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Neurostimulator and Women Safety System Two Switching State between the Palpitation Methodology

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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.

Key Words: Women Palpitation, RF Signal Communication, IOT

INTRODUCTION

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.

Scope of the Paper

The aim of our paper 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 without internet.

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.

Existing System Disadvantages

- Single alert system leads to lesser communication
- slow response

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 paper 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 senses 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 [1].

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 [2].

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. Once the device is activated it starts sending the GPS location to the ICE contacts and police control rooms. 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 [3].

The crimes against women have been rising significantly and often hear about molestation, eve-teasing and rape cases in the public places of the society. The security of women is the most important concern these days and to build a safety device to act as a rescue and to prevent from harm at the time of hazard is highly necessary especially for women. In this paper, a smart device for women's safety which automates the emergency alert system by using pressure sensor pulse-rate sensor and temperature sensor to detect a possible atrocity automatically using outlier detection is proposed. This system detects and sends the alerts for the dear ones with the location coordinates of the women without the requirement of her interaction in critical times. It sends an emergency message[4].

Every day, every woman, young girls, mothers and women from all walks of life are struggling to be safe and protect themselves from the roving gaze of the horribly insensitive men who molest, assault and violate the dignity of women on a daily basis. The streets, public transport, public places in particular have become the dominion of the hunters. Due to these atrocities that women are subjected to in the present scenario, a smart security wearable device for women based on Internet of Things is proposed. It is implemented in the form of a smart ring (SMARISA) and comprises of Raspberry Pi Zero, Raspberry Pi camera, buzzer and button to activate the services. This device is extremely portable and can be activated by the victim on being assaulted just by the click of a button that will fetch her current location and also capture the image of the attacker via Raspberry Pi camera. The location and the link of the image captured will be sent to predefined emergency contact numbers or police via smart phone of the victim thus preventing the use of additional hardware devices/modules and making the device compact[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 method.

Proposed System Advantages

1. Multiple alert systems provide higher possibility to send the data properly.
2. Faster response.
3. No chance for data loss.

BLOCK DIAGRAM

General

Our paper focuse, 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.

Block Diagram

Transmitter

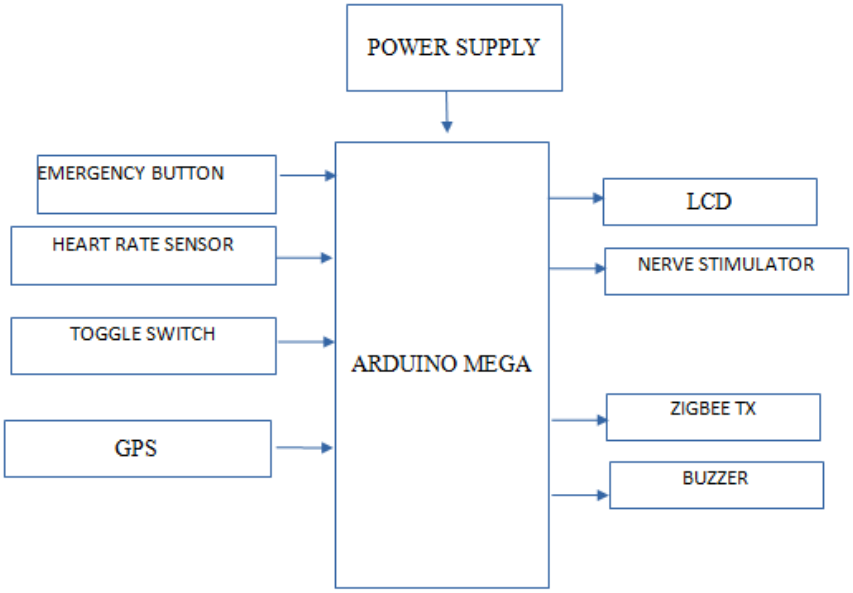

Fig: Transmitter

RECEIVER

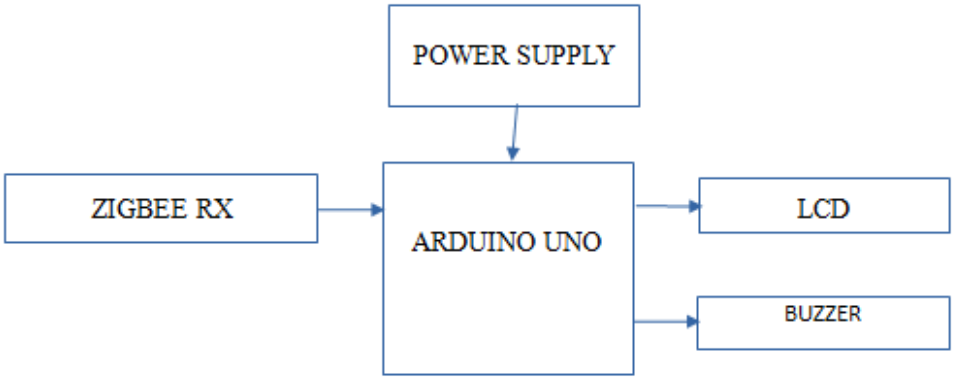

Fig: Receiver

Modules

Alert through the Push Button

Module Description:

Alert through the push button helps the person to enable the nerve stimulator. The second module is the alert through the heart sensor, in such situations, sometimes person may get panic attack, this will send alert without any user input and the palpitation indicates the deteriorating situations of the person and will send the alert to the police station. Alert for the

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

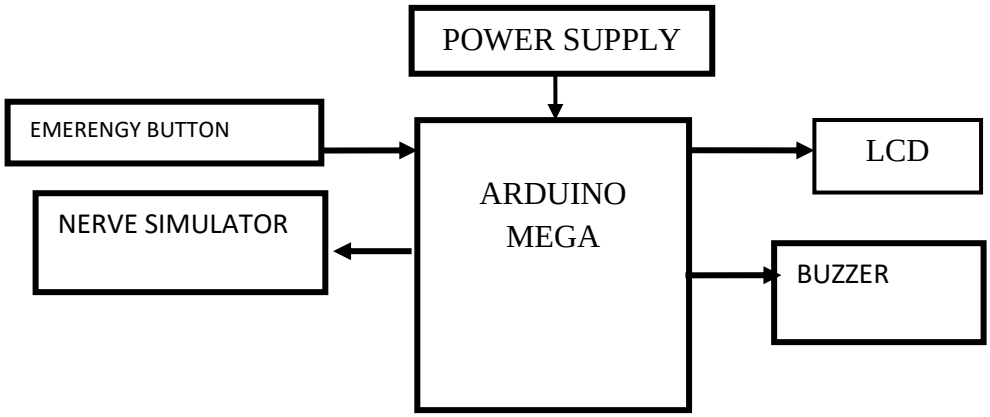

Fig . Alert through the Push Button

Alert through Heart Beat Sensor
Module Description :
In this mode LCD and HEART BEAT SENSOR is interfaced with arduino UNO . By interfacing Buzzer with arduino we can alert to the nearby people. If anybody touches the system the interfaced heart sensor give shock to the person automatically send the alert. In the situation the heart beat will be normal and manually turn on the switch and send the alert.

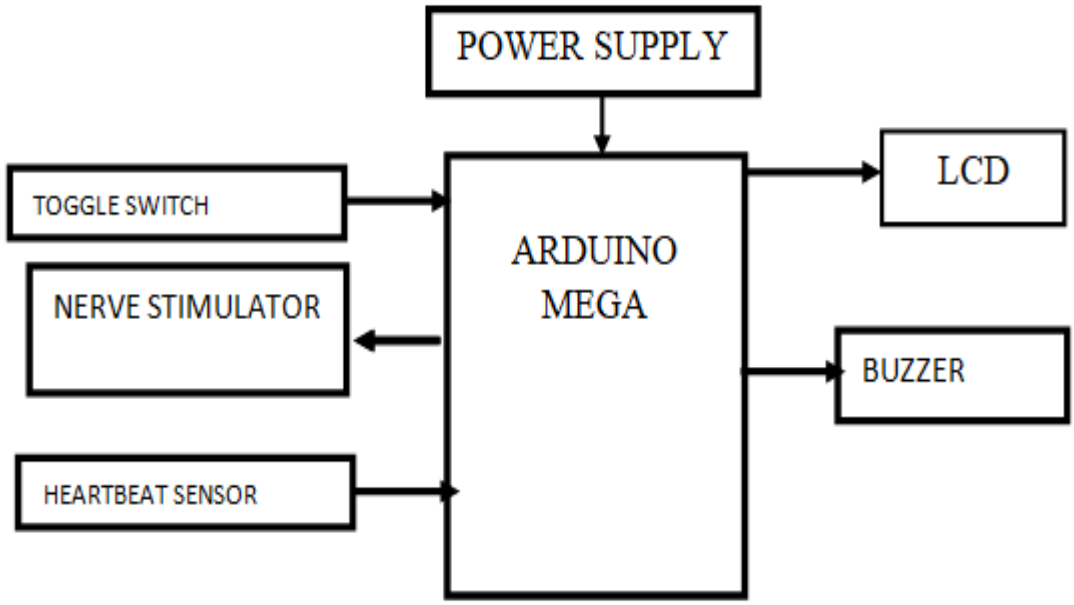

Fig Alert through Heart Beat Sensor

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

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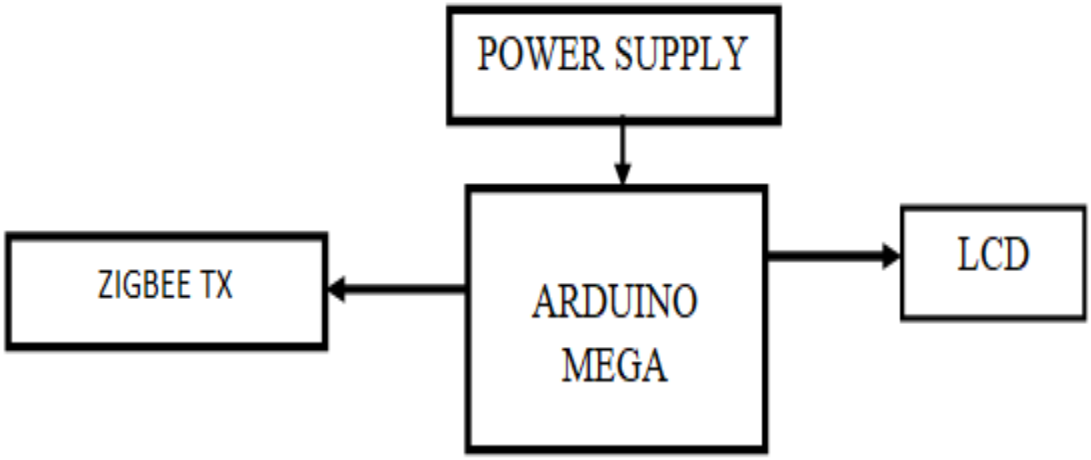

