

ANALYSIS OF AN EFFICIENT WOMEN SAFETY SYSTEM USING NERVE SIMULATOR

Submitted in partial fulfillment of the necessities for the award of Bachelor of
Engineering degree in Electronics and Communication Engineering.

By

KRITHIKA M (Register No. 38130113)

C.J. LITTLE ANGELA (Register No.38130114)



**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING**

SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with Grade "A" by NAAC

JEPPIAR NAGAR, RAJIV GANDHI SALAI, CHENNAI -600119

MAY-2022



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

Accredited "A" Grade by NAAC | 12B Status by UGC | Approved by AICTE

www.sathyabama.ac.in

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BONAFIDE CERTIFICATE

This is often to certify that this Project Report is that the bonafide work of KRITHIKA M (38130113) And C.J.LITTLE ANGELA (38130114) who applied the project entitled ANALYSIS OF AN EFFICIENT WOMEN SAFETY SYSTEM USING NERVE SIMULATOR under my /our supervision from December 2021 to April 2022

Internal Guide

Dr.Mathan N., M.Tech.,Ph.D

Assistant Professor

Head of the Department

Dr. T. RAVI, M.E., Ph.D.,

Submitted for viva voce examination held on **07.05.2022**

Internal Examiner

External Examiner

DECLARATION

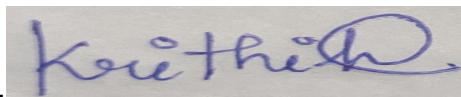
We KRITHIKA M (38130113) And C.J.LITTLE ANGELA (38130114) hereby declare that the Project Report entitled **ANALYSIS OF AN EFFICIENT WOMEN SAFETY SYSTEM USING NERVE SIMULATOR** done by us under the guidance of **Dr.Mathan N.,M.Tech.,Ph.D Assistant Proffessor** is submitted in partial fulfillment of the wants for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

DATE: 07.05.2022

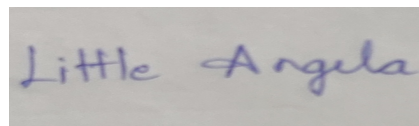
PLACE: CHENNAI

SIGNATURE OF THE CANDIDATE

1.

Handwritten signature of Krithika M in blue ink.

2.

Handwritten signature of Little Angela in blue ink.

ACKNOWLEDGEMENT

We are pleased to acknowledge our sincere due to Board of Management of **SATHYABAMA** for his or her kind encouragement in doing this project and for completing it successfully. I'm grateful to them.

We convey our thanks to **Dr. N.M. Nanthitha, Dean, School of Electrical and Electronics Engineering** and **Dr. T. Ravi, Head of the Department, Department of Electronics and Communication Engineering** for providing me necessary support and details at the proper time during the progressive reviews.

We would prefer to express our sincere and deep sense of gratitude to my Project Guide **Dr.Mathan N.,M.Tech.,Ph.D Assistant Proffessor** for his valuable guidance, suggestions and constant encouragement paved way for the successful completion of my project work.

We wish to specific our thanks to all Teaching and Non-teaching staff members of the Department of Department of Electronics and Communication Engineering who were helpful in some ways for the completion of the project.

ABSTRACT

Ensuring women's safety in smart cities is a need of the hour. Even though several legal and technological steps are adopted worldwide, women's safety continues to be an international concern Criminal records are maintained by law enforcement agencies and are most often not available to the public in an easily comprehensible form. While some wearable devices and mobile

applications are available which are touted to aid in ensuring women's safety, they utilize limited societal intervention and are not very efficient in ensuring the safety of the women as and when required. This work applies the Geographic Positioning System (GPS) for the identification of location of women and it intimates to the nearer police stations and alert the public by using buzzer. The nerve stimulator generates an electric shock pulses which helps to safe guard from criminals.

TABLE OF CONTENTS

CHAPTER NO

TITLE

ABSTRACT
LIST OF
FIGURES
LIST OF TABLES

1.	CHAPTER 1 : INTRODUCTION	1
	1.1 GENERAL	1
	1.2 SCOPE OF THE PROJECT	1
	1.3 EXISTING SYSTEM	1
	1.3.1 EXISTING SYSTEM DISADVANTAGE	1
	1.4 LITERATURE SURVEY	2
	1.5 PROPOSED SYSTEM	5
	1.5.1 PROPOSED SYSTEM ADVANTAGES	5
2.	CHAPTER 2 :PROJECT DESCRIPTION	5
	2.1 GENERAL	5
	2.2 BLOCK DIAGRAM	5
	2.3 MODULES NAME	6
	2.4 MODULE DESCRIPTION	6
	2.4.1 ALERT THROUGH PUSHBUTTON	6
	2.4.2 ALERT BY MESSAGE OR CALL	7
	2.4.3 ALERT FOR POLICE STATION	8
	2.4.4 IOT MODULE FOR WEBPAGE ACCESS AND GPS	8
	2.5 BLOCK DIAGRAM DESCRIPTION	9

3.	CHAPTER 3: HARDWARE AND SOFTWARE DESCRIPTION	9
	3.1 HARDWARE DESCRIPTION	9
	3.1.1 ARDUINO	9
	3.1.1.1 ARDUINO MEGA	10
	3.1.1.2 ADUINO UNO	13
	3.1.2 POWER SUPPLY	15
	3.1.3 GSM	16
	3.1.4 GPS	19
	3.1.5 BUZZER	22
	3.1.6 LCD	23
	3.1.7 ZIGBEE	26
	3.1.8 NERVE STIMULATOR	26
	3.1.9 PUSH BUTTON	27
	3.2 SOFTWARE DESCRIPTION	28
	3.2.1 EMBEDDED C	28
	3.2.2 ARDUINO SOFTWARE IDE	31
4.	CHAPTER 4: OUTPUT	33
	4.1 OUTPUT	33
5.	CHAPTER 5: CONCLUSION	35
	5.1 APPLICATIONS	35
	5.2 FUTURE ENHANCEMENTS	35
	5.3 ADVANTAGES	35
	5.4 CONCLUSION	35

LIST OF FIGURES

FIGURE NO	NAME OF THE FIGURE	PAGE NUMBER
2.2	Block Diagram	5
2.4.1	Alert through push button	6
2.4.2	Alert message or call	7
2.4.3	Alert for police station	8
2.4.4	IOT Module for webpage access	8
3.1	Arduino Mega	10
3.2	Ultrasonic sensor code	12
3.3	Arduino mega 2560 pin diagram	13
3.4	Arduino UNO	13
3.5	Atmega 168 pin mapping	15

FIGURE NO	NAME OF THE FIGURE	PAGE NUMBER
3.6	Power supply	16
3.7	GSM module	17

3.8	SIM Connections	18
3.9	GPS	19
3.10	Space segment	20
3.11	Control segment	21
3.12	User segment	21
3.13	Active passive buzzer	22
3.14	LCD	24
3.15	LCD Pinout diagram	24
3.16	Nerve stimulator	27
3.17	Push button	27
3.18	Block diagram of Embedded system	29
3.19	Embedded C programming development	29
3.20	Embedded C programming steps	30
3.21	Basic structure of Embedded system	30
3.22	Arduino software IDE	32
4.1	LCD Display of the system	34
4.2	SMS Alert	34
4.3	Hardware Connections	34

LIST OF TABLES

S.NO	TABLE NO.	DESCRIPTION	PAGE NUMBER
1	3.1	Technical specification of Arduino mega	11
2	3.2	Technical specification of Arduino UNO	14
3	3.3	VBAT Pin description	17
4	3.4	SIM Pin description	18
5	3.5	Buzzer pin configuration	23
6	3.6	LCD Pin no table	24

CHAPTER: 1- INTRODUCTION

1.1 GENERAL

This paper focuses on a security system that is designed merely to serve the purpose of providing security to women so that they never feel helpless while facing such social challenges. An advanced system can be built that can detect the location and health condition of person that will enable us to take action accordingly based on electronic gadgets like GPS receiver, body temperature sensor, GSM, Pulse rate sensor. We can make use of number of sensors to precisely detect the real time situation of the women in critical abusive situations. The heartbeat of a person in such situations is normally higher which helps make decisions along with other sensors like motion sensors to detect the abnormal motion of the women while she is victimized. The idea to develop a smart device for women is that it's completely comfortable and easy to use as compared with already existing women security solutions such as a separate garment, bulky belts and infamous mobile apps that are just very abstract and obsolete.

