A Project Report

on

SAFE SOLE DISTRESS ALARM SYSTEM FOR FEMALE SECURITY USING IOT

Submitted in partial fulfillment of the requirement for the award of the degree of

BACHELOR OF TECHNOLOGY
in
ELECTRONICS AND COMMUNICATION ENGINEERING

Submitted by

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RAMACHANDRA COLLEGE OF ENGINEERING
(Approved by AICTE, New Delhi, Affiliated to JNTUK: Kakinada)
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2021-22

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BONAFIDE CERTIFICATE

This is to certify that this project report entitled **"SAFE SOLE DISTRESS ALARM SYSTEM FOR FEMALE SECURITY USING IOT"** is being submitted by **M. M. V. SATYA KISHORE (18ME1A04A1), S.POOJITHA MANI (19ME5A0414), K. SRAVANI (18ME1A0465) and M. PAVAN KUMAR VARMA (18ME1A0498)** in partial fulfillment of **BACHELOR OF TECHNOLOGY in ELECTRONICS AND COMMUNICATION ENGINEERING** is a bonafide work carried out under my guidance and supervision during the academic year 2021-2022 and it has been found worthy of acceptance according to the requirement of the university.

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DECLARATION

We here by declare that the project work entitled "**SAFE SOLE DISTRESS ALARM SYSTEM FOR FEMALE SECURITY USING IOT**" submitted to JNTU Kakinada, is a record of original work done by us.

This project work is submitted in the partial fulfillment for the degree of Bachelor of Technology in Electronics and Communication Engineering.

The results embedded in this thesis have not been submitted to any other University or Institute for the award of any degree or Diploma

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ABSTRACT

Today inside the current overall circumstance, ladies are defying various issues. This project work proposes a contraption which is a consolidation of different devices as a wearable "wrist band" prototype that unendingly talks with a sensible phone that moves toward the net. This project presents the development of a sole protection of female using Arduino microcontroller which is named as 'SAFE SOLE'. This project covers illustrative bits of knowledge concerning the arrangement and use of wrist band. A trigger, microcontroller (ATmega328), GSM module (SIM800) (subscriber identity module), GPS module (Neo-6M), IoT module (ESP-12E), Buzzer, and Pulse Sensor are included in the contraption. When a woman senses danger during this endeavor, she needs to keep the trigger of the contraption close. At the point where the device is authorized, it uses GPS (Global Positioning System) to track the stream territory and sends an emergency message using GSM (Global Mobile Correspondence System) to the registered adaptive number. The IoT section is used to proficiently follow the globe and inform to the net.

In this project we are adding voice play back module for sending recorded voice to authentication person, when the person in danger condition then automatically send call to that person with voice message and gps location and status of women condition to iot server.

Keywords

Internet of things (IOT), Global Positioning System (GPS), Global System for Mobile Communication (GSM), Pulse sensor, Voice play back module, Push button, Arduino Nano**.**

CHAPTER-1

INTRODUCTION

The protection of women is currently in danger, mainly in India. Many preventive steps are taken by the legislature to prevent these exercises from getting out of hand, but the production rate of these wrongdoings has not been affected at the same time and has remained unchanged. In the workplace, the complexity of lewd behavior is primarily stepped by step. Lewd behavior in a working environment is the unacceptable behavior of a person who causes the following annoyance, offense, or misery A major portion of such cases was occurred to the lady by men performing in a business in a high situation. At regular intervals, women are kidnapped, assaulted like clockwork, 17 endowments passing daily. The anxiety of badgering in contrast to ladies is not just the outdoor situation, but it can also occur in homes, women do not seem to be all that truly fit as compared to men, so any assistance would be a refuge for them in the event of a necessity. Besides, students face events such as child trafficking, seizing, after they hold on to leave or land a college transport. Your advanced transportable will enable you to submit crisis cautions to selected people and also allow people to consider your location in the event that something goes wrong. Often there is also a condition that when females have had a mishap in the night-time night and there is no one to help them, the person will not have the option in such circumstances to tell the circumstances he/she faces. Moreover, they do not have the foggiest idea about the subtleties of critical care and to understand the person where the episode is going on. Nowadays, however, there are various advanced applications and gadgets for women's protection that can be introduced uniquely by barely on one click.

Here we use IOT in this project and about that is discussed in detailed in appendix.

CHAPTER-2

LITERATURE SURVEY

The author [1] mentions Right Now of Items (IoT), wearable gadgets where sensors collect data from the environment are packed with mounted gadgets. At that point, the data is packaged and handed-off to remote areas for inquiry. These early developments, though looking harmless, pose security and safety issues. The topic of the potential and effects of trading such gadgets arises. They review normal structure rehearsals and their security and safety recommendations based on the IoT and wearable gadgets plan stream. Two agents from each classification, the Google Nest Thermostat and the Nike+ Fuel band, taxi are selected as models of how existing security activities in the industry as an untimely idea affect the subsequent gadget and the future security outcomes of the customer. They at that point examine configuration stream improvements, through which security systems can productively be included into gadget, immensely varying from customary practices.

The author [2] explicitly describes features of a portion of the open doors introduced by the emergence of the alleged Internet of Things and wearable innovation and urges approach producers to allow these advances to be produced. The Internet of Things and wearable technology challenges current social, economic, and legal norms. These developments pose a number of questions about safety and security. Discussions arise over specialized initiatives, the interoperability structure and access to sufficient reach to enable the administration of remote systems. Those issues are not managed here. [3] At that point choice to top-down guideline is to manage these worries inventively as they create utilizing blend of instructive endeavors, mechanical strengthening apparatuses, social standards, open and guard dog pressure, industry best practices and self-guideline, straightforwardness, and focused on

requirement of existing lawful norms (particularly torts) varying. [4] The cloud idea that has as of late become the innovative hotly debated issue is incredibly old. Distributed computing for the majority had at last arrived. Cloud stockpiling is a subcategory of the exceptionally unpredictable distributed computing thought. It is a service model in which information is kept up, oversaw, and supported up remotely and made accessible trousers over a system 40; regularly the Internet41, Files Anywhere.com was one of the first companies to offer the distributed storage administration. [5] Their distributed storage administration empowered clients to store information on their servers from anyplace whenever, while additionally having the option to recover the information from anyplace at any time.

CHAPTER-3

EXISTING SYSTEM

They have made up a prototype that can be dressed by any person on their arms as a keen gadget. The band is complex, when women believe its need, the normality needs to tap on the screen twice, or she believes someone is acting inappropriately with her. The gadget will begin sending the current latitudinal and longitudinal co-ordinates location to the Emergency contacts and the PCR after tapping on the computer. The gadget comprises of a signal that radiates blare sound following a moment of genuine alertment of the gadget. The anthem of the ringer comprises to 50 meters of range. The signal will begin blowing after the real actuation of the gadget and the area at that specific time will be addressed. There are two hubs at the highest point of the band that transmit electrical flow as it interacts after the gadget is stepped with any surface. With the assistance of outflow current, the current is formed.

3.1 BLOCK DIAGRAM:

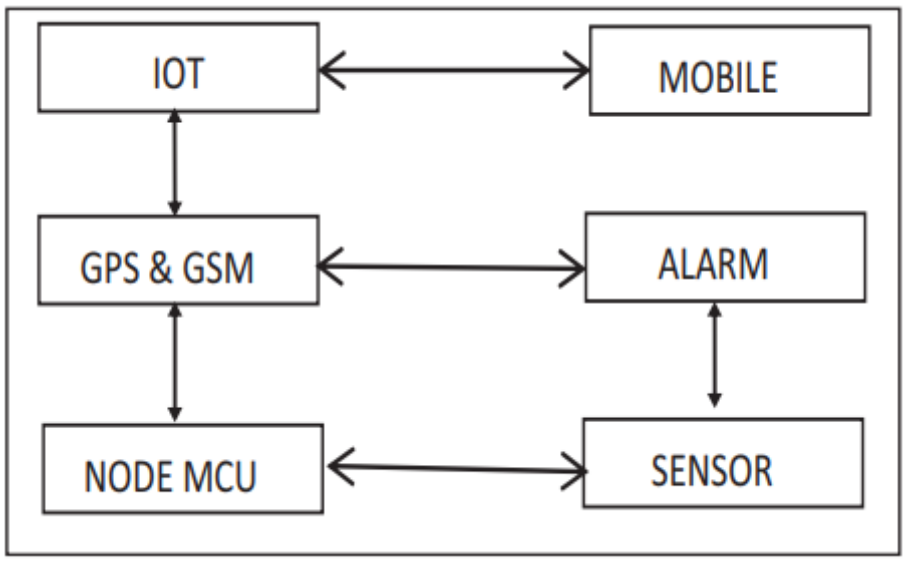


Fig-1

CHAPTER-4

PROPOSED SYSTEM

In addition, the shift of this method Emergency secret is that they are at some point women feel that they are in danger around then they press emergency button that makes a clamorous sound at that time signal. They sent the notification to the registered phone number. When the emergency button is clicked, the device is allowed. It is altered that when the button is pushed, it directs the caution messages quickly like "I'm in danger and it has been included with the voice play back module which sends the voice message , it has been embedded with pulse sensor it monitors the heart beat ranking and it also sends the data directly when the heart rating increases than the permissible limit, This whole data of status is directly uploaded to the cloud through internet and the text and voice message using GSM module, GPS latitude and longitude values to the concerned mobile numbers. The local alerting also intimated using Buzzer Track the phone and we have used a method to tap the quantity button, just in case the catch is sustained time, then message warning, second in case the catch is crushed on various occasions, then message and tone, and third in case the catch is crushed while at that time. This work had proposed when the switch is pressed, the contraption would get sanctioned therefore with in an extraordinarily small quantity of milliseconds. The zone of failure will be pursued immediately and alerts will be sent to emergency contacts. The yelling warning device will start and simultaneously. This work had suggested GPS will follow the stream zone and drive it by methods for SMS to the enrolled emergency contact numbers, it in like manner record sound.

We are proposing a system that, for security purposes, could be useful for women. The proposed system for women includes a wearable

security gadget with a crisis button to send a note and playback module to capture the voice message of aggressors. At the purpose when ladies are in a very tough situation, she will press the catch of the gadget instantly. Area of casualty is followed help of GPS and film gets caught a crisis message with voice message are going to be sent to each important contact. Not only the location but also the status is always monitored on the IoT server like UBIDOTS using internet

4.1 BLOCK DIAGRAM:

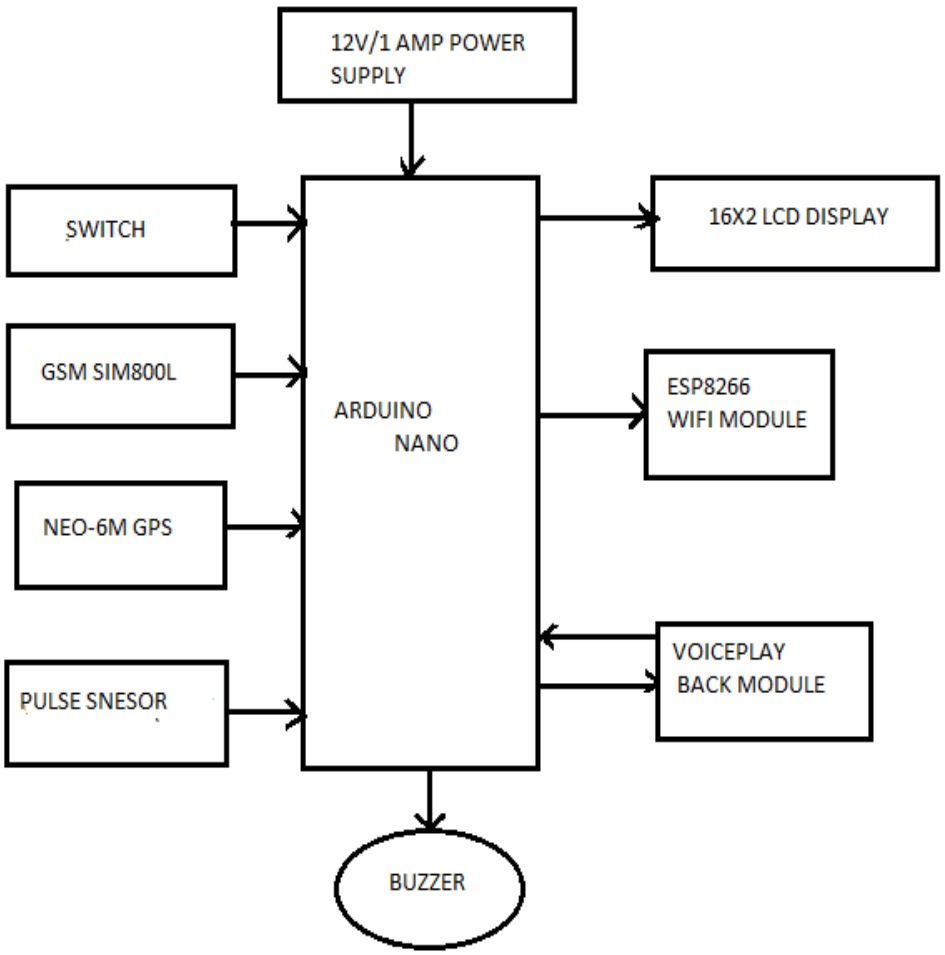


Fig-2

CHAPTER-5

HARDWARE REQUIREMENTS

5.1 ARDUINO NANO:

Arduino Nano is one type of microcontroller board, and it is designed by Arduino.cc. It can be built with a microcontroller like Atmega328. This microcontroller is also used in Arduino UNO. It is a small size board and also flexible with a wide variety of applications. Other Arduino boards mainly include Arduino Mega, Arduino Pro Mini, Arduino UNO, Arduino YUN, Arduino Lilypad, Arduino Leonardo, and Arduino Due. And other development boards are AVR Development Board, PIC Development Board, Raspberry Pi, Intel Edison, MSP430 Launchpad, and ESP32 board.

This board has many functions and features like an Arduino Duemilanove board. However, this Nano board is different in packaging. It doesn't have any DC jack so that the power supply can be given using a small USB port otherwise straightly connected to the pins like VCC & GND. This board can be supplied with 6 to 20volts using a mini USB port on the board.