Fig No. 3.5 Alert for Police Station- Transmitter

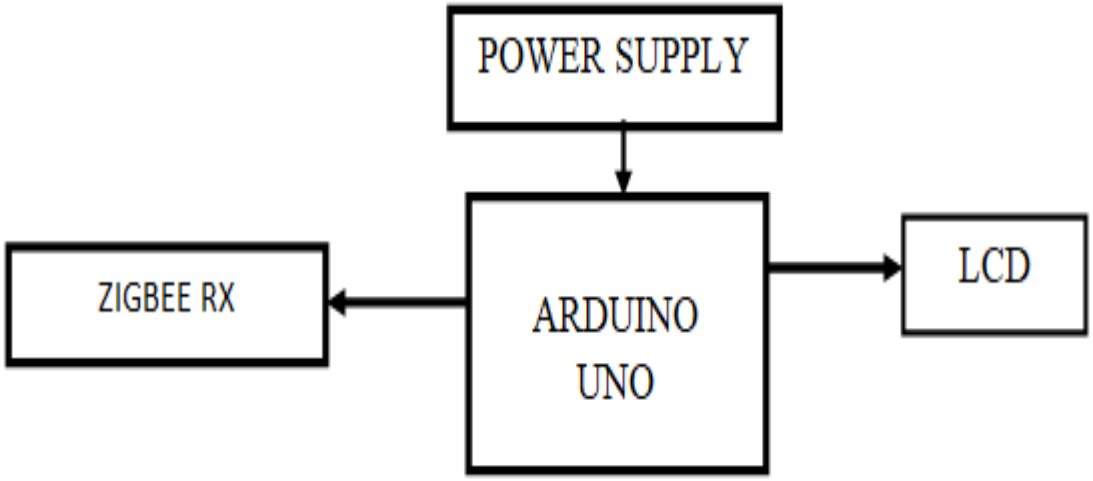

Fig: Alert for Police Station- Receiver

Block Diagram Description And Working

The ARDUINO MEGA microcontroller is used in this proposed method to interface multiple inputs and output devices. The LCD is used to display the current execution process, in the transmitter kit, the LCD display shows our health condition through the sensor which contains photodiode. While in receiver kit, the LCD display the location of the person in the terms of latitude and longitude.

The toggle switch is used to manual (push button) and automatic (heart rate sensor) alert switching by the women. The push button is used to send the alert message manual pressing. The heart rate sensor is used to detect the palpitation level of the women. The nerve stimulator is used to provide the electrical shock pulses. The GPS is used to provide the location. The zigbee connectivity is used.

EXPERIMENT PARTS

Hardware Requirements

Arduino
Need For Arduino
Arduino Mega

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Technical Specifications:

Table: Technical Specification Atmega2560 Microcontroller

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
Flash Memory	256 KB of which 8 KB used by boot loader
SRAM	8 KB
EEPROM	4 KB
Clock Speed	16 MHz
LED_BUILTIN	13
Length	101.52 mm
Width	53.3 mm
Weight	37 g