1.2 SCOPE OF THE PROJECT:

The aim of our project is to ensure women safety through designing a safety device that will reduce the delay in the current system. This system also ensures the women's safety through an alert system.

1.3 EXISTING SYSTEM

In Existing method, the women safety system has delay. So that it takes time for the help to arrive to the particular location and there is no defending measure to compensate the delay as it is a Single alert system.

1.3.1 EXISTING SYSTEM DISADVANTAGE

- Single alert system leads to lesser communication
- Slow response

1.4 LITERATURE SURVEY

Title 1: Smart Intelligent System for Women and Child Security.

Authors: Prof. Sunil K Punjabi, Prof. Suvarna Chaure, Prof. Ujwala Ravale, Prof. Deepti Reddy

Year: 2018

Description:

This paper surveys about the security system for women and children which allows immediate responses in any harassment in public places, societies etc. Women all over the world are facing unethical physical harassment and Children cannot be left unattended at a social event or outside the home. Our project solves both the problems. A portable device which will have a pressure switch. As soon as an assailant is about to attack the women/child or when they sense any insecurity from a stranger, he/she can then put pressure on the device by squeezing or compressing it. Instantly the pressure sensor senses this pressure and a conventional SMS, with the victim's location will be sent to their parents/guardians cell phone numbers stored in the device while purchasing it, followed by a call. If the call is unanswered for a prolonged time, a call will be redirected to the police and the same message will be sent. The main feature of our system is less response time will be required for helping the victim.

Title 2: A Switch Triggered Rescue Assistance System for Safety of Women

Authors: Madhura Mahajan, KTV Reddy, Manita Rajput

Year: 2018

Description:

In recent years, acts of assault and violence against women are rising at a menacing rate. The exponential increase in assault, violence and attacks against women in the past few years, is posing a threat to the growth and development of women. Defence is not the only measure that can suffice against this increasing abuse. A security solution that creates a sense of safety among women needs to be devised. In instances of attack, it is largely reported that women are immobilized. There is thus, a need of simpler safety solution that can be activated simply by pressing a switch and can instantly send out alerts to the near ones of the victim. In this paper we have designed

and implemented such a system in the form of a partial wearable and partial portable system.

Title 3: The Personal Stun- a Smart Device for Women's Safety.

Authors: Shivani Ahir, Smit Kapadia, Prof. Jigar Chauhan, Prof. Nidhi Sanghavi

Year: 2018

Description:

Women security is need of the hour now-a-days. In India, there are many cases of women harassment and molestation. Safety of women matters let be whether at home, outdoor or it be their work place. The literature surveyed shows that there are many mobile applications that are used for women safety purpose. One recent research study shows that there is a footwear chip which is sticked to the footwear that gets activated when the person taps one leg behind the other 4 times. We focus on developing a prototype that is a smart band which gets activated by tapping on the screen twice.

There is a pulse rate sensor embedded in the device that senses the pulse rate of the person and a temperature sensor that senses body temperature of the person. The band when thrown with force the force sensor will get activated and sends the current location of the victim. A Piezo buzzer siren will get activated after 1-2 mins of the actual device getting turned on. The range of the buzzer is of 80-110 dB which can be heard from a distance of 50 feet long. An electric shock circuit is designed that emits electric current. On the top of the band screen there are two metal points that generates the shock when the two metal points come in contact with any surface or anybody. The device supports a micro usb charging. A smart application will be developed on the android platform which is connected with the device via bluetooth interface that shows the sensed data of the subject to the ICE contacts. Until the device is turned off it will send the location on the interval of 5 mins and will keep on beeping continuously.

Title 4: An Innovative Approach for Women and Children's Security Based Location Tracking System

Authors: Dr.Velayutham.R, Sabari.M, Sorna Rajeswari.M,

Year: 2016

Description:

Now-a-days children and women are facing many security related problems. In such situations, they are helpless and don't have any way to protect them or inform it to their family members, neighbours or police station and they feel as handicaps. Hence there should be a system to protect them in such times. So this system helps them to seek help in any critical situation. For that, the system contains GPS to detect location and GSM mechanisms to pass their current location to any one of the trusted contacts as a google map link and services are provided to track the locations from that moment onwards to save the person.

Title 5: Prototype of an Intelligent System based on RFID and GPS Technologies for Women Safety

Authors: Shaik Mazhar Hussain, Shaikh Azeemuddin Nizamuddin, Rolito Asuncion, Chandrashekar Ramaiah, Ajay Vikram Singh

Year: 2016

Description:

Security for women has become a major issue in most of the countries. Survey results shows that every year around 25000 crime against women were booked across India. From the last ten years, the statistics among women abusement, sexual harassment have been steadily increasing. It has become mandatory to come up with a solution to protect the women from being a victim and to reduce the attacks. The main objective of this paper is to design and implement a highly reliable system for protecting women from being harassed. In this paper, we have developed an intelligent women safety system using Radio Frequency Identification (RFID) and Global positioning system (GPS). The main idea here is using a active RFID tag with passive RFID reader to scan the information and this information is transferred to the AT89C52 microcontroller where in the contacts of around 4 to 5 people is stored in the data base. Once the information is received by the controller, it sends the message to the contacts

through GSM module and the location is tracked through the GPS. The simulation is done in ISIS proteus.

1.5 PROPOSED SYSTEM

In this proposed system, the emergency alert system where the delay in the existing system is reduced and there will be a defending device (Nerve stimulator) to defend till the help arrives. This devices sends several alert to the nearby devices so that the help can arrive at the earliest. This system also sends the live location of the person who requires help. Zigbee used in this system to send alert system as it works in broadcasting met.

1.5.1 PROPOSED SYSTEM ADVANTAGES

1. In Proposed method, the safety measures are improved by adding multiple alert systems.
2. Live tracking of location is possible.

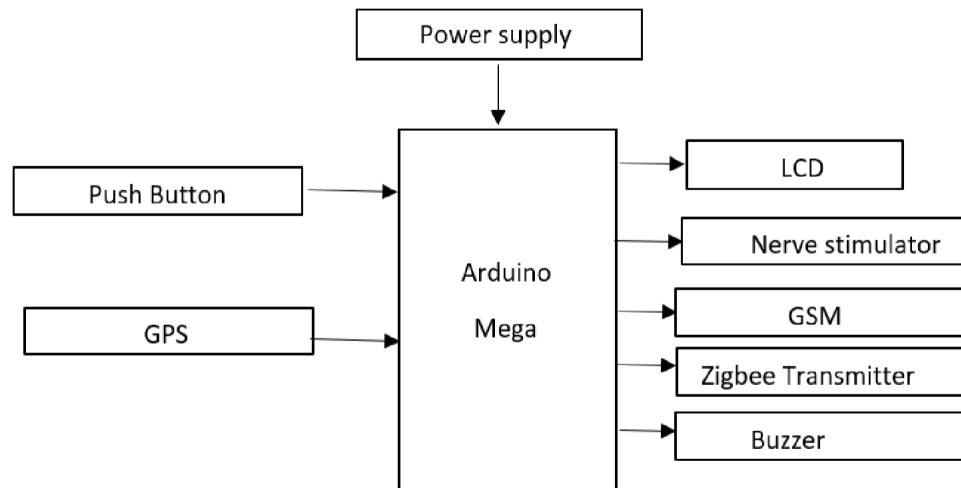
CHAPTER: 2 - PROJECT DESCRIPTION

2.1 GENERAL

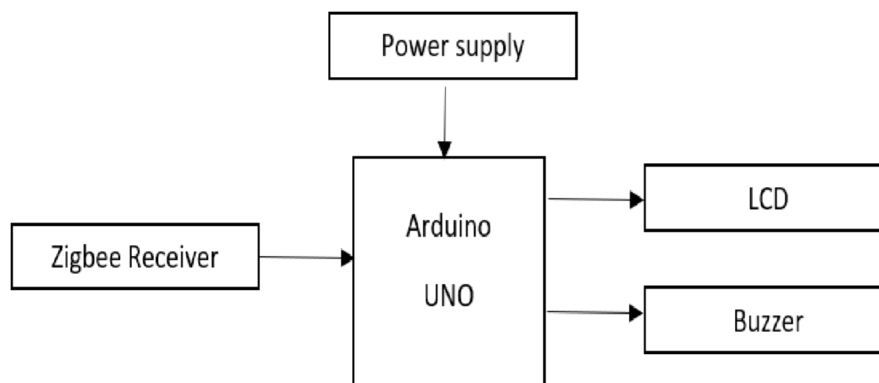
In this project, we increase the women's security by using nerve simulator and other components. This method of women safety helps the women to safe guard themselves from attackers and also attack the enemies using electrical shock generated by nerve stimulator.