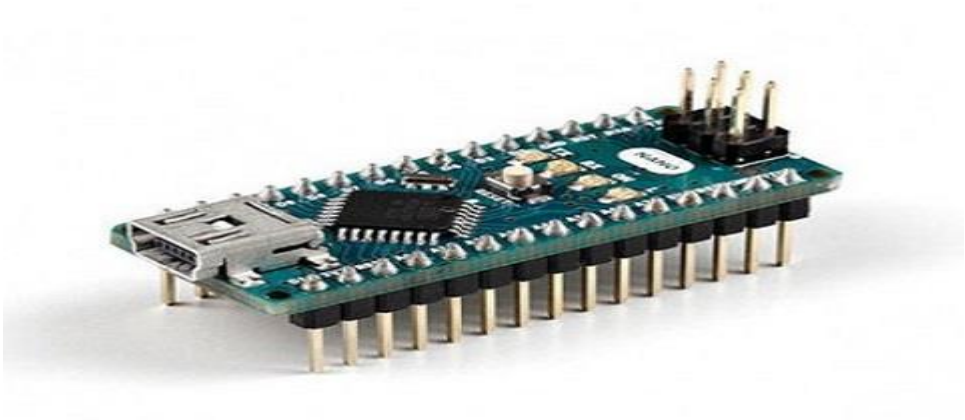


Fig-3

The features of an Arduino nano mainly include the following.

ATmega328P Microcontroller is from 8-bit AVR family

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

Arduino Nano Pinout

Arduino nano pin configuration is shown below and each pin functionality is discussed below.

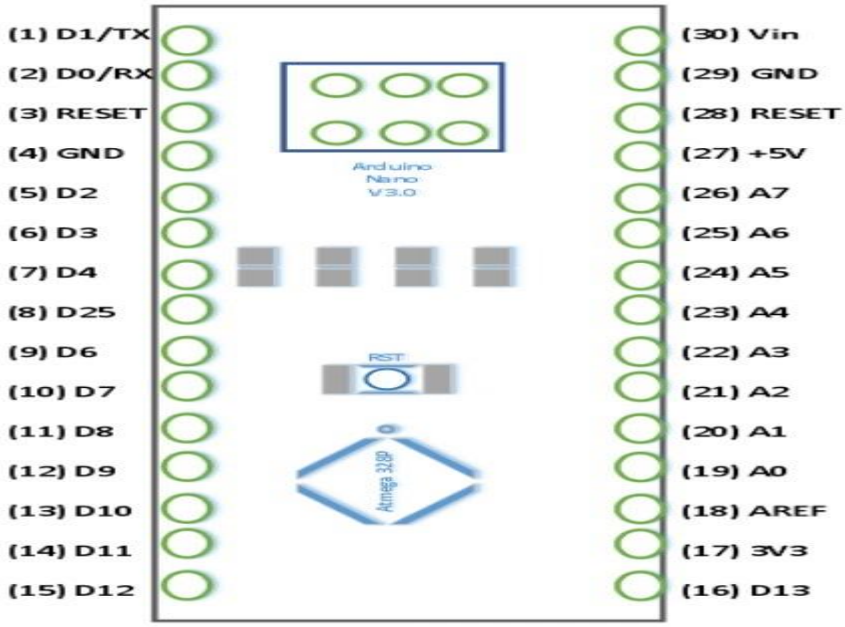


Fig-4

Arduino-nano-pinout

Difference between Arduino UNO and Arduino Nano

The Arduino Nano board is similar to an Arduino UNO board including similar microcontroller like Atmega328p. Thus they can share a similar program. The main difference between these two is the size. Because Arduino Uno size is double to nano board. So Uno boards use more space on the system. The programming of UNO can be done with a USB cable whereas Nano uses the mini USB cable. The main differences between these two are listed in the following table.

Specifications	Arduino Uno	Arduino Nano
Processor	ATmega328P	ATmega328P
Input Voltage	5V / 7-12V	5V / 7-12V
Speed of CPU	16 MHz	16 MHz
Analog I/O	6 / 0	8 / 0
Digital IO/PWM	14 / 6	14 / 6
EEPROM / SRAM [kB]	1 / 2	1 / 2
Flash	32	32
USB	Regular	Mini
USART	1	1

Table-1

Arduino Nano Communication

The communication of an Arduino Nano board can be done using different sources like using an additional Arduino board, a computer, otherwise using microcontrollers. The microcontroller using in Nano board (ATmega328) offers serial communication (UART TTL). This can be accessible at digital pins like TX, and RX. The Arduino software comprises of a serial monitor to allow easy textual information to transmit and receive from the board.

The TX & RX LEDs on the Nano board will blink whenever information is being sent out through the FTDI & USB link in the direction of the computer. The library-like Software Serial allows serial communication on any of the digital pins on the board.

Arduino Nano Programming

The programming of an Arduino nano can be done using the Arduino software. Click the Tools option and select the nano board. Microcontroller ATmega328 over the Nano board comes with preprogrammed with a boot loader. This boot loader lets to upload new code without using an exterior hardware programmer.

Applications of Arduino Nano

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

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

ATmega 328P

The Atmel 8-bit AVR RISC-based microcontroller combines 32 kB ISP flash memory with read-while-write capabilities, 1 kB EEPROM, 2 kB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serialinterface, SPI serial port, 6-channel 10-bit A/D converter (8-channels

in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz.

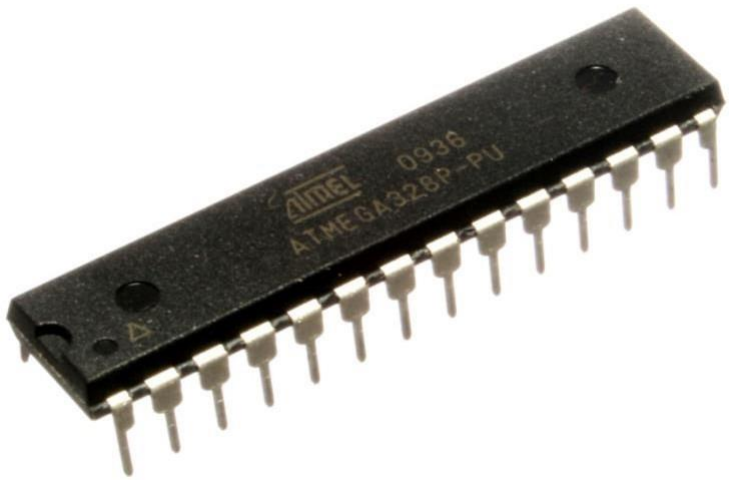


Fig-5

5.2 LCD:

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, settingthe 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.

They are used in a wide range of applications including: computer monitors, television, instrument panels, aircraft cockpit displays, signal, etc. They are common in consumer devices such as video players, gaming devices, clocks, watches, calculators, and telephones. LCDs have displaced cathode ray tube (CRT) displays in most applications. They are usually more compact, lightweight, portable, less expensive, more reliable, and easier on the eyes. They are available in a wider range of screen sizes than CRT and plasma displays, and since they do not use phosphors, they cannot suffer image burn-in.

Each pixel of an LCD typically consists of a layer of molecules aligned between two transparent electrodes, and two polarizing filters the axes of transmission of which are (in most of the cases) perpendicular to each other. With no actual liquid crystal between the polarizing filters, light passing through the first filter would be blocked by the second (crossed) polarizer. In most of the cases the liquid crystal has double refraction

Lcd display:

LCD with top polarizer removed from device and placed on top, such that the top and bottom polarizer's are parallel.

Fig-6

The optical effect of a twisted nematic device in the voltage-on state is far less dependent on variations in the device thickness than that in the voltage-off state. Because of this, these devices are usually operated between crossed polarizer such that they appear brightwith no voltage . These devices can also be operated between parallel polarizer, in which case the bright and dark states are reversed. The voltage-off dark state in this configuration appears blotchy, however, because of small variations of thickness across the device.

Both the liquid crystal material and the alignment layer material contain ionic compounds. If an electric field of one particular polarity is applied for a long period of time, this ionic material is attracted to the surfaces and degrades the device performance. This is Avoided either by applying an alternating current or by reversing the polarity of the electricfield as the device is addressed.

Pin diagram:

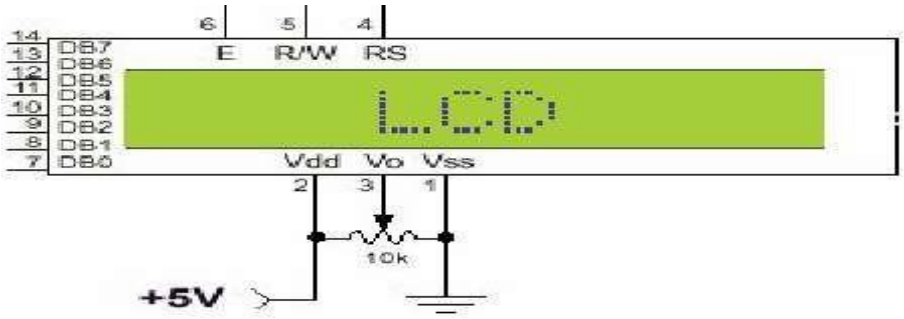


Fig-7

Most LCDs with 1 controller has 14 Pins and LCDs with 2 controller has 16 Pins (two pins are extra in both for back-light LED connections).

PIN DESCRIPTION OF LCD

PIN	SYMBOL	FUNCTION
1	Vss	Power Supply(GND)
2	Vdd	Power Supply(+5V)
3	Vo	Contrast Adjust
4	RS	Instruction/Data Register Select
5	R/W	Data Bus Line
6	E	Enable Signal
7-14	DB0-DB7	Data Bus Line
15	A	Power Supply for LED B/L(+)
16	K	Power Supply for LED B/L(-)

5.3ESP8266(Wi-Fi Module):

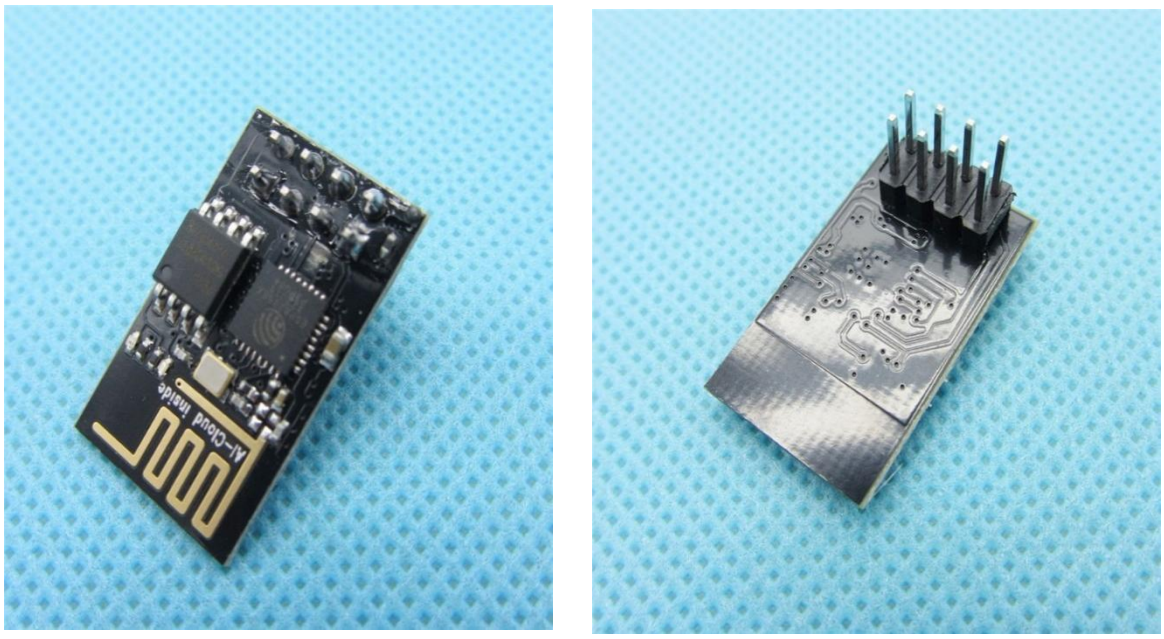


Fig-8

ESP8266 is a highly integrated chip designed for the needs of a new connected world. It offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another applicationprocessor.

ESP8266 has powerful on-board processing and storage capabilities that allow it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, and the entire solution, including front-end module, is designed to occupy minimal PCB area.

Espressif's ESP8266EX delivers highly integrated Wi-Fi SoC solution to meet users' continuous demands for efficient power usage, compact design and reliable performance in the Internet of Things industry. With the complete and self-contained Wi-Fi networking capabilities, ESP8266EX can

perform either as a standalone application or as the slave to a host MCU. When ESP8266EX hosts the application, it promptly boots up from the flash. The integrated highspeed cache helps to increase the system performance and optimize the system memory. Also, ESP8266EX can be applied to any microcontroller design as a Wi-Fi adaptor through SPI/SDIO or UART interfaces.

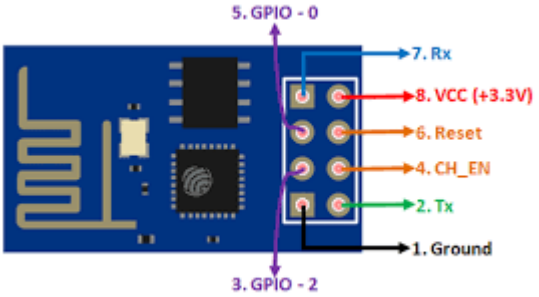


Fig-9

The Wi-Fi module shown above is attached to the STM32 board through the UART communication interface, and it is used to transmit and receive data via Wi-Fi, where it is connected to the hotspot using the user's ssid and password, which is contained in the application. Instead of bulky circuits, the GPIO pins of the ESP8266 are utilised for control and monitoring. In this work, we use this wi—fi module to monitor the state of the water monitoring system.

5.4 PUSH BUTTON

A hand switch / Pushbutton switch is exactly what the name implies: an electrical switch actuated by a person's hand motion. These may take the form of toggle, pushbutton, rotary, pull-chain, etc.A common form of industrial pushbutton switch looks something like this:

The threaded neck inserts through a hole cut into a metal or plastic panel, with a matching nut to hold it in place. Thus, the button faces the human operator(s) while the switch contacts reside on the other side of the panel.

