



INTELLIGENT TRAFFIC CONTROL SYSTEM



A PROJECT REPORT

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INTERNAL EXAMINER

EXTERNAL EXAMINER

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Abstract

The scope of our project covers the upcoming status for more than 20 years and friendly for our engineers on the basics of two following analysis. In India work tips are the most important component of the day transport demand is likely to increase by about 2.5 times from 1995 to 2015 in large meters and other medium sized cities by about 3-3.5 times our project also covers the status of traffic management streamlining technologies that have been developed and implemented all over the world and its manipulation to match it with the Indian cities.

Initial steps in the implementation of an intelligent traffic light control system using Programmable Logic Controller (PLC) technology to control the system and SCADA for monitoring the system. Using DTMF and CAMERA we can track and provide proper support for emergency vehicles and patrol vehicles. Using PLC and SCADA the whole traffic signal system can be automatically as well as manually control from control room, and make it easier and faster way for the emergency vehicles to reach their destinations.

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LIST OF ABBREVIATIONS

GSM	Global System for Mobile communication
PLC	Programmable Logic Controller
SCADA	Supervisory Control And Data Acquisition
EEPROM	Electrically Erasable Programmable Read Only Memory
DTMF	Dual Tone Multi-Frequency
API	Application Programmable Interface
PID	Proportional- Integral- Derivative Controller
HMI	Human Machine Interface
DCS	Distributed Control System
RTU	Remote Terminal Unit
SONET/SDH	Synchronous Optical Networking and Synchronous Digital Hierarchy
SMPS	Switched Mode Power Supply
SPST	Single Pole Single Throw
SPDT	Single Pole Double Throw
DPST	Double Pole Single Throw
DPDT	Double Pole Double Throw

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CHAPTER - 1

1. INTRODUCTION:

India is the second most population country in the world and is a fast growing economy. It is seeing a terrible road congestion problem in the cities infrastructure growth is slow as compared to the growth in number of vehicles. Also Indian traffic is non-lane based and classic. In India we are still using primitive technologies whereas countries such as Europe, America, Japan, Middle East and all are using most advanced traffic control systems which reduces their in incident rates and delay issues and all.

There was news published in economic times owned by India time's newspaper on June 3rd 2015 "Railways will soon switch over to centralized traffic control [CTC] system with more priority on highly congested regions". These are some of our reasons for this proposal.

Traffic pattern on Indian rule is highly heterogeneous in nature. There are around 30 million vehicles in India, Which are growing at the rate of 15 to 17%. Average number of road accidents per thousand vehicles in around 43. As per the latest TMS [Traffic Management System] study which takes much closer look at the traffic problems all over India. Reports highlights are insufficient signalling technologies, incident reduction technologies, technologies for overcoming parking problems and road safety related technologies. They came out with are a specific solutions for some parts of Delhi, Kanpur and South India. But it is no more sufficient to handle and co-operative with two days vehicles density today what is a "centralized and intelligent traffic monitoring and control system". That can control traffic based on realise situation hereby we propose a system that is even

computable than the current or modern traffic control system techniques used in foreign countries.

1.1 BLOCK DIAGRAM:

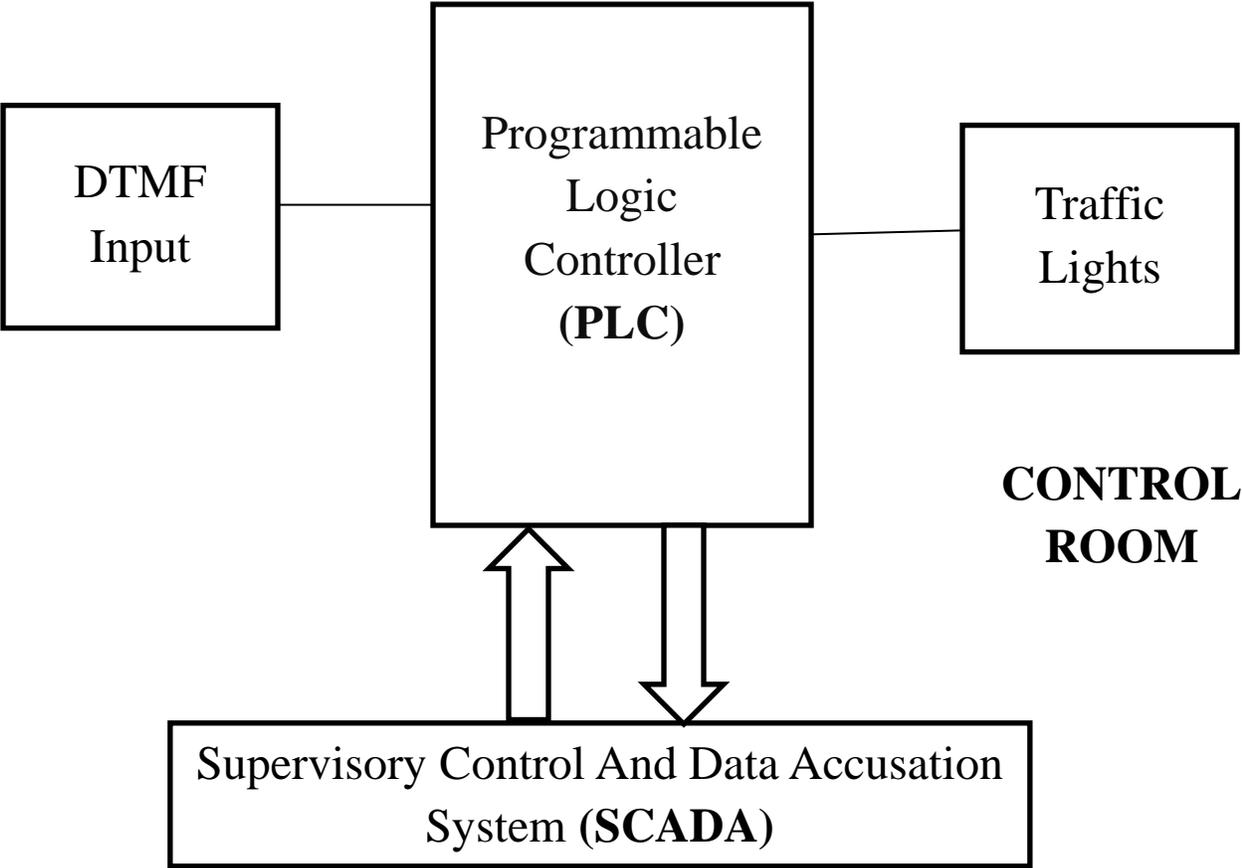


Figure 1.2 BLOCK DIAGRAM OF TRAFFIC CONTROL SYSTEM

1.2 WORKING PRINCIPLE:

In a widespread prospective a unique way to control the traffic indication light with respect to the careful virtualization mechanism of the intensity. The entire process have been optimized through a gateway called “**Programmable**

Logic Controller” which acts as an digital computer and has been ruggedized and adapted for the control such as assembly lines. The area which gets encompassed with vehicle. Will be pointed out for its path direction. Which could be monitored with a device called “**SCADA**”. This gets incorporated in a control room. On another hand through DTMF, the selective region in chosen through the received signal in terms of decoded bits and gets manually controlled in the traffic indication light. All of a sudden, the respective region which has an arrival of the ambulance. Will be blocked spontaneously in order to leave path for the ambulance for a hospital.