2.2 BLOCK DIAGRAM

TRANSMITTER SECTION



RECIEVER SECTION

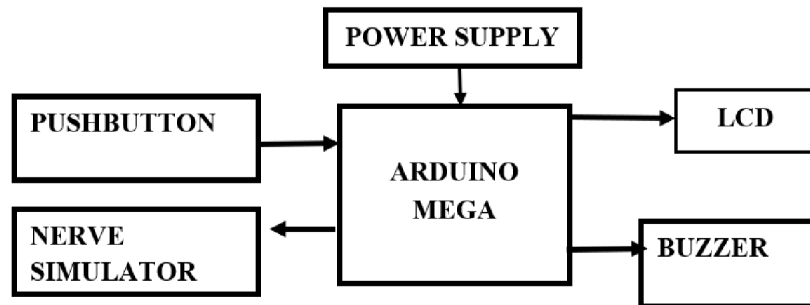


2.3 MODULES NAME

- † Alert through push button
- † Alert message or call
- † Alert for police station
- † IOT Module for Internet access and GPS

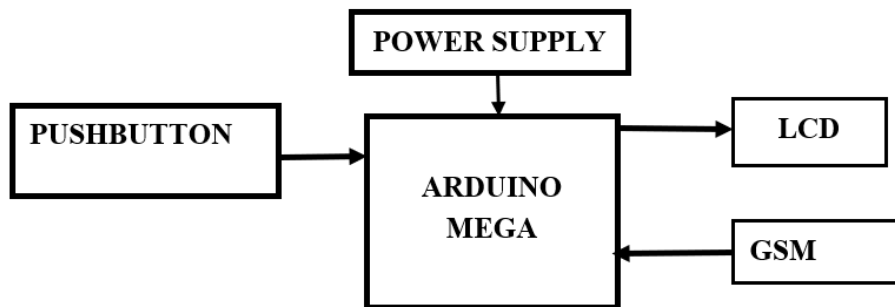
2.4 MODULE DESCRIPTION

2.4.1 ALERT THROUGH PUSHBUTTON



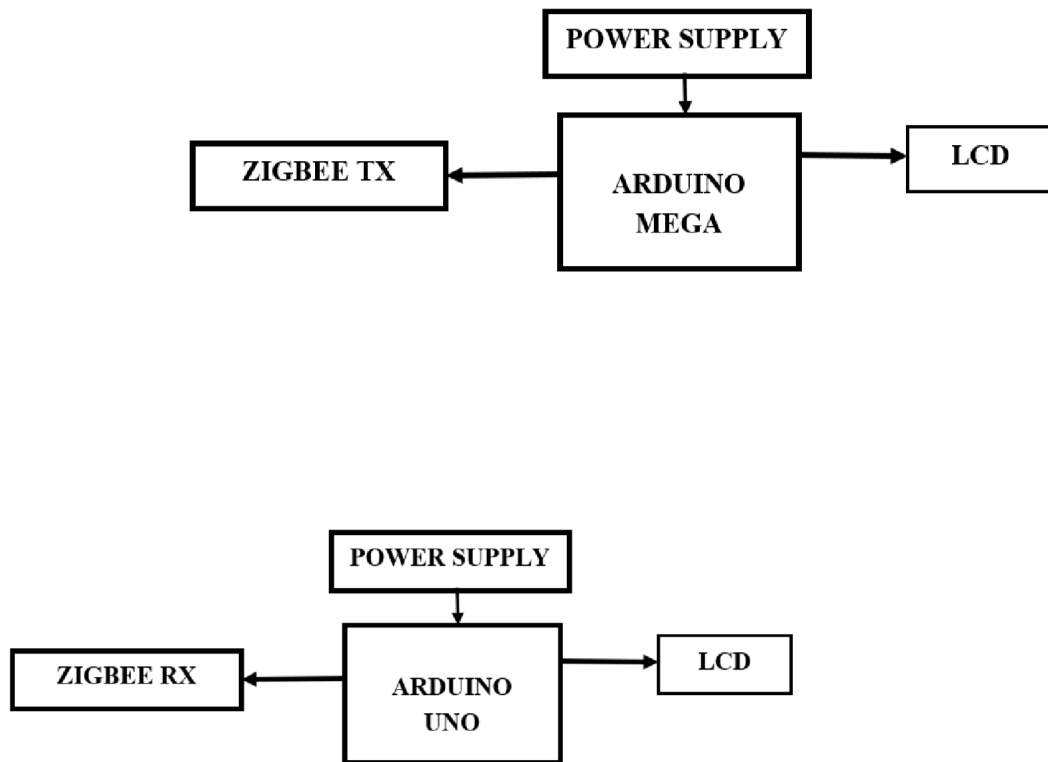
In this mode LCD and PUSHBUTTON is interfaced with arduino UNO. By interfacing Buzzer with arduino we can alert to the nearby people. If anybody touch the system the interfaced nerve simulator give shock to the person who touch.

2.4.2 ALERT MESSAGE OR CALL



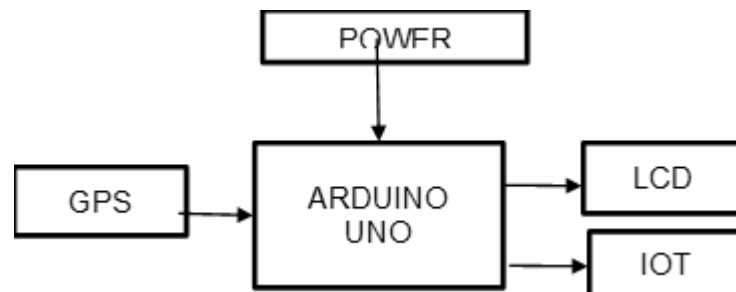
When pressing the pushbutton the system sends the alert message to the mobile, who links number with the gsm. The lcd is interface with arduino . To interface LCD to the Arduino we need Liquid crystal library. The LCD module is use liquid crystal to print visible text on display. 16×2 LCD comes with 16 columns and 2 rows hence it's called as 16×2 LCD Module.

2.4.3 ALERT FOR POLICE STATION



When the pushbutton is activated, the zigbee transmitter on a transmitting side sends data to the receiving side. In the receiving side, there is a zigbee receiver which can receive data and alert the police station. The alert message can be displayed on the LCD.

2.4.4 IOT MODULE FOR WEBPAGE ACCESS AND GPS



The internet of things (IoT) is the network of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, actuators, and network

connectivity that enable these objects to collect and exchange data. And by use of gps we can locate the place and it update on iot. In application, we can use multiple devices, by IOT we can monitor the locations on web page and take action accordingly.

2.5 BLOCK DIAGRAM DESCRIPTION AND WORKING

The Arduino MEGA microcontroller is used in this proposed method. The LCD is used to display the current execution process. The push button is used as an emergency switch. The nerve stimulator is used to provide the electrical shock pulses. The GSM is used to send the alert message or call. The GPS is used to provide the Location of the device. The zigbee is used to transmit the emergency data to the nearby rescue teams. The Arduino UNO is used in the receiver section. The buzzer is used to provide the audio alert.

CHAPTER: 3 – HARDWARE AND SOFTWARE DESCRIPTION

3.1 HARDWARE DESCRIPTION:

3.1.1 ARDUINO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. [Arduino boards](#) are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board.

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this opensource platform, their contributions have added up to an incredible amount of [accessible knowledge](#) that can be of great help to novices and experts alike. Arduino was born at the Ivrea Interaction Design Institute as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. As soon as it reached a wider community, the Arduino board started changing to adapt to new needs and challenges, differentiating its offer from simple 8-bit boards to products for IoT applications, wearable, 3D printing, and embedded environments.

All Arduino boards are completely open-source, empowering users to build them independently and eventually adapt them to their particular needs. The [software](#), too, is open-source, and it is growing through the contributions of users worldwide.