When pressed, the downward motion of the actuator breaks the electrical bridge between the two NC contacts, forming a new bridge between the NO contacts:

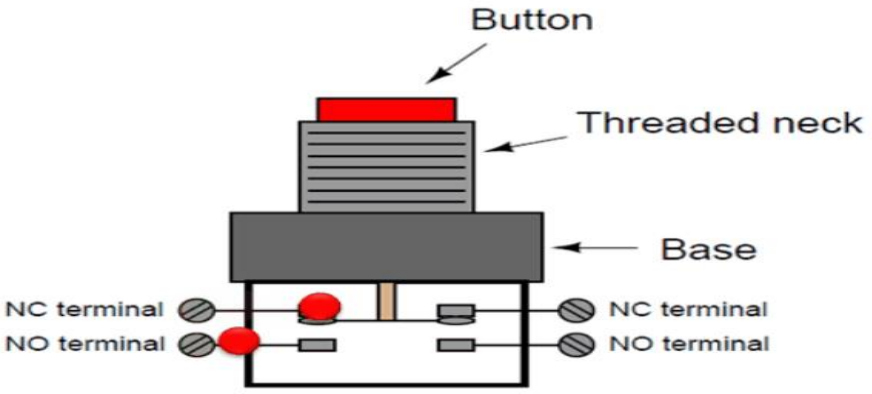
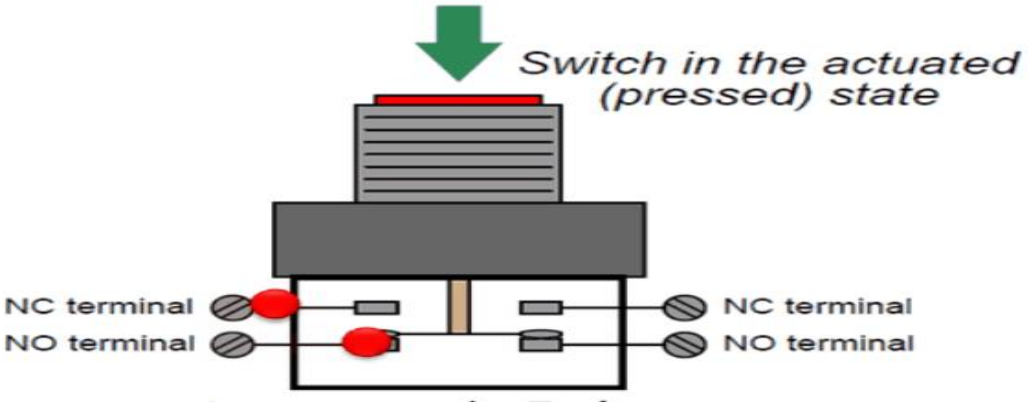


Fig-10

Fig-11



The schematic diagram symbol for this type of switch looks much like the real thing, with the normally-closed contact set on top and the normally-open contact set below:

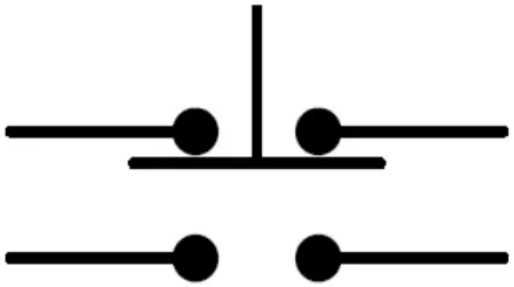


Fig-12

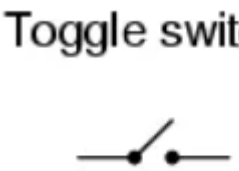
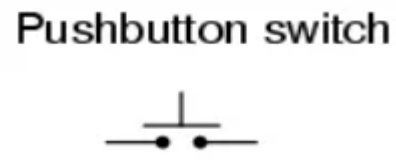


Fig-13

Toggle switches are actuated by a lever angled in one of two or more positions. The common light switch used in household wiring is an example of a toggle switch.

Most toggle switches will come to rest in any of their lever positions, while others have an internal spring mechanism returning the lever to a certain *normal* position, allowing for what is called "momentary" operation.



Pushbutton switches are two-position devices actuated with a button that is pressed and released. Most pushbutton switches have an internal spring

mechanism returning the button to its "out," or "unpressed," position, for momentary operation.

Some pushbutton switches will latch alternately on or off with every push of the button. Other pushbutton switches will stay in their "in," or "pressed," position until the button is pulled back out. This last type of pushbutton switches usually have a mushroom-shaped button for easy push-pull action.

5.5 GSM Technology:

Definition of GSM:

GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services.

GSM (Global System for Mobile communication) is a digital mobile telephone system that is widely used in Europe and other parts of the world. GSM uses a variation of Time Division Multiple Access (TDMA) and is the most widely used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1,800 MHz frequency band. It supports voice calls and data transfer speeds of up to 9.6 kbit/s, together with the transmission of SMS (Short Message Service).

GSM-900 uses 890–915 MHz to send information from the mobile station to the base station (uplink) and 935–960 MHz for the other direction (downlink), providing 124 RF channels (channel numbers 1 to 124) spaced at 200 kHz. Duplex spacing of 45 MHz is used. In some countries the GSM-900 band has been extended to cover a larger frequency range. This 'extended GSM', E-GSM, uses 880–915 MHz (uplink) and 925–960 MHz (downlink), adding 50 channels (channel numbers 975 to 1023 and 0) to the original GSM-900 band.

GSM Modem:

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 dial- up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radiowave

Fig-15

GSM SIM300 MODEM

A GSM modem can be an external device or a PC Card / PCMCIA Card. Typically, an external GSM modem is connected to a computer through a serial cable or a USB cable. A GSM modem in the form of a PC Card / PCMCIA Card is designed for use with a laptop computer. It should be inserted into one of the PC Card / PCMCIA Card slots of a laptop computer. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate.

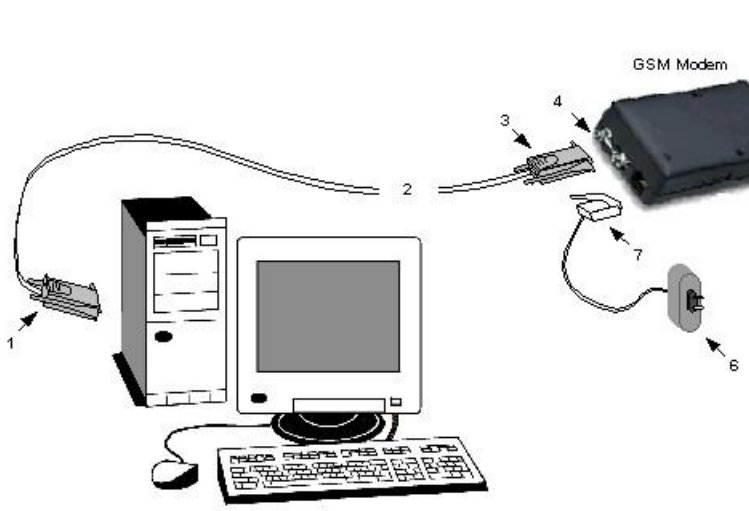
A SIM card contains the following information:

- Subscriber telephone number (MSISDN)
- International subscriber number (**IMSI, International Mobile Subscriber Identity)**
- State of the SIM card
- Service code (operator)
- Authentication key

- PIN (*Personal Identification Code*)
- PUK (*Personal Unlock Code*)
- Reading, writing and deleting SMS messages.
- Sending SMS messages.
- Monitoring the signal strength.
- Monitoring the charging status and charge level of the battery.

Reading, writing and searching phone book entry

Establishing connection between PC and GSM modem



1. Serial cable connect to PC
2. Serial Cable
3. Serial cable conenct to GSM modem
4. Modem's Serial Port
5. Antenna
6. Adapter for power
7. Plugin for the power supply to the modem

The number of SMS messages that can be processed by a GSM modem per minute is very low i.e., about 6 to 10 SMS messages per minute.

Introduction to AT Commands

AT commands are instructions used to control a modem. AT is the abbreviation of Attention. Every command line starts with "AT" or "at". That's the reason, modem commands are called AT commands. Many of the commands that are used to control wired dial- up modems, such as ATD (Dial), ATA (Answer), ATH (Hook control) and ATO (Return to online data state) are also supported by GSM modems and mobile phones.

Besides this common AT command set, GSM modems and mobile phones support an AT command set that is specific to the GSM technology, which includes SMS-related commands like AT+CMGS (Send SMS message), AT+CMSS (Send SMS message from storage), AT+CMGL (List SMS messages) and AT+CMGR (Read SMS messages).

The number of SMS messages that can be processed by a GSM modem per minute is very low i.e., about 6 to 10 SMS messages per minute.

Some of the tasks that can be done using AT commands with a GSM modem or mobilephone are listed below:

- Get basic information about the mobile phone or GSM modem. For example, name of manufacturer (AT+CGMI), model number (AT+CGMM), IMEI number (International Mobile Equipment Identity) (AT+CGSN) and software version (AT+CGMR).
- Get basic information about the subscriber. For example, MSISDN (AT+CNUM) and IMSI number (International Mobile Subscriber Identity) (AT+CIMI).
- Get the current status of the mobile phone or GSM/GPRS modem. For example, mobile phone activity status (AT+CPAS), mobile network registration status (AT+CREG), radio signal strength (AT+CSQ), battery charge

level and battery charging status (AT+CBC).

- Establish a data connection or voice connection to a remote modem (ATD, ATA, etc).
- Send and receive fax (ATD, ATA, AT+F*).
- Send (AT+CMGS, AT+CMSS), read (AT+CMGR, AT+CMGL), write (AT+CMGW)or delete (AT+CMGD) SMS messages and obtain notifications of newly received SMS messages (AT+CNMI).
- Read (AT+CPBR), write (AT+CPBW) or search (AT+CPBF) phonebook entries.
- Perform security-related tasks, such as opening or closing facility locks (AT+CLCK), checking whether a facility is locked (AT+CLCK) and changing passwords (AT+CPWD).

(Facility lock examples: SIM lock [a password must be given to the SIM card every time the mobile phone is switched on] and PH-SIM lock [a certain SIM card is associated with the mobile phone. To use other SIM cards with the mobile phone, a password must be entered.])

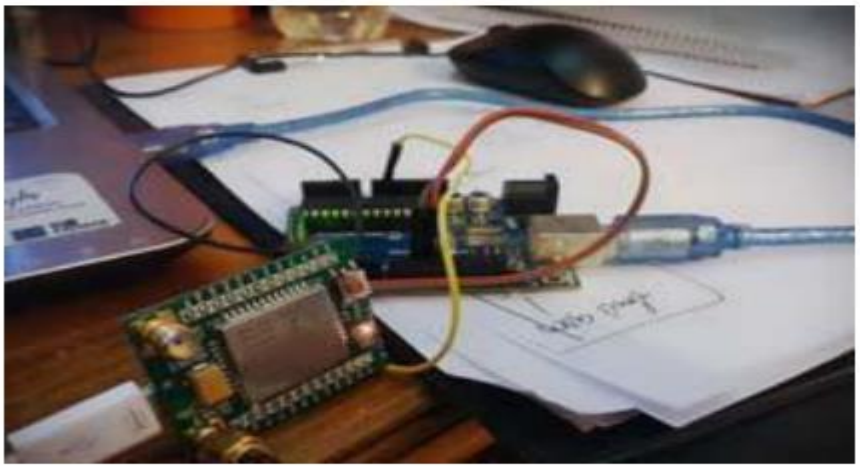
5.6 GPS Tracker:

GPS Stands for global positioning system and is a network system that uses satellite network to provide position speed and time of any GPS Receiver. There are a wide range of satellites orbiting around the earth. The GPS Receiver tracks at least four or more than four satellites from any given position on earth surface and figure out distance of these satellites and use these information to achieve its own location on earth. The better the signals or more satellites it can track the more accurate positioning is achieved.

In this system, we tried to prevent overloading of the ship in sensor applications. But even after prevention of overloading the ships are vulnerable to extreme weathers. If any kind of disaster happens the system can track the last

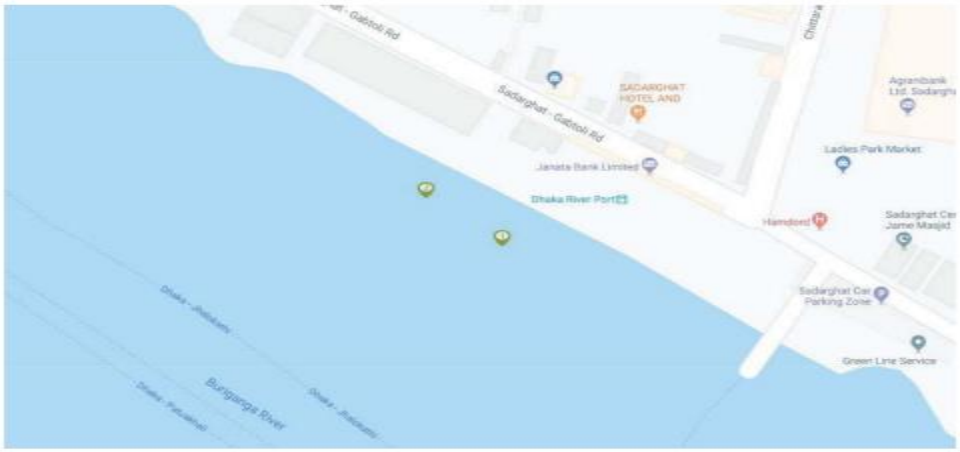
known location of the ship. The ships are tracked real time in the system. These are tracked using the GPS module installed in the system. If any kind of disaster happens, the last location of the system and notify other nearby ships - since all the nodes are connected to a central hub- to help reduce the casualties and operate rescue operations if needed.

Fig-17



GPS circuit

Here, we used AI GPS Module connected with the micro controller with baud range 9600 as the figure shows above. The GPS Tracker is used with TinyURL Library to get the location information in longitude and latitude format. This information is then sent to the control center for plotting the ships as nodes in Google maps. An instance is shown in the figure b



From the GPS module the co-ordinates are displayed in real time using serial communication. The data of the location are shown in figure below.

```
OK
Waiting for GPS fix.....................
AT+GPS=0

OK
loc: 23.758768, 90.357910
AT+GPS=1

OK
Waiting for GPS fix.....................
AT+GPS=0

OK
loc: 23.758817, 90.357994
```

: Latitude and Longitude

5.7 VOICE RECORD MODULE :

Voice Record Module is base on ISD1820, which a multiple-message record/playback device. It can offers true single-chip voice recording, no-volatile storage, and playback capability for 8 to 20 seconds.

The sample is 3.2k and the total 20s for the Recorder. Thismodule use is very easy which you could direct control by push button on board or by Microcontroller such as Arduino, STM32, ChipKit etc. Frome these, you can easy control record , playback and repeat and so on.