CHAPTER - 2

2. HARDWARE DESCRIPTION

PROGRAMMABLE LOGIC CONTROLLER

2.1 INTRODUCTION OF PLC:

Programmable Logic Controller is a solid state device which controls its output based on its input and predefined program. It is a specialized computer used to control machines and processes. It makes use of a programmable memory to store instructions and execute specific functions include the on/off control, timing, counting, sequencing, arithmetic and data handling. Basically the PLC is a solid state assembly of digital logic elements designed to make logical decisions and provide outputs.

Programmable Logic Controller is the heart of automated irrigation system. PLC helps in controlling pump station motor contactors, GSM and DTMF. PLC programming is done using Ladder Diagram Language. Ladder diagram is specialized schematic language commonly used to document industrial control logic systems.

2.2 BLOCK DIAGRAM OF PLC:

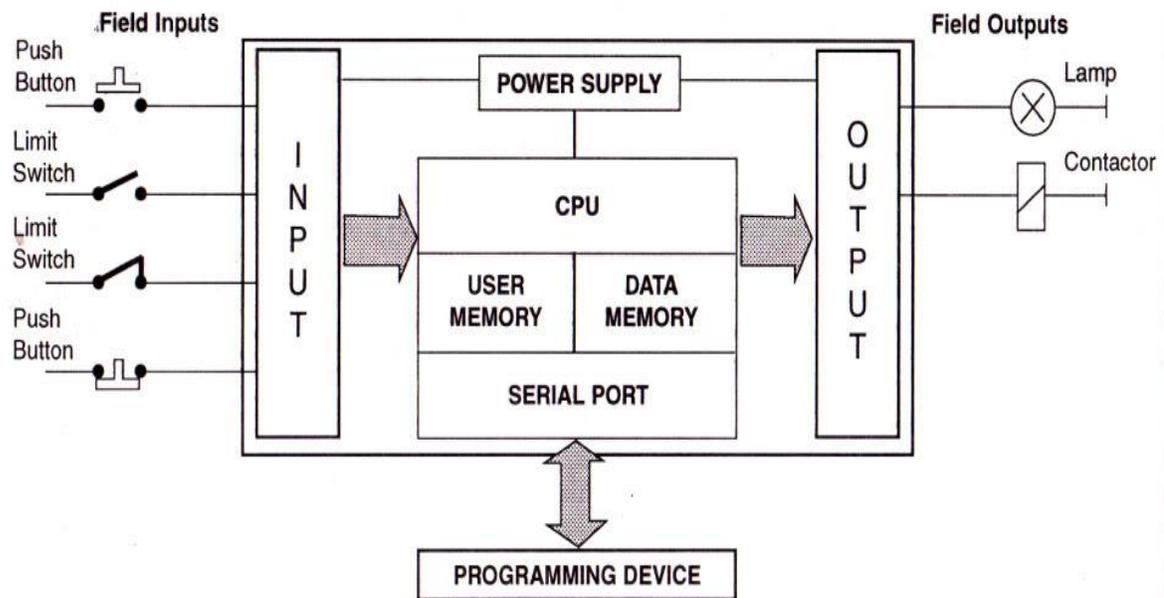


Figure 2.2 BLOCK DIAGRAM OF PLC

A simplified block diagram of a PLC shown in above Figure It has three major units/sections.

- I/O (Input/Output) Modules.
- CPU (Central Processing Units).
- Programmer/Monitor.

The input section converts the field signals supplied by input devices/sensors to logic-level signals that the PLC's CPU. The Processor Section reads these inputs, Processes the signal, and prepares the output signals. The output section converts the logic level output signals coming from processor section to high level signals

and used to actuate various output field devices. The programmer/monitor is used to enter the user's program into memory and to monitor the execution of the program.

2.2.1 I/O Section:

The I/O sections establish the interfacing between physical devices in the real world outside the PLC and the digital arena inside the PLC.

The input module has bank of terminals for physically connecting input devices, like push buttons, limit switches etc. to a PLC. The role of an input module is to translate signals from input devices into a form that the PLC's CPU can understand. The Output module also has bank of terminals that physically connect output devices like solenoids, motor starters, indicating lamps etc. to a PLC. The role of an output module is to translate signals from the PLC's CPU into a form that the output device can use.

The tasks of the I/O section can be classified as:

- Conditioning
- Isolation
- Termination
- Indication

An electronic system for connecting I/O modules to remotely located I/O devices can be added if needed. The actual operating process under PLC Control can be thousands of feet from the CPU and its I/O modules.

2.2.2 CPU Section:

The Central Processing Unit, the brain of the system is the control portion of the PLC. It has three Subparts.

- Memory System
- Processor
- Power Supply

2.2.3 Memory System:

The memory is the area of the CPU in which data and information is stored and retrieved. The total memory area can be subdivided into the following four Sections.

- **I/O Image Memory**

The input image memory consists of memory locations used to hold the ON or OFF states of each input field devices, in the input status file. The output status file consists of memory locations that stores the ON or OFF states of hardware output devices in the field. Data is stored in the output status file as a result of solving user program and is waiting to be transferred to the output module's switching device.

- 1. Data Memory**

It is used to store numerical data required in math calculation, bar code data

- 2. User Memory**

It contains user's application program.

3. Executive Memory

It is used to store an executive program or system software. An operating system of the PLC is a special program that controls the action of CPU and consequently the execution of the user's program.

A PLC operating system is designed to scan image memory, interprets the instruction of user's program stored in main memory, and executes the user's application program the operating system is supplied by the PLC manufacturer and is permanently held in memory.

2.2.4 Processor:

The processor, the heart of CPU is the computerized part of the CPU in the form -of Microprocessor / Micro controller chip. It supervises all operation in the system and performs all tasks necessary to fulfil the PLC function.

1. It reads the information i.e. status of externally connected input devices with input module.
2. It stores this information in memory for later use.
3. It carries out mathematical and logic operations as specified in application program.
4. After solving the user's program, it writes the result values in the memory.
5. It sends data out to external devices like output module, so as to actuate field hardware.
6. It performs peripheral and external device communication.
7. It performs self-diagnostics.

2.2.5 Power Supply:

The power supply provides power to memory system, processor and I/O Modules.

- It converts the higher level AC line Voltage to various operational DC values.
- For electronic circuitry.
- It filters and regulates the DC voltages to ensure proper computer operations.

2.2.6 Programmer/Monitor:

The Programmer/Monitor (PM) is a device used to communicate with the circuits of the PLC. The programming unit allows the engineer/technicians to enter the edit the program to be executed. In its simplest form it can be handheld device with membrane keypad for program entry and a display device (LED or LCD) for viewing program steps of functions.

2.3 ELECTRICAL RELAY:

The term Relay generally refers to a device that provides an electrical connection between two or more points in response to the application of a control signal.

An electromechanical relay can be defined as an electrically operated switch that completes or interrupts a circuit by physical movement of electrical contacts into contact with each other.

