Daffodil International University

Dhaka, Bangladesh

Thesis Report
On
IOT BASED AUTOMATIC CONTROL CIRCUIT
BREAKER FOR TRANSMISSION LINE

This thesis has been submitted to the Department of Electrical and Electronic Engineering in partial fulfillment of the requirement for the degree of Bachelor of Science in Electrical and Electronic Engineering.

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APPROVAL LETTER

This thesis report titled **"IOT BASED AUTOMATIC CONTROL CIRCUIT BREAKER FOR TRANSMISSION LINE",** submitted by Rakib Hossain ID:163-33-335, Sabuj Kumer Sarkar ID: 163-33-338 to the Department of Electrical & Electronic Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on January, 2020.

Board of Examiners:

DECLARATION

We hereby declare that this thesis is based on the result found by ourselves. The materials of work found by other researchers are mentioned by reference. This thesis is submitted to Daffodil International University for partial fulfillment of the requirement of the degree of B.Sc. in Electrical and Electronics Engineering. This thesis neither in whole nor in part has been previously submitted for any degree.

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List of Abbreviations

CD	Chromatic Dispersion
EMI	Immune to Electromagnetic Interference
FBG	Fiber Bragg Gratings
FWHM	Full Width at Half Maximum
GVD	Group Velocity Dispersion
LED	Light Emitting Diodes
MD	Material Dispersion
NLSE	Nonlinear Schrödinger Equation
PMD	Polarization Mode Dispersion
PUA	Piecewise Uniform Approach

RMS	Root Mean Square
SSMF	Standard Single Mode Fiber
TFBG	Tilted Fiber Bragg Gratings
UV	Ultraviolet
WD	Wave-guide Dispersion
WDM	Wavelength Division Multiplexed

List of Symbols

λ	Wavelength
λ_B	Bragg wavelength
n_{eff}	Effective index
z	Position along the grating
n	Mode index
f	Fundamental Frequency
ω	Angular frequency
M	Modulation Index
T	Fundamental Time Period

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Lastly, I want to acknowledge the contributions of my parents, family members and my friends for their constant and never-ending motivation.

ABSTRACT

Every project has fixed goal the main goal of this project is to detects the faults when Over voltage and short circuit occurs the circuit will automatically Trip. When we apply 220 volts at both step-down transformer for line 1 and 2. In this method the primary voltage is 220v and secondary voltage is 120. The secondary terminal connected with two resistance with negative side. And the positive side connected with relay. Then we filtering this circuit by using diode and capacitor. Then we using 5v regulator for converted 12v Dc. A transistor is connected with (by using wire) regulator. A Transistor is used for safe the circuit when fault occurs the circuit will not be affected for input and output filtering, we used two capacitors. Then we got fixed 5v. this 5v going to operate the ARDUINO, GSM, And LCD. It also can control the circuit by using GSM.

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

In control transmission frameworks, most of voltage and current sign mutilations are brought about by deficiencies. Flaws that happen in control transmission lines can cause an interference of intensity supply. The time required to find a shortcoming is definitely diminished, as the framework naturally and precisely gives exact deficiency area data. This will guarantee a shorter reaction time for specialized group to correct these shortcomings and in this manner help spare transformers from harm and fiascos. A savvy GSM based shortcoming recognition and area framework was utilized to satisfactorily and precisely show and find where deficiency had happened. The framework utilizes a present transformer, a voltage transformer, PIC 16F877 Micro controller, RS-232 connector, and a GSM modem. The framework consequently identifies blames, examinations and groups these issues and afterward, computes the flaw good ways from the control room utilizing an impedance-based calculation technique. At last the flaw data is transmitted to the control room. The venture presents plan and execution of a dispersed observing and brought together control framework. The ace slave correspondence with the Modbus convention is actualized. There are numerous courses of deficiencies in control transmission prompting power blackouts, if not appropriately oversaw. Eminent among them incorporates

☐ Faults at the power generation station

☐ Damage to power transmission lines (tree falling on lines)

☐ Faults at the substations or parts of distribution subsystem

☐ Lightening

1.2 SINGLE LINE TO GROUND FAULT

Conduit tumbles to the ground or gets into contacts with the impartial wire. It could likewise be the aftereffect of falling trees in a stormy tempest. This sort could be spoken to as appeared in Fig 1 underneath
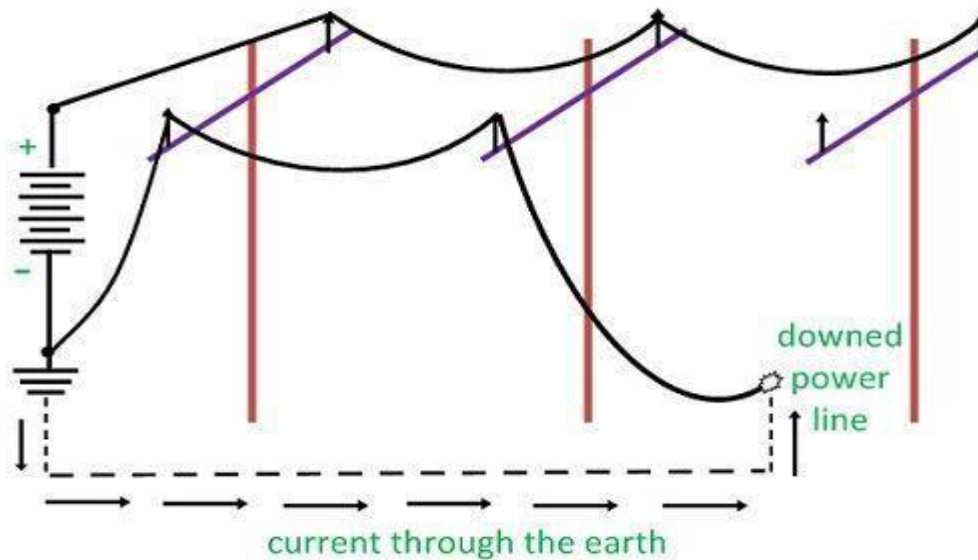
Fig no 1.1: Single Line to Ground Fault

1.3 LINE-TO-LINE FAULT

The second most happening kind of shunt issues is the Line-to-Line issue (LL). This is said to happen when two transmission lines are short-circuited. As on account of a huge fledgling remaining on one transmission line and contacting the other or if a tree limb happens to fall over two power transmission lines.
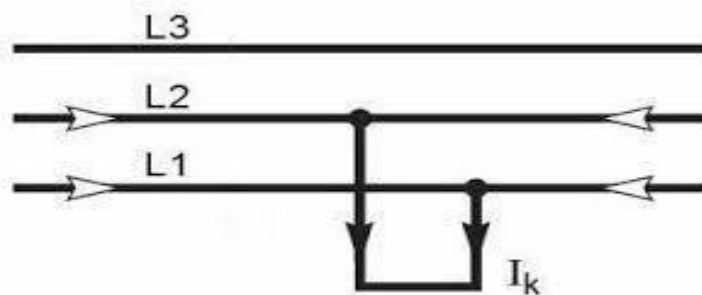
Fig no 1.2: Line to line fault

1.4 Line-To-Ground Fault

The third sort of shunt shortcoming is the Double Line-to-Ground fault (DLG) in figure underneath. This can be a consequence of a tree falling on two of the electrical cables, or different causes.
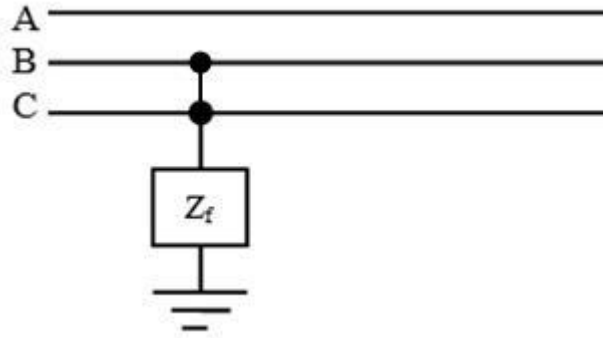
Fig no 1.3: Line to ground fault

1.5 BALANCE THREE PHASE

The fourth and the genuine sort of flaw is the decent three stage, which can happen by a contact between the three electrical cables in a wide range of structures.
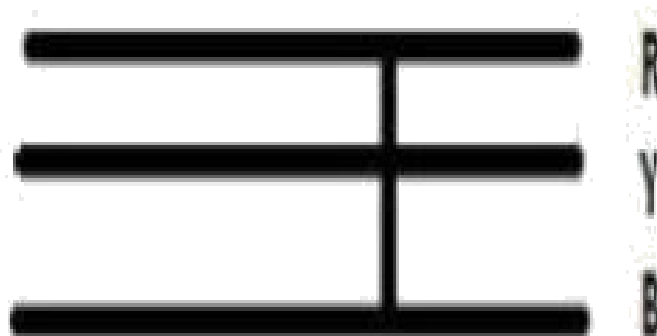
Fig no 1.4: Balance three phase

1.6 PROPOSED METHOD FOR DETECTION AND PROTECTION OF FAULT

Impressive research has been done in the zone of deficiency analysis techniques, especially to spiral dissemination frameworks. These strategies utilize different algorithmic methodologies, where the deficiency area is iteratively determined by refreshing the flaw current.

1.   Impedance and Fundamental Frequency Component Based Methods

2.   High Frequency Components and Traveling Wave Based Methods

3.   Knowledge-Based Method

4.   Artificial Intelligence (AI) and Statistical Analysis Based Methods

5.   Distributed Device Based Methods Hybrid Methods

1.7 IMPEDANCE AND FUNDAMENTAL FREQUENCY COMPONENT BASED METHODS

The separation of deficiency from the essential dispersion transport is evaluated by impedance-based strategy. Voltage and current qualities estimated toward one side or the two parts of the bargains are required in this strategy. The strategy utilizes numerical conditions to evaluate the shortcoming area. Proposed a strategy that utilized the principal recurrence voltages and flows estimated at a line terminal previously and during the shortcoming. The shortcoming area strategy was depicted by considering a solitary stage to-ground issue on an outspread framework. By and by, despite everything they believed the line to be completely transposed, and was useful for line-to-ground flaws. The proposed technique that depended on estimations gave by Intelligent Electronic Devices (IEDs) with worked in oscillography work. This is introduced uniquely at the substation level and on a database that stores data about the system topology and its electrical parameters. Specifically, on 12kV systems utilization of the strategy was an issue.