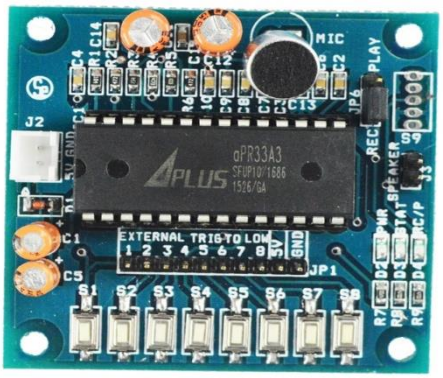


Fig-19

Features

- Push-button interface, playback can be edge or level activated
- Automatic power-dwon mode
- On-chip 8Ω speaker driver
- Signal 3V Power Supply
- Can be controlled both manually or by MCU
- Sample rate and duration changable by replacing a single resistor
- Record up to 20 seconds of audio
- Dimensions: 37 x 54 mm

If you want change record duration, an external resistor is necessary to select the record duration and sampling frequency, which can range from 8 - 20 seconds (4-12kHz sampling frequency). The Voice Record Module of our provide default connect 100k resistor through P2 by short cap. So the default record duration is 10s.

1. **PLAYE** - Playback, Edge-activated:When a HIGH-going transition is detected on continues until an End-of-Message (EOM) marker is encountered or the end of the memory space is reached.
2. **REC** - The REC input is an active-HIGH record signal.The device records whenever REC is HIGH. This pin must remain HIGH for the duration of the recording. REC takes precedence over either playback (PLAYL or PLAYE) signal.
3. **Speaker Outputs** - The SP+ and SP- pins provide direct drive for loudspeakers with impedances as low as 8Ω.
4. **MIC** - Microphone Input, the microphone input transfers its signals to the on-chip preamplifier.
5. **REPLAY** - loop play the record.

6. **FT** - Feed Through: This mode allows use of the speaker drivers for external signals.
7. **ISD1820** - IC chip
8. **Lead Out IO** - VCC LED NC FT GND / VCC REC PLAYE PLAYL GND
9. **P2** - default short connection ROSC to 100kΩ resistance, that's means record duration is 10s
10. **PLAYL** - Playback, Level-activated, when this input pin level transits for LOW to HIGH, a playback cycle is initiated.

5.8PULSE SENSOR:

Knowing the heart rate data is very helpful while doing exercises, actively studying, etc. But measuring heart rate is a difficult problem. So, a pulse sensor is used to overcome this problem. This sensor is a plug & play heart-rate sensor, utilized by artists, students, athletes, mobile & game developers, makers who desire to know the existing heart-rate data to use in their live projects.

This sensor merges a simple optical heart rate sensor through a circuit. This circuit is used for noise cancellation & amplification to get consistent pulse readings very quickly. It uses 4mA of power at 5V, so it is very useful in mobile applications. This article discusses an overview of pulse sensors and their working with applications.

What is Pulse Sensor?

A plug-and-play sensor that is used to detect the heart rate data is known as a pulse sensor. This sensor is used by athletes, students, mobile & game developers, etc. This sensor clips on an earlobe or a fingertip by connecting right to an Arduino board through jumper cables. In real-time, the pulse rate can be monitored through an open-source monitoring app.

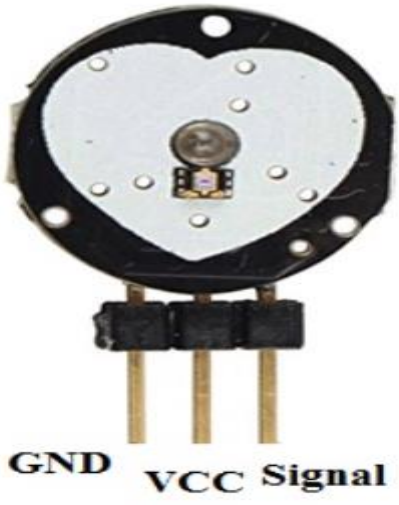


Fig-20

Here, a pulse signal is a variation within the blood level that happens when the heart forces the blood & a detector monitors the change in the blood volume. There are four methods to determine heart rate like a photoelectric pulse wave, electrocardiogram, phonocardiography & BP measurement but the pulse sensor uses the photoelectric technique.

Pin Configuration

The **pulse sensor pin configuration** includes three pins which are discussed below.

- **Pin1 (Ground):** This is a black color wire, used to connect to the GND terminal of the system
- **Pin2 (Vcc):** This is a red color wire, used to connect to +3.3V/+5V voltage supply
- **Pin3 (Signal):** This is a purple color wire, used to connect the output signal which is pulsating

Features & Specifications

The **features of the pulse sensor** include the following.

- This is a heart rate/biometric pulse rate detecting sensor
- This is a plug & play type sensor

- The operating voltage of this sensor is +5V/+3.3V
- Consumption of current is 4mA
- Length is 0.625”
- Width is 0.125
- Integral Amplification
- Circuit for cancellation of noise

The **specifications of the pulse sensor** include the following.

- The maximum current is 100mA
- Heartbeat deduction output LED
- VCC is +5v DC through high-quality regulation
- Light source – 660nm super Red LED
- Output data level is 5V TTL

Pulse Sensor Working Principle

The working principle of the pulse sensor is extremely simple. This sensor includes two faces where the first face is connected with an LED including an ambient light sensor whereas another face is connected with circuitry. This circuit aids in noise cancellation as well as amplification.

On the front side, the LED is connected to a vein of a human body (ear tips or Fingertip), however, it should be located directly on top of a vein. The LED produces light that will drop directly on the vein.

5.9 POWER SUPPLY:

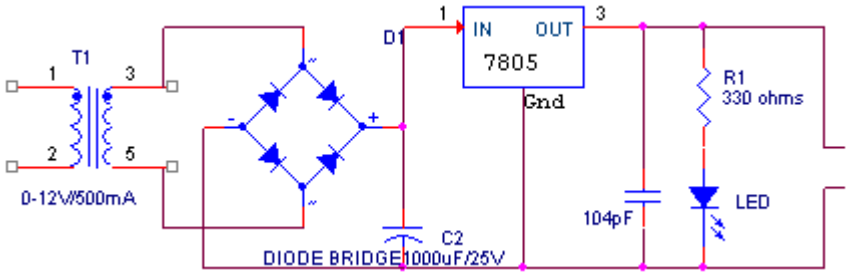


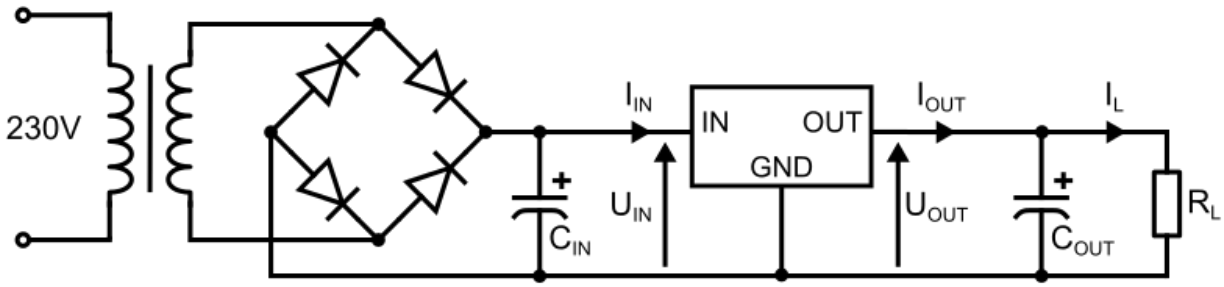
Fig-21

We know that there are different types of electrical & electronic circuits which use a DC power supply. Universally, we cannot use the DC

batteries due to expensive as well as require replacement when discharged. In this situation, we require a circuit which can change AC supply to DC supply. A rectifier filter circuit includes a normal **DC power supply**. The normal DC power supply o/p remains stable if the load is contrast. Although in several electronic circuits it is extremely significant to maintain the DC power supply constant irrespective of alternative AC supply.

What is Regulated Power Supply?

The **IC Regulated power supply (RPS)** is one kind of electronic circuit, designed to provide the stable DC voltage of fixed value across load terminals irrespective of load variations. The main function of the regulated power supply is to convert an unregulated alternating current (AC) to a steady direct current (DC). The RPS is used to confirm that if the input changes then the output will be stable. This power supply is also called a linear power supply, and this will allow an AC input as well as provides steady DC output. Please refer the link to know more about – Power Supply Classification and Its Various Types

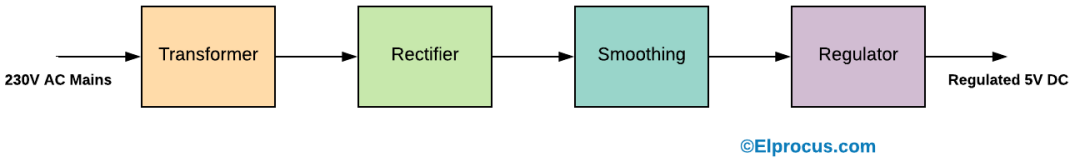


Regulated Power Supply Circuit Fig-22

Block Diagram of Regulated Power Supply

The **block diagram of a regulated power supply** mainly includes a **step-down transformer**, a rectifier, a DC filter, and a regulator.

The **Construction & working of a regulated power supply** is discussed below.



Regulated Power Supply Block Diagram FIG-23

Transformers.

A transformer uses the principles of electromagnetism to change one A.C. voltage level to another. Faraday's work in the 19th century showed that a changing current in a conductor (e.g. a transformer primary winding) sets up a changing magnetic field around the conductor. If another conductor (secondary winding) is placed within this changing magnetic field a voltage will be induced into that winding.

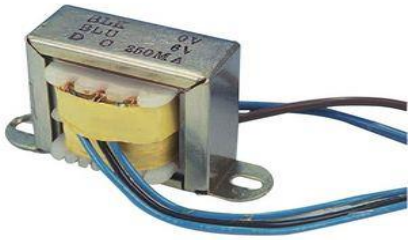


Fig-24

Turns Ratio.

Faraday also calculated that the voltage induced into the secondary winding would have a magnitude that depends on the TURNS

RATIO of the transformer. i.e. If the secondary winding has half the number of turns of the primary winding, then the secondary voltage will be half the voltage across the primary winding. Likewise, if the secondary winding has twice the number of turns of the primary winding, the secondary voltage will be double the primary voltage.

Power ratio

Because the transformer is a passive component, (it has no external power supply) it cannot produce more power out from its secondary than is applied to its primary. Therefore if the secondary voltage is greater than the primary voltage by a particular amount, the secondary current will be smaller than the primary current by a similar amount, i.e. If the voltage is doubled the current will be halved.

Transformer Losses.

The formulae in Fig. 11.1.1 relate to an ideal transformer, i.e. a transformer with no power losses, in which, Primary volt amperes = Secondary volt amperes.

While practical transformers can be extremely efficient, some losses will occur because not all of the magnetic flux produced by the primary winding will link with the secondary winding. The power losses that occur in a transformer are of three types:

1. Copper Losses.

These losses can also be called winding losses or I2R losses, because they can occur in windings made from metals other than copper. The losses become evident as heat, generated in the (copper) wire windings as they dissipate power due to the resistance of the wire.

The power loss in a transformer winding can be calculated by using the current in the winding and its resistance, in formula for power, P = I2R. This formula is the reason copper losses are sometimes called I2R losses. To minimise the losses the resistance of the winding must be kept low, using wire of suitable cross sectional area and low resistivity.

2. Hysteresis losses.

Each time the alternating current reverses (once each cycle), tiny "magnetic domains" within the core material are reversed. These are physical changes within the core material and take up some energy. The amount of energy used depends on the "reluctance" of the core material; in large cores of power transformers where hysteresis loss maybe a problem it is largely overcome by using special low reluctance "grain oriented" steel as the core material.

3. Eddy Current losses.

Because the iron or steel core is an electrical conductor as well as a magnetic circuit, the changing current in the primary will tend to set up an EMF within the core as well as in the secondary winding. The currents induced into the core will oppose the changes of magnetic field taking place in the core. For this reason these eddy currents must be kept as small as possible. This is achieved by dividing the metal core into thin sheets or "laminations", each one insulated from the others by an insulating coat of lacquer or oxide. Laminated cores greatly reduce the formation of eddy currents without affecting the magnetic properties of the core.

In high frequency transformers eddy current losses are reduced by using a core made of a ceramic material containing a large proportion of tiny metal particles, iron dust or manganese zinc. The ceramic insulates the

metal particles from each other, giving a similar effect to laminations, and performing better at high frequencies.

Due to the ways of reducing losses described above, practical transformers closely approach the ideal in performance. In large power transformers, efficiencies of about 98% can be achieved. Therefore for most practical calculations, it can be assumed that a transformer is "Ideal" unless its losses are specified.

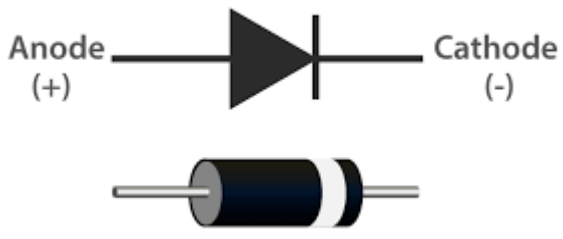
Rectifier

A rectifier is an electrical device used to convert alternating current into direct current. It can be a full wave rectifier as well as half wave rectifier with the help of a transformer by a bridge rectifier otherwise center tapped secondary winding. However, the rectifier's o/p can be variable.

Many electronic circuits require a rectified DC power supply to power various electronic basic components from the available AC mains supply. Rectifiers are used to convert an AC power to a DC power. Among the rectifiers, the bridge rectifier is the most efficient rectifier circuit.

We can define bridge rectifiers as a type of full-wave rectifier that uses four or more diodes in a bridge circuit configuration to efficiently convert alternating (AC) current to a direct (DC) current. In the next few sections, let us learn more about its construction, working, and more.

Diode



diode, an electrical component that allows the flow of current in only one direction. In circuit diagrams, a diode is represented by a triangle with a line across one vertex.

The most common type of diode uses a *p*-*n* junction. In this type of diode, one material (*n*) in which electrons are charge carriers abuts a second material (*p*) in which holes (places depleted of electrons that act as positively charged particles) act as charge carriers. At their interface, a depletion region is formed across which electrons diffuse to fill holes in the *p*-side. This stops the further flow of electrons. When this junction is forward biased (that is, a positive voltage is applied to the *p*-side), electrons can easily move across the junction to fill the holes, and a current flows through the diode. When the junction is reverse biased (that is, a negative voltage is applied to the *p*-side), the depletion region widens and electrons cannot easily move across. The current remains very small until a certain voltage (the breakdown voltage) is reached and the current suddenly increases.