Electromechanical relays are switches that typically are used to control high power electrical devices. Electromechanical relays are used in many of today's

electrical machines when it is vital to control a circuit, either with a low power signal or when multiple circuits must be controlled by one single signal.

2.3.1 CONSTRUCTION OF A RELAY:

A relay consists of an armature, spring, yoke, contacts and a coil.

1. **Coil:** Wire is wound around a metal core. The coil of wire causes an electromagnetic field.
2. **Armature:** A relays moving part. The armature opens and closes the contacts. An attached spring returns the armature to its original position.
3. **Contacts:** The conducting part of the switch that makes (closes) or breaks (opens) a circuit.

In electromechanical relay construction the magnetic field produced in coil is used to exert mechanical force on magnetic objects. This is similar to permanent magnets used to attract magnetic objects, but here the magnetic field can be turned on or off by regulating current flow through the coil. Thus, we can say that the electromechanical relay operation is dependent on the current flowing through the coil.

2.3.2 WORKING OF A RELAY:

Relays involve two circuits: the energizing circuit and the contact circuit. The coil is on the energizing side; and the relays contacts are on the contact side.

When a relays coil is energized, current flow through the coil creates a magnetic field. The magnetic coil attracts a ferrous plate, which is part of the

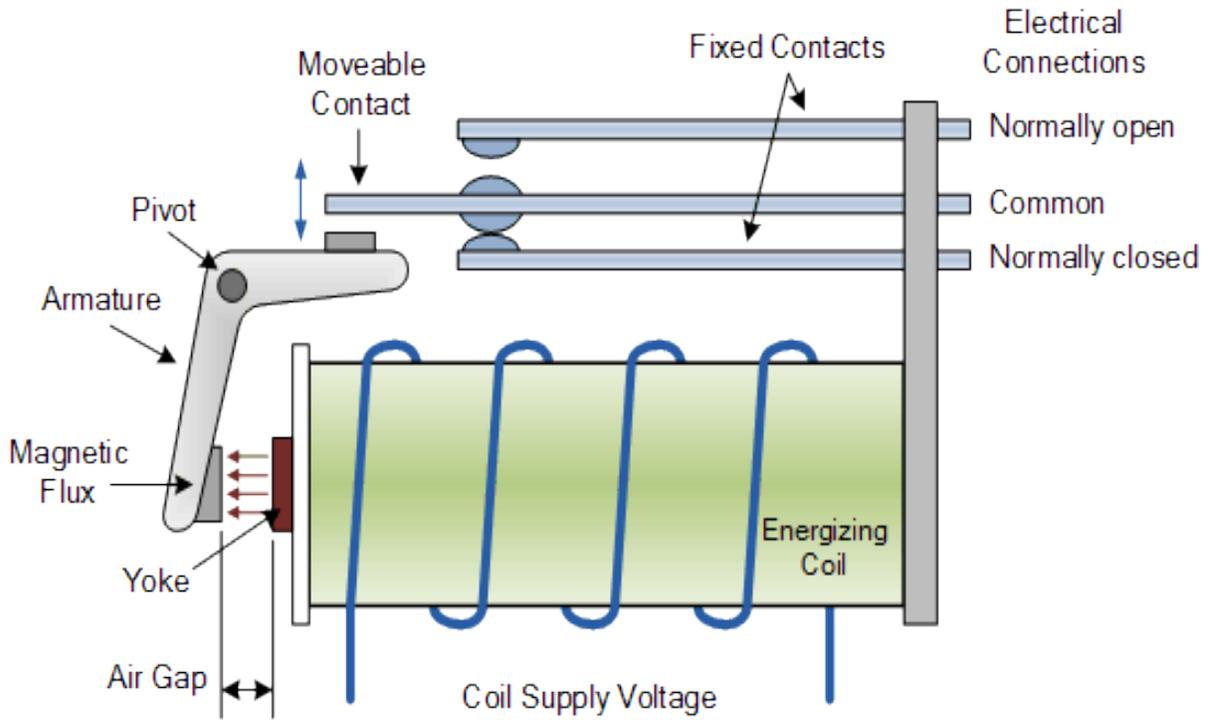


Figure 2.3.2 WORKING OF RELAY

armature. One end of the armature is attached to the metal frame, which is formed so that the armature can pivot, while the other end opens and closes the contacts.

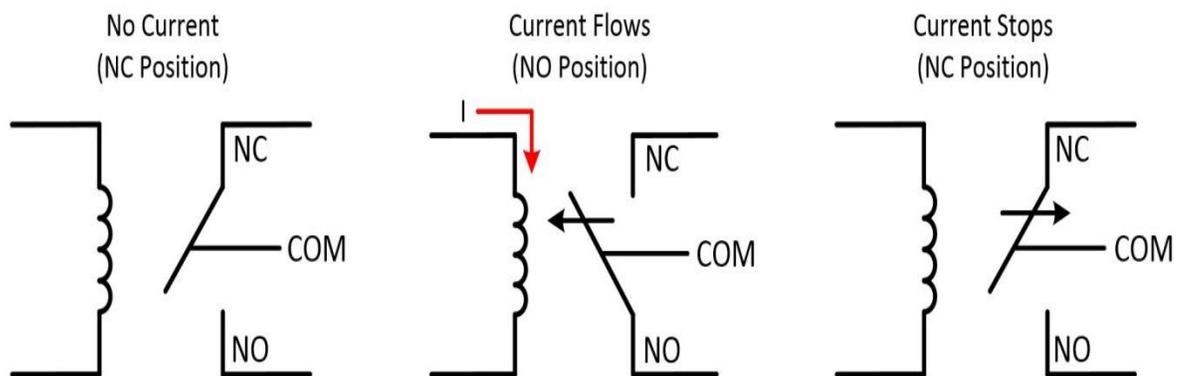


Figure 2.3.3 DIAGRAM FOR RELAY CONNECTION

We have two sets of electrically conductive contacts. Relays may be Normally Open, or Normally Closed. One pair of contacts are known as Normally Open, (NO) and another set which are classed as Normally Closed, (NC).

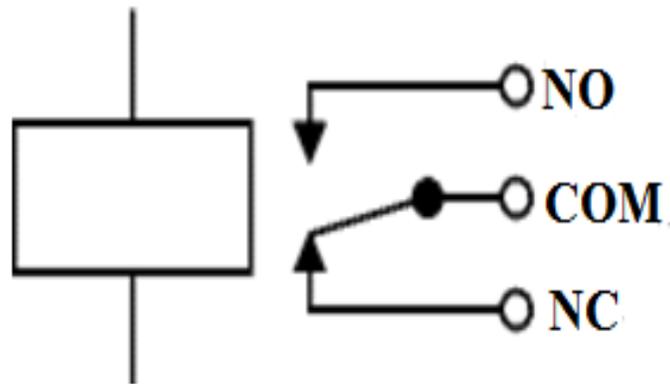


Figure 2.3.4 SYMBOL OF RELAY

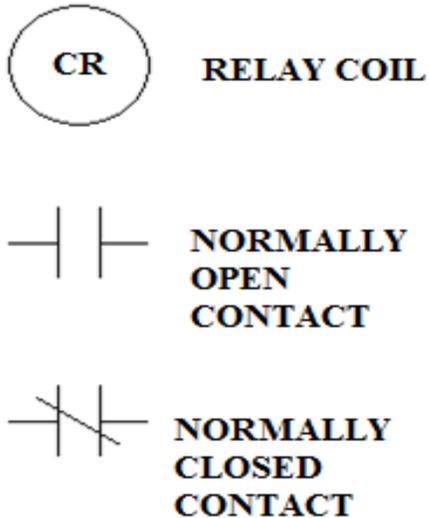
In the normally open position, the contacts are closed only when the field current is ON and the switch contacts are pulled towards the inductive coil.