1.8: **BLOCK DIAGRAM FOR THESE PROJECTS**
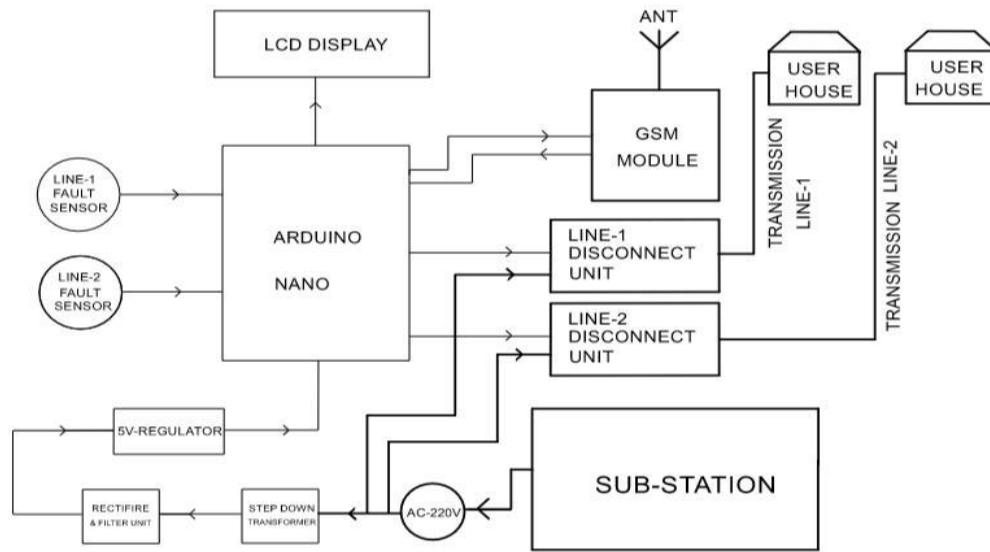

Fig no 1.5: Block diagram for these projects
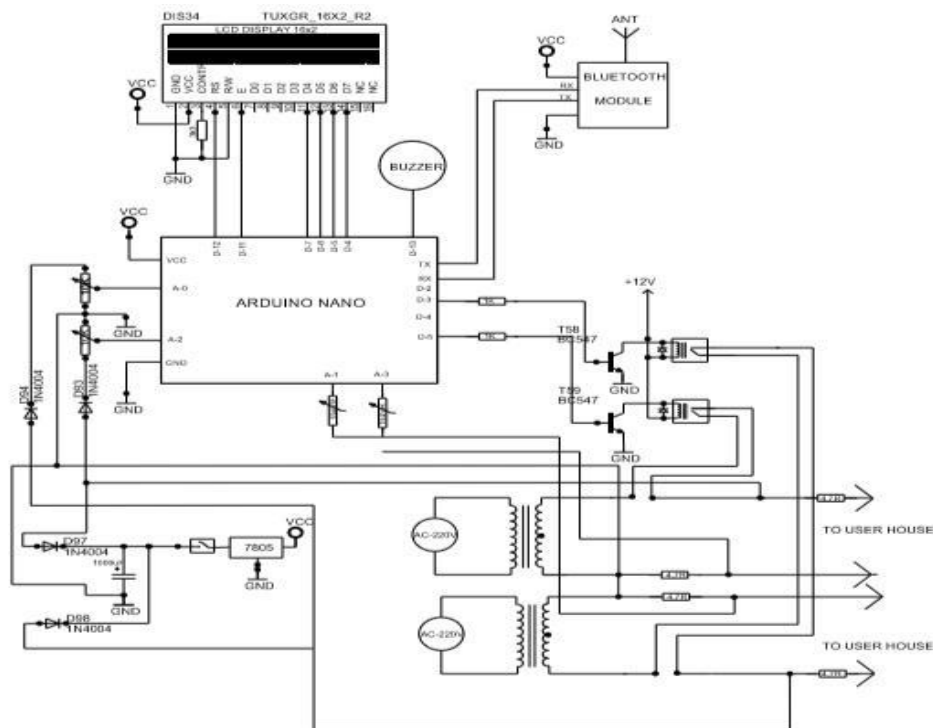
1.9 CIRCUIT DIAGRAM FOR THESE PROJECTS

Fig no 1.6: Circuit diagram for these projects

1.10 WORKING PRINCIPLE

The set up or field gadget comprises of 3 significant parts, instrument transformer (CT and VT), GSM modem and microcontroller. The primaries of the CT and VT which are associated with the line sense the relating current and voltage estimations of the framework and feed the yield to the ADC of the microcontroller which changes over the sign to a computerized structure so as to be prepared by the CPU of the microcontroller. The microcontroller fills in as the essential issue of the set up. It contains a lot of programming codes which have been put away in the EEPROM which empowers it to characterize the flaw type dependent on the voltage and current qualities. In light of the program, the microcontroller analyses these qualities to see whether they are inside the range required. On the off chance that the voltage and current qualities are out of range when contrasted with the reference, it gives a sign of a shortcoming. The microcontroller additionally ascertains the deficiency separation, comparative with the gadget dependent on an impedance-based calculation and afterward transfers this data to the modem for transmission.

1.11 EXISTING SYSTEMS

For the most part, when a shortcoming happens in transmission line, except if it is extreme it is concealed. Be that as it may, slowly these minor deficiencies can prompt harm of transformer and can go devastation to human life. It might likewise start fire. Present day in India, we don't have a framework close by that would tell us continuously once a shortcoming happens. Matter of concern is that since we don't make some genuine memories framework, this prompts harm of the hidden gear's associated and ends up being a risk to human around. So as to stay away from such episodes to the most extreme degree, support or checking of the transmission lines are commonly completed on a successive premise. This prompt expanded labour prerequisite. The reality remains that the genuine aim of this isn't met the same number of multiple times line disappointment might be because of downpour, toppling of trees which can't be anticipated. Like in Western Ghats where the transmission lines are generally drawn in the midst of the timberland and spots like Chiranjeevi where huge precipitation nearly sets everything stop. It is important to comprehend the gravity and delayed consequences of a line disappointment. To defeat these, we are proposing a GSM based transmission line deficiency identification System. At whatever point the present edge is crossed, the microcontroller in a flash starts a message to be sent to the zone lineman and the Control Station expressing the definite shaft to post area.

This encourages us to understand a practically continuous framework. The genuine aim of identifying issue progressively and securing the transformer at the soonest is figured it out. Note that transformers are expensive. A 11KV transformer on a normal costs 3000 US$.

1.12 FAULTS

In an electric power framework, a flaw is any strange progression of electric flow. For instance, a short out is a shortcoming where current stream by passes the ordinary burden. An open circuit shortcoming happens if a circuit is hindered by some disappointment. In three stage frameworks, an issue may include at least one stages and ground, or may happen just between stages. In a "ground deficiency" or "earth issue", current streams into the earth. The forthcoming short out current of a deficiency can be determined for control frameworks. In control frameworks, defensive gadgets distinguish deficiency conditions and work circuit breakers and different gadgets to restrict the loss of administration because of a disappointment. In a poly stage framework, a deficiency may influence all stages similarly which is an "even shortcoming".

1.13 TECHNICAL DETAILS

Worldwide System for Mobile interchanges is the most well-known standard for cell phones on the planet. Its advertiser, the GSM Association, gauge that 82% of the worldwide versatile market utilizes the standard. GSM is utilized by more than 2 billion individuals crosswise over in excess of 212 nations and regions. Its pervasiveness makes worldwide wandering exceptionally regular between cell phone administrators, empowering endorsers of utilization their phones in numerous pieces of the world. GSM has utilized an assortment of voice codices to crush 3.1 kHz sound into somewhere in the range of 5.6 and 13 Kbit/s. Initially, two codices', named after the kinds of information channel they were distributed, were utilized, called Half Rate (5.6 Kbit/s) and Full Rate (13 Kbit/s). These utilized a framework dependent on direct prescient coding. In extra to being proficient with bit rates, these codecs additionally made it simpler to recognize progressively significant pieces of the sound, permitting the air interface layer to organize and better secure these pieces of the sign. There five distinctive cell measures in a GSM organize large scale, small scale, Pico, femtohm and umbrella cells. The inclusion territory of every cell shifts as indicated by the usage condition. Full scale cells can be viewed as cells where the base station receiving wire is introduced on a pole or a structure better than

expected rooftop top level. Small scale cells will be celling whose reception apparatus stature is under normal rooftop top level; they are ordinarily utilized in urban zones. Pico cells are little cells whose inclusion breadth is a couple dozen meters; they are essentially utilized inside. Festo cells will be cells intended for use in private or independent venture conditions and interface with the specialist organization's system by means of a broadband web associate.

CHAPTER 2

GSM ARCHITECTURE

2.1 SUBSCRIBER IDENTITY MODULE (SIM)

One of the key features of GSM is the Subscriber Identity Module (SIM), for the most part known as a SIM card. The SIM is a distinct smart thought containing the customer's enrolment information and phonebook. This empowers the customer to hold their information in the wake of trading handsets. Of course, the customer can in like manner change heads while holding the handset basically by changing the SIM. A couple of executives will block this by empowering the phone to use only a lone SIM, or only a SIM gave by them; this preparation is known as SIM catapulting, and is unlawful in specific countries. An endorser can when in doubt contact the provider to empty the lock for a cost, utilize private organizations to oust the lock, to use adequate programming and destinations available on the Internet to open the handset themselves. While most locales offer the opening for a charge, some do it in vain.

2.2 WORKING OF GSM MODEM

A GSM modem is a remote modem that works with GSM remote systems. A remote modem is like a dial-up modem. The primary contrast is that a remote modem transmits information through a remote system while a dial-up modem transmits information through a copper phone line. Most cell phones can be utilized as a remote modem. To send SMS messages, ahead of all comers a legitimate SIM card into a GSM modem, which is then associated with microcontroller by RS 232 link. Subsequent to interfacing a GSM modem to a microcontroller, you can control the GSM modem by sending directions to it.

GSM represents Global System for Mobile interchanges. Created in 1990, it has become the most famous standard for cell phones on the planet. The usage condition decides the inclusion region of every cell. The limits of cells can cover between adjoining cells

(enormous cells can be changed over into littler cells). The innovation utilizes a mix of recurrence division multiplexing (FDM) and time division multiplexing (TDM).