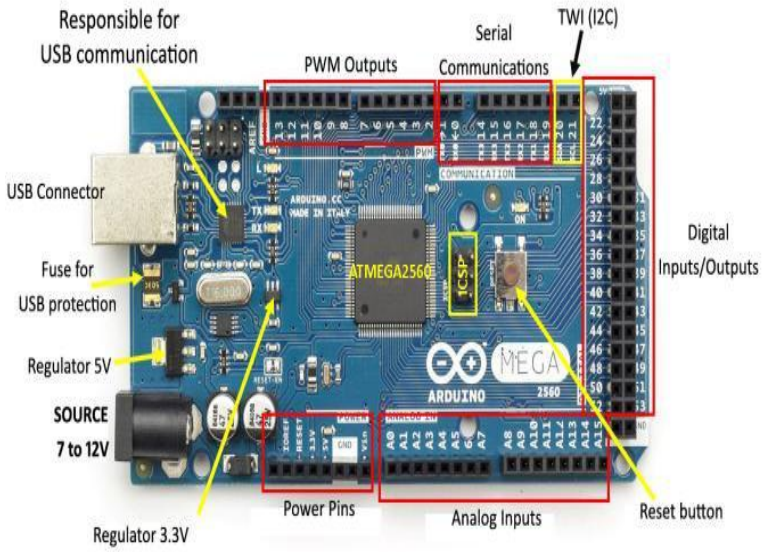

Fig: Arduino Atmega2560 Microcontroller

Arduino Description

Arduino is open-source hardware. The hardware reference designs are distributed under a Creative Commons Attribution Share-Alike 2.5 license and are available on the Arduino website. Layout and production files for some versions of the hardware are also available. Although the hardware and software designs are freely available under copy left licenses, the developers have requested the name Arduino to be exclusive to the official product and not be used for derived works without permission. The official policy document on use of the Arduino name emphasizes that the project is open to incorporating work by others into the official product. An early Arduino board with an RS-232 serial interface (upper left) and an Atmel ATmega8 microcontroller chip (black, lower right); the 14 digital I/O pins are at the top, the 6 analog input pins at the lower right, and the power connector at the lower left.

Arduino microcontrollers are pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory. The default bootloader of the Arduino UNO is the optiboot bootloader. Boards are loaded with program code via a serial connection to another computer. Some serial Arduino boards contain a level shifter circuit to convert between RS-232 logic levels and transistor–transistor logic (TTL) level signals. Current Arduino boards are programmed via Universal Serial Bus (USB), implemented using USB-to-serial adapter chips such as the FTDI FT232. Some boards, such as later-model Uno boards, substitute the FTDI chip with a separate AVR chip containing USB-to-serial firmware, which is reprogrammable via its own ICSP header.

Many Arduino-compatible and Arduino-derived boards exist. Some are functionally equivalent to an Arduino and can be used interchangeably. Many enhance the basic Arduino by adding output drivers, often for use in school-level education, to simplify making buggies and small robots. Others are electrically equivalent but change the form factor, sometimes retaining compatibility with shields, sometimes not. Some variants use different processors, of varying compatibility.

Arduino 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 (reference, C header files).

Power Specification

The Mega 2560 has a resettable poly fuse that protects your computer's USB ports from shorts and over current. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed. The Mega 2560 can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and pin headers of the POWER connector.The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may become unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

Table Power Pins Specification

Vin	The input voltage to the board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
5V	This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it

3V3	A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA
GND	Ground pins
IOREF	This pin on the board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs for working with the 5V or 3.3V

Rduino Memory
The ATmega2560 has 256 KB of flash memory for storing code (of which 8 KB is used for the boot loader), 8 KB of SRAM and 4 KB of EEPROM (which can be read and written with the EEPROM library).

Input and Output
In ATMEGA2560, Each of the 54 digital pins on the Mega can be used as an input or output, using pin Mode(), digital Write(), and digital Read() 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 20-50 k ohm. A maximum of 40mA is the value that must not be exceeded to avoid permanent damage to the microcontroller.

In addition, some pins have specialized functions:

Serial: 0 (RX) and 1 (TX); Serial 1: 19 (RX) and 18 (TX); Serial 2: 17 (RX) and 16 (TX); Serial 3: 15 (RX) and 14 (TX). Used to receive (RX) and transmit (TX) TTL serial data. Pins 0 and 1 are also connected to the corresponding pins of the ATmega16U2 USB-to-TTL Serial chip.

External Interrupts: 2 (interrupt 0), 3 (interrupt 1), 18 (interrupt 5), 19 (interrupt 4), 20 (interrupt 3), and 21 (interrupt 2). These pins can be configured to trigger an interrupt on a low level, a rising or falling edge, or a change in level. See the attach Interrupt() function for details.

PWM: 2 to 13 and 44 to 46. Provide 8-bit PWM output with the analog Write() function.

SPI: 50 (MISO), 51 (MOSI), 52 (SCK), 53 (SS). These pins support SPI communication using the SPI library. The SPI pins are also broken out on the ICSP header, which is physically compatible with the Arduino Uno.

LED: 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.

TWI: 20 (SDA) and 21 (SCL). Support TWI communication using the Wire library. Note that these pins are not in the same location as the TWI pins on the old Duemilanove or Diecimila Arduino boards.

The Mega 2560 has 16 analog inputs, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and analog Reference () function.

There are a couple of other pins on the board:

AREF: Reference voltage for the analog inputs, used with analog Reference()

Reset : Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board

Hardware Communication
The Mega 2560 board has a number of facilities for communicating with a computer, another board, or other microcontrollers. The ATmega2560 provides four hardware UARTs for TTL (5V) serial communication. An ATmega16U2 (ATmega 8U2 on the revision 1 and revision 2 boards) on the board channels one of these over USB and provides a virtual com port to software. The Arduino Software (IDE) includes a serial monitor which allows simple textual data to be sent to

and from the board. The RX and TX LEDs on the board will flash when data is being transmitted via the ATmega8U2/ATmega16U2 chip and USB connection to the computer (but not for serial communication on pins 0 and 1.