In the normally closed position, the contacts are permanently closed when the field current is OFF as the switch contacts return to their normal position.

These terms Normally Open, Normally Closed refer to the state of the electrical contacts when the relay coil is “de-energized”, i.e. no supply voltage connected to the relay coil.

Contacts come in a number of different configurations, depending on the number of Breaks, poles and Throws that make up the relay.

RELAY SYMBOLS:



2.3.3 TYPES OF RELAY:

BASED ON NUMBER OF POLES:

Electrical relays can be made up of one or more individual switch contacts with each contact being referred to as a pole.

1. **Single Pole Single Throw (SPST)** - these types of relay comprise of 4 terminals. Two terminals are used as coil points and other two can be used to connect or disconnect the circuit (A and B).



Figure 2.3.5 DIAGRAM OF SPST

2. **Single Pole Double Throw (SPDT)** - these types of relay comprise of 5 terminals two for coil one for common terminal(C) and rest two can be connected to the common terminal.

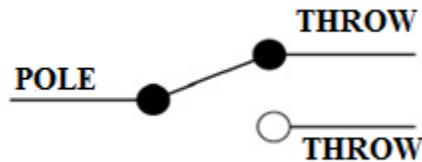


Figure 2.3.6 DIAGRAM OF SPDT

3. **Double Pole Single Throw (DPST)** - these types of relay comprise of 6 terminals two for coil and other four for connecting and disconnecting two devices. In other words it contains two SPST relay in one package.

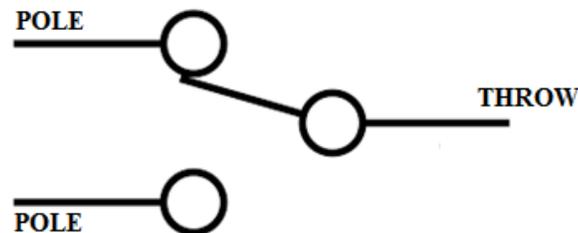


Figure 2.3.7 DIAGRAM OF DPST

4. **Double Pole Double Throw(DPDT)** - these types of relay comprise of 8 terminals two for coil and another two as common point and rest for connecting and disconnecting devices. In another words in this two SPDT relay are connected in one package.

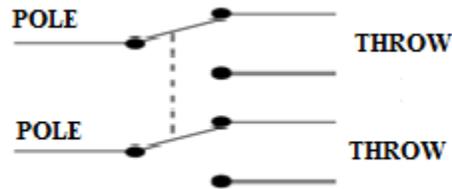


Figure 2.3.8 DIAGRAM OF DPDT

2.3.4 TYPES OF RELAYS:

- DC Relays
- AC Relays
- Solid State Relays
- Reed Relays

DC RELAYS:

DC relays work on the same principle as electromagnetic induction; DC relays are employed with a freewheeling diode to de-energize the coil. DC relay operates on 24V DC

AC RELAYS:

AC relays work on the same principle as electromagnetic induction; AC relays uses laminated cores to prevent eddy current losses. The aspect of an AC relay is that for every half cycle, the direction of the current supply changes; therefore, for every cycle the coil loses its magnetism since the zero current in every half cycle makes the relay continuously make and break the circuit. AC relay operates on 230V AC.

SOLID STATE RELAYS:

Solid State uses solid state components to perform the switching operation without moving any parts. Since the control energy required is much lower compared with the output power to be controlled by this relay that results the power gain higher when compared to the electromagnetic relays. Solid state relay operates on 5V DC.

REED RELAYS:

Reed Relays consist of a pair of magnetic strips (also called as reed) that is sealed within a glass tube. This reed acts as both an armature and a contact blade. The magnetic field applied to the coil is wrapped around this tube that makes these reeds move so that switching operation is performed.

5.4 DTMF:

DTMF is a signaling system for identifying the keys or better say the number dialed on a pushbutton or DTMF keypad. The early telephone systems used pulse dialing or loop disconnect signaling. This was replaced by multi frequency (MF) dialing. DTMF is a multi-frequency tone dialing system used by the push button keypads in telephone and mobile sets to convey the number or key dialed by the caller. DTMF has enabled the long distance signaling of dialed numbers in voice frequency range over telephone lines. This has eliminated the need of telecom operator between the callers and evolved automated dialing in the telephone switching centers.

DTMF (Dual tone multi frequency) as the name suggests uses a combination of two sine wave tones to represent a key. These tones are called row and column frequencies as they correspond to the layout of a telephone keypad.

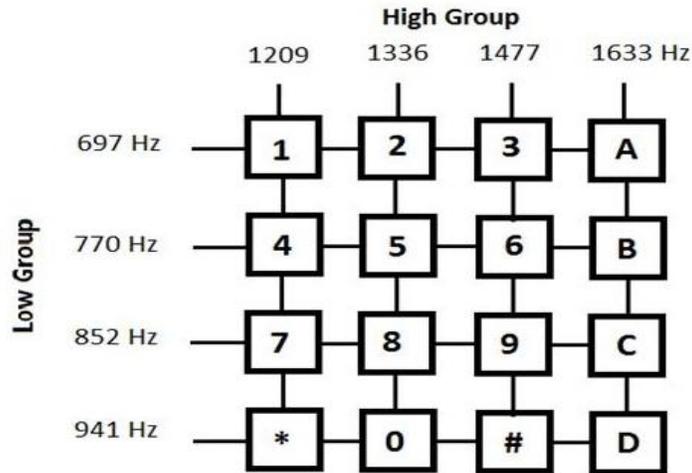


Figure 2.4 DTMF KEYBOARD

A DTMF keypad (generator or encoder) generates a sinusoidal tone which is mixture of the row and column frequencies. The row frequencies are low group frequencies. The column frequencies belong to high group frequencies. This prevents misinterpretation of the harmonics. Also the frequencies for DTMF are so chosen that none have a harmonic relationship with the others and that mixing the frequencies would not produce sum or product frequencies that could mimic another valid tone. The high-group frequencies (the column tones) are slightly louder than the low-group to compensate for the high-frequency roll off of voice audio systems.

DTMF tones are able to represent one of the 16 different states or symbols on the keypad. This is equivalent to 4 bits of data, also known as nibble.

2.5 GSM:

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

GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates.