2.3 SHORT MESSAGE SERVICE (SMS)

Short Message Service is a typical monetarily moderate help utilized for getting and sending messages in content. It utilizes the GSM system to move data. This strategy for transmitting information is very famous because of accommodation and minimal effort factor. A solitary instant message can comprise up to 160 characters. SMS portable began is a term utilized when a message is sent by a versatile, anyway when a message is gotten by a versatile it is named SMS versatile ended. Remote information correspondence and checking is upheld by SMS because of its bi-directional information move and its stable execution. Amit sachem et al have talked about the client can peruse remote electrical parameters by sending a direction in type of SMS messages. In view of the setting, ongoing electrical parameter can be naturally sent in type of SMS occasionally. Amendment of issues during event of any variation from the norm in electrical cables and utilizing SMS through GSM system to illuminate work force regarding this activity is additionally made accessible. Andriy Palomar et al proposed the framework, a Cellular telephone which as a Subscriber's Identifying Module (SIM) card with a particular number through which correspondence is made. The vehicle of correspondence is remote that deals with the Global System for Mobile correspondence innovation (GSM). Utilizing helpful transferring procedures these additions are likewise workable for single-radio wire hubs. The researchers thought about the fundamental.

2.4 THE COMMUNICATION SYSTEM

The GSM modem is a wireless modem that works with a GSM wireless network. Unlike the dial-up modem, the GSM modem sends and receives data through waves. It requires a SIM card from a wireless network carrier to function. Whenever the set threshold is bridged, the system sends an instant message to the utility mobile phone, stating the existing fault and the location using the GSM modem.

2.5 OPERATION OF THE GSM

GSM Modems are constrained by the microcontroller utilizing the AT directions. Anyway, the GSM modem bolsters a fixed and expanded arrangement of AT directions. Characterized in the GSM gauges are these all-encompassing arrangement of AT directions which empowers the accompanying capacities;

-Send SMS messages.

-Reading, writing and searching phone contacts.

- Monitor signal quality.

-Read, write and delete SMS messages.

2.6 THE SWITCHING DEVICE RELAY

The hand-off goes about as an electrical separation to disconnect the whole framework on the event of flaw. It shut down or de-invigorates other electrical gear in the framework, which will at that point enable work to be done sometime later. As an electrical contraption for modified control, it is prompted by assortment in the conditions of the electrical circuit.

2.7 OPERATION OF THE RELAY

The appraised curl voltage of the hand-off utilized is 5V DC. This voltage is required for the hand-off to play out the capacity of opening or shutting it switch. This 5V DC is nourished to the transfer curl terminals. The attractive field inside the curl breakdown at whatever point there is an unexpected break in the progression of current through the hand-off loop because of the switch opening.

2.8 THE SENSING UNIT

The sensing unit consists of the voltage sensing, the current sensing, the frequency sensing and the temperature sensing, as it helps to acquire electrical parameter and make the respective signals available for the PIC to process.

2.9 SIM800L OVERVIEW:

SIM800L is a quad-band GSM/GPRS module, that manages frequencies GSM850MHz, EGSM900MHz, DCS1800MHz and PCS1900MHz. SIM800L features GPRS multi-space class 12/class 10 (optional) and supports the GPRS coding plans CS-1, CS-2, CS-3 and CS-4.

Fig no 2.1: SIM Module

With a little arrangement of 15.8*17.8*2.4mm, SIM800L can meet practically all the space prerequisites in client applications, for example, advanced mobile phone, PDA and other cell phones.

SIM800L has 88pin heap of LGA packaging, and gives all gear interfaces between the module and customers' sheets.

 Support 5*5*2 keypads

 One full modem sequential port, client can design two sequential ports

 One USB, the USB interfaces can debug, download software

 Audio channel which includes two microphone input; a receiver output and a speaker output

□ Programmable general-purpose input and output.

□ A SIM card interface

□ Support FM

□ Support one PWM

2.10 POWER SUPPLY:

The power supply extent of SIM800L is from 3.4V to 4.4V. Suggested voltage is 4.0V. The transmitting impacted will cause voltage drop and the power supply must have the alternative to surrender sufficient current to 2A. For the VBAT input, an alternate route capacitor (low ESR, for instance, a 100 μF is unequivocally recommended.

2.11 POWER SUPPLY PIN

Pin 1 and Pin 42 are VBAT input, Pins 2,43,44,45 are GND of power supply, VRTC pin is control supply of the RTC circuit in the module. VDD_EXT yield 2.8V when module is in ordinary movement mode.

While organizing the influence supply in customer's application, give exceptional thought to control setbacks. Assurance that the data voltage never plunges under 3.0V in any occasion, when current usage climbs to 2A in the transmit burst. In case the power voltage plunges under 3.0V, the module may be shut down normally.

2.12 POWER ON SIM800L

Client can control on SIM800L by pulling down the PWRKEY pin for at any rate 1 second and discharge. This pin is now dismantled up to VBAT in the module inner, so outside draw up isn't important. Reference circuit is appeared as beneath.

2.13 RESULT

The investigation of deficiency recognition and area arrangement of transmission line. Regardless of whether it is any sort of issue that can be recognized and found. At the point when issue get happens on the transmission line the sign is send to the control room or phone through a GSM modem. The message jump on the adaptable that is the inadequacy between post 1 and 2 and the issue which is even or unsymmetrical like L-G, L-L, L-L-G, L-L-L, L-L-L-G. The sign that appears on the control room or mobile phone is the L*G or some other sort of defect occurred on transmission line.

2.14 List of Component with Price

SL No	Component Name	Quantity	Price
1	Microcontroller (PIC 16F73)	2	450
2	16X2 LED	1	300
3	Partex board	1	400
4	Step Down X-former	2	300
5	LED Bulb	1	50
6	Crystal (16MHz)	2	20
7	7805 Regulator	4	100
8	Capacitor 122MFD/35V	8	50
9	LED	10	40
10	Power Switch	2	40
11	Diode SR560	2	30
12	FAN	2	100
13	Some Resister		20
14	Optocoupler	1	30
15	Copper transmission Line		50
16	Connector	1	20
17	IC Bess	2	50

18	GSM MODULE	1	500
	Total Price (IN TAKA)		**2650**

CHAPTER 3

Hardware and Component

3.1 ARDUINO NANO MICROCONTROLLER BOARD

Characterizing Arduino Nano

An Arduino is actually a microcontroller-based pack which can be either used direct by purchasing from the merchant or can be made at home using the portions, inferable from its open source hardware incorporate. It is basically used in exchanges and in controlling or working various contraptions. It was set up by Massimo Bansi and David Cuartillas in 2005.
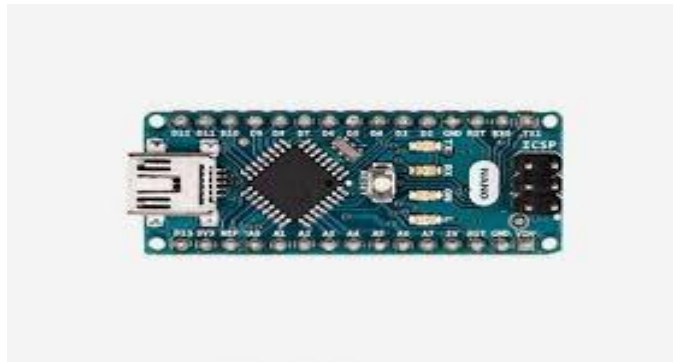

Fig no 3.1: Arduino Nano Microcontroller Board

3.2 ARDUINO ARCHITECTURE

Arduino's processor basically uses the Harvard designing where the program code and program data have separate memory. It involves two memories Program memory and the data memory. The code is taken care of in the flash program memory, while the data is taken care of in the data memory. The Atmega328 has 32 KB of blast memory for taking care of code (of which 0.5 KB is used for the bootloader), 2 KB of SRAM and 1 KB of EEPROM and works with a clock speed of 16MHz.
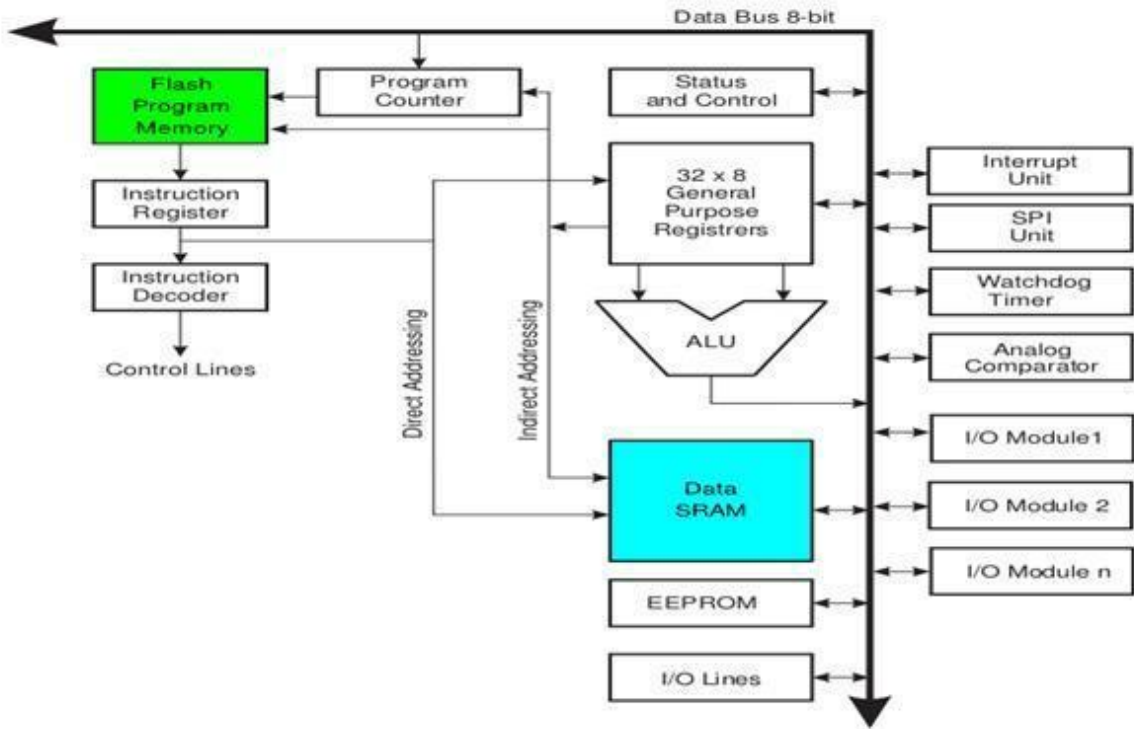
Fig no 3.2: Arduino Architecture