Technical Specifications

Table Technical Specification at mega328p Microcontroller

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
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by boot loader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
LED_BUILTIN	13
Length	68.6 mm
Width	53.4 mm

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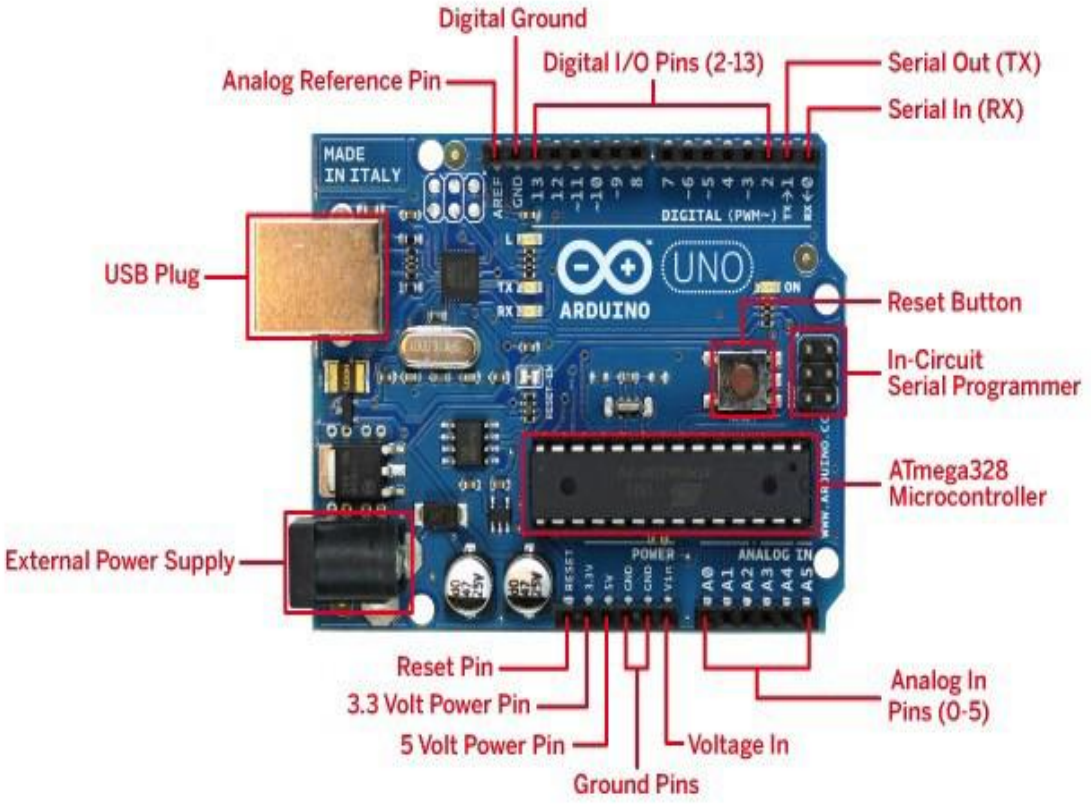


Fig No. Arduino Uno Atmega 328p Microcontroller

Power Pins Specification

Vin	The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin
5V	This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board
3V3	A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
GND	Ground pins
IOREF	This pin on the Arduino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs to work with the 5V or 3.3V

Power Supply

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

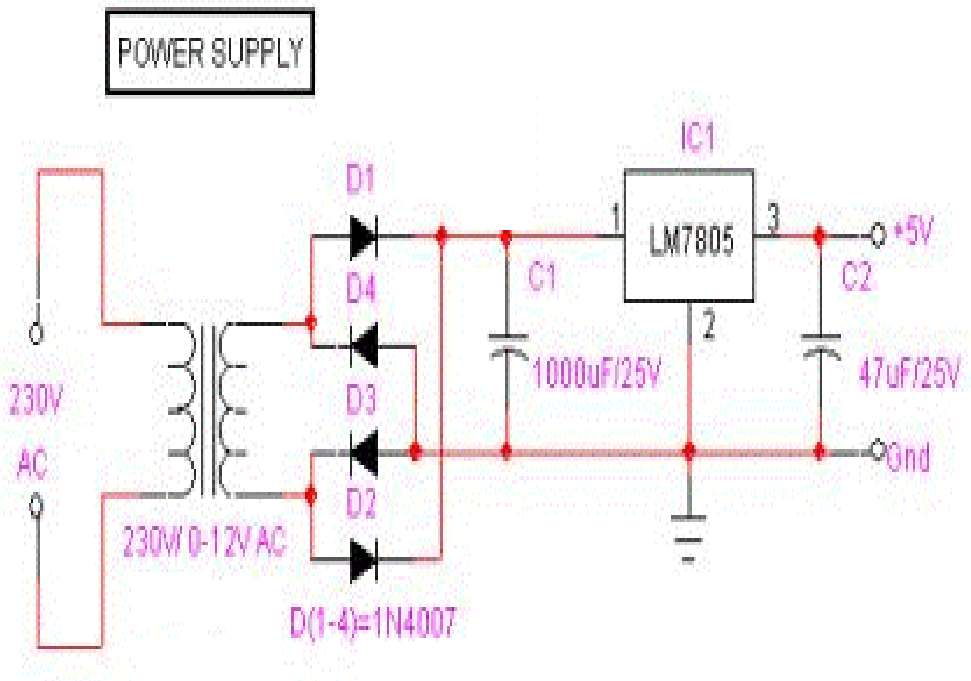


Fig No. 4.5 +5V DC Power Supply

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.