3.1.1.1 ARDUINO MEGA

The MEGA 2560 is designed for more complex projects. With 54 digital I/O pins, 16 analog inputs and a larger space for your sketch it is the recommended board for 3D printers and robotics projects. This gives your projects plenty of room and opportunities.

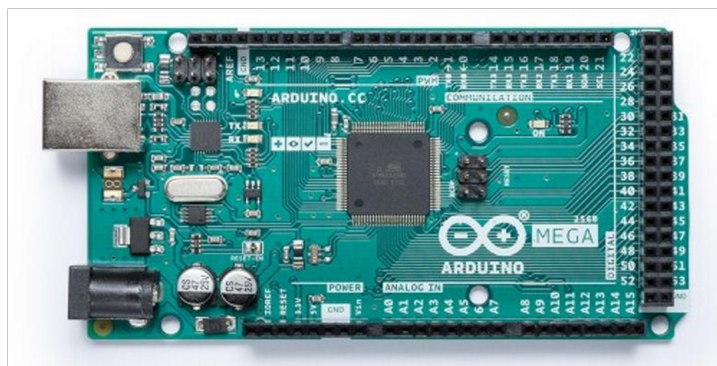


Fig 3.1 Arduino Mega

The **Arduino Mega 2560** is a microcontroller board based on the [ATmega2560](#). It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection,

a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Mega 2560 board is compatible with most shields designed for the Uno and the former boards Duemilanove or Diecimila.

TECHNICAL SPECIFICATIONS:

Table 3.1

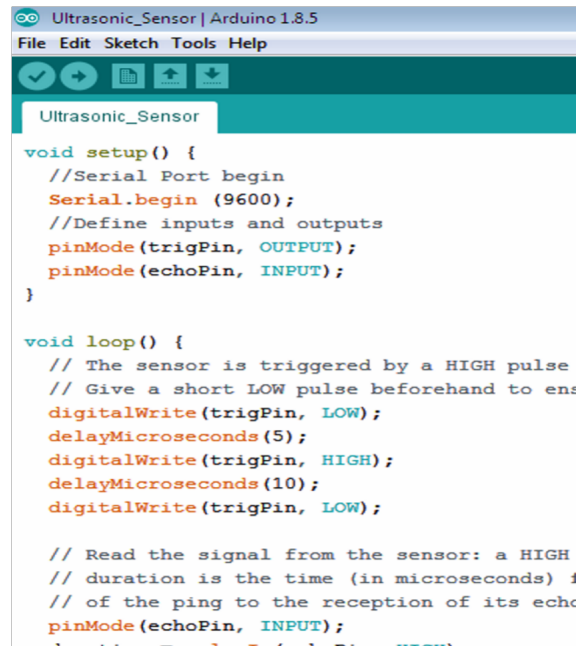
Microcontroller	ATmega2560
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	54 (of which 15 provide PWM output)
Analog Input Pins	16
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA

PROGRAMMING:

The Mega 2560 board can be programmed with the Arduino Software (IDE).

The ATmega2560 on the Mega 2560 comes preprogrammed with a boot loader that allows you to upload new code to it without the use of an external hardware programmer.

It communicates using the original STK500 protocol (refer, C header files). You can also bypass the boot loader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header using Arduino ISP or similar.

The image is a screenshot of the Arduino IDE interface. The title bar at the top reads "Ultrasonic_Sensor | Arduino 1.8.5". Below the title bar is a menu bar with "File", "Edit", "Sketch", "Tools", and "Help". Underneath the menu bar is a toolbar with icons for opening files, saving, and other standard IDE functions. The main text area displays the code for the "Ultrasonic_Sensor" sketch. The code is written in C++ and includes comments in blue. It defines a setup function and a loop function. The setup function initializes the serial port at 9600 baud and sets the trigPin as an output and the echoPin as an input. The loop function sends a HIGH pulse to the trigPin, waits for 5 microseconds, then reads the signal from the echoPin. The code is as follows:

```
void setup() {  
  //Serial Port begin  
  Serial.begin (9600);  
  //Define inputs and outputs  
  pinMode(trigPin, OUTPUT);  
  pinMode(echoPin, INPUT);  
}  
  
void loop() {  
  // The sensor is triggered by a HIGH pulse  
  // Give a short LOW pulse beforehand to ensure a clean HIGH pulse  
  digitalWrite(trigPin, LOW);  
  delayMicroseconds(5);  
  digitalWrite(trigPin, HIGH);  
  delayMicroseconds(10);  
  digitalWrite(trigPin, LOW);  
  
  // Read the signal from the sensor: a HIGH pulse  
  // duration is the time (in microseconds) from the sending of the ping  
  // to the reception of its echo (reflected from the object)  
  pinMode(echoPin, INPUT);  
  long duration;  
  duration = pulseIn(echoPin, HIGH);  
  // Convert the time to a distance  
  // The speed of sound is 340 m/s  
  // distance = (speed * time) / 2  
  // The division by 2 is necessary because the sound has to travel to the object and back  
  // Convert the distance to centimeters  
  float distance = (duration * 0.034) / 2;  
  // Print the distance  
  Serial.println(distance);  
  delay(1000);  
}
```

Fig 3.2 Ultrasonic sensor code

The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available in the Arduino repository. The ATmega16U2/8U2 is loaded with a DFU boot loader, which can be activated by:

- † **On Rev1 boards:** connecting the solder jumper on the back of the board (near the map of Italy) and then resetting the 8U2.
- † **On Rev2 or later boards:** there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode.

Arduino Mega 2560 PIN diagram

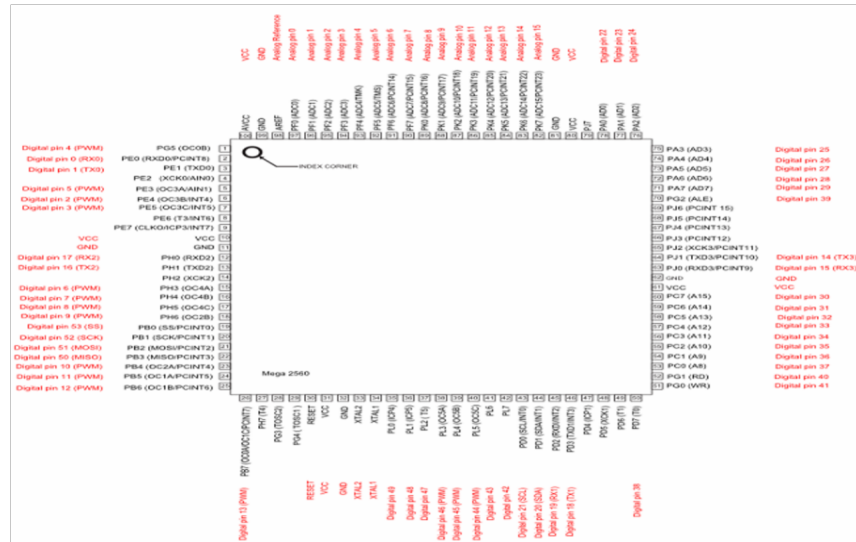


Fig 3.3 Arduino Mega 2560 PIN diagram

3.1.1.2 ADUINO UNO

The UNO is the best board to get started with electronics and coding. If this is your first experience tinkering with the platform, the UNO is the most robust board you can start playing with. The UNO is the most used and documented board of the whole Arduino family.



Fig 3.4 Arduino Uno

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a

reset 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 get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

Table 3.2 : TECHNICAL SPECIFICATIONS:

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6

INPUT AND OUTPUT:

See the mapping between Arduino pins and ATmega328P ports. The mapping for the Atmega8, 168, and 328 is identical. Note that this chart is for the DIP-package chip.

The Arduino Mini is based upon a smaller physical IC package that includes two extra ADC pins, which are not available in the DIP-package Arduino implementations.