Construction

The construction of a bridge rectifier is shown in the figure below. The bridge rectifier circuit is made of four diodes D_1, D_2, D_3, D_4, and a load resistor R_L. The four diodes are connected in a closed-loop configuration to efficiently convert the alternating current (AC) into Direct Current (DC). The main advantage of this configuration is the absence of the expensive center-tapped transformer. Therefore, the size and cost are reduced.

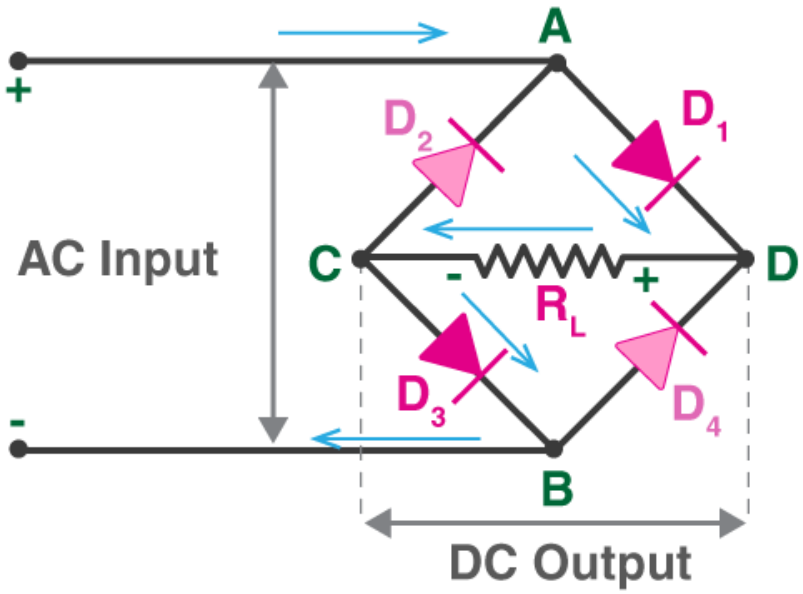


Fig-26

Working

When an AC signal is applied across the bridge rectifier, during the positive half cycle, terminal A becomes positive while terminal B becomes negative. This results in diodes D_1 and D_3 to become forward biased while D_2 and D_4 become reverse biased.

The current flow during the positive half-cycle is shown in the figure below:

During the negative half-cycle, terminal B becomes positive while the terminal A becomes negative. This causes diodes D_2 and D_4 to become forward biased and diode D_1 and D_3 to be reverse biased.

The current flow during the negative half cycle is shown in the figure below:

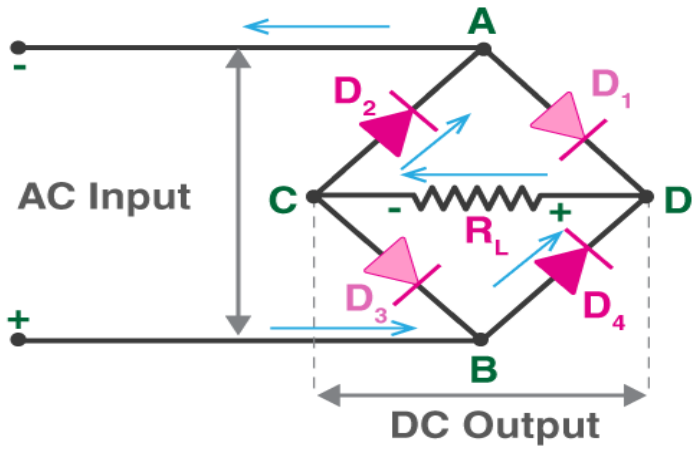


Fig-27

From the figures given above, we notice that the current flow across load resistor R_L is the same during the positive half cycle and the negative half cycles. The output DC signal polarity may be either completely positive or negative. In our case, it is completely positive. If the direction of diodes is reversed then we get a complete negative DC voltage.

Thus, a bridge rectifier allows electric current during both positive and negative half cycles of the input AC signal.

The output waveforms of the bridge rectifier are shown in the below figure-28

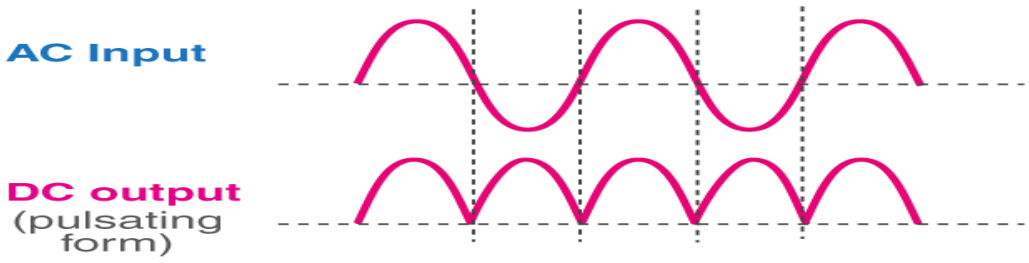


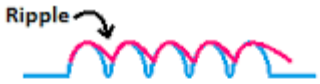
Fig-28

Ripple Factor

The smoothness of the output DC signal is measured by a factor known as the ripple factor. The output DC signal with fewer ripples is considered a smooth DC signal while the output with high ripples is considered a high pulsating DC signal.

Mathematically, the ripple factor is defined as the ratio of ripple voltage to the pure DC voltage.

The ripple factor for a bridge rectifier is given by



Formula to Find
Ripple Factor of Bridge Rectifier:

$$\gamma = \sqrt{\left(\frac{V_{rms}}{V_{dc}}\right)^2 - 1}$$

So the Ripple Factor is,

$$\gamma = \sqrt{\left(\frac{V_{rms}}{V_{dc}}\right)^2 - 1} = 0.48$$

For bridge rectifiers, the ripple factor is 0.48.

Peak Inverse Voltage

The maximum voltage that a diode can withstand in the reverse bias condition is known as a peak inverse voltage. During the positive half cycle, the diodes D_1 and D_3 are in the conducting state while D_2 and D_4 are in the non-conducting state. Similarly, during the negative half cycle, diodes D_2 and D_4 are in the conducting state, and diodes D_1 and D_3 are in the non-conducting state.

Efficiency

The rectifier efficiency determines how efficiently the rectifier converts Alternating Current (AC) into Direct Current (DC). Rectifier efficiency is defined as the ratio of the DC output power to the AC input power. The maximum efficiency of a bridge rectifier is 81.2%.

Filter

A filter in the regulated power supply is mainly used for leveling the ac differences from the corrected voltage. Rectifiers are classified into four types namely capacitor filter, Inductor filter, LC filter & RC filter.

Voltage Regulator

A **voltage regulator** in the regulated power supply is essential for keeping a steady DC output voltage by supplying load regulation as well as line regulation. For this reason, we can employ regulators like a Zener, transistorized, otherwise 3-terminal integrated regulators. An SMPS-switched mode power supply can be used for supplying huge load current by small power dissipation within the series pass transistor.

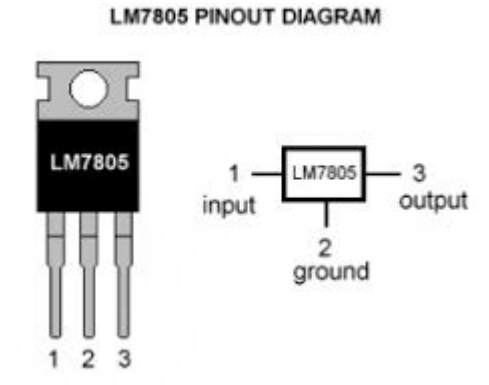


Fig-29

5.10 BUZZER

The buzzer is a sounding device that can convert audio signals into sound signals. It is usually powered by DC voltage. It is widely used in alarms, computers, printers and other electronic products as sound devices. It is mainly divided into piezoelectric buzzer and electromagnetic buzzer, represented by the letter "H" or "HA" in the circuit. According to different designs and uses, the buzzer can emit various sounds such as music, siren, buzzer, alarm, and electric bell.

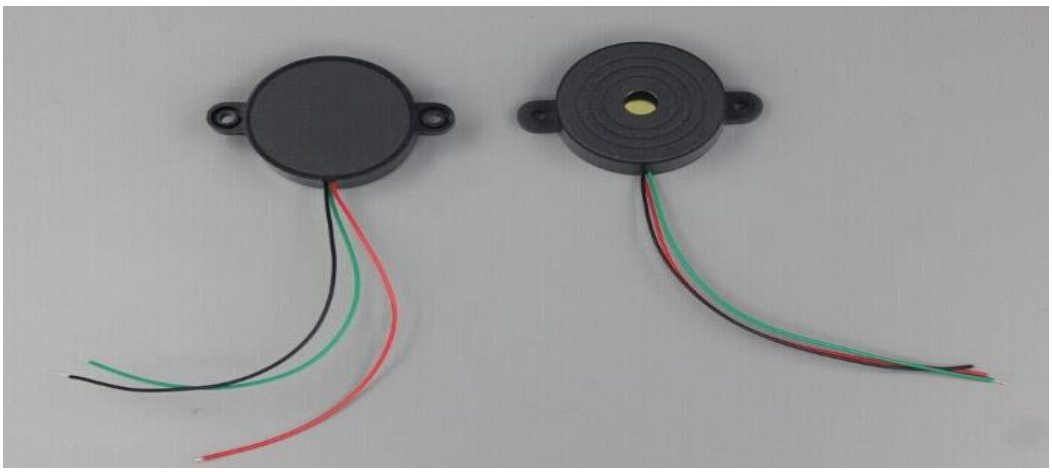


Fig-30

Piezo buzzer

The piezoelectric buzzer uses the piezoelectric effect of the piezoelectric ceramics and uses the pulse current to drive the vibration of the metal plate to generate sound. Piezoelectric buzzer is mainly composed of multi-resonator, piezoelectric plate, impedance matcher, resonance box, housing, etc. Some of the piezoelectric buzzers are also equipped with light-emitting diodes. The multi-resonator consists of transistors or integrated circuits. When the power supply is switched on (1.5~15V DC operating voltage), the multi-resonator oscillates and outputs 1.5~2.5kHz audio signal. The impedance matcher pushes the piezoelectric plate to generate sound

Classification of buzzers

Classified according to buzzer construction

Piezoelectric buzzer: It uses piezoelectric material, which generates electric charge when the piezoelectric material is deformed by external force.Similarly, the piezoelectric material deforms when energized.

Electromagnetic buzzer: mainly uses the magnetic field generated by the energized conductor to drive the drum film fixed on the coil by the magnetic force generated by a fixed magnet and the conducting conductor.

The two buzzers have different pronunciation principles. The piezoelectric buzzer is simple and durable in structure, but it has a single tone and color difference and is suitable for alarms and other equipment. The electromagnetic buzzer is mostly used for voice, music and other equipment because of its good sound color.

Classified according to the way the buzzer is driven

Active buzzer (with drive line): With oscillator inside, it can chime when energized. The ideal signal is direct current, usually marked as VDC, VDD, etc., which can convert constant direct current into pulse signal of a certain frequency.

Passive Buzzer (External Drive): There is no oscillator inside. It can not be chirped by DC signal. It must be driven by 2K~5K square wave because the magnetic circuit is constant.

CHAPTER-6

SOFTWARE REQUIREMENTS

- Knowledge on Embedded C for programming.
- Arduino IDE.
- UBIDOTS server

6.1 EMBEDDED SYSTEMS:

Embedded systems are electronic devices that incorporate microprocessors with in their implementations. The main purposes of the microprocessors are to simplify the system design and provide flexibility. Having a microprocessor in the device helps in removing the bugs, making modifications, or adding new features are only matter of rewriting the software that controls the device. Or in other words embedded computer systems are electronic systems that include a microcomputer to perform a specific dedicated application. The computer is hidden inside these products. Embedded systems are ubiquitous. Every week millions of tiny computer chips come pouring out of factories finding their way into our everyday products.

Embedded systems are self-contained programs that are embedded within a piece of hardware. Whereas a regular computer has many different applications and software that can be applied to various tasks, embedded systems are usually set to a specific task that cannot be altered without physically manipulating the circuitry. Another way to think of an embedded system is as a computer system that is created with optimal efficiency, thereby allowing it to complete specific functions as quickly as possible.

Embedded systems designers usually have a significant grasp of hardware technologies. They use specific programming languages and software to develop embedded systems and manipulate the equipment. When searching online, companies offer embedded systems development kits and other embedded systems tools for use by engineers and businesses.

CHARACTERISTICS*:*

Two major areas of differences are cost and power consumption. Since many embedded systems are produced in tens of thousands to millions of units range, reducing cost is a major concern. Embedded systems often use a (relatively) slow processor and small memory size to minimize costs.

The slowness is not just clock speed. The whole architecture of the computer is often intentionally simplified to lower costs. For example, embedded systems often use peripherals controlled by synchronous serial interfaces, which are ten to hundreds of times slower than comparable peripherals used in PCs. Programs on an embedded system often run with real-time constraints with limited hardware resources: often there is no disk drive, operating system, keyboard or screen. A flash drive may replace rotating media, and a small keypad and LCD screen may be used instead of a PC's keyboard and screen.

Firmware is the name for software that is embedded in hardware devices, e.g. in one or more ROM/Flash memory IC chips. Embedded systems are routinely expected to maintain 100% reliability while running continuously for long periods, sometimes measured in years. Firmware is usually developed and tested too much harsher requirements than is general-purpose software, which can usually be easily restarted if a problem occurs.

PLATFORM:

There are many different CPU architectures used in embedded designs. This in contrast to the desktop computer market which is limited to just a few competing architectures mainly the Intel/AMD x86 and the Apple/Motorola/IBM Power PC's which are used in the Apple Macintosh. One common configuration for embedded systems is the system on a chip, an application-specific integrated circuit, for which the CPU was purchased as intellectual property to add to the IC's design.

TOOLS:

Like a typical computer programmer, embedded system designers use compilers, assemblers and debuggers to develop an embedded system. Those software tools can come from several sources:

Software companies that specialize in the embedded market Ported from the GNU software development tools. Sometimes, development tools for a personal computer can be used if the embedded processor is a close relative to a common PC processor. Embedded system designers also use a few software tools rarely used by typical computer programmers. Some designers keep a utility program to turn data files into code, so that they can include any kind of data in a program. Most designers also have utility programs to add a checksum or CRC to a program, so it can check its program data before executing it.

OPERATING SYSTEM:

They often have no operating system, or a specialized embedded operating system (often a real-time operating system), or the programmer is assigned to port one of these to the new system.

