't included). as a result of programming a microcontroller is somewhat completely different from programming a laptop, there are variety of device-specific libraries (e.g., ever-changing pin modes, output knowledge on pins, reading analog values, and timers). This generally confuses users World Health Organization assume Arduino is programmed in associate “Arduino language.” However, the Arduino is, in fact, programmed in C++. It simply uses distinctive libraries for the device.



Fig: 4.26 Arduino IDE basic program

The Arduino IDE supports the languages C and C++ victimisation special rules of code structuring. The Arduino IDE provides a software system library from the Wiring project, that provides several common input and output procedures. User-written code solely needs 2 basic functions, for beginning the sketch and therefore the main program loop, that ar compiled associated coupled with a program stub main() into an possible cyclic computer programme with the antelope toolchain, conjointly enclosed with the IDE distribution. The Arduino IDE employs the program avrdude to convert the possible code into a document in positional notation cryptography that's loaded into the Arduino board by a loader program within the board's computer code.

4.11 EMBEDDED C

Embedded C is most well liked programming language in software system field for developing electronic gadgets. every processor utilized in electronic system is related to embedded software system.

Embedded C programming plays a key role in playing specific perform by the processor. In regular life we have a tendency to used several electronic devices like portable, washer, photographic camera, etc. These all device operating relies on microcontroller that are programmed by embedded C.

The Embedded C code written in higher than diagram is employed for blinking the diode connected with Port0 of microcontroller.

In embedded system programming C code is most well-liked over alternative language. because of the subsequent reasons:

- Easy to understand
- High Reliability
- Portability
- Scalability

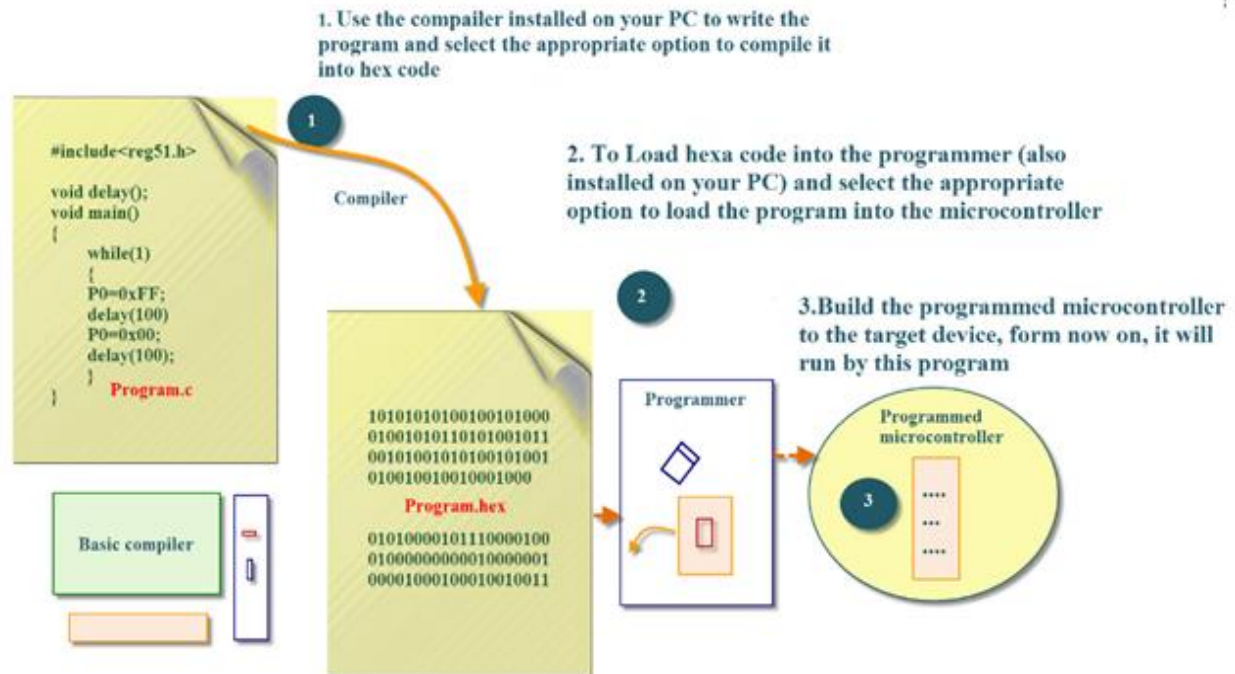


Fig: 4.27 Conversion of program to microcontroller

Function may be a assortment of statements that's used for performing arts a selected task and a set of 1 or a lot of functions is termed a artificial language.