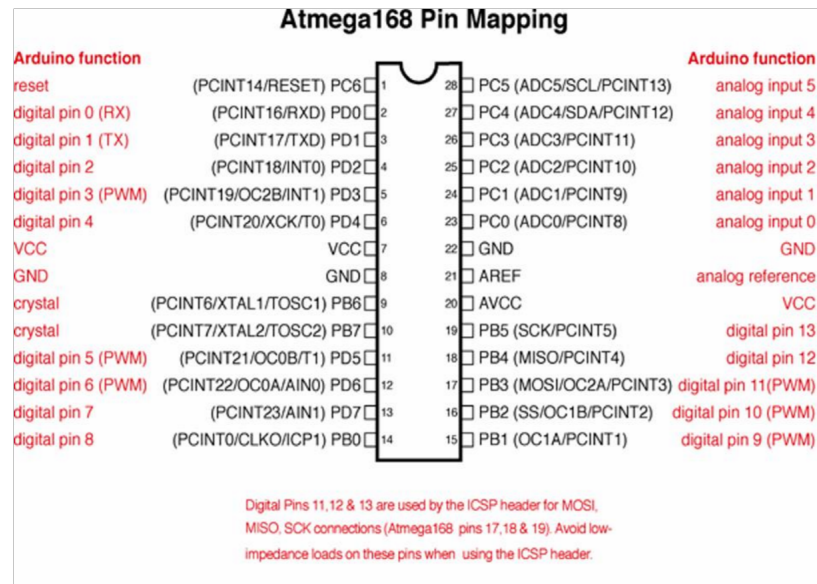


Fig 3.5 Atmega 168 pin Mapping

Each of the 14 digital pins on the Uno can be used as an input or output, using **pinMode()**, **digitalWrite()**, and **digitalRead()** functions. They operate at 5 volts. Each pin can provide or receive 20 mA as recommended operating condition and has an internal pull-up resistor (disconnected by default) of 20-50k ohm. A maximum of 40mA is the value that must not be exceeded on any I/O pin to avoid permanent damage to the microcontroller.

3.1.2 POWER SUPPLY

This section describes how to generate +5V DC power supply

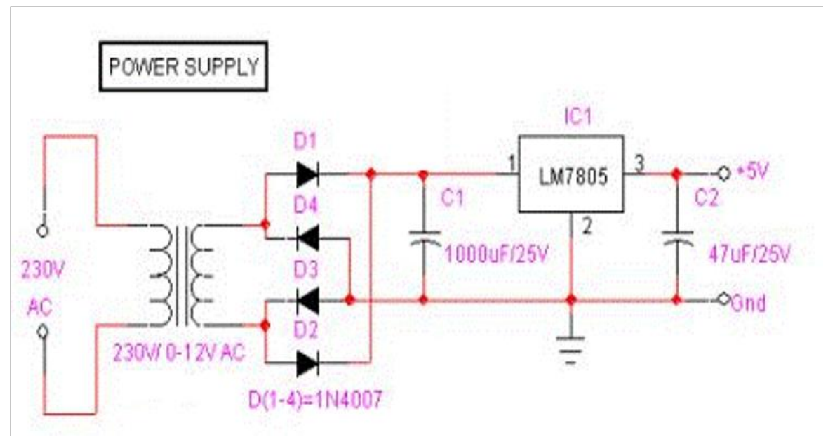


Fig 3.6 Power supply

The power supply section is the important one. It should deliver constant output regulated power supply for successful working of the project. A 0-12V/1 mA transformer is used for this purpose. The primary of this transformer is connected in to main supply through on/off switch& fuse for protecting from overload and short circuit protection. The secondary is connected to the diodes to convert 12V AC to 12V DC voltage. And filtered by the capacitors, which is further regulated to +5v, by using IC 7805.

3.1.3 GSM

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dialup modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. The working of GSM modem is based on commands, the commands always start with AT (which means ATtention) and finish with a <CR> character. For example, the dialing command is ATD<number>; ATD3314629080; here the dialing command ends with semicolon. The AT commands are given to the GSM modem with the help of PC or controller. The GSM modem is serially interfaced with the controller with the help of MAX 232. Here max 232 acts as driver which converts TTL levels to the RS 232 levels. For serial interface GSM modem requires the signal based on RS 232 levels. The T1_OUT and R1_IN pin of MAX 232 is connected to the TX and RX pin of GSM modem.



Fig 3.7: GSM module

An overview of the LinkSprite GSM/GPRS module: a miniature, single-side board, quadband GSM 850/EGSM 900/DCS 1800/PCS 1900 module, ready for integration in various kinds of Fix wireless phones and other wireless devices.

INTERFACE AND FUNCTIONALITIES

POWER SUPPLY

Power Supply Description

The power supply is one of the key issues in the designing GSM terminals. Due to the 577us radio burst emission in GSM every 4.615ms, power supply must be able to deliver high current peaks in a short time. During these peaks, ripples and drops on the supply voltage must not exceed a certain limit.

Table 3.3 : VBAT Pin Description

	Pin number	V_{MIN}	V_{NOM}	V_{MAX}	Ripple max
VBAT (V)	1,3,5,7	3.3V (*)	3.6V	4.2V (**)	50mV _{PP} for freq<200KHz 2mV _{PP} for freq>200KHz

SIM Interface

Table 3.4 : SIM Pin Description

Pin number	Pin name	Type	Description
29	SIM_DA	I/O	SIM Serial Data
27	SIM_CLK	O	SIM Clock
21	SIM_RST	O	SIM Reset
51	SIM_VCC	P	SIM Power Supply

SIM card connection:

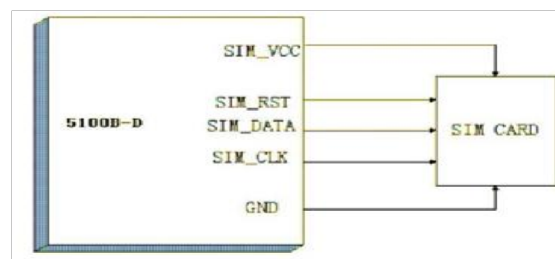


Figure 3.8 : SIM connection (no power control)

Figure 3.8 shows system design for 3.0V and 1.8V SIM card interface. The SIM level shift is built in the SC6600D chip.

3.1.4 GPS-- GLOBAL POSITIONING SYSTEM

GPS or Global Positioning System is a satellite navigation system that furnishes location and time information in all climate conditions to the user. GPS is used for navigation in planes, ships, cars and trucks also. The system gives critical abilities to military and civilian users around the globe. GPS provides continuous real time, 3dimensional positioning, navigation and timing worldwide. The Global Positioning System (GPS) is a satellite-based navigation system made up of at least 24 satellites. GPS works in any weather conditions, anywhere in the world, 24 hours a day, with no subscription fees or setup charges. The U.S. Department of Defense (USDOD) originally put the satellites into orbit for military use, but they were made available for civilian use in the 1980s.



Fig 3.9: GPS

WORKING OF GPS:

GPS satellites circle the Earth twice a day in a precise orbit. Each satellite transmits a unique signal and orbital parameters that allow GPS devices to decode and compute the precise location of the satellite. GPS receivers use this information and trilateration to calculate a user's exact location. Essentially, the GPS receiver measures the distance to each satellite by the amount of time it takes to receive a transmitted signal. With distance measurements from a few more satellites, the receiver can determine a user's position and display it electronically to measure your running route, map a golf course, find a way home or adventure anywhere.

To calculate your 2-D position (latitude and longitude) and track movement, a GPS receiver must be locked on to the signal of at least 3 satellites. With 4 or more

satellites in view, the receiver can determine your 3-D position (latitude, longitude and altitude). Generally, a GPS receiver will track 8 or more satellites, but that depends on the time of day and where you are on the earth. Some devices can do all of that from your wrist.

GPS SEGMENT:

The GPS system consists of three segments:

1. The space segment: the GPS satellites
2. The control system, operated by the U.S. military
3. The user segment, which includes both military and civilian users and their GPS equipment.

SPACE SEGMENT:

The space segment is the number of satellites in the constellation. It comprises of 29 satellites circling the earth every 12 hours at 12,000 miles in altitude. The function of the space segment is utilized to route/navigation signals and to store and retransmit the route/navigation message sent by the control segment. These transmissions are controlled by highly stable atomic clocks on the satellites. The GPS Space Segment is formed by a satellite constellation with enough satellites to ensure that the users will have, at least, 4 simultaneous satellites in view from any point at the Earth surface at any time.