DEBUGGING:

Debugging is usually performed with an in-circuit emulator, or some type of debugger that can interrupt the micro controller's internal microcode. The microcode interrupt lets the debugger operate in hardware in which only the CPU works. The CPU-based debugger can be used to test and debug the electronics of the computer from the viewpoint of the CPU.

Developers should insist on debugging which shows the high-level language, with breakpoints and single stepping, because these features are widely available. Also, developers should write and use simple logging facilities to debug sequences of real-time events. PC or mainframe programmers first encountering this sort of programming often become confused about design priorities and acceptable methods. Mentoring, code-reviews and ego less programming are recommended.

DESIGN OF EMBEDDED SYSTEMS:

The electronics usually uses either a microprocessor or a microcontroller. Some large or old systems use general-purpose mainframes computers or minicomputers.

START-UP:

All embedded systems have start-up code. Usually it disables interrupts, sets up the electronics, tests the computer (RAM, CPU and software), and then starts the application code. Many embedded systems recover from short-term power failures by restarting (without recent self-tests). Restart times under a tenth of a second are common.

Many designers have found one of more hardware plus software-controlled LED's useful to indicate errors during development (and in some instances, after product release, to produce troubleshooting diagnostics). A common scheme is to have the electronics turn off the LED(s) at reset, whereupon the software turns it on at the first opportunity, to prove that the hardware and start-up software have performed their job so far. After that, the software blinks the LED(s) or sets up light patterns during normal operation, to indicate program execution progress and/or errors. This serves to reassure most technicians/engineers and some users.

THE CONTROL LOOP:

In this design, the software has a loop. The loop calls subroutines. Each subroutine manages a part of the hardware or software. Interrupts generally set flags, or update counters that are read by the rest of the software. A simple API disables and enables interrupts. Done right, it handles nested calls in nested subroutines, and restores the preceding interrupt state in the outermost enable. This is one of the simplest methods of creating an exocrine.

State machines may be implemented with a function-pointer per state-machine (in C++, C or assembly, anyway). A change of state stores a different function into the pointer. The function pointer is executed every time the loop runs.

Many designers recommend reading each IO device once per loop, and storing the result so the logic acts on consistent values. Many designers prefer to design their state machines to check only one or two things per state. Usually this is a hardware event, and a software timer.

Designers recommend that hierarchical state machines should run the lower-level state machines before the higher, so the higher run with accurate information.

Complex functions like internal combustion controls are often handled with multi-dimensional tables. Instead of complex calculations, the code looks up the values. The software can interpolate between entries, to keep the tables small and cheap.

One major disadvantage of this system is that it does not guarantee a time to respond to any particular hardware event. Careful coding can easily assure that nothing disables interrupts for long. Thus interrupt code can run at very precise timings. Another major weakness of this system is that it can become complex to add new features. Algorithms that take a long time to run must be carefully broken down so only a little piece gets done each time through the main loop.

USER INTERFACES:

Interface designers at PARC, Apple Computer, Boeing and HP minimize the number of types of user actions. For example, use two buttons (the absolute minimum) to control a menu system (just to be clear, one button should be "next menu entry" the other button should be "select this menu entry"). A touch-screen or screen-edge buttons also minimize the types of user actions.

Another basic trick is to minimize and simplify the type of output. Designs should consider using a status light for each interface plug, or failure condition, to tell what failed. A cheap variation is to have two light bars with a printed matrix of errors that they select- the user can glue on the labels for the language that she speaks.

For example, Boeing's standard test interface is a button and some lights. When you press the button, all the lights turn on. When you release the button, the lights with failures stay on. The labels are in Basic English.

Another essential trick is to make any modes absolutely clear on the user's display. If an interface has modes, they must be reversible in an obvious way. Most designers prefer the display to respond to the user. The display should change immediately after a user action. If the machine is going to do anything, it should start within 7 seconds, or give progress reports.

MICROCONTROLLERS

Microcontrollers as the name suggests are small controllers. They are like single chip computers that are often embedded into other systems to function as processing/controlling unit. For example the remote control you are using probably has microcontrollers inside that do decoding and other controlling functions. They are also used in automobiles, washing machines, microwave ovens, toys ... etc, where automation is needed.

Micro-controllers are useful to the extent that they communicate with other devices, such as sensors, motors, switches, keypads, displays, memory and even other micro-controllers. Many interface methods have been developed over the years to solve the complex problem of balancing circuit design criteria such as features, cost, size, weight, power consumption, reliability, availability, manufacturability. Many microcontroller designs typically mix multiple interfacing methods. In a very simplistic form, a micro-controller system can be viewed as a system that reads from (monitors) inputs, performs processing and writes to (controls) outputs.

Embedded system means the processor is embedded into the required application. An embedded product uses a microprocessor or microcontroller to do one task only. In an embedded system, there is only one application software that is typically burned into ROM. Example: printer, keyboard, video game player

Microprocessor - A single chip that contains the CPU or most of the computer

Microcontroller - A single chip used to control other devices

MICROPROCESSOR VS MICROCONTROLLER:

Microprocessor:

- CPU is stand-alone, RAM, ROM, I/O, timer are separate
- Designer can decide on the amount of ROM, RAM and I/O ports.
- expensive
- versatility general-purpose

Microcontroller:

- CPU, RAM, ROM, I/O and timer are all on a single chip
- fix amount of on-chip ROM, RAM, I/O ports
- for applications in which cost, power and space are critical
- single-purpose

6.2 ARDUINO IDE:

The Arduino Software (IDE) makes it easy to write code and upload it to the board offline. We recommend it for users with poor or no internet connection. This software can be used with any Arduino board.

There are currently two versions of the Arduino IDE, one is the IDE 1.x.x and the other is IDE 2.x. The IDE 2.x is new major release that is faster and even more powerful to the IDE 1.x.x. In addition to a more modern editor and a more responsive interface it includes advanced features to help users with their coding and debugging.

The following steps can guide you with using the offline IDE (you can choose either IDE 1.x.x or IDE 2.x):

1. Download and install the Arduino Software IDE:

- **Arduino IDE 1.x.x** (Windows, Mac OS, Linux, Portable IDE for Windows and Linux, ChromeOS).
- **Arduino IDE 2.x**

2. Connect your Arduino board to your device.

3. Open the Arduino Software (IDE).

The Arduino Integrated Development Environment - or Arduino Software (IDE) - connects to the Arduino boards to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called **sketches**. These sketches are written in the text editor and are saved with the file extension .ino.

Using the offline IDE 1.x.x

The editor contains the four main areas:

1. A **Toolbar with buttons** for common functions and a series of menus. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

2. The **message area**, gives feedback while saving and exporting and also displays errors.

3. The **text editor** for writing your code.

4. The **text console** displays text output by the Arduino Software (IDE), including complete error messages and other information.

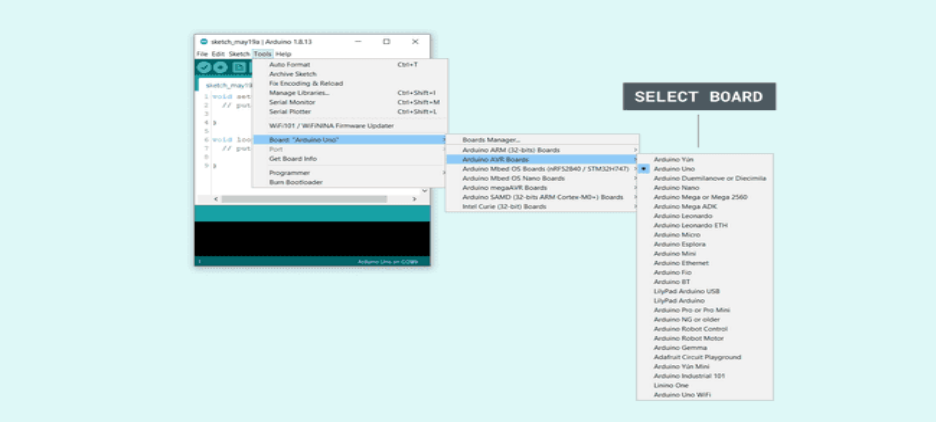
The bottom right-hand corner of the window displays the configured board and serial port.

The Arduino Software IDE fig-31

Now that you are all set up, **let's try to make your board blink!**

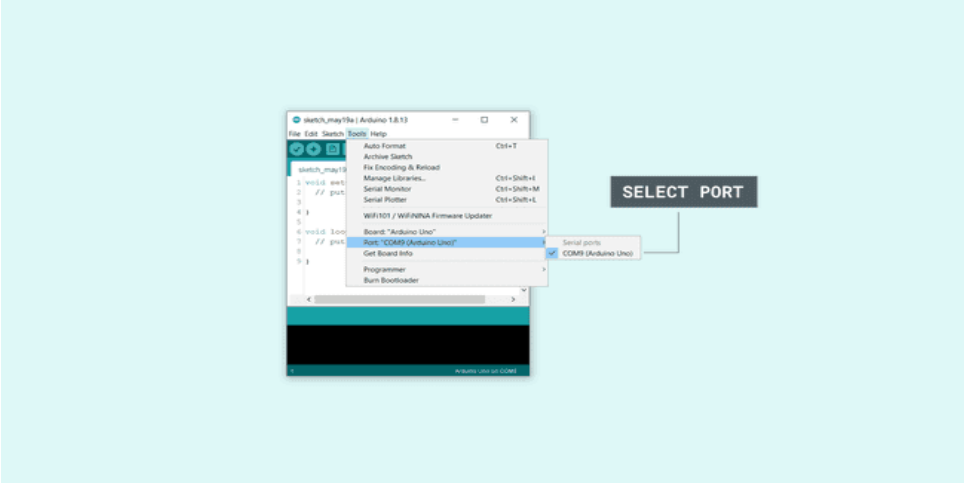
5. **Connect your Arduino** or Genuino board to your computer.

6. Now, you need to **select the right core & board**. This is done by navigating to **Tools > Board > Arduino AVR Boards > Board**. Make sure you select the board that you are using. If you cannot find your board, you can add it from **Tools > Board**



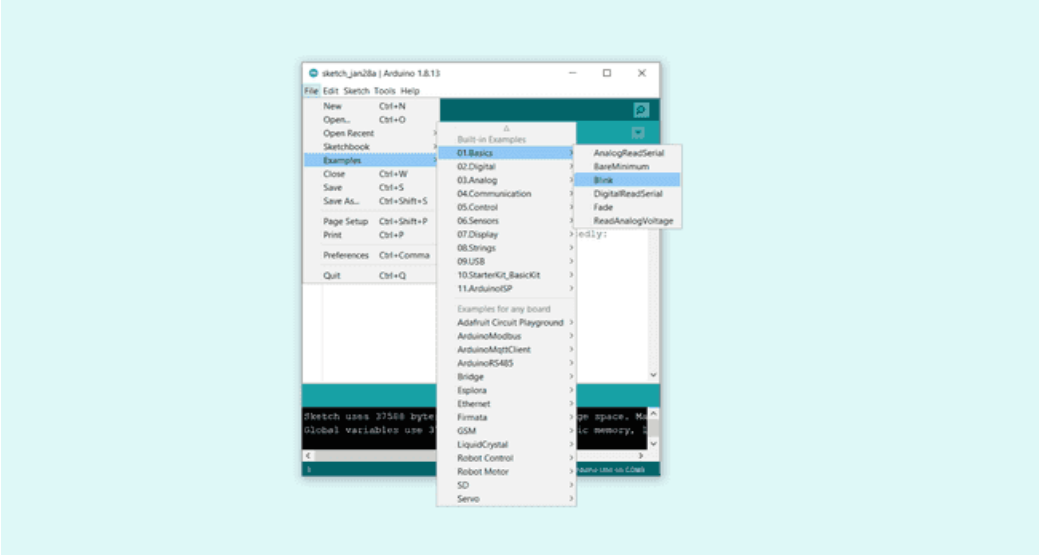
Selecting a board fig-32

7. Now, let's make sure that your board is found by the to **Tools > Port**, where you select your board from the list.



Selecting the port

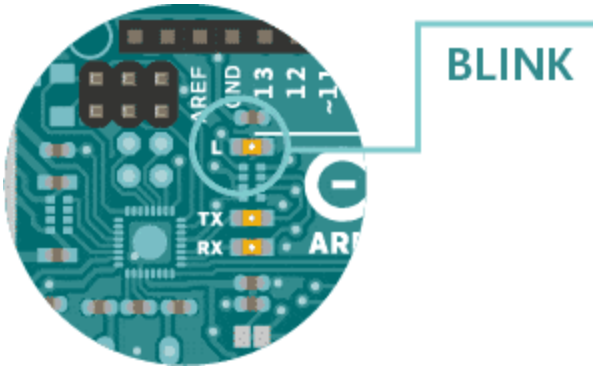
8. Let's **try an example**: navigate to **File > Examples > 01.Basics > Blink.**



Opening an example-fig-33

9. To **upload it to your board**, simply click on the arrow in the top left corner. This process takes a few seconds, and it is important to not disconnect the board during this process. If the upload is successful, the message "Done uploading" will appear in the bottom output area.

10. Once the upload is complete, you should then see on your board the yellow LED with an L next to it start blinking. You can **adjust the speed of blinking** by changing the delay number in the parenthesis to 100, and upload the Blink sketch again. Now the LED should blink much faster.



Congratulations! You have successfully programmed your board to blink its on-board LED! You can find more information about the Arduino Software (IDE) 2.x here.

Using the offline IDE 2.x

The editor contains the four main areas:

1. A **toolbar with buttons** for common functions and a series of menus. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, choose your board and port and open the serial monitor.

2. The **Sidebar** for regularly used tools. It gives you quick access to board managers, libraries, debugging your board as well as a search and replacement tool.

3. The **text editor** for writing your code.

4. Console controls gives control over the output on the console.

5. The **text console** displays text output by the Arduino Software (IDE), including complete error messages and other information.

The bottom right-hand corner of the window displays the configured board and serial port.