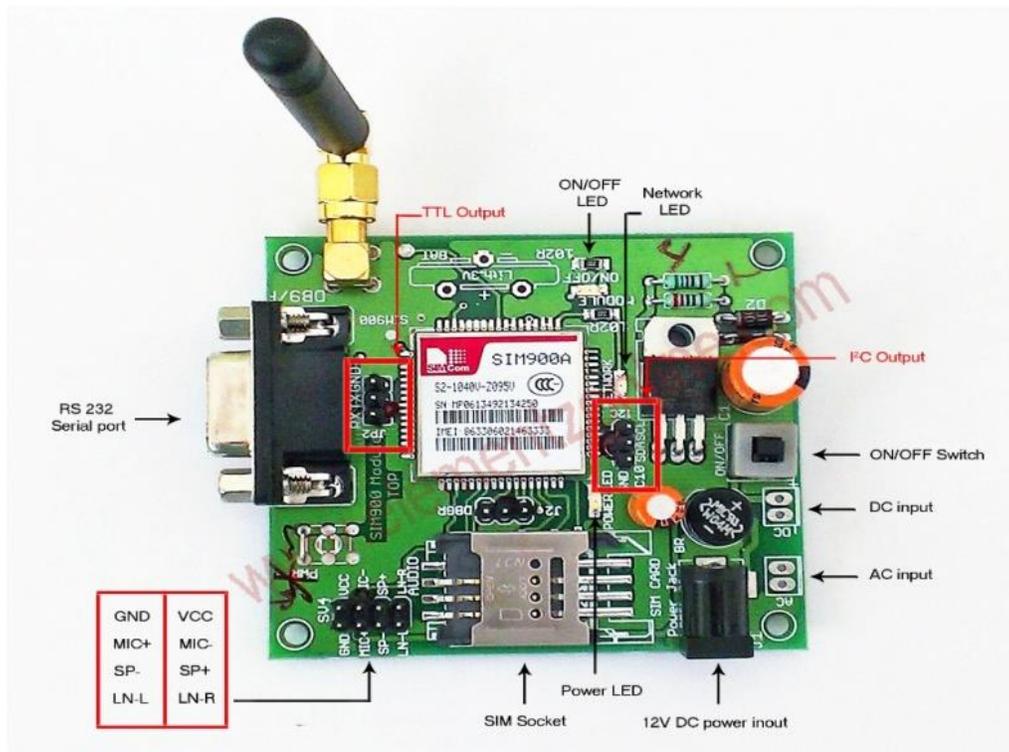


Figure2.5 SIM 900 GSM MODEM

2.5.1 GSM ARCH:

A GSM network comprises of many functional units. The GSM network can be broadly divided into:

- Mobile station (MS)
- Base-Station Subsystem (BSS)
- Network and Switching Subsystem (NSS)
- Operation and Support Subsystem (OSS)

Mobile Station

It is the mobile phone which consists of the transceiver, the display and the processor and is controlled by a SIM card operating over the network.

Base Station Subsystem

It acts as an interface between the mobile station and the network subsystem. It consists of the Base Transceiver Station which contains the radio transceivers and handles the protocols for communication with mobiles. It also consists of the Base Station Controller which controls the Base Transceiver station and acts as an interface between the mobile station and mobile switching center.

Network Subsystem

It provides the basic network connection to the mobile stations. The basic part of the Network Subsystem is the Mobile Service Switching Centre which provides access to different networks like ISDN, PSTN etc. It also consists of the Home Location Register and the Visitor Location Register which provides the call routing and roaming capabilities of GSM. It also contains the Equipment Identity Register which maintains an account of all the mobile equipment's wherein each

mobile is identified by its own IMEI number. IMEI stands for International Mobile Equipment Identity.

Operation and support subsystem

The OSS is the functional entity from which the network operator monitors and controls the system. The purpose of OSS is to offer the customer cost-effective support for centralized, regional and local operational and maintenance activities that are required for a GSM network. An important function of OSS is to provide a network overview and support the maintenance activities of different operation and maintenance organizations.

2.6 LED:

A **Light-Emitting Diode (LED)** is a two-lead semiconductor light source. It is a p–n junction diode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor. LEDs are typically small (less than 1 mm²) and integrated optical components may be used to shape the radiation pattern.

Appearing as practical electronic components in 1962, ^[7] the earliest LEDs emitted low-intensity infrared light. Infrared LEDs are still frequently used as transmitting elements in remote-control circuits, such as those in remote controls for a wide

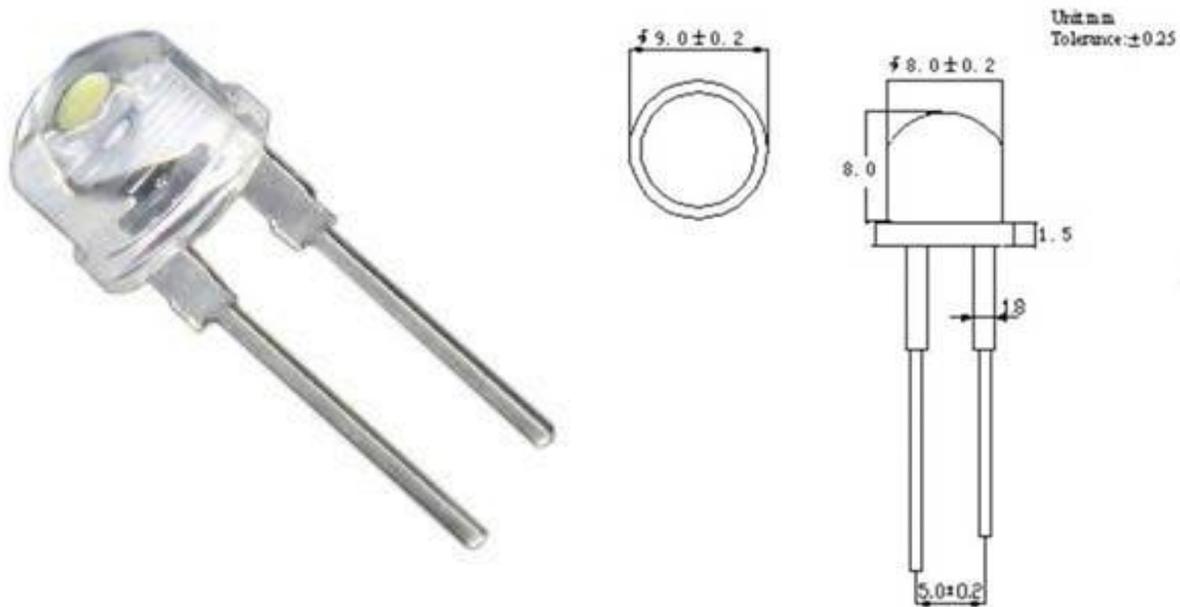


Figure 2.6 DIAGRAM OF LED

Appearing as practical electronic components in 1962,^[7] the earliest LEDs emitted low-intensity infrared light. Infrared LEDs are still frequently used as transmitting elements in remote-control circuits, such as those in remote controls for a wide variety of consumer electronics. The first visible-light LEDs were also of low intensity and limited to red. Modern LEDs are available across the visible, ultraviolet, and infrared wavelengths, with very high brightness.

Early LEDs were often used as indicator lamps for electronic devices, replacing small incandescent bulbs. They were soon packaged into numeric readouts in the form of seven-segment displays and were commonly seen in digital clocks. Recent developments in LEDs permit them to be used in environmental and task lighting. LEDs have allowed new displays and sensors to be developed, while their high switching rates are also used in advanced communications technology.