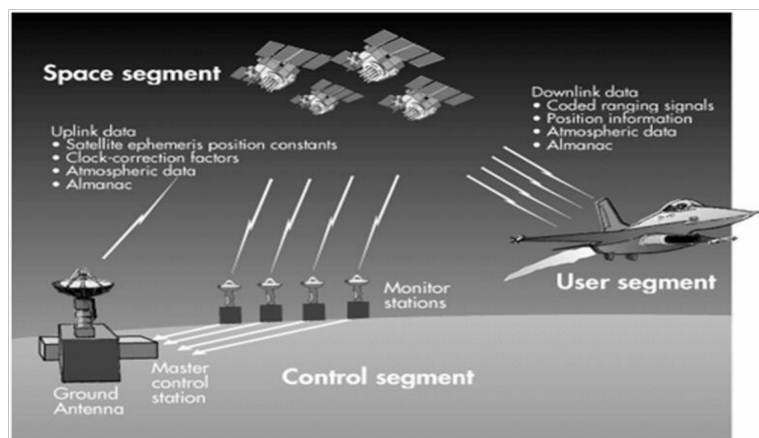


Fig 3.10 Space segment

CONTROL SEGMENT:

The control segment comprises of a master control station and five monitor stations outfitted with atomic clocks that are spread around the globe. The five monitor stations monitor the GPS satellite signals and then send that qualified information to the master control station where abnormalities are revised and sent back to the GPS satellites through ground antennas. Control segment also referred as monitor station.



Fig 3.11 Control segment

USER SEGMENT:

The user segment comprises of the GPS receiver, which receives the signals from the GPS satellites and determine how far away it is from each satellite. Mainly this segment is used for the U.S military, missile guidance systems, civilian applications for GPS in almost every field. Most of the civilian uses this from survey to transportation to natural resources and from there to agriculture purpose and mapping too.



Fig 3.12: User Segment

APPLICATION OF GPS:

- GLOBAL POSITIONING SYSTEM (GPS) APPLICATION GPS is considered a dual-use technology, meaning it has significant military and civilian applications.
- Current Applications of GPS • Public Safety • Environmental resource agents • Aviation • Military • Local planning • Surveying • Recreation • Business
- Tracking Devices One of the easiest applications to consider is the simple GPS tracking device.
- Using the 'GOTO' function, the GPS will guide you to a predefined Waypoint using a compass and "pointer" You can program the GPS to "beep" when you are within a certain distance of the defined Waypoint.

3.1.5 BUZZER

A **buzzer** is a small yet efficient component to add sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on breadboard, Perf Board and even on PCBs which makes this a widely used component in most electronic applications. There are two types are buzzers that are commonly available. The one shown here is a simple buzzer which when powered will make a Continuous Beep sound, the other type is called a readymade buzzer which will look bulkier than this and will produce a Beep. Beep. Beep. Sound due to the internal oscillating circuit present inside it. But, the one shown here is most widely used because it can be customised with help of other circuits to fit easily in our application. This buzzer can be used by simply powering it using a DC power supply ranging from 4V to 9V. A simple 9V battery can also be used, but it is recommended to use a regulated +5V or +6V DC supply. The buzzer is normally associated with a switching circuit to turn ON or turn OFF the buzzer at required time and require interval.

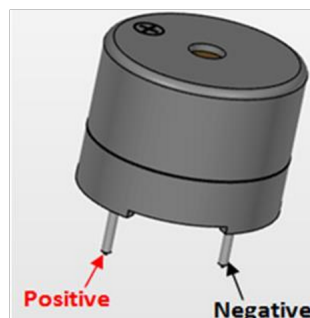


Fig 3.13: Active passive buzzer

Table 3.5 Buzzer Pin Configuration

Pin Number	Pin Name	Description
1	Positive	Identified by (+) symbol or longer terminal lead. Can be powered by 6V DC
2	Negative	Identified by short terminal lead. Typically connected to the ground of the circuit

Buzzer Features and Specifications

- Rated Voltage: 6V DC
- Operating Voltage: 4-8V DC
- Rated current: <30mA
- Sound Type: Continuous Beep
- Resonant Frequency: ~2300 Hz

Applications of Buzzer

- Alarming Circuits, where the user has to be alarmed about something
- Communication equipments
- Automobile electronics
- Portable equipments, due to its compact size.

3.1.6 LCD

LCD screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the

command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

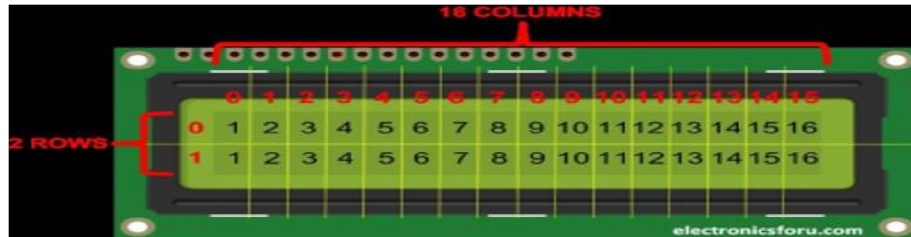


Fig 3.14: LCD

We come across [LCD](#) displays everywhere around us. Computers, calculators, television sets, mobile phones, digital watches use some kind of display to display the time. An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in projects. The 16×2 translates to a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7 pixel matrix.

16X2 LCD PINOUT DIAGRAM:

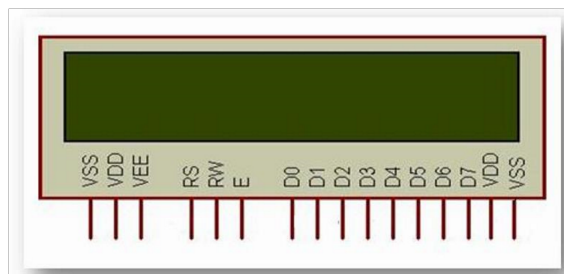


Fig 3.15: LCD Pinout Diagram

Table 3.6 LCD Pin no Table

PIN NO.	FUNCTION	NAME
1	Ground (0V)	Ground

2	Supply voltage; 5V (4.7V – 5.3V)	VCC
3	Contrast adjustment; the best way is to use a variable resistor such as a potentiometer.	Vo / VEE
4	Selects command register when low, and data register when high	RS (Register Select)
5	Low to write to the register; High to read from the register	Read/write
6	Sends data to data pins when a high to low pulse is given; Extra voltage push is required to execute the instruction and EN(enable) signal is used for this purpose. Usually, we make it en=0 and when we want to execute the instruction we make it high en=1 for some milliseconds. After this we again make it ground that is, en=0.	Enable
7	8-bit data pins	DB0
8		DB1
9		DB2
10		DB3
11		DB4

12		DB5
13		DB6
14		DB7
15	Backlight VCC (5V)	Led+
16	Backlight Ground (0V)	Led-

3.1.7 ZIGBEE

ZigBee is a wireless technology developed as an open global standard to address the unique needs of low-cost, low-power, wireless sensor networks. The standard takes full advantage of the IEEE 802.15.4 physical radio specification and operates in unlicensed bands worldwide at the following frequencies: 2.400–2.484 GHz, 902-928 MHz and 868.0–868.6 MHz.

1. The power levels (down from 5v to 3.3v) to power the zigbee module.
2. The communication lines (TX, RX, DIN and DOUT) to the appropriate voltages. The Zigbee module acts as both transmitter and receiver. The Rx and Tx pins of

ZIGBEE are connected to Tx and Rx of microcontroller respectively. The data's from microcontroller is serially transmitted to Zigbee module via UART port. Then Zigbee transmits the data to another Zigbee. The data's from Zigbee transmitted from Dout pin. The Zigbee from other side receives the data via Din pin.

3.1.8 NERVE STIMULATOR

We have attempted to quantify the performance of natural versus artificial sensors when used in a closed-loop functional electrical stimulation system. Peroneal nerve stimulation was applied during gait to a multiple sclerosis subject with a drop foot. Stimulation was applied only during the swing phase to provide artificially induced dorsiflexion of the foot. Detection of the onset of the stance phase was accomplished using a standard heel contact switch mounted inside the subject's shoe (the artificial sensor) and using processed nerve signals derived from an implanted nerve-cuff electrode (the natural sensor). A detection percentage of at least 85% was achieved using the afferent nerve signal information only.

FEATURES

- † Input voltage: 5v
- † Output voltage: 5-15v
- † Frequency range: 0.1 to 99 Hz.
- † Resolution: 0.01mA
- † Pulse duration: 0.1ms.