3.3 ARDUINO PIN DIAGRAM

A regular case of Arduino board is Arduino Uno. It comprises of ATmega328-a 28 pin microcin
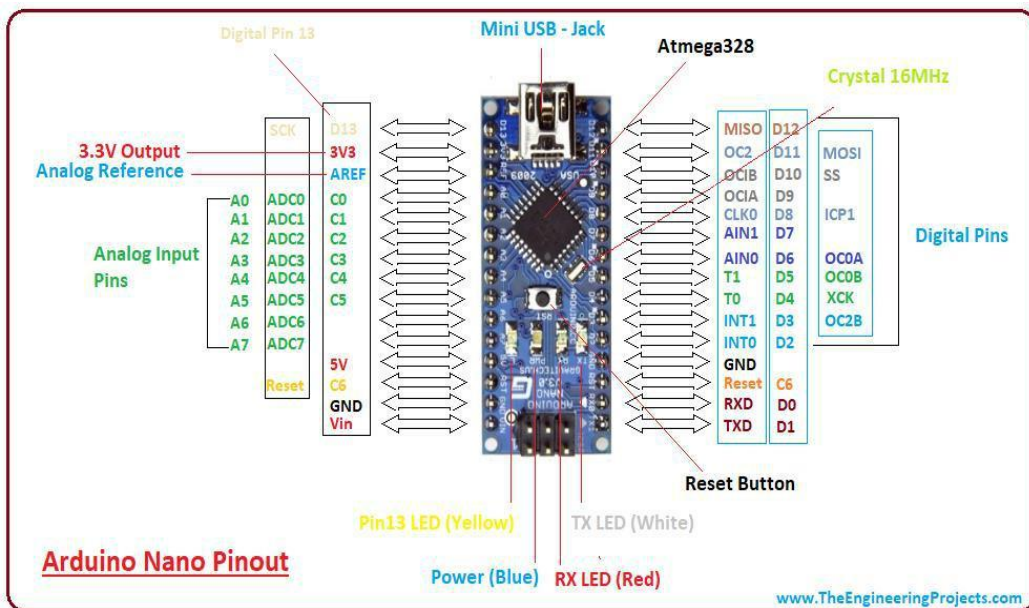

Fig no

3.3: Arduino pin diagram

Power Jack: Arduino can be control either from the pc through a USB or through external source like connector or a battery. It can take a shot at an external supply of 7 to 12V. Power can be applied remotely through the pin Vin or by giving voltage reference through the Ref pin.

Modernized Inputs: It contains 14 propelled wellsprings of data/yield sticks, all of which plus or minus up 40mA current. Some of them have interesting limits like pins 0 and 1, which go about as Rx and Tx independently, for successive correspondence, pins 2 and 3-which are outside meddles with, pins 3,5,6,9,11 which gives p w m yield and pin 13 where LED is related.

Basic information sources: It has 6 basic data/yield sticks, each giving an objective of 10 bits.

Arafa: It offers reference to the basic wellsprings of information

Reset: It resets the microcontroller when low.

3.4 HOW TO PROGRAM AN ARDUINO

The most significant bit of leeway with Arduino is the projects can be straightforwardly stacked to the gadget without requiring any equipment software engineer to consume the program.
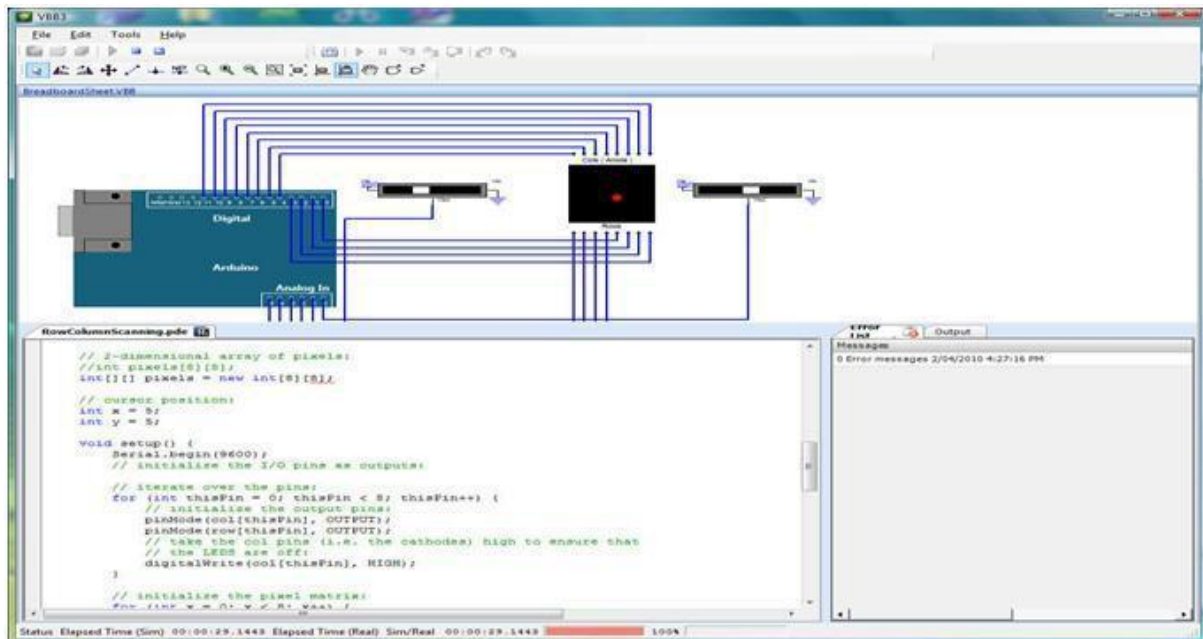

Fig no 3.4: Arduino connection diagram

This is done as a result of the nearness of the 0.5KB of Bootloader which enables the program to be scorched into the circuit. We should simply to download the Arduino programming and composing the code.

The Arduino gadget window contains the toolbar with the gets like check, move, new, open, extra, successive screen. It is like manner involves a substance instrument to form the code, a message area which shows the analysis like exhibiting the bungles, the substance comfort which shows the yield and a movement of menus like the File, Edit, Tools

5 Steps to program an Arduino

Projects written in Arduino are known as representations. A fundamental sketch comprises of 3 sections

1.   Declaration   of   Variables

2.   Initialization: It   is   written in   the   setup   ()   function.

3. Control code: It is written tuned in () work.

3.5 HOW TO DESIGN YOUR OWN ARDUINO

We can in like manner plan our own Arduino by following the schematic given by the Arduino dealer and besides available at the destinations. All we need are the going with portions A breadboard, a drove, a power jack, an IC connection, a microcontroller, scarcely any resistors, 2 controllers, 2 capacitors. The IC connection and the power jack are mounted on the board. Incorporate the 5v and 3.3v controller circuits using the blends of controllers and capacitors. Include genuine power relationship with the microcontroller pins. Interface the reset pin of the IC connection to a 10K resistor. Interface the valuable stone oscillators to pins 9 and 10Connect the incited the best possible pin. Mount the female headers onto the board and partner them to the specific pins on the chip Mount the section of 6 male headers, which can be used as a decision to move programs. Move the program on the Microcontroller of the readymade Arduino and a while later pry it off and place back on the customer pack. It goes with an open source gear incorporate which engages customers to develop their very own unit using successfully available one as a sort of viewpoint source. The Arduino writing computer programs is flawless with a wide scope of working systems like Windows, Linux, and Macintosh, etc. It moreover goes with open source programming feature which enables experienced programming planners to use the Arduino code to unite with the present programming language libraries and can be widened and changed.

3.6 POWER SUPPLY

A power supply is an electronic device that arrangements electric imperativeness to an electrical weight. The fundamental limit of a power supply is to change more than one kind of electrical essentialness to another. In this manner, control supplies are now and again insinuated as electric power converters. Some power supplies are discrete, free contraptions; however, others are consolidated with greater devices nearby their stores. Cases of the last fuse control supplies found in PCs and purchaser equipment contraptions. The wellspring of this power can emerge out of various source like the primary AC voltage, a battery or even from a sustainable power source like sun-based board wind turbine or energy unit to give some examples. The most widely recognized wellspring of intensity is generally the principle AC.
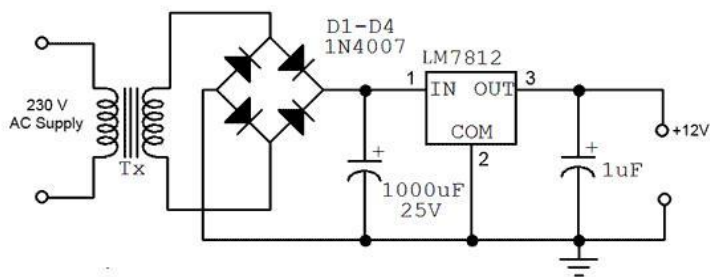

Fig no 3.5: AC-DC Power Supply & Circuit Diagram.
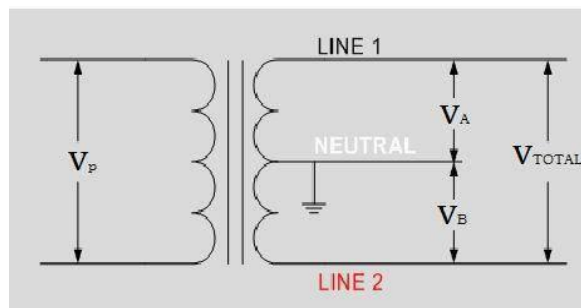
3.7 TRANSFORMER

Fig no 3.6: Transformer

A transformer is a gadget comprising of two firmly coupled loops called essential and optional curls. An AC voltage applied to the essential shows up over the auxiliary with a

voltage increase extent to the turn proportion of the transformer and a present augmentation conversely corresponding to the turn proportion control is saved turn apportion = VP/VS=NP/Ns and power out = control in or Vs

3.8 WORKING OF THIS TRANSFORMER

The two voltages, between line 1 and unprejudiced and among impartial and line 2 can be named as VA and VB independently. By then the logical association of these two voltages shows that they are dependent upon the basic voltage similarly as the turn distribute of the transformer.