The Arduino Software IDE

Now that you are all set up, **let's try to make your board blink!**

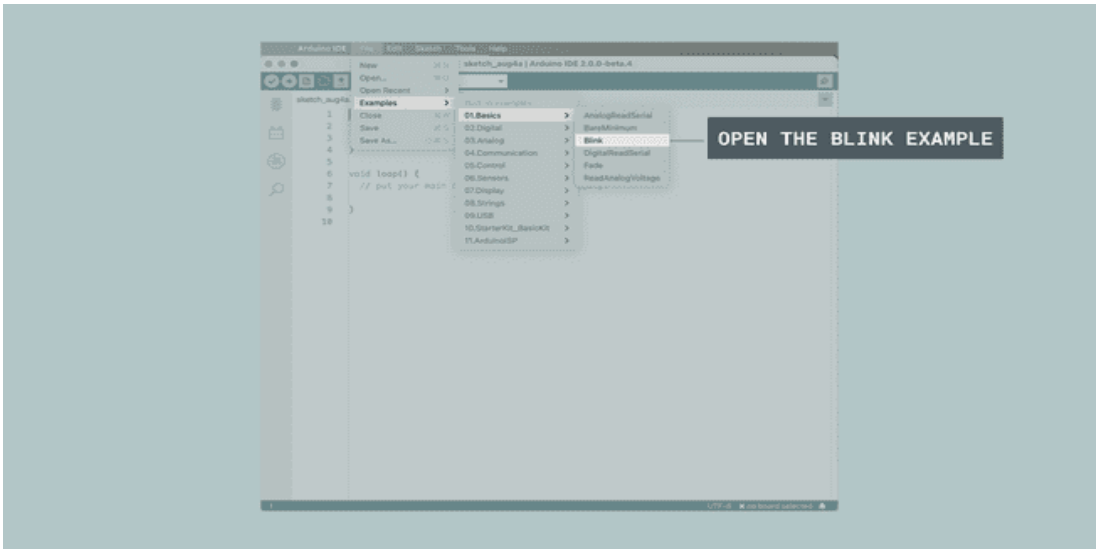
1. Connect your Arduino or Genuino board to your computer.

2. Now, you need to **select the right board & port**. This is done from the toolbar. Make sure you select the board that you are using. If you cannot find your board, you can add it from the board manager in the sidebar.

Selecting a board & port fig-35

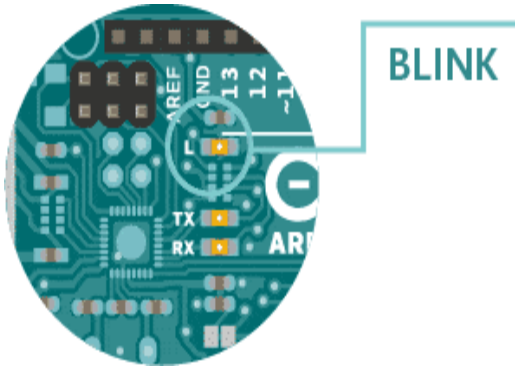
3.Let’s **try an example**: navigate to **File > Examples > 01.Basics > Blink.**

4. Opening an example



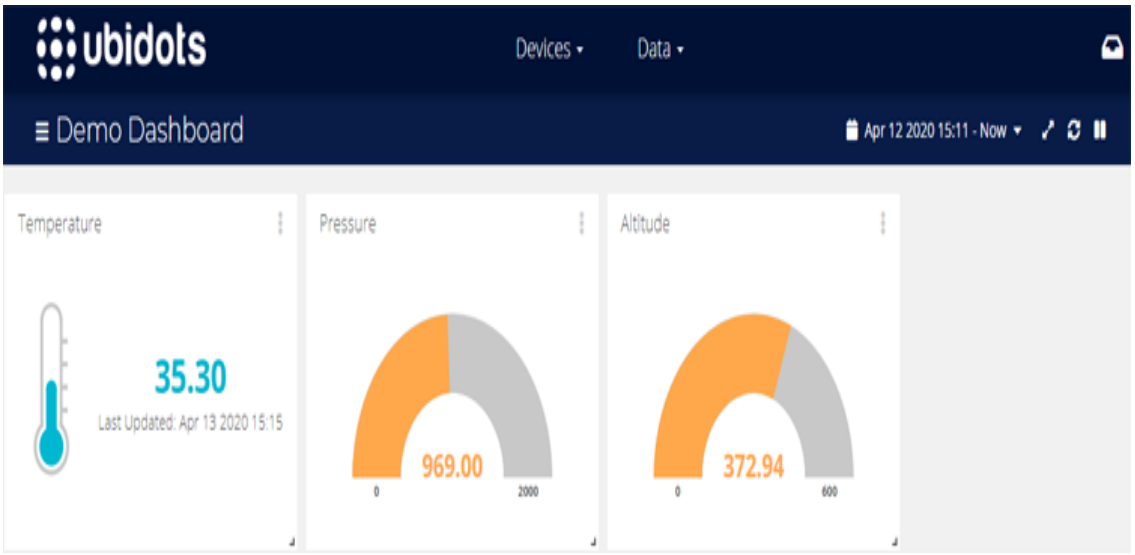
To **upload it to your board**, simply click on the arrow in the top left corner. This process takes a few seconds, and it is important to not disconnect the board during this process. If the upload is successful, the message "Done uploading" will appear in the bottom output area.

Once the upload is complete, you should see on your board the yellow LED with the letter **L** next to it, start blinking. You can **adjust the speed of blinking** by changing the delay number in the parenthesis to 100, and upload the Blink sketch again. Now the LED should blink much faster.



6.3 UBIDOTS:

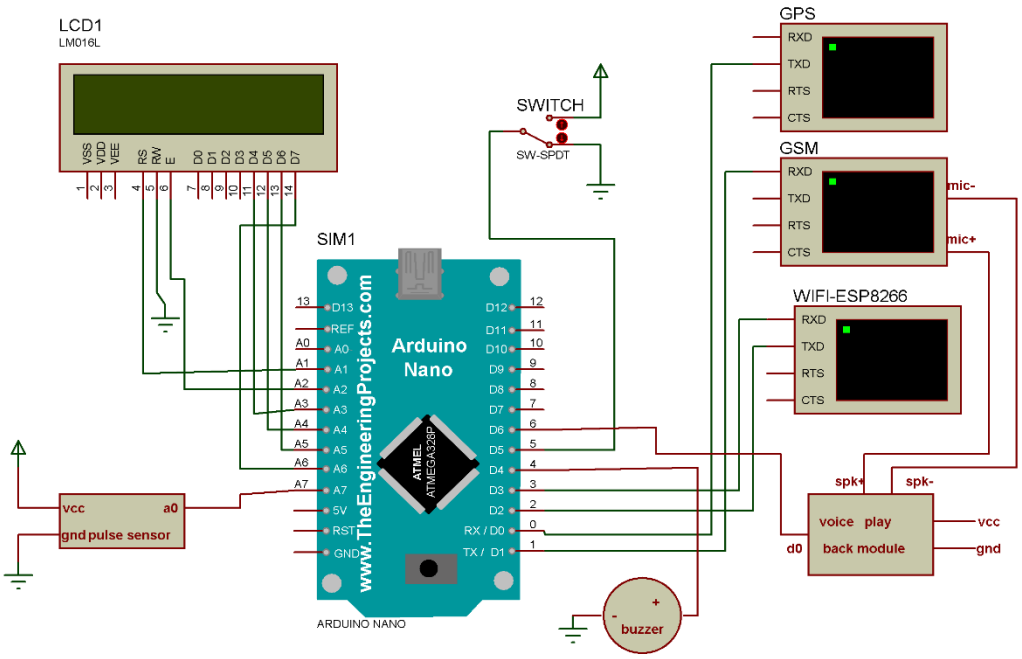
Ubidots is an Internet of Things (IoT) data analytics and visualization company. We turn sensor data into information that matters for business-decisions, machine-to-machine interactions, educational research, and increase economization of global resources. Ubidots exists as an easy and affordable means to integrate the power of the IoT into your business or research.



Ubidots technology and engineering stack was developed to deliver a secure, white-glove experience for our users. Device friendly APIs (accessed over HTTP/MQTT/TCP/UDP protocols) provide a simple and secure connection for sending and retrieving data to and from our cloud service in real-time. Ubidots' time-series backend services are performance optimized for IoT data storage, computation, and retrieval. Our application enablement platform supports interactive, real-time data visualization (widgets), and an IoT App Builder that allows developers to extend the platform with their own HTML/JS code for private customization when desired. Ubidots exists to empower your data from device to visualization.

CHAPTER-7

SCHEMATIC DIAGRAM



The schematic design of a women's safety system is illustrated above. All modules in the system are powered by a 5V supply, and the system's primary brain is an Arduino NANO. It is linked to the push button switch, which is linked to the digital pin (D5), and it is used as the toggle system in the woman safety system to activate the alarm and initialise all the sensors to operate with toggle and activates to transmit SMS and location using GPS. The GSM RX pin is linked to digital pin D1/TX, the GPS TX pin is attached to digital pin D2/RX, and the ESP8266 RX and TX pins are connected to pins D2,D3 to transfer data to a cloud data store through the internet. When a signal is received on digital pin D6, the voice play back module activates the mic and captures the voice message, which is then sent to the relevant folks through the GSM module. It also warns the people near

it via a buzzer. When the push button is hit, the buzzer attached to digital pin D4 sounds an alarm. Not only does it provide an alarm, but it also continually monitors the woman's pulse when it rises at unexpected moments and is built as a wearable gadget that sends an alert when it rises over the legal limit. The pulse sensor is attached to Analog pin A7, and all data may be monitored and alerted to individuals through the cloud, as well as shown on the LCD connected to the Arduino NANO.

CHAPTER-8

HARDWARE MODEL

9.1.Hardware model when in off condition is shown below:

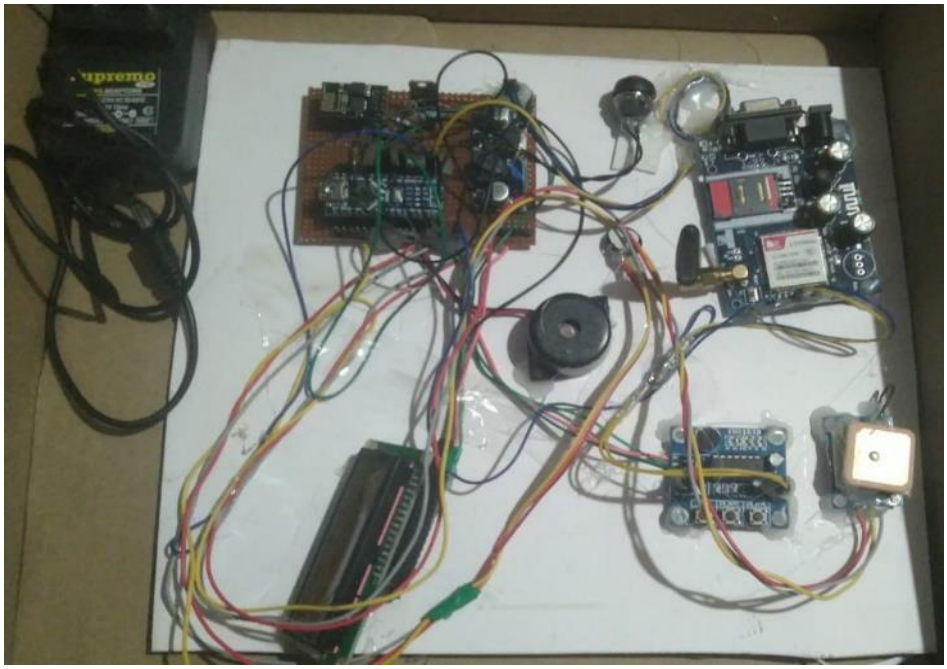
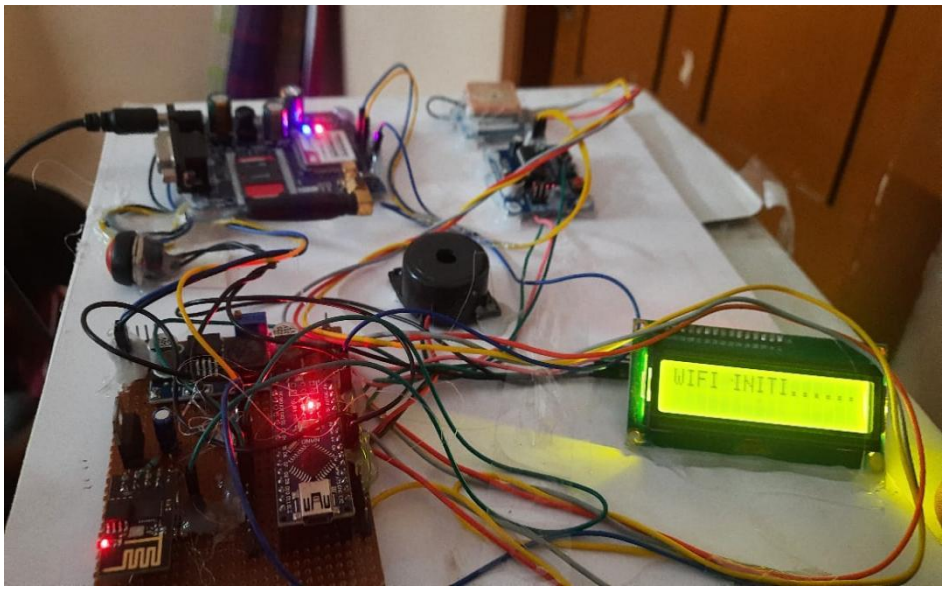


Fig-39

9.2. Hardware model when in on condition is shown below:



CHAPTER-9
OUTPUT

The output of our proposed system is

a) GSM sends a message to the registered mobile numbers and makes an alert call to that numbers.

b) And we uses a pulse sensor which automatically sends message and call.