APPLICATIONS

- † Real Shock for Humans
- † Medical applications



Fig 3.16: Nerve stimulator

3.1.9 PUSH BUTTON

Push Buttons are normally-open tactile switches. Push buttons allow us to power the circuit or make any particular connection only when we press the button. Simply, it makes the circuit connected when pressed and breaks when released. A push button is also used for triggering of the SCR by gate terminal. These are the most common buttons which we see in our daily life electronic equipment's. Some of the applications of the Push button are mentioned at the end of the article.



Fig 3.17: Push button

Push Button Features

- Prevent flux rise by the insert-molded terminal
- Snap-in mount terminal
- Contact Bounce: MAX 5mS
- Crisp clicking by tactile feedback
- Dielectric Withstanding Voltage 250V AC for 1 minute

Technical Specifications

- Mode of Operation: Tactile feedback
- Power Rating: MAX 50mA 24V DC
- Insulation Resistance: 100Mohm at 100v
- Operating Force: 2.55 ± 0.69 N
- Contact Resistance: MAX 100mOhm
- Operating Temperature Range: -20 to +70 °C
- Storage Temperature Range: -20 to +70 °C

3.2 SOFTWARE REQUIREMENTS:

3.2.1 EMBEDDED C

Embedded C is most popular programming language in software field for developing electronic gadgets. Each processor used in electronic system is associated with embedded software.

Embedded C programming plays a key role in performing specific function by the processor. In day-to-day life we used many electronic devices such as mobile phone, washing machine, digital camera, etc. These all device working is based on microcontroller that are programmed by embedded C.

Let's see the block diagram representation of embedded system programming:

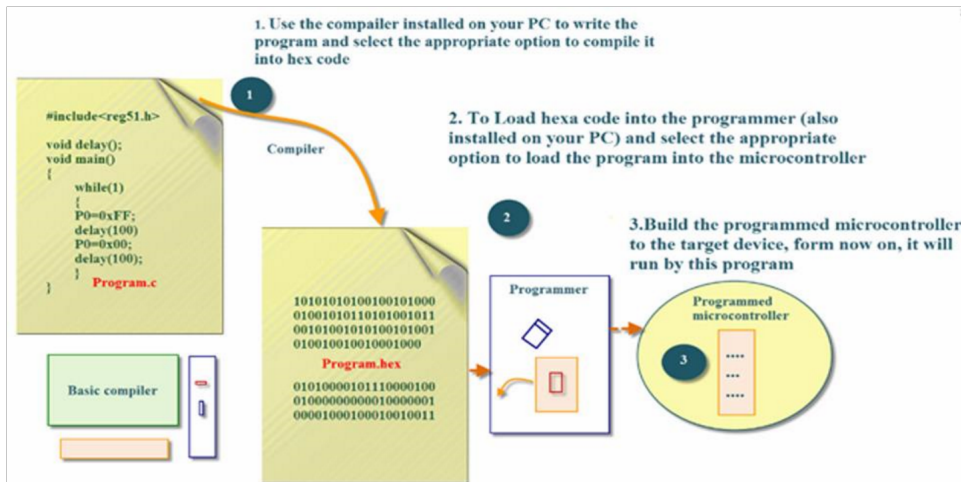


Fig 3.18: Block diagram representation of embedded system

EMBEDDED SYSTEM PROGRAMMING:

Basic Declaration

Let's see the block diagram of Embedded C Programming development:

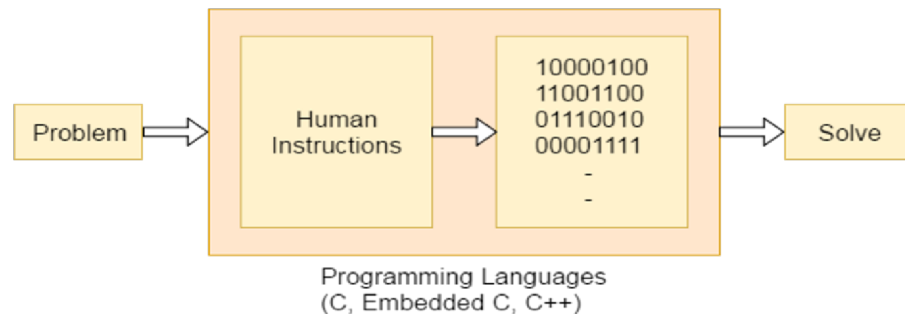


Fig 3.19: Embedded C programming development

Function is a collection of statements that is used for performing a specific task and a collection of one or more functions is called a programming language. Every language is consisting of basic elements and grammatical rules.

BASIC EMBEDDED C PROGRAMMING STEPS

Let's see the block diagram representation of Embedded C Programming Steps:

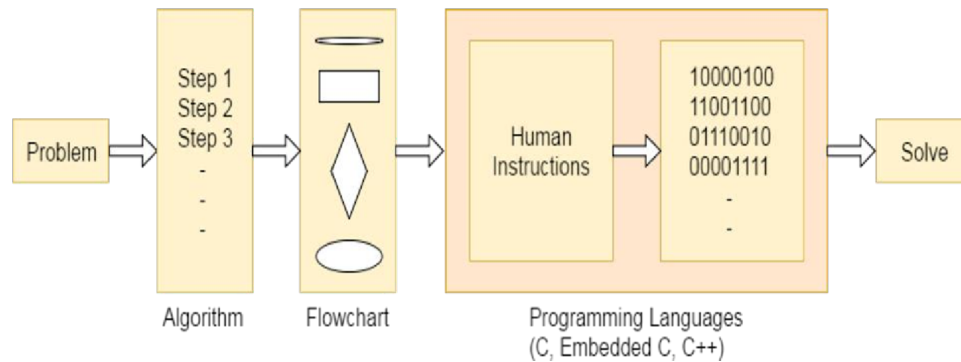


Fig 3.20: Embedded C Programming steps

The microcontroller programming is different for each type of operating system. Even though there are many operating system are exist such as Windows, Linux, RTOS, etc but RTOS has several advantage for embedded system development.

EMBEDDED SYSTEMS:

Embedded System is a system composed of hardware, application software and real time operating system. It can be small independent system or large combinational system. Our Embedded System tutorial includes all topics of Embedded System such as characteristics, designing, processors, microcontrollers, tools, addressing modes, assembly language, interrupts, embedded c programming, led blinking, serial communication, lcd programming, keyboard programming, project implementation etc.

BASIC STRUCTURE OF AN EMBEDDED SYSTEM:

Let's see the block diagram shows the basic structure of an embedded system.

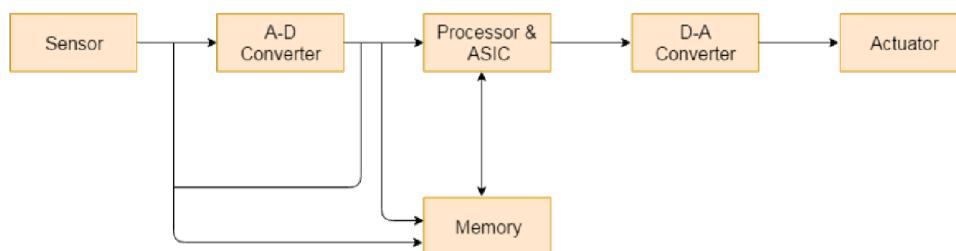


Fig 3.21: Basic structure of Embedded system

- Sensor:** Sensor used for sensing the change in environment condition and it generate the electric signal on the basis of change in environment condition. Therefore it is also called as transducers for providing electric input signal on the basis of change in environment condition.

- **A-D Converter:** An analog-to-digital converter is a device that converts analog electric input signal into its equivalent digital signal for further processing in an embedded system.
- **Processor & ASICs:** Processor used for processing the signal and data to execute desired set of instructions with high-speed of operation. Application specific integrated circuit (ASIC) is an integrated circuit designed to perform task specific operation inside an embedded system.
- **D-A Converter:** A digital-to-analog converter is a device that converts digital electric input signal into its equivalent analog signal for further processing in an embedded system.
- **Actuators:** Actuators is a comparator used for comparing the analog input signal level to desired output signal level for providing the error free output from the system.

Advantages:

- Same hardware can be used in variety of application.
- Lesser power requirement
- Lower operational cost of system
- Provide high performance and efficiency

Disadvantages:

- Developing a system required more time. Due to functional complexity.
- Skilled engineers required because one mistake may result in destroying of complete project.