One thing that should be noted here is that both the yields VA and VB separately are identical in size yet converse in bearing, which suggests that they are 180 degrees out of stage with each other.
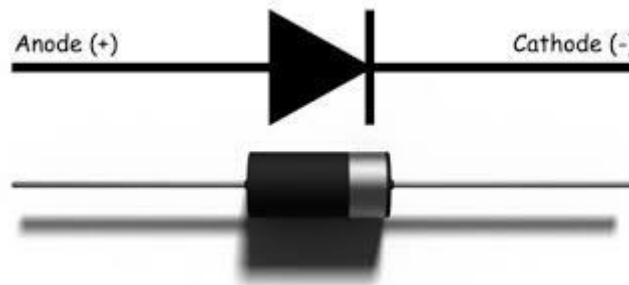
3.9 DIODE

Fig. no 3.7: Diode and symbol

The term diode for the most part suggests a little sign gadget with current ordinarily in the milliamp go. A semiconductor diode comprises of a PN unction and has two (2) terminals, an anode (+) and cathode (-) current streams from anode to cathode inside the diode. Diodes are semiconductor gadget that may be portrayed as passing current one way as it were. The last piece of that announcement applies similarly vacuum tube diodes.
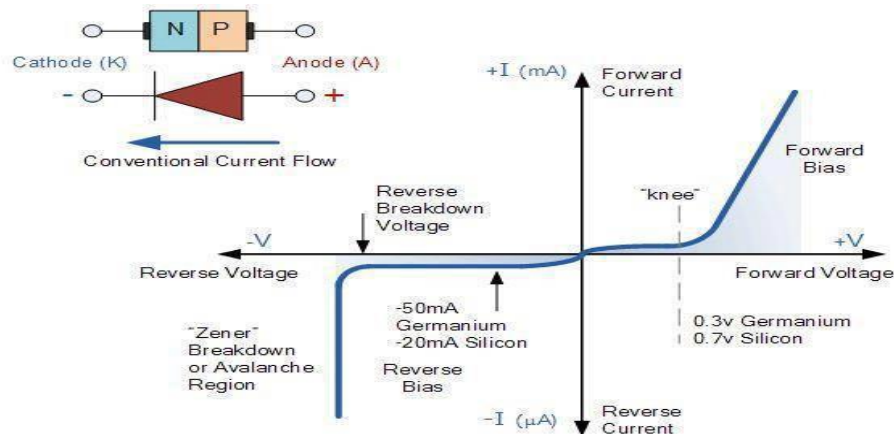
3.10 CHARACTERISTICS

Fig 3.8: Junction diode symbol and static V-I characteristics

There are two working locale and three potential "biasing" conditions for the standard

Convergence Diode and these are:

1. Zero Bias – No outside voltage potential is applied to the PN convergence Diode

2. Switch Bias – The voltage potential is related negative, (- ve) to the P type material and positive, (+ ve) to the N-type material over the diode which has the effect of Increasing the PN convergence diode's width.
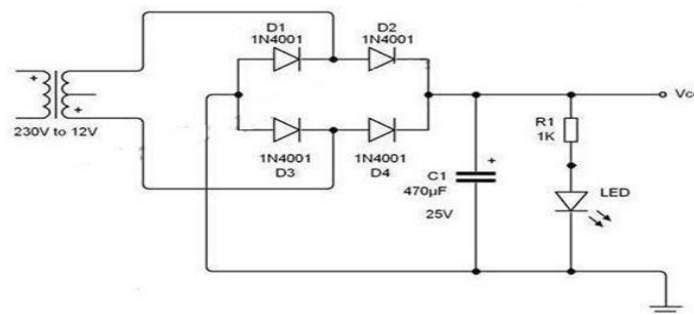
3.11 FULL-WAVE RECTIFIERS

Fig no 3.9: Bridge rectifier circuit

A rectifier is an electronic circuit that changes over AC voltage to DC voltage. It very well may be actualized utilizing a capacitor diode blend. The interesting property of diodes, allowing the current to stream a solitary way is used in here. It changes over an air conditioner voltage into

a throbbing dc voltage utilizing both half cycles of the applied air conditioning voltage. Scaffold rectifier is a full wave rectifier circuit utilizing the mix of four diodes to frame an extension.

3.12 WORKING OF A BRIDGE RECTIFIER

•During the positive half cycle of optional voltage, diodes D2 and D3 are forward one-sided and diodes D1 and D4 are invert one-sided. Presently the present moves through D2–>Load–>D3.

•During the negative half cycle of the auxiliary voltage, diodes D1 and D4 are forward one-sided and rectifier diodes D2 and D3 are invert one-sided. Presently the present moves through D4–>Load>D1.
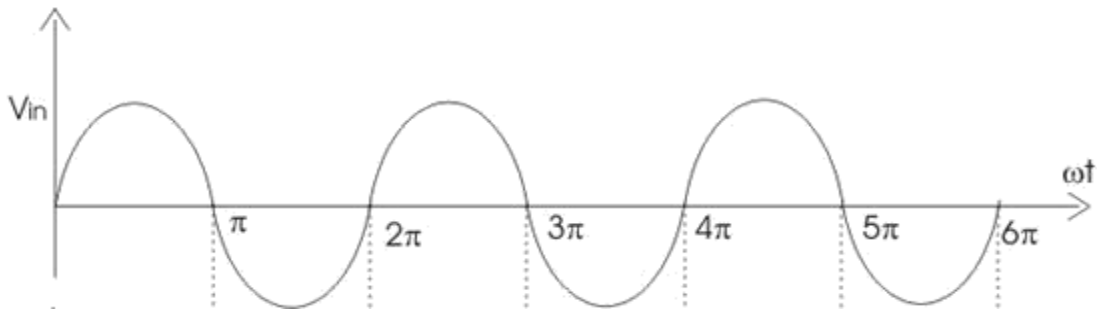

Fig no 3.10: Bridge rectifier wave diagram

•Addition of a capacitor at the yield changes over the throbbing DC voltage to fixed DC voltage.

•Up to a timespan of t=1s input voltage is expanding, so the capacitor energizes to top estimation of the information. After t=1s input begins to diminish, at that point the voltage over the capacitor switch inclinations the diodes D2 and D4 and along these lines it won't direct. Presently capacitor releases through the heap, at that point voltage over the capacitor diminishes.
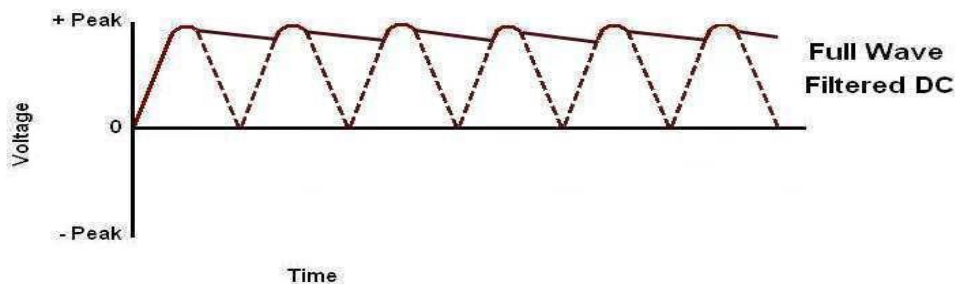

Fig 3.11: Filtered output

3.13 CAPACITOR

Capacitor is a detached two-terminal electrical part used to store vitality in an electric field. The types of viable capacitors differ generally, yet all contain in any event two conductors isolated by a non-conductor. Capacitors utilized as parts of electrical frameworks, for instance comprise of metal soils isolated by a layer of protecting film. A capacitor is detached electronic segment comprising of a couple of conveyors isolated by a dielectric (separator) when there is a potential contrast (voltage) over the distinguished on one plate and negative charge on the other plate. Vitality is put away in the electrostatic field and is estimated in farads.
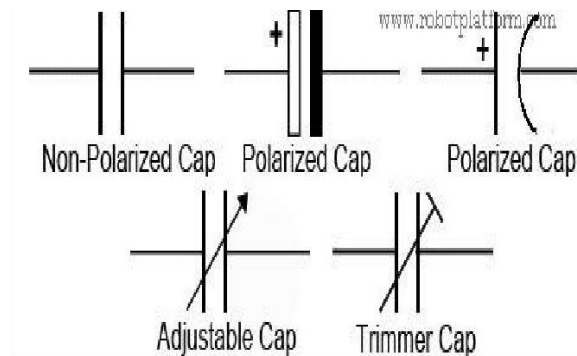

Fig.no 3.12: Capacitors & Capacitor symbols.
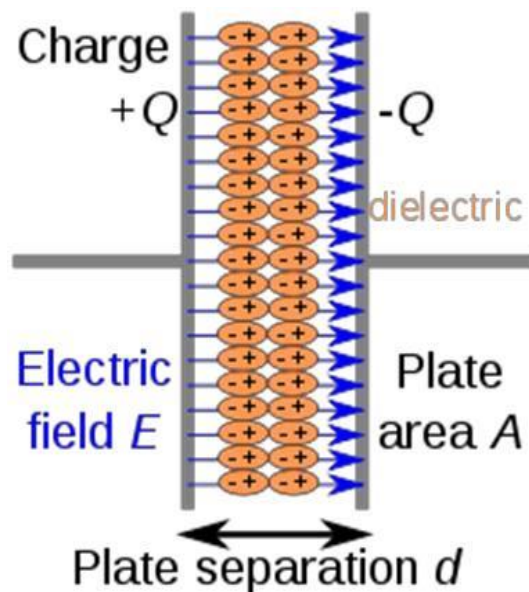
3.14 THEORY OF OPERATION

Fig 3.13: Internal constriction of capacitors

A capacitor comprises of two conductors isolated by a non-conductive district. The non-conductive area is known as the dielectric. In easier terms, the dielectric is only an electrical encasing. Instances of dielectric media are glass, air, paper, vacuum, and even a semiconductor exhaustion area artificially indistinguishable from the conduits. A capacitor is thought to act naturally contained and secluded, with no net electric charge and no impact from any outside electric field. The channels along these lines hold equivalent and inverse charges on their confronting surfaces, and the dielectric builds up an electric field. In SI units, a capacitance of one farad implies that one coulomb of charge on every conductor causes a voltage of one volt over the gadget.

3.15 VOLTAGE REGULATOR

A voltage controller is a framework intended to naturally keep up a consistent voltage level. A voltage controller may utilize a straightforward feed-forward plan or may incorporate negative criticism. It might utilize an electromechanical system, or electronic segments.