Most shoppers square measure accustomed to application package that offer practicality on a pc. Embedded package but is commonly less visible, however no simpler. not like application package, embedded package has fastened hardware needs and capabilities, and addition of third-party hardware or package is strictly controlled. Embedded package has to embody all required device drivers at producing time, and therefore the device drivers square measure written for the particular hardware. The package is very keen about the mainframe and specific chips chosen. Most embedded package engineers have a minimum of a passing data of reading schematics, and reading knowledge sheets for elements to see usage of registers and communication system. Conversion between decimal, hex and binary is beneficial further as victimization bit manipulation.

Web applications square measure seldom used, though XML files and different output could also be passed to a pc for show. File systems with folders square measure usually absent as square measure SQL databases.

Software development needs use of a cross compiler, that runs on a pc however produces feasible code for the target device. Debugging needs use of AN in-circuit aper, JTAG or SWD. package developers typically have access to the entire kernel (OS) source code.

Size of the storage memory and RAM can vary significantly. Some of the systems run in 16 KB of Flash and 4 KB of RAM with a CPU operating at 8 MHz, other systems may rival contemporary computers.[8] These space requirements lead to more work being done in C or embedded C++, instead of C++. Interpreted languages like BASIC (while e.g. Parallax Propeller can use compiled BASIC) and Java (Java ME Embedded 8.3[9] is available for example., ARM Cortex-M4, Cortex-M7 microcontrollers and older ARM11 used in Raspberry Pi and Intel Galileo Gen. 2) are not likely used; while an implementation of the interpreted Python 3 language – Micro Python – is however available expressly for microcontroller use, e.g. 32-bit ARM-based (such as BBC micro: bit) and 16-bit PIC microcontrollers.

Communications between processors other components are essential. Besides direct memory addressing, common protocols include I²C, SPI, serial ports, and USB.

Communications protocols designed for use in embedded systems are available as closed source from companies including Inter Niche Technologies and CMX Systems. Open-source protocols stem from uIP, lwip, and others

- This program explains how to use structure within structure in C using normal variable. “student_college_detail” structure is declared inside “student detail” structure in this program. Both structure variables Please note that members of “student_college_detail” structure are accessed by 2 dot(.) operator and members of “student are normal structure variables.
- _detail” structure are accessed by single dot(.) operator.

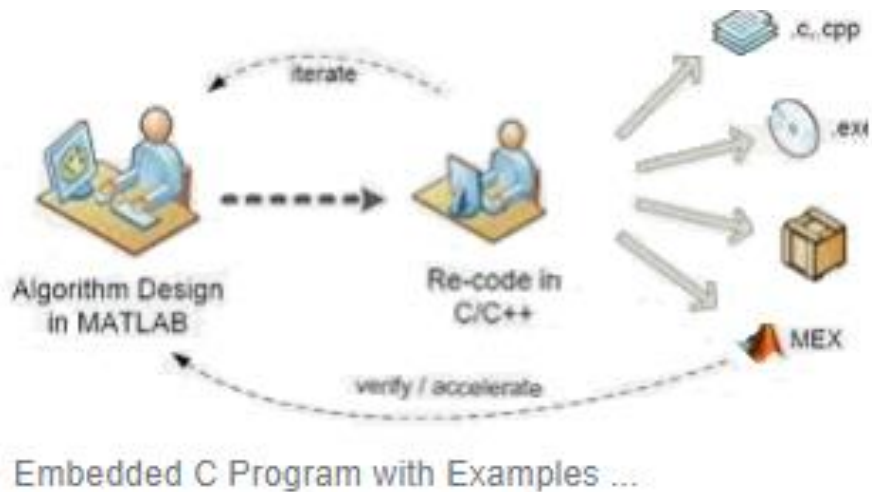


Fig: 4.28 Embedded C Program with Example

A Keyword is a special word with a special meaning to the compiler (a C Compiler for example, is a software that is used to convert program written in C to Machine Code). For example, if we take the Keil's Cx51 Compiler (a popular C Compiler for 8051 based Microcontrollers) the following are some of the keywords:

- bit
- sbit
- sfr
- small
- large

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

CHAPTER-5

RESULT AND PERFORMANCE ANALYSIS

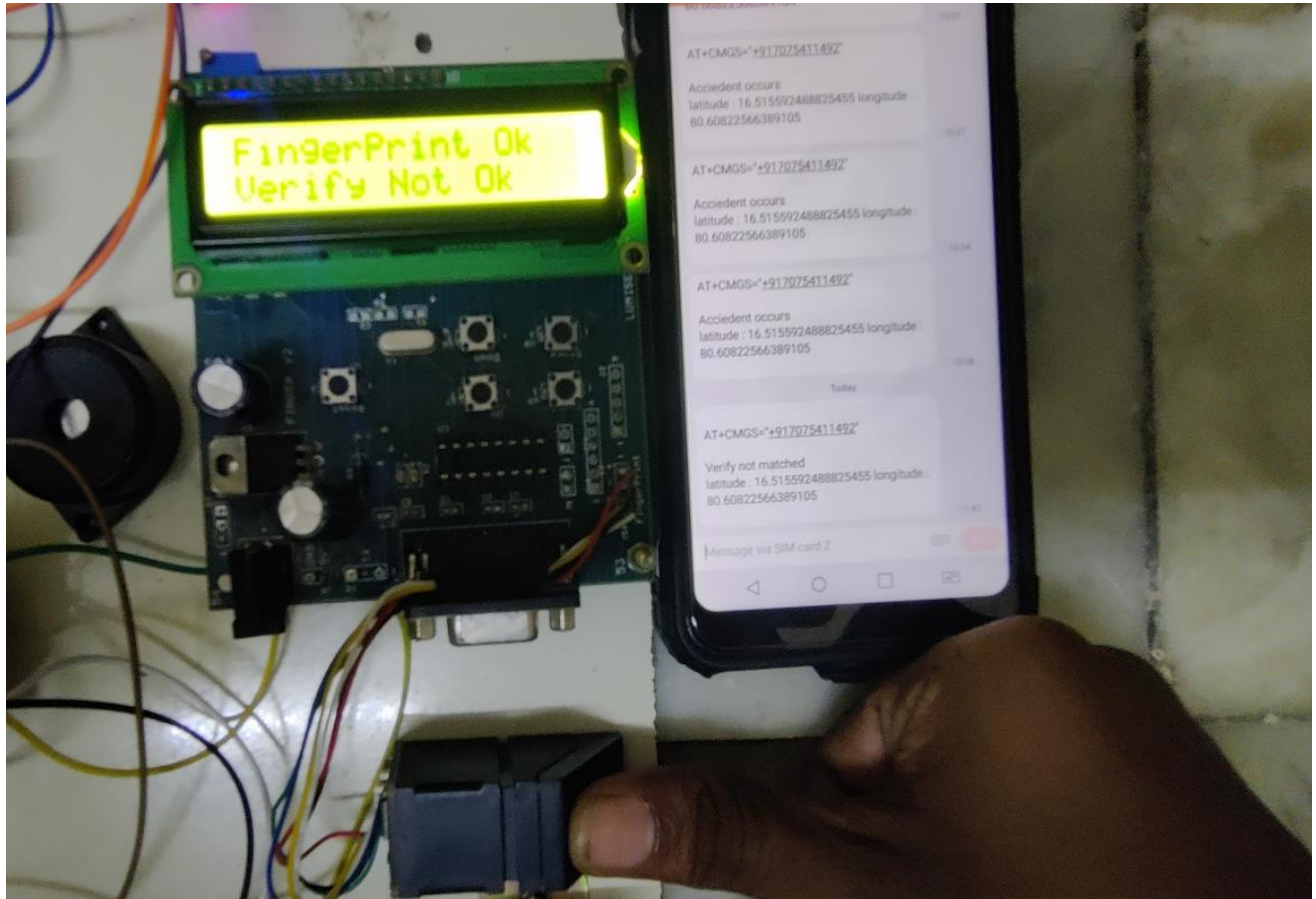


Fig: 5.1 Finger Print Sensor not matched



Fig: 5.2 Finger Print Sensor matched



Fig: 5.3 Notification of Accident by vibration sensor



Fig: 5.4 Notification of Accident by mems sensor

This project is used to provide security to vehicle and safety to the person who is driving the car . To start a car, finger print of that person has to match, if the finger print does not matching an intimation message sent to the owner of that car with location is shown in fig:5.1. If finger print matches then intimation message sent to the user is shown in fig:5.2 and car engine gets started. If any accident happens then according to the nature of the accident, the signal from the vibration or mems sensor will be sent to the aurdino as shown in fig: 5.3 & fig: 5.4.

CHAPTER- 6

CONCLUSION

In our country, many of people have lost their life by accidents, because of causalities or improper communication. So, an automatic vehicle accident and theft detection system are implemented. By, using this system we can reduce death due to accidents and we can take immediate action after the accident. Also, it is used in the theft detection. A fingerprint recognition system, vibration sensor and mems sensor are used in this project. GSM module is used to transfer information about the vehicle theft to the owner. GPS technology is implemented to restrict the vehicle within the particular area by the owner. The system can be used for track and monitor the vehicle by the owner at anytime from anywhere. Thus, techniques presented in this project provide high security and dependability to the vehicle. The scope of the proposed methodology lies in achieving a faster and efficient vehicle security system. The demand for auto-guard systems for protecting the vehicle from theft and loss is increasing day by day. The proposed system will be an intellectual system to meet this demand.

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Vehicle theft alert and engine lock system using Gsm & Gps

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