LEDs have many advantages over incandescent light sources including lower energy consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. Light-emitting diodes are now used in applications as diverse as aviation lighting, automotive headlamps, advertising, general lighting, traffic signals, camera flashes, and lighted wallpaper. As of 2017, LED lights home room lighting is as cheap or cheaper than compact fluorescent lamp sources of comparable output. They are also significantly more energy efficient and, arguably, have fewer environmental concerns linked to their disposal.

2.7 SWITCHED MODE POWER SUPPLY:

A switch-mode power supply (SMPS) is an electronic power supply that uses a switching regulator in order to control the conversion of electrical power in a highly efficient manner. This higher efficiency (thus lower heat dissipation) is the chief advantage of a switched-mode power supply.



Figure 2.7.1 SWITCHED MODE POWER SUPPLY

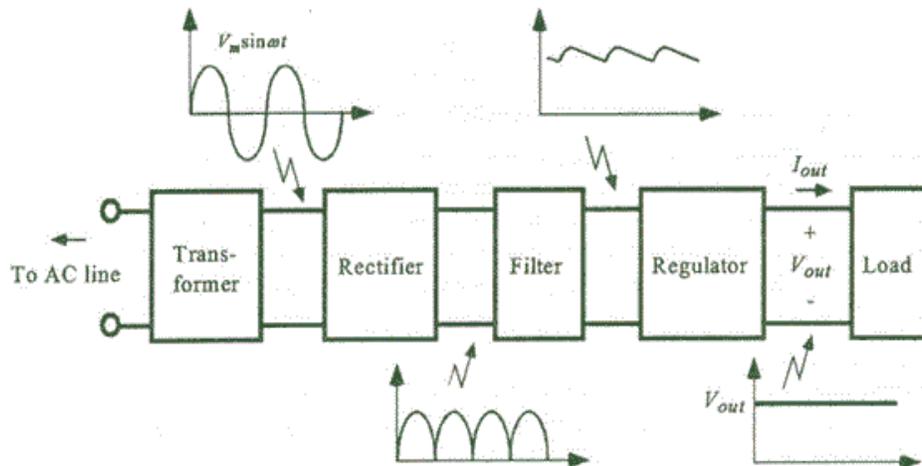


Figure 2.7.2 BLOCK DIAGRAM

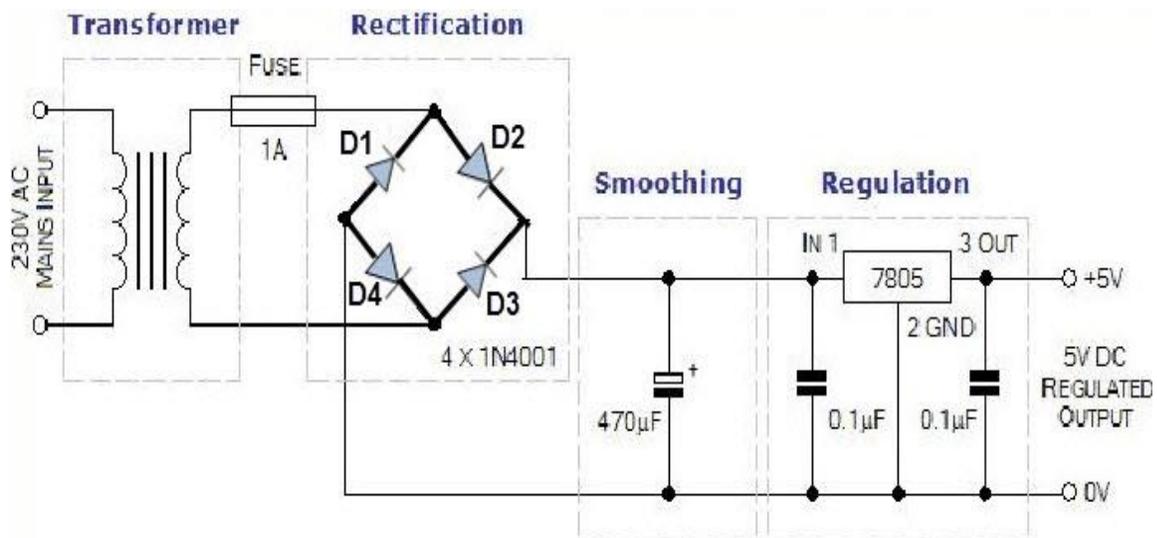


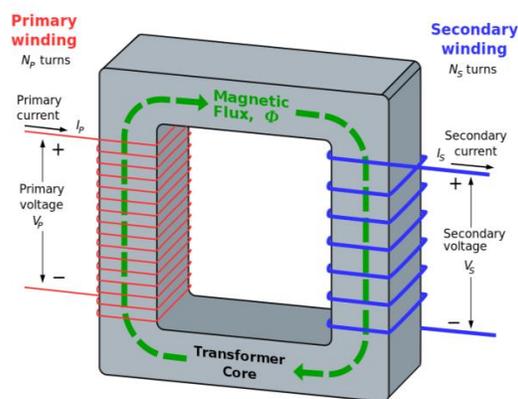
Figure 2.7.3CIRCUIT DIAGRAM

COMPONENTS:

- Transformer
- Rectifier
- Filter
- Voltage Regulator

2.7.1 TRANSFORMER:

A transformer is an electrical device that transfers electrical energy between two or more circuits through electromagnetic induction. A type of transformers depends on the construction (or) electrical properties of certain installation requirement.



wiki How to Convert AC to DC

Figure 2.7.4 TRANSFORMER

Types:

- Step up transformer
- Step down transformer

Step down transformer:

Step down transformer converts high voltage low current power into low voltage high current power. The secondary side has less number of windings than primary side.

2.7.2 RECTIFIER:

A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. The process is known as rectification.

Types:

- Half wave rectifier
- Full wave rectifier
- Bridge rectifier

Bridge Rectifier:

Bridge rectifier consists of four diodes in the form of bridge. The secondary side of the transformer is connected to two diametrically opposite points of the bridge. The load can be connected to the other two points of the bridge. During the Positive half cycle of the input AC waveform diodes D1 and D3 are forward biased and D2 and D4 are reverse biased. When the voltage, more than the threshold level of diodes D1 and D3, starts conducting – the load current starts flowing through it. During the negative half cycle of the input AC waveform, the diodes D2 and D4 are forward biased, and D1 and D3 are reverse biased. Load current starts flowing through the D2 and D4 diodes.