Voltage Regulators Output Voltages

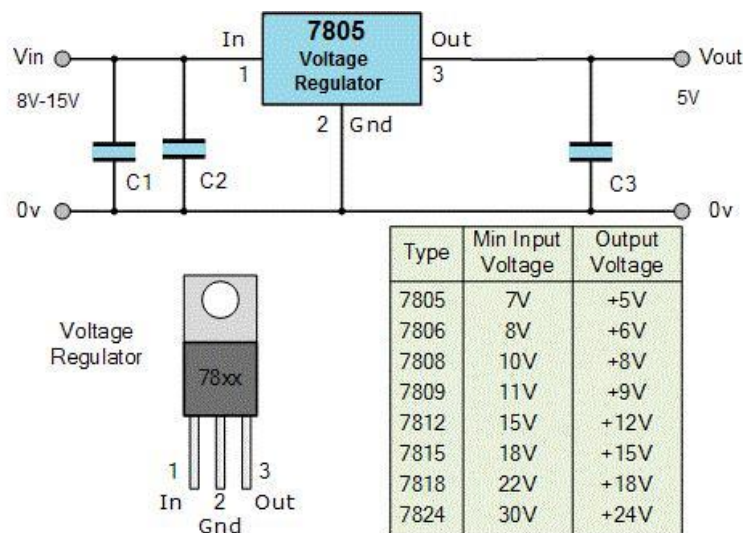| Type	Min Input Voltage	Output Voltage
7805	7V	+5V
7806	8V	+6V
7808	10V	+8V
7809	11V	+9V
7812	15V	+12V
7815	18V	+15V
7818	22V	+18V
7824	30V	+24V

Fig no 3.14: Voltage regulator output voltage

CHAPTER 4
LCD MODULE

4.1 ITRODUCTION

Driven (Liquid Crystal Display) screen is an electronic presentation module

These modules are favoured more than seven portions and other multi fragment LCDs

LCDs are efficient

Development and Working Principle of LCD Display

What is an LCD (Liquid Crystal Display)?

A fluid gem show or LCD draws its definition from its name itself. It is blend of two conditions of issue, the strong and the fluid. Driven uses a fluid gem to deliver an obvious picture. Fluid precious stone presentations are super-slender innovation show screen that are commonly utilized in workstation phone, TVs, PDAs and versatile computer games. Dirven's advances enable showcases to be a lot slenderer when contrasted with cathode beam tube (CRT) innovation.
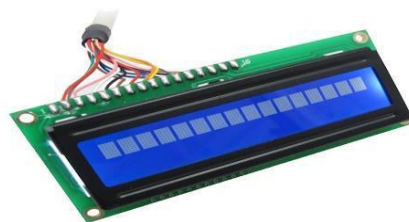

Fig no 4.1: LCD display

An LCD is either comprised of a functioning lattice show framework or an uninvolved showcase network. The greater part of the Smartphone's with LCD show innovation utilizes dynamic framework show, yet a portion of the more seasoned shows still utilize the uninvolved showcase lattice plans. A large portion of the electronic gadgets

fundamentally rely upon fluid gem show innovation for their showcase. The fluid has an exceptional bit of leeway of having low power utilization than the LCD or cathode beam tube.
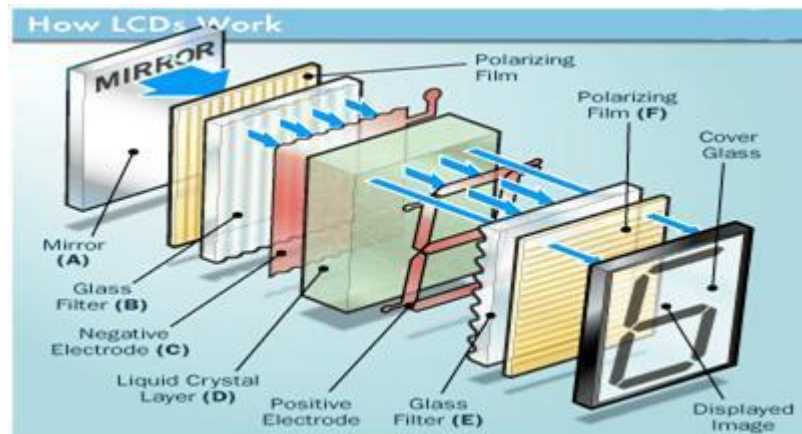
4.2 HOW LCDs ARE CONSTRUCTED

Fig no 4.2: LCD display construction

Basic realities that ought to be considered while making an LCD:

The essential structure of LCD ought to be constrained by changing the applied current.

We should utilize a spellbound light.

Fluid precious stone should capable be to control both of the activity to transmit or can likewise ready to change the energized light.

As referenced over that we have to take two energized glass pieces channel really taking shape of the fluid gem. The glass which doesn't have an energized film on the outside of it must be scoured with an extraordinary polymer which will make infinitesimal depressions on the outside of the captivated glass channel. The scores must be a similar way of the spellbound film.

4.3 HOW LCD WORK

The standard behind the LCD's is that when an electrical flow is applied to the fluid precious stone particle, the atom will in general untwist. This causes the edge of light which is going through the particle of the energized glass and furthermore cause an adjustment in the point of the top polarizing channel. Therefore, somewhat light is permitted to pass the enraptured glass through a specific zone of the LCD. Accordingly, that specific region will become dull contrasted with other. The LCD deals with the guideline of blocking light. While developing the LCD's, a reflected mirror is orchestrated at the back. A terminal plane is made of indium-tin oxide which is kept on top and an energized glass with a polarizing film is likewise included the base of the gadget. The total locale of the LCD must be encased by a typical cathode or more it ought to be the fluid precious stone issue Next goes to the second bit of glass with an anode as the square shape on the base and, on top, another polarizing film. It must be viewed as that both the pieces are kept at right edges. When there is no current, the light goes through the front of the LCD it will be reflected by the mirror and ricocheted back. As the anode is associated with a battery the current from it will cause the fluid gems between the normal plane terminal and the cathode moulded like a square shape to untwist. Consequently, the light is obstructed from going through. That specific rectangular region seems clear.

4.4 Points of interest OF AN LCDs

LCD's devours less measure of intensity contrasted with CRT and LED

LCD's are comprising of some microwatts for show in contrast with some plant watts for LCD's

LCDs are of minimal effort

Gives fantastic complexity

LCD's are more slender and lighter when contrasted with cathode beam cylinder and LCD

4.5 DISADVANTAGES OF AN LCDs

Require extra light sources

Scope of temperature is restricted for activity

Low dependability

Speed is low

Dirven's need an AC drive

Uses of Liquid Crystal Display

Fluid gem innovation has significant applications in the field of science and designing also on electronic gadgets.

Fluid gem thermometer

Optical imaging

The fluid gem show method is additionally relevant in representation of the radio recurrence waves in the waveguide

Utilized in the medicinal application.

4.6 BACKGROUND STUDY

Internationally, there are three stages in electric power supply framework. These include the age stage, the transmission stage and the dispersion stage. Every one of these stages includes certain unmistakable generation forms, work exercises and dangers.

4.7 C PROGRAMENING CODE FOR THESE PROJECTS

#include<Liquid Crystal's>

Liquid Crystal LED (11,9,7,6,5,4);

#define BUZ 2

#define LEDN 8

#define LEDL 3

int temp=0, I=0, cnt, cnt1;

char str [15];

void setup ()

{

  LED. Begin (16,2);

  Serial. Begin (9600);

```
pin Mode (BUZ, OUTPUT);

pin Mode (LEDN, OUTPUT);

pin Mode (LEDL, OUTPUT);


LED. set Cursor (0,0);

LED. Print (" GSM PREPAID        ");

LED. set Cursor (0,1);

LED. Print (" ENERGY METER ");

digital Write (BUZ, HIGH);

delay (60);

digital Write (BUZ, LOW);

delay (60);

digital Write (BUZ, HIGH);

delay (60);

digital Write (BUZ, LOW);

delay (60);

digital Write (BUZ, HIGH);

delay (60);

digital Write (BUZ, LOW);

delay (60);


digital Write (LEDL, HIGH);
```

```
LED. set Cursor (0,1);

LED. Print (" System Ready ");

Serial. Printing ("AT+CNMI=2,2,0,0,0");

delay (500);

Serial. printing("AT+CMGF=1");

delay (1000);

digital Write (LEDL, LOW);

//LED. Clear ();


SendMessage1();
}
////////////////////////////////////////////////////////////////////
////////////////////////////////////////////////////////////////////
void loop ()
{
 DISPLAY1();

 SENSOR ();

 if(temp==1)

 {

  check ();

  temp=0;

  I=0;
```

```
 delay (10);

 }


//////////////////////

 cnt++;

 if(cnt> 250)

 {cnt1++cnt=0;}

 if (cnt1 > 10)

 cnt1=0;

 /////////////////////

}

//////////////////////////////////////////////////////////////////////

//////////////////////////////////////////////////////////////////////

void DISPLAY1()

{

   LED. set Cursor (0,0);

   LED. Print (" SYSTEM READY   ");

   LED. set Cursor (0,1);

   LED. Print (" INITIALIZING... ");


    if ((cnt == 0) | (cnt == 1) | (cnt == 15) | (cnt == 16) | (cnt == 30) | (cnt == 31))

    digital Write (LEDN, HIGH);
```

```
 else

    digital Write (LEDN, LOW);

}

//////////////////////////////////////////////////////////////////////

void SENSOR ()

{


}



//////////////////////////////////////////////////////////////////////

 void serial Event ()

 {

  while (Serial. Available ())

  {

    if (Serial. Find("#A."))

    {

      digital Write (LEDN, HIGH);

      delay (10);

      digital Write (LEDN, LOW);

      while (Serial. Available ())

      {

        char in Char=Serial. Read ();
```

```
  str[I++] =in Char;

    if (in Char=='*')

    {

     temp=1;

     return;

    }

   }

  }

 }

//////////////////////////////////////////////////////////////////

void check ()

{

  if (! (strncmp (str,"rs50 bdt",5)))

  {

   digital Write (LEDL, HIGH);

   LED. set Cursor (13,1);

   LED. Print("ON    ");

   delay (2000);

   SendMessage2();

  }

  if (! (strncmp (str,"rs100 bdt",6)))
```

```
  {

    digital Write (LEDL, LOW);

    LED. set Cursor (13,1);

    LED. Print("OFF  ");

    delay (2000);

  }



}
```

//

//

```
void SendMessage1()                    // fan on

{

 Serial. Printing ("AT+CMGF=1");

 delay (100);

 Serial. printing("AT+CMGS=\"+8801715528642\"\r");

 delay (100);

 Serial. printing ("SYSTEM READY");

 delay (100);

 Serial. printing((char)26);

 delay (2000);

}
```

```
void SendMessage2()                    // FAN OFF

{

 Serial. printing("AT+CMGF=1");

 delay (100);

 Serial. printing("AT+CMGS=\"+8801715528642\"\r");

 delay (100);

 Serial. printing ("BALANCE REFILLED BY TK 50.0 BDT. successful ");

 delay (100);

 Serial. printing((char)26);

 delay (2000);

}

void SendMessage3()                    // FAN OFF

{

 Serial. printing("AT+CMGF=1");

 delay (100);

 Serial. printing("AT+CMGS=\"+8801715528642\"\r");

 delay (100);

 Serial. printing ("BALANCE REFILLED BY TK 100.0 BDT.");

 delay (100);

 Serial. printing((char)26);

 delay (2000);
 }
```

CHAPTER 5
HARDWARE INTEGRATION

5.1 LINE ONE AND TWO OPEN

When we project on, the voltage values of v1 and v2 are in the first state v1 246v and v2 222v. now I 0.00A and I2 0.00A.