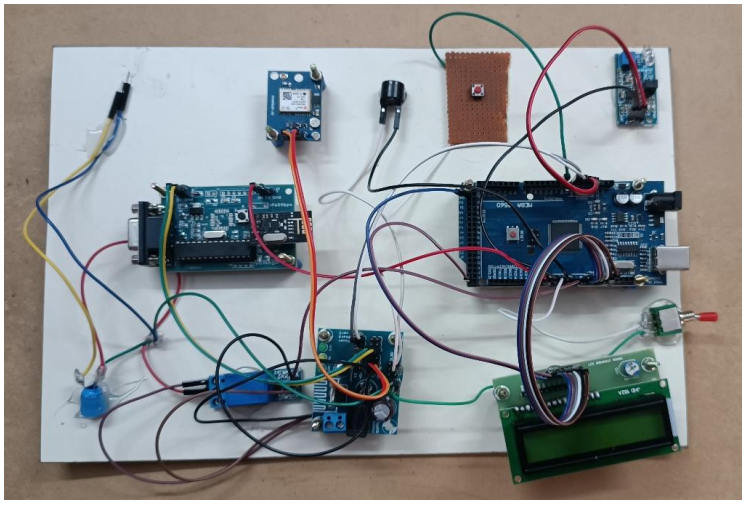
There are two types are buzzers that are commonly available. The one shown here is a simple buzzer which when powered will make a Continuous beep sound, the other type is called a readymade buzzer which will look bulkier than this and will produce a Beep. Beep. Beep. Sound due to the internal oscillating circuit present inside it. But, the one shown here is most widely used because it can be customized 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.