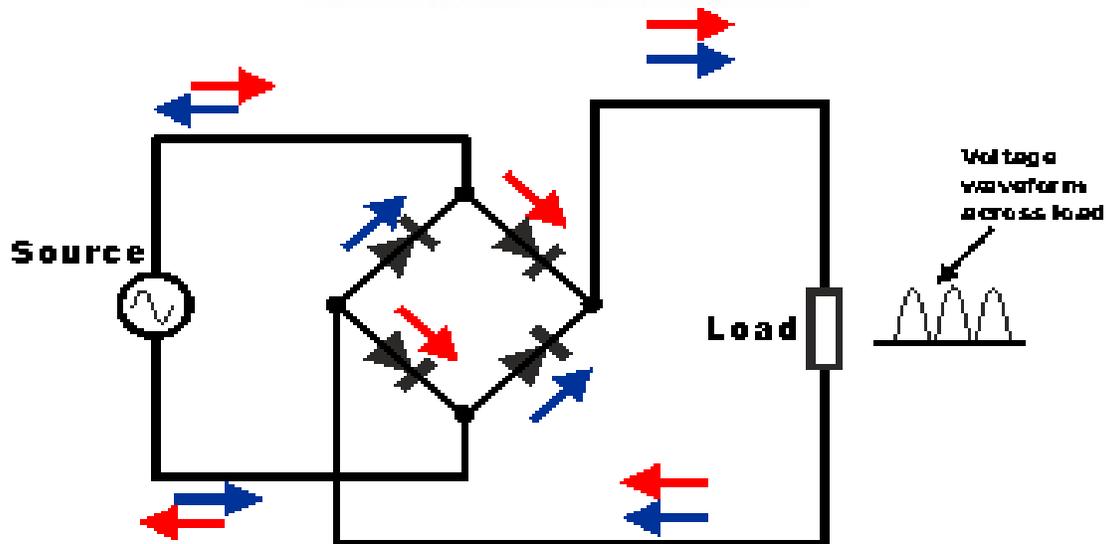
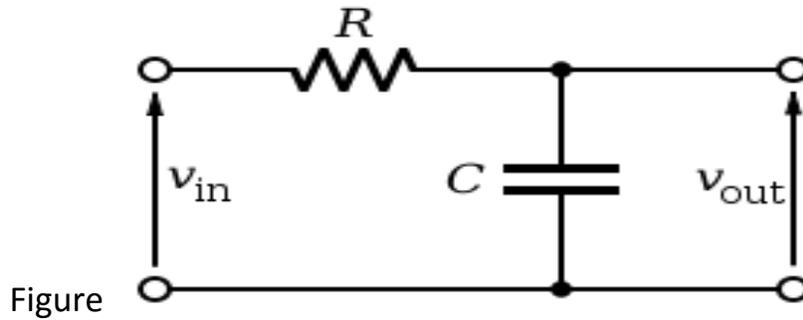


Figure 2.7.5 BRIDGE RECTIFIER

2.7.3 FILTER:

The output of the diode bridge is a DC consisting of ripples also called as pulsating DC. This pulsating DC can be filtered using a capacitor filter for removing the ripples. In the circuit, capacitor stores energy while the input increases from zero to a peak value and, while the supply voltage decreases from peak value to zero, capacitor starts discharging. This charging and discharging of the capacitor will make the pulsating DC into pure DC.



Figure

Figure 2.7.6 CIRCUIT DIAGRAM OF FILTER

2.7.4 VOLTAGE REGULATOR:

Voltage regulator is designed to automatically maintain a constant voltage. IC 78xx are positive voltage regulators and IC 79xx are negative voltage regulator. IC 7805 gives 5v output voltage whereas 7812 gives 12v output voltage. This IC contains three pins. The first pin is an input pin, middle pin is a ground pin and the third pin is an output pin.

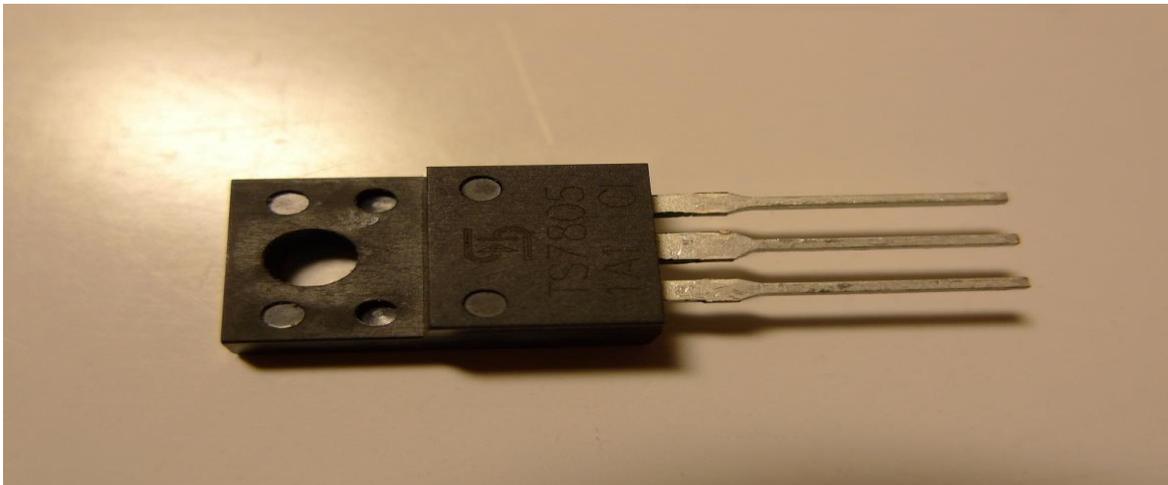


Figure 2.7.6 VOLTAGE REGULATOR

CHAPTER - 3

3. SOFTWARE DESCRIPTION

3.1 INTRODUCTION:

SCADA stands for Supervisory Control and Data Acquisition; it is an industrial computer-based control system employed to gather and analyze the real-time data to keep track, monitor and control industrial equipment's in different types of industries. In general, for controlling and monitoring a substation in real time (PLCs) Programmable Logic Controllers, Circuit breakers and Power monitors are used. Data is transmitted from the PLCs and other devices to a computer-based-SCADA node located at each substation. One or more computers are located at different centralized control and monitoring points.

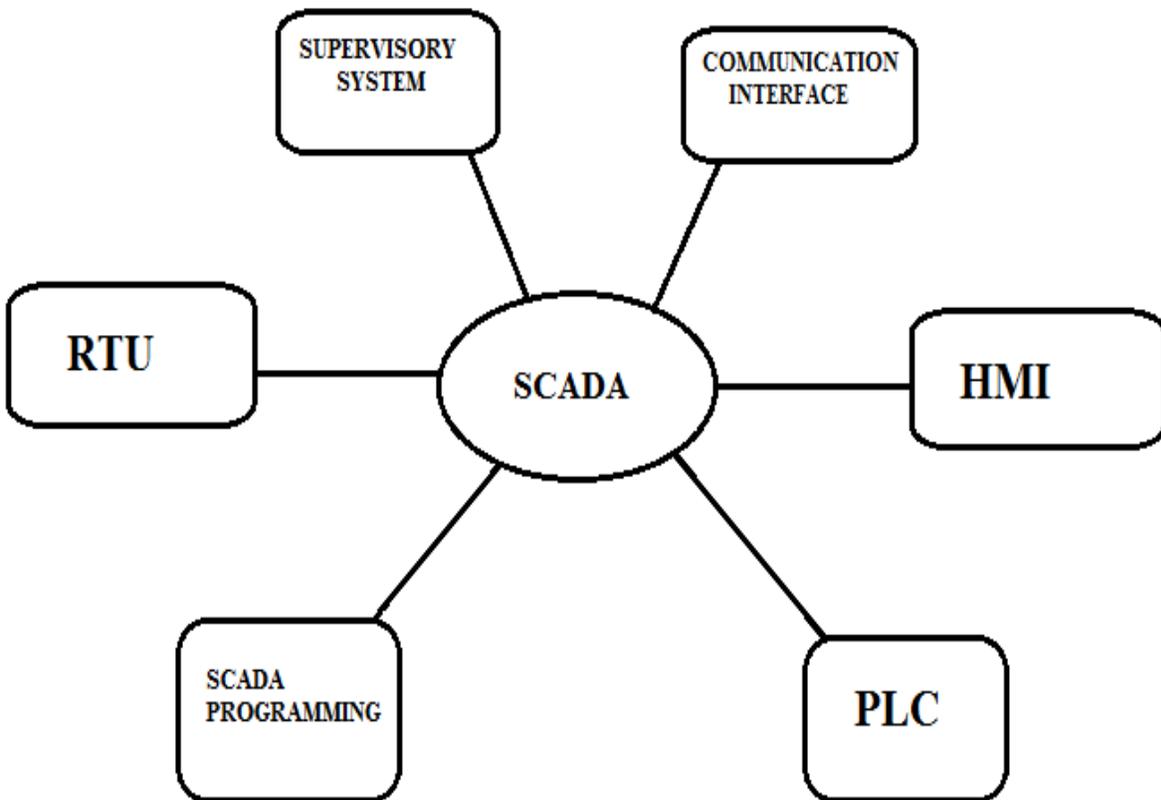
SCADA system usage has become popular from the 1960s with the increase in need of monitoring and controlling the equipment. Early systems built using mainframe computers were expensive as they were manually operated and monitored. But the recent advancements in technology have made-advanced, automated SCADA systems with maximum efficiency at reduced cost, according to the alarming requirements of the company.