Fig no 5.1: line one and two open

5.2 LINE ONE FAULT

When we apply power supply into line1 (amp L1 :1.18). and the over voltage occurs it detects the line fault. That's why the line goes to automatic trip so the line current goes to zero.
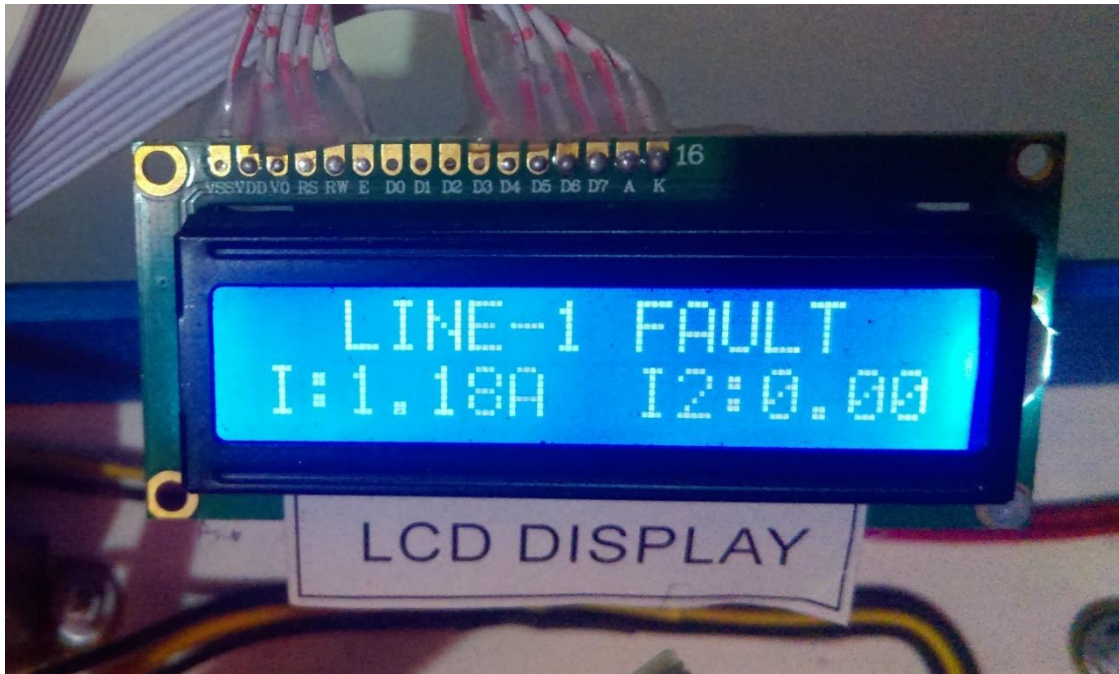
Fig no 5.2: line one fault

5.3line two fault

When we apply power supply into line2 (amp L2 :1.33). and the over voltage occurs it detects the line fault. That's why the line goes to automatic trip so the line current goes to zero.
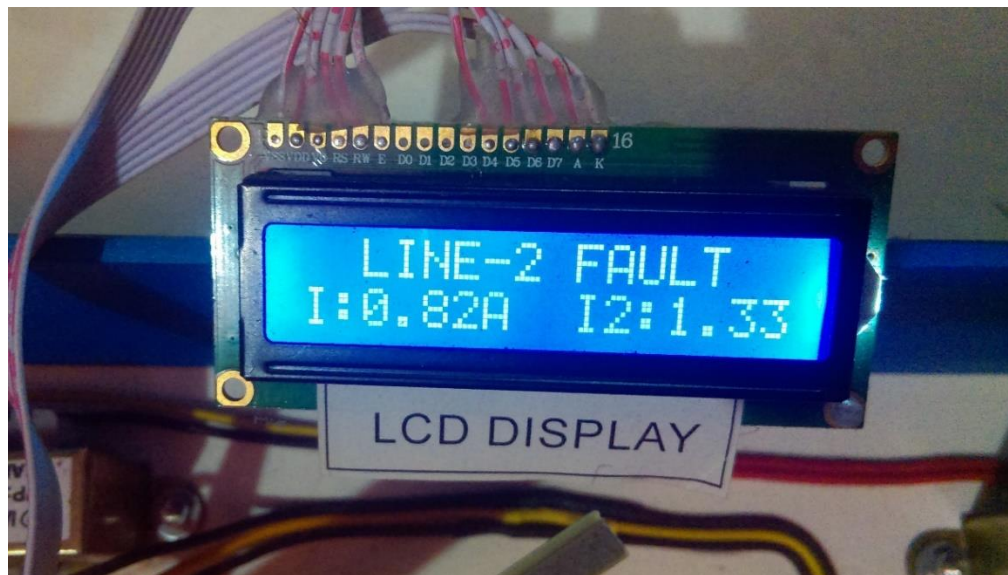

Fig no 5.3: line two fault

5.4 picture of project

First of All, we apply 220 volts at both step-down transformer for line 1 and 2. In this method the primary voltage is 220v and secondary voltage is 120. The secondary terminal connected with two resistance with negative side. And the positive side connected with relay. The we filtering this circuit by using diode and capacitor. Then we using 5v regulator for converted 12v Dc. We know a transistor is connected with by using wire regulator input transistor. Transistor is used for safe the circuit when fault occurs the circuit will not be affected for input and output filtering, we used two capacitors. Then we got fixed 5v. this 5v going to operate the ARDUINO, GSM, And LCD. The Arduino GSM and LCD devices are always operating by 5v. the Arduino has 30 pins. We used nano technology Arduino from A0-A7 pin is knows called ADC pin. The D2 pin is for output. For voltage divider we used voltage source and amp source.
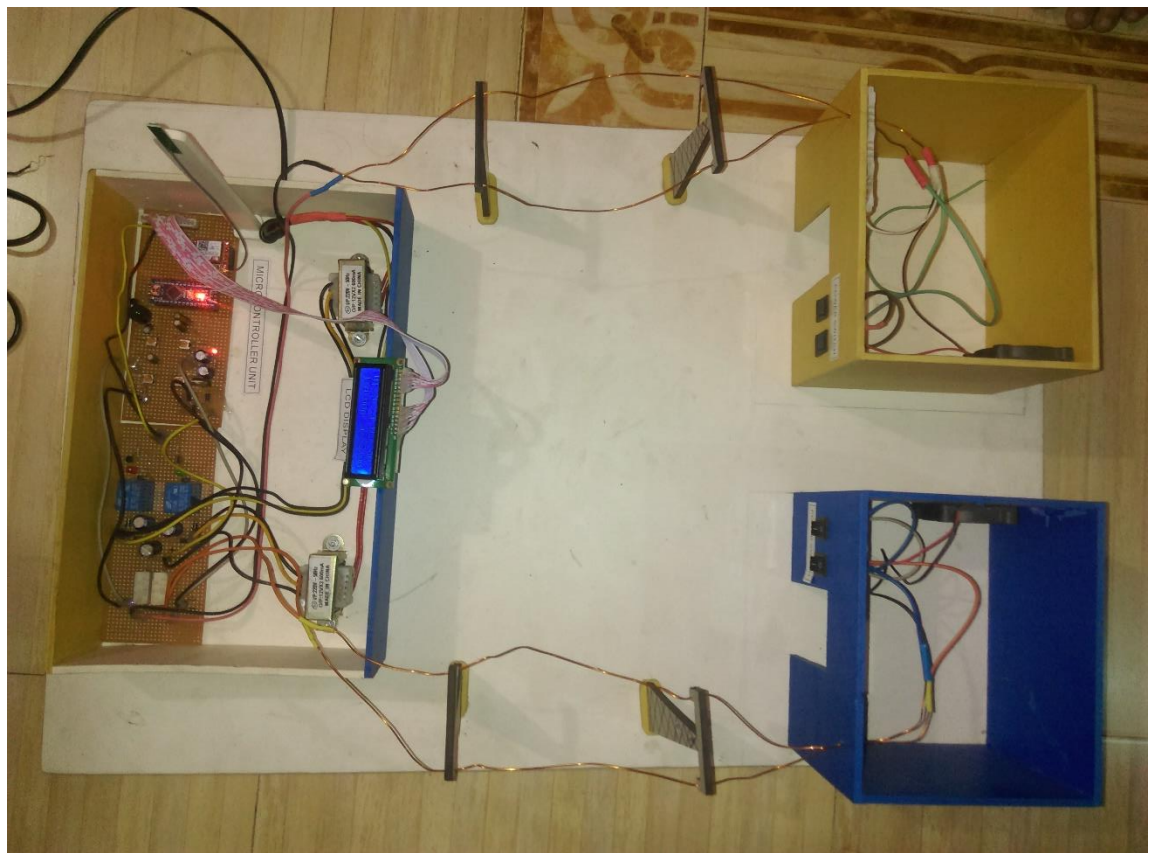

fig no 5.4: picture of project

CHAPTER 6
CONCLUSIONS

Here, in this undertaking we have planned a GSM based transmission line checking and sign framework that sends data of the equivalent to control room by means of SMS. The actualized framework configuration for the most part focuses on the dispersion framework. It gives the best approach to identify the shortcomings, for example, wastage of vitality and power burglary. The framework persistently screens different parameters of the framework. It additionally recognizes the shortcoming at the appropriate time and henceforth maintains a strategic distance from unlawful utilization of power. Programmed checking, breaking down and recording is done on the PC screen through hyper terminal. The venture has ceaseless observing framework incorporating the GSM correspondence innovation and the microcontroller innovation. It additionally speaks to the equipment design and the product stream. The usage of the framework will spare enormous measure of power and accordingly power will be accessible for progressively number of shoppers in an exceptionally populated nation, for example, BANGLADESH. Here, in this task we have planned a GSM based transmission line observing and sign framework that sends data of the equivalent to power board through SMS.

6.1 Future scope

As we referred before this theory is definitely not a total undertaking. This is only an essential structure of another total framework. We have done all the essential necessities of a run of the simple Substation and on safety. The assignment that we have done are by all account not the only undertaking the parts can do. There is a great deal of different degrees for this task. More machines can be included this framework with an incredible transfer module.