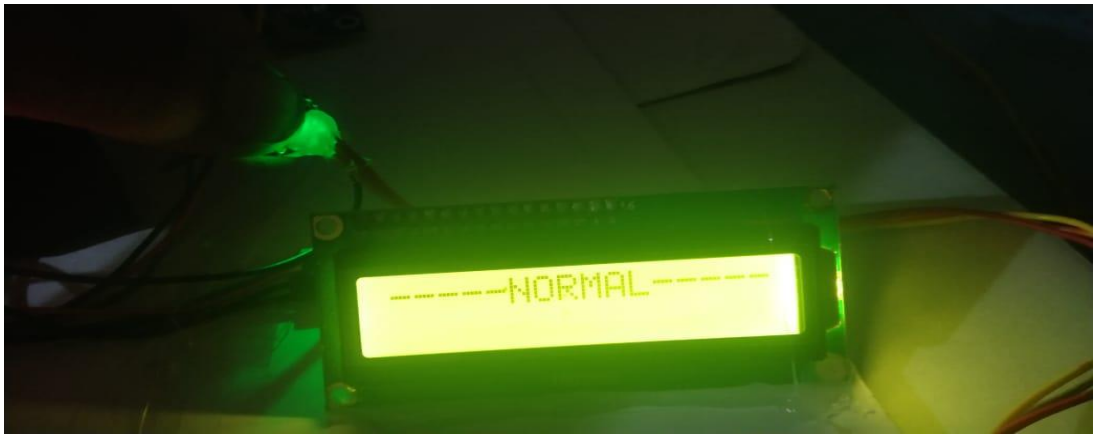
S. No.	Input	Output
1.	Push Button	SMS, Call, Buzzer and lcd display
2.	Pulse sensor	SMS, Call, Buzzer and lcd display

Table-3

The output of LCD in different stages is shown below:

- **When in normal condition:**

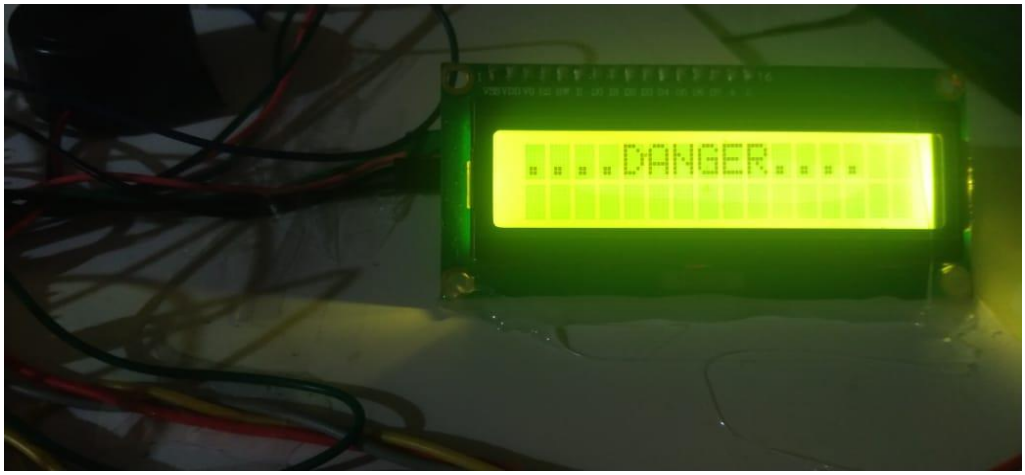
In this normal condition the display of LCD shows normal



➢ **When the push button is pressed:**

There are different steps in this stage. They are

STEP-1

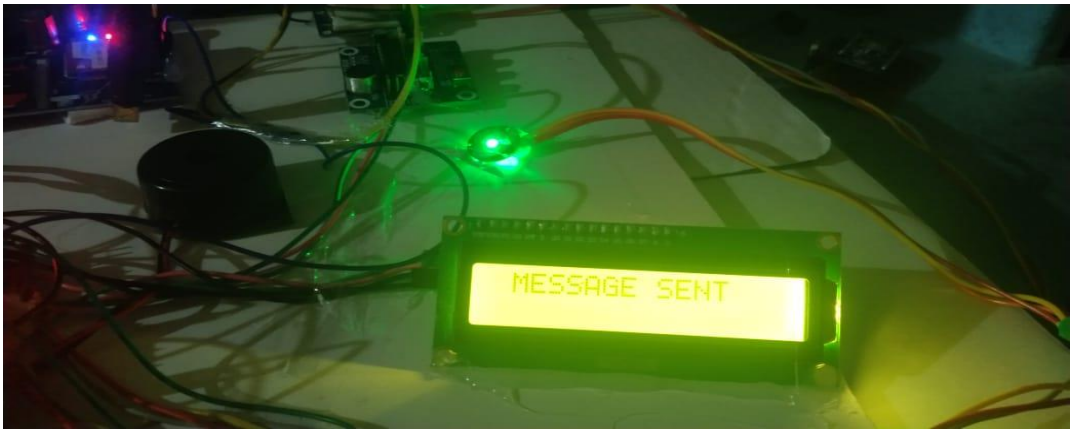


STEP-2

STEP-3

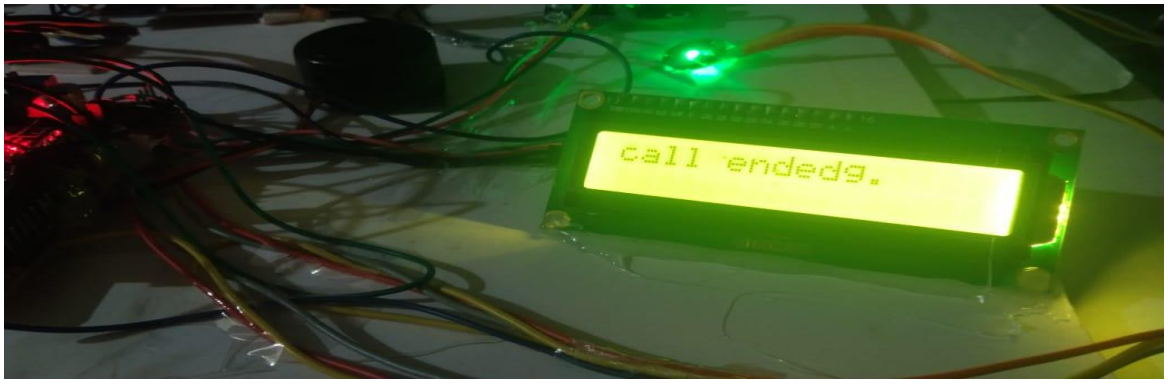
STEP-4

STEP-5

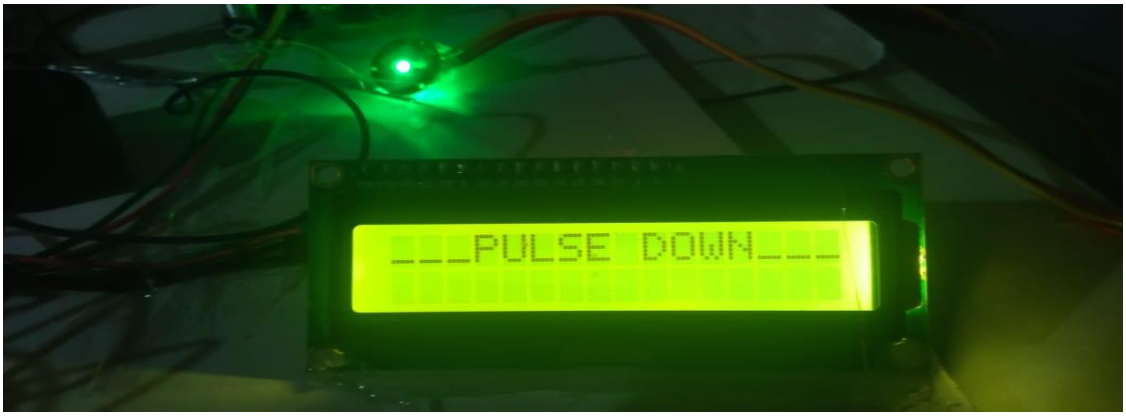


STEP-6

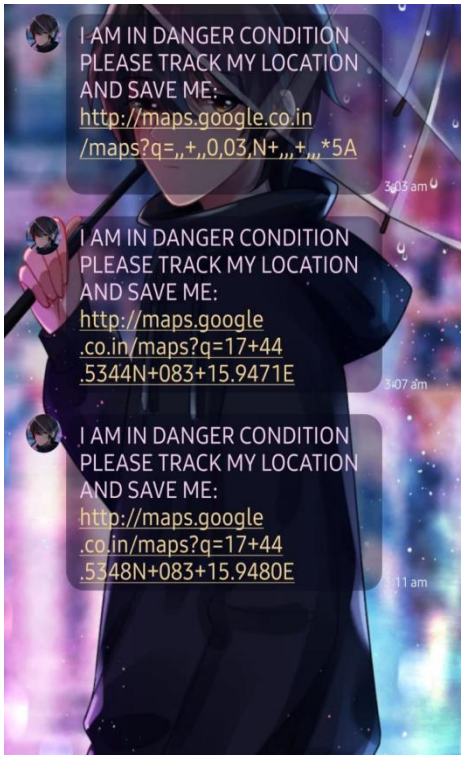
STEP-7



When pulse sensor is on:



The message the we received to the registered mobile numbers:



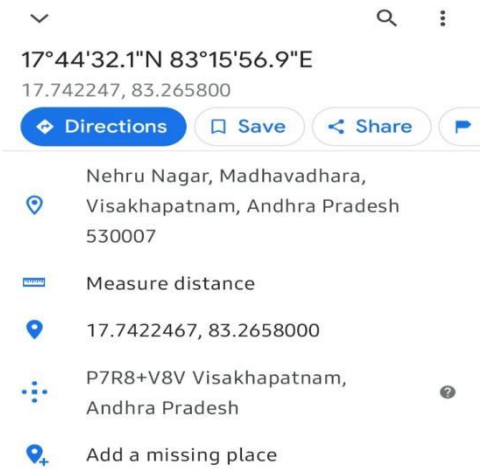


Fig-42 **Fif-43**

We also receive a call for the registered mobile numbers:

CHAPTER-10

CONCLUSION

The objective of this undertaking is to guarantee each woman in our general populace to incline that everything is great with the world and guaranteed. As per the examination in India 53 out 0f 100 of working ladies are not inclining that everything is great with the world - Women is working in night move. In a total of 86 working women in India, women facing impediments are also high in various locations in Delhi, Mumbai, Hyderabad, Kolkata, and Pune. By finishing consistent application and a gadget, we can deal with the issues partly. With further exploration and progress, this task is utilized as a little wearable contraption like a watch, swinging in this manner on. Setting up a game plan for an IoT building consolidates having a decent comprehension of the movements and region choices accessible to an undertaking and having a study of what a section of the key musings will be for the structure. Endeavors are entering new fields with IoT plans, and, as introduced in the going with White Paper of the strategy, working in affiliation and cooperation with other help suppliers is a property of this market.

APPLICATIONS:

1.Women safety system
2.Children safety system
3.Vehicle tracking and security system

CHAPTER-11

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APPENDIX

INTERNET OF THINGS

INTRODCTION TO INTERNET OF THINGS (IoT):

Anyone who says that the Internet has fundamentally changed society may be right, but at the same time, the greatest transformation actually still lies ahead of us. Several new technologies are now converging in a way that means the Internet is on the brink of a substantial expansion as objects large and small get connected and assume their own web identity.

Following on from the Internet of computers, when our servers and personal computers were connected to a global network, and the Internet of mobile telephones, when it was the turn of telephones and other mobile units, the next phase of development is the Internet of things, when more or less anything will be connected and managed in the virtual world. This revolution will be the Net's largest enlargement ever and will have sweeping effects on every industry — and all of our everyday lives.

Smart connectivity with existing networks and context-aware computation using network resources is an indispensable part of IoT. With the growing presence of Wi-Fi and 4G-LTE wireless Internet access, the evolution towards ubiquitous information and communication networks is already evident. However, for the Internet of Things vision to successfully emerge, the computing paradigm will need to go beyond traditional mobile computing scenarios that use smart phones and portables, and evolve into connecting everyday existing objects and embedding intelligence into our environment.

DEFITNITION OF INTERNET OF THINGS (IoT)

"Today computers and the Internet are almost wholly dependent on human beings for information. Nearly all of the roughly 50 petabyte (1 petabyte=1015 bytes) of data available on the Internet were first captured and created by human beings by typing, pressing a record button, taking a digital picture, or scanning a bar code. Conventional diagrams of the Internet leave out the most numerous and important routers of all - people. The problem is, people have limited time, attention and accuracy all of which means they are not very good at capturing data about things in the real world. And that's a big deal. We're physical, and so is our environment … You can't eat bits, burn them to stay warm or put them in your gas tank. Ideas and information are important, but things matter much more. Yet today's information technology is so dependent on data originated by people that our computers know more about ideas than things. If we had

computers that knew everything there was to know about things using data they gathered without any help from us we would be able to track and count everything, and greatly reduce waste, loss and cost. We would know when things needed replacing, repairing or recalling, and whether they were fresh or past their best. The Internet of Things has the potential to change the world, just as the Internet did or even more.

ARCHITECTURE OF INTERNET OF THINGS

Architecture of internet Of Things contains basically 4 layers:

- Application Layer
- Gateway and the network layer
- Management Service layer
- Sensor layer

APPLICATION LAYER:

- Lowest Abstraction Layer
- With sensors we are creating digital nervous system.
- Incorporated to measure physical quantities
- Interconnects the physical and digital world
- Collects and process the real time information

GATEWAY AND THE NETWORK LAYER:

- Robust and High performance network infrastructure
- Supports the communication requirements for latency, bandwidth or security
- Allows multiple organizations to share and use the same network independently

MANAGEMENT LAYER:

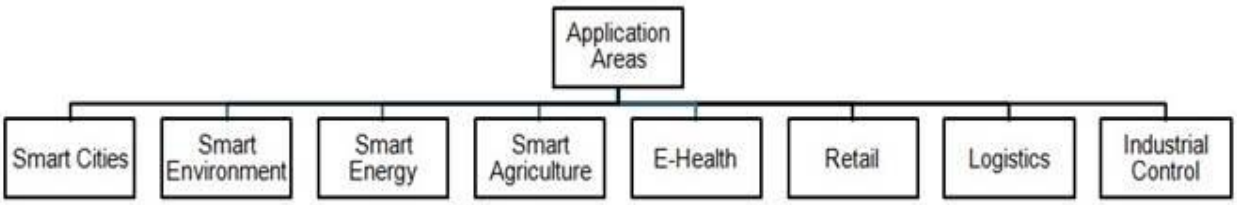
- Capturing of periodic sensory data
- Data Analytics (Extracts relevant information from massive amount of raw data)
- Streaming Analytics (Process real time data)
- Ensures security and privacy of data.

SENSOR LAYER:

- Provides a user interface for using IoT.
- Different applications for various sectors like Transportation, Healthcare, Agriculture, Supply chains, Government, Retail etc.

APPLICATIONS:

There are several application domains which will be impacted by the emerging Internet of Things. The applications can be classified based on the type of network availability, coverage, scale, heterogeneity, repeatability, user involvement and impact.
We categorize the applications into four application domains:
(1) Personal and Home
(2) Enterprise
(3) Utilities
(4) Mobile.
There is a huge crossover in applications and the use of data between domains. For instance, the Personal and Home IoT produces electricity usage data in the house and makes it available to the electricity (utility) company which can in turn optimize the supply and demand in the Utility IoT. The internet enables sharing of data between different serviceproviders in a seamless manner creating multiple business opportunities.



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