3.2.2 ARDUINO SOFTWARE IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.



Fig 3.22: Arduino software IDE

SKETCHBOOK:

The Arduino Software (IDE) uses the concept of a sketchbook: a standard place to store your programs (or sketches). The sketches in your sketchbook can be opened from the **File > Sketchbook** menu or from the **Open** button on the toolbar. The first time you run the Arduino software, it will automatically create a directory for your sketchbook. You can view or change the location of the sketchbook location from with the **Preferences** dialog.

Beginning with version 1.0, files are saved with a .ino file extension. Previous versions use the .pde extension. You may still open .pde named files in version 1.0 and later, the software will automatically rename the extension to .ino.

TABS, MULTIPLE FILES, AND COMPILATION:

Allows you to manage sketches with more than one file (each of which appears in its own tab). These can be normal Arduino code files (no visible extension), C files (.c extension), C++ files (.cpp), or header files (.h).

UPLOADING:

Before uploading your sketch, you need to select the correct items from the **Tools > Board** and **Tools > Port** menus. The [boards](#) are described below. On the Mac, the serial port is probably something like `/dev/tty.usbmodem241` (for an Uno or Mega2560 or Leonardo) or `/dev/tty.usbserial-1B1` (for a Duemilanove or earlier USB board), or `/dev/tty.USA19QW1b1P1.1` (for a serial board connected with a Keyspan USB-to-Serial adapter). On Windows, it's probably COM1 or COM2 (for a serial board) or COM4, COM5, COM7, or higher (for a USB board) - to find out, you look for USB serial device in the ports section of the Windows Device Manager. On Linux, it should be `/dev/ttyACMx`, `/dev/ttyUSBx` or similar. Once you've selected the correct serial port and board, press the upload button in the toolbar or select the **Upload** item from the **Sketch** menu. Current Arduino boards will reset automatically and begin the upload. With older boards (preDiecimila) that lack auto-reset, you'll need to press the reset button on the board just before starting the upload. On most boards, you'll see the RX and TX LEDs blink as the sketch is uploaded. The Arduino Software (IDE) will display a message when the upload is complete, or show an error. When you upload a sketch, you're using the Arduino **bootloader**, a small program that has been loaded on to the microcontroller on your board. It allows you to upload code without using any additional hardware. The bootloader is active for a few seconds when the board resets; then it starts whichever sketch was most recently uploaded to the microcontroller. The boot loader will blink the on-board (pin 13) LED when it starts .

CHAPTER: 4 - OUTPUT

4.1 OUTPUT:

This system can help women by just pressing the push button on the system. The system has the ability to help them with techniques which are embed into a system. The women carrying the device, in case of any physical threatening /harassment at that time, she presses the emergency switch which is supplied with power supply the buzzer, Nerve Stimulator, LCD, GSM, Zigbee, and GPS gets activated and in LCD display it displays the emergency message as shown in the below fig.

LCD DISPLAY OF THE SYSTEM



Fig 4.1: LCD Display of the system

After pressing push button alert message will be send through SMS as shown in the below figure.

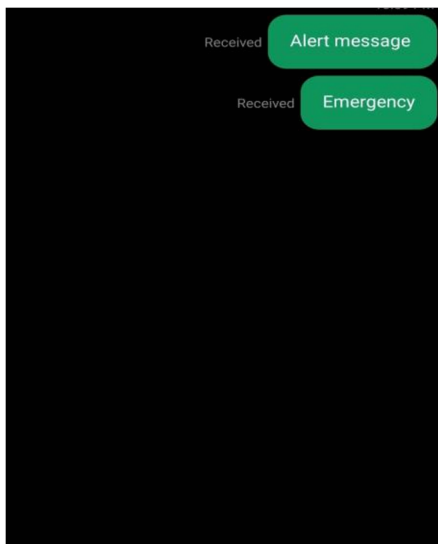


Fig 4.2: SMS Alert

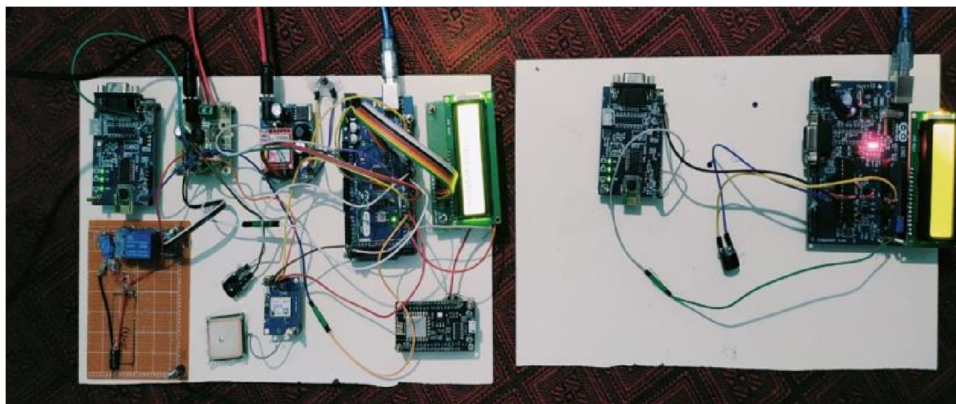


Fig 4.3: HARDWARE CONNECTIONS

CHAPTER: 5 -FUTURE ENHANCEMENT

5.1 APPLICATIONS

- It is used in women safety.
- This system can be used to alert the nearby police station in case of emergency.

5.2 FUTURE ENHANCEMENT:

- ▮ This device can be introduced compactly so that it can be easy to carry.
- ▮ Further this alert system can be monitored through a centralized system.

5.3 ADVANTAGES:

- Multiple alert systems provide higher communication. ○
Faster response

5.4 CONCLUSION:

This system reduces the delay which improves the safety of women. This system also sends alert signals to nearby devices so that help can arrive without delay. Message through GPS and GSM technology is the additional part to help this project to send alert messages to relatives.

5.5 REFERENCES

1. N. Cheng *et al.*, "Big data driven vehicular networks," *IEEE Netw.*, vol. 32, no. 6, pp. 160–167, Nov. 2018.
2. A. Boukerche, H. A. B. F. Oliveira, E. F. Nakamura, and A. A. F. Loureiro,

- “Vehicular ad hoc networks: A new challenge for localization-based systems,” *Comput. Commun.*, vol. 31, no. 12, pp. 2838–2849, Jul. 2008.
3. E. I. Laftchiev, C. M. Lagoa, and S. N. Brennan, “Vehicle localization using invehicle pitch data and dynamical models,” *IEEE Trans. Intell. Transp. Syst.*, vol. 16, no. 1, pp. 206–220, Feb. 2015.
 4. B.-H. Lee, J.-H. Song, J.-H. Im, S.-H. Im, M.-B. Heo, and G.-I. Jee, “GPS/DR error estimation for autonomous vehicle localization,” *Sensors*, vol. 15, no. 8, pp. 20779–20798, Aug. 2015.
 5. K. Jo, K. Chu, K. Lee, and M. Sunwoo, “Integration of multiple vehicle models with an IMM filter for vehicle localization,” in *Proc. IEEE Intell. Vehicles Symp.*, Jun. 2010, pp. 746–751.
 6. H.-Y. Yu and J.-J. Chen, “An intelligent space location identification system based on passive RFID tags,” in *Proc. Int. Conf. Mach. Learn. Cybern. (ICMLC)*, Jul. 2014, pp. 428–433.
 7. Y. Zhao, Y. Liu, and L. M. Ni, “VIRE: Active RFID-based localization using virtual reference elimination,” in *Proc. Int. Conf. Parallel Process. (ICPP)*, Sep. 2007, p. 56.
 8. L. Ni, D. Zhang, and M. Souryal, “RFID-based localization and tracking technologies,” *IEEE Wireless Commun.*, vol. 18, no. 2, pp. 45–51, Apr. 2011.
 9. C.-H. Ko, “RFID 3D location sensing algorithms,” *Autom. Construct.*, vol. 19, no. 5, pp. 588–595, Aug. 2010.
 10. S. Azzouzi, M. Cremer, U. Dettmar, R. Kronberger, and T. Knie, “New measurement results for the localization of UHF RFID transponders using an angle of arrival (AoA) approach,” in *Proc. IEEE Int. Conf. RFID*, Apr. 2011, pp. 91–97.