√The project "IOT based automatic control circuit breaker for transmission line" is intended to automate the certain function of substation the main scope of this project is that we can control substation by using GSM and Arduino Nano.

√With the recent expansion of communication networks, substation overvoltage and overcurrent control by Using this circuit.

√ the device is must helpful I controlling substation safety. It decreases the wastage of our important time and safety.

√GSM is globally accepted standard for digital cellular communication.

√A helpful future add or future could be the addition of GSM

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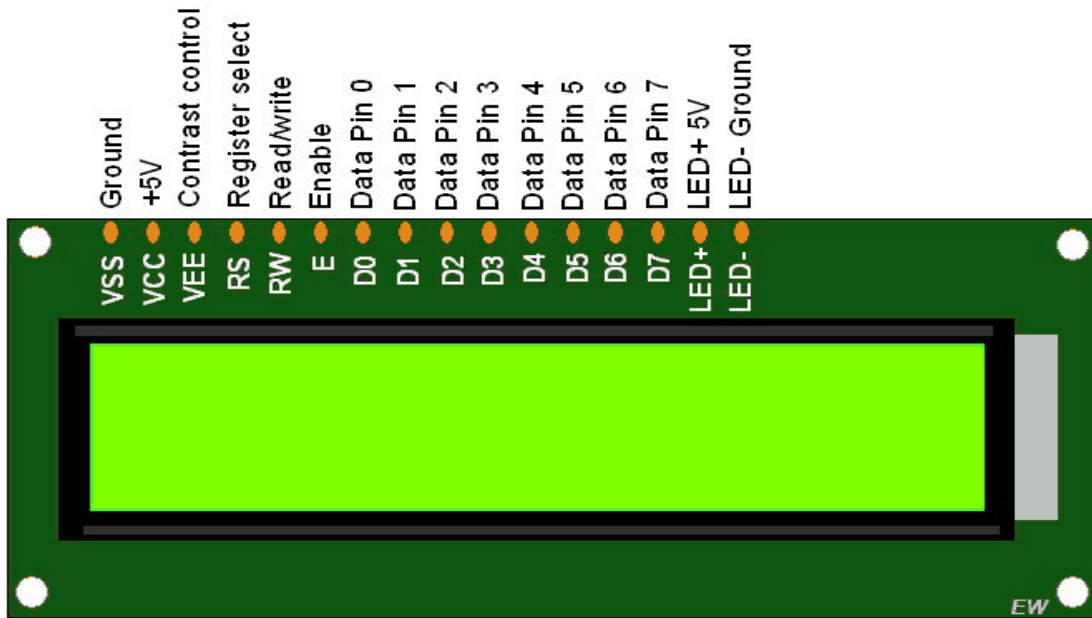
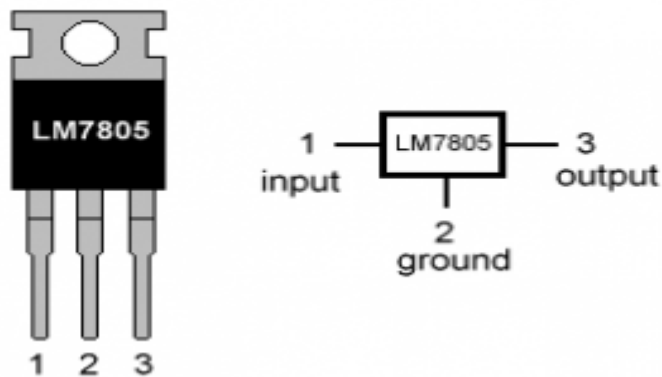# Appendix

Fig: LCD Monitor

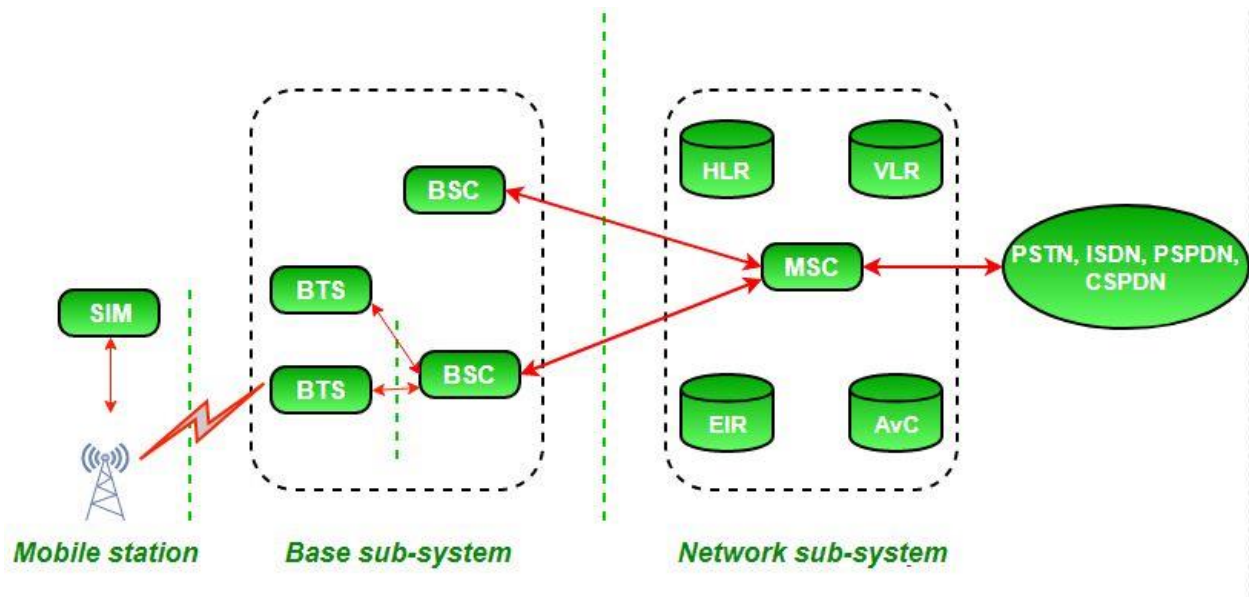Fig: Regulator pin Diagram

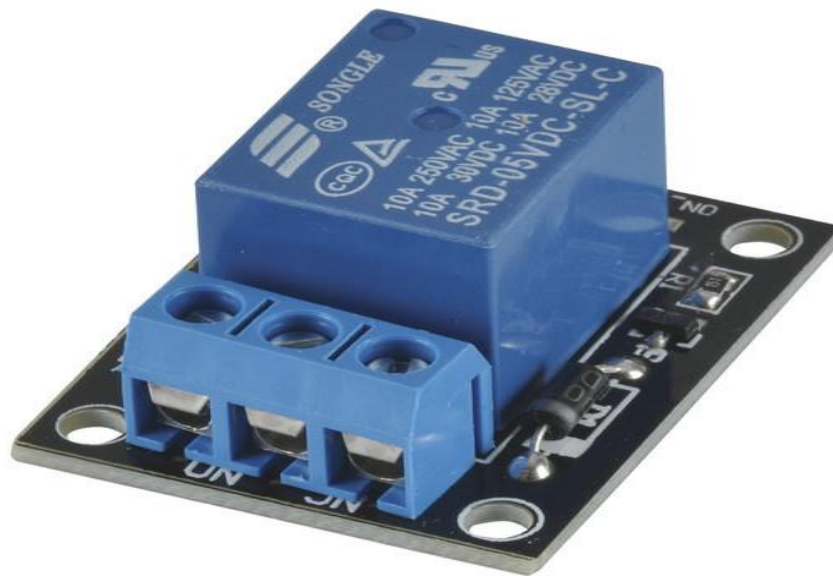Fig: GSM networking system

Fig: Buzzer

Fig: XC4419-arduino-compatible-5v-relay-boardImageMain-515

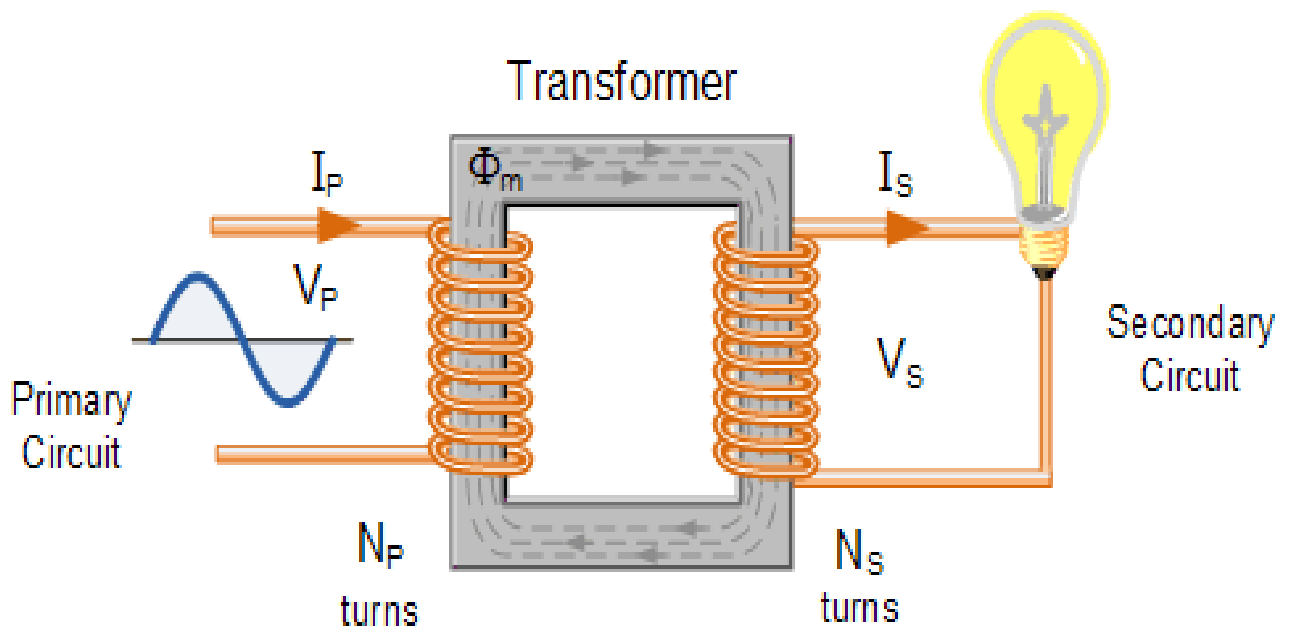Fig: Transformer