It works like a supervisor who supervises the entire plant area, if needed it also controls the process as well as converts the data segments for storing process values (e.g. Level, pressure).For a distant place if we want to run the process that is, starting, stopping, opening, closing of field instruments as well as logging the various values SCADA can do for you.

SCADA is not a 100% controller it is just software which has to be linked with controllers, it is to be connected to PLC, PID, DCS systems which in turn are connected to the field instruments.

Hazardous areas, unhygienic places, hilly areas, sea beds where a person can't be sent regularly but process has to be watched continuously or it should be controlled then it can be done using SCADA.

3.2 BLOCK DIAGRAM:



Figures 3.2 BLOCK DIAGRAM OF SCADA

3.2.1. Human-machine Interface (HMI):

It is an input-output device that presents the process data to be controlled by a human operator. It is used by linking to the SCADA system's software programs and databases for providing the management information, including the scheduled maintenance procedures, detailed schematics, logistic information, trending and diagnostic data for a specific sensor or machine. HMI systems facilitate the operating personnel to see the information graphically.

3.2.2. Supervisory System:

Supervisory system is used as server for communicating between the equipment of the SCADA system such as RTUs, PLCs and sensors, etc., and the HMI software used in the control room workstations. Master station or supervisory station comprises a single PC in smaller SCADA systems and, in case of larger SCADA systems, supervisory system comprises distributed software applications, disaster recovery sites and multiple servers. These multiple servers are configured in a hot-standby formation or dual-redundant, which continuously controls and monitors in case of a server failure for increasing the integrity of the system.

3.2.3. Remote Terminal Units:

Physical objects in the SCADA systems are interfaced with the microprocessor controlled electronic devices called as Remote Terminal Units

(RTUs). These units are used to transmit telemetry data to the supervisory system and receive the messages from the master system for controlling the connected objects. Hence, these are also called as Remote Telemetry Units.

3.2.4. Programmable Logic Controllers:

In SCADA systems, PLCs are connected to the sensors for collecting the sensor output signals in order to convert the sensor signals into digital data. PLCs are used instead of RTUs because of the advantages of PLCs like flexibility, configuration, versatile and affordability compared to RTUs.

3.2.5. Communication Infrastructure:

Generally the combination of radio and direct wired connections is used for SCADA systems, but in case of large systems like power stations and railways SONET/SDH are frequently used. Among the very compact SCADA protocols used in SCADA systems – a few communication protocols, which are standardized and recognized by SCADA vendors – send information only when the supervisory station polls the RTUs.

3.2.6. SCADA Programming:

SCADA programming in a master or HMI is used for creating maps and diagrams which will give important situational information in case of an event failure or process failure. Standard interfaces are used for programming most commercial SCADA systems. SCADA programming can be done using derived programming language or C language.

3.3. Need of SCADA:

Previously without SCADA an industrial process was entirely controlled by PLC, CNC, PID & micro controllers having programmed in certain languages or codes. These codes were either written in assembly language or relay logic without any true animation that would explain the process running.

Thus to make the understanding process easily with the help of true animation SCADA came into existence.

3.4. Application of SCADA:

There are numerous applications of SCADA systems, but a few most frequently used SCADA an application includes:

- Facility managers use SCADA to control HVAC, refrigeration units ,lighting and entry systems
- It can manage parts inventories for just in time manufacturing, regulate industrial automation and robots, and monitor process and quality control.
- State and municipal water utilities use SCADA to monitor and regulate water flow, reservoir levels, pipe pressures and other factors.
- It regulates traffic lights, controls traffic flow and detects out of order signals.

3.5 WONDERWARE INTOUCH SCADA:

- Wonder ware InTouch has been the world's number one human machine interface(HMI) for over 25 years
- It offers

- Legendary ease of use
- Market leading innovation
- Unequaled investment protection
- Brilliant graphics
- Unsurpassed connectivity
- The industry's best support
- The broadest partner ecosystem

3.5.1 TAGNAME DICTONARY:

- The tagname dictionary (runtime database) is the heart of the InTouch.
- At runtime, the database contains the current value of all the items in the database.
- In order to create the runtime database, InTouch requires information about all of the variables being created.
- Therefore each variable must be assigned a tagname and type

3.5.2 TAGNAME & TAGTYPES:

- Every symbol used in software has to be specified name.
- The logical name given to any symbol is said to be tagname
- A tag type defines the symbol category. It may be discrete or analog.

3.5.3 SCRIPTS:

- It is the combination of logical operators which are written in a statement.
- It is used to run the applications made or stimulate before final execution.

- Various types of scripts make project execution simpler for programmer.

3.6 TYPES OF SCADA SYSTEMS:

There are different types of SCADA systems that can be considered as SCADA architectures of four different generations:

1. First Generation: Monolithic or Early SCADA systems,
2. Second Generation: Distributed SCADA systems,
3. Third Generation: Networked SCADA systems and
4. Fourth Generation: Internet of things technology, SCADA systems

3.6.1. Monolithic or Early SCADA Systems:

Minicomputers are used earlier for computing the SCADA systems. In earlier times, during the time of first generation, monolithic SCADA systems were developed wherein the common network services were not available. Hence, these are independent systems without having any connectivity to other systems. All the remote terminal unit sites would connect to a back-up mainframe system for achieving the first generation SCADA system redundancy, which was used in case of failure of the primary mainframe system. The functions of the monolithic SCADA systems in the early first generation were limited to monitoring sensors in the system and flagging any operations in case of surpassing programmed alarm levels.

3.6.2. Distributed SCADA Systems:

In the