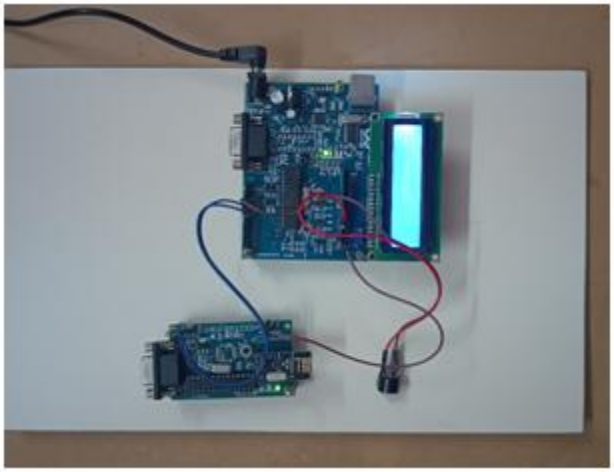
Buzzer Pin Configuration

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

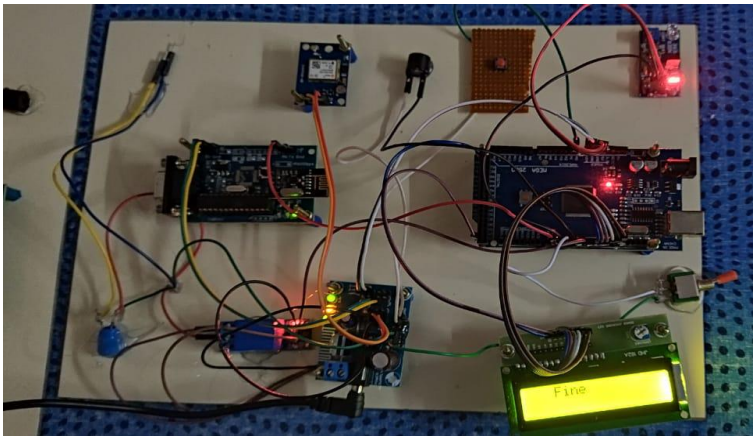
Module Output



Transmitter



Receiver



Transmitter – Manual Mode

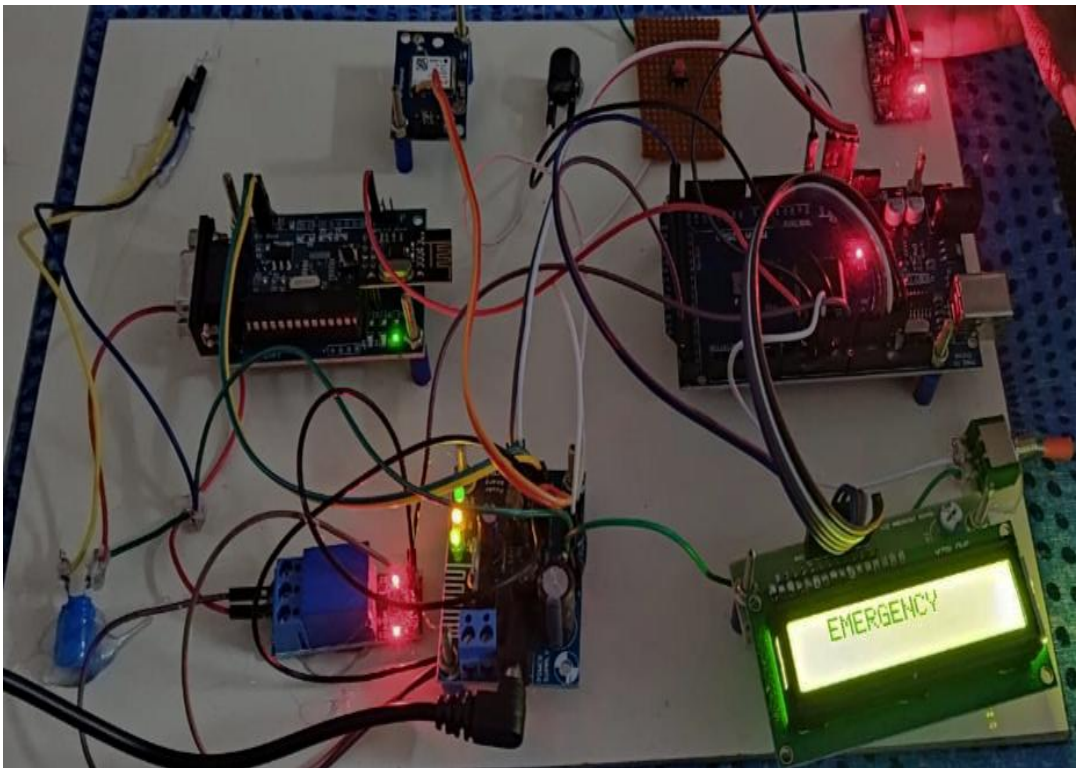


Fig No: Transmitter – Auto Mode

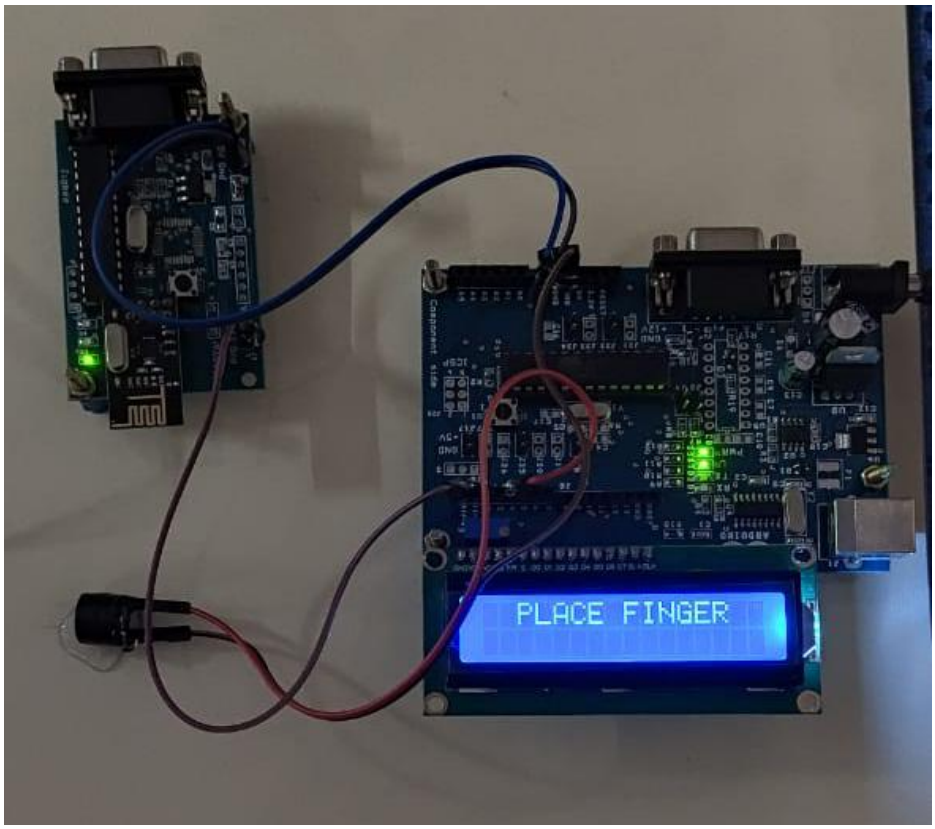


Fig: Receiver – Manual Mode

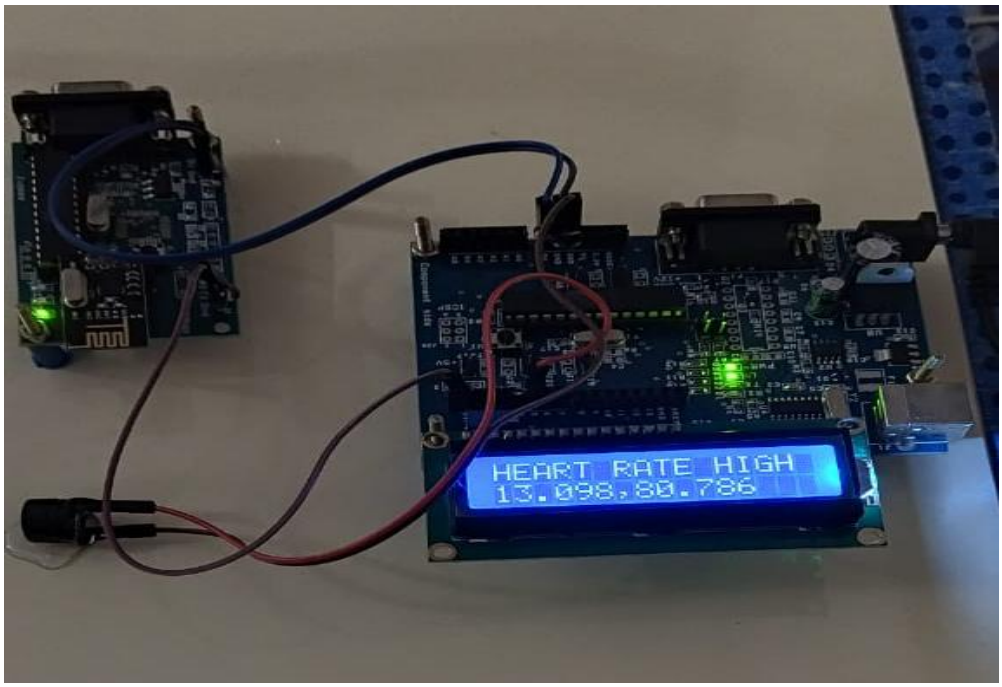


Fig : Receiver – Palpitation Indication & Latitude & Longitude

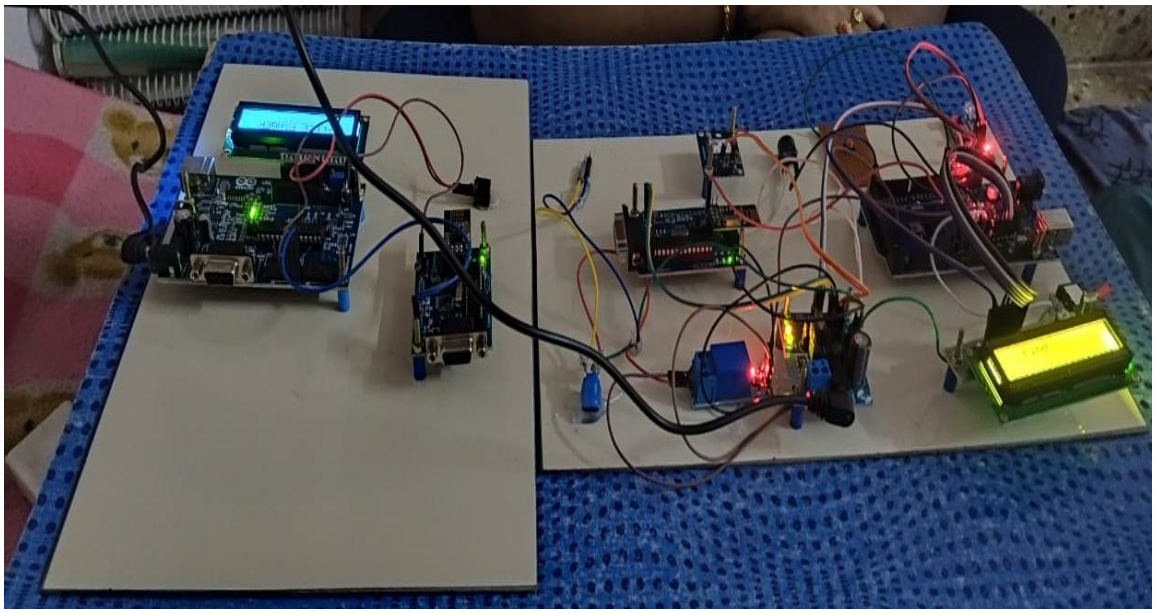


Fig : Transmitter & Receiver (Complete Kit)

CONCLUSION & FUTURE ENHANCEMENT

Women have the potential to open up new avenues and opportunities, providing themselves with greater access to education, employment and entrepreneurship. Women also play a pivotal role in uplifting of our country. Women can revive a surprising approach and offer distinctive perspectives to meet new challenges being posed in our society and design new products. In this project, the 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 technology is the additional part to help this project to send alert messages to relatives. Women safety devices mainly came into existence as

they reduces the amount of risk and brings non human assistance when they are in a dangerous situation and it helps to identify and call on resources for help.

Women's life becomes endangered due to violence and harassment and these factors are keeping them away from participating many social activities. To get non-entangled from this situation, women safety devices are being invented making our people feel safe and sound. These devices are either being invented with or without internet of things. Women's safety device with GPS tracking and alerts using a nerve stimulator is the best solution to the problem. This will provide the location of the person who is in peril to the nearer police stations. The main advantage of this system is that the proposed device uses multiple user communication. There is no loss of mobile data. This device consists of a system that ensures dual alerts in case a woman is attacked or if she thinks she is in trouble. The main objective of this project is to provide a reliable security system for a woman when they feel unsafe. This device has an additional feature, a nerve stimulator which generates non fatal electrical pulses and gives the person a chance to defend themselves. This device is mainly used for women safety. This women safety has become very essential at present and in future also. This device is mainly introduced compactly so that it can be easily carried anywhere. Further this alert system can be monitored through a centralized system. This device gives a faster response when compared to the single user communication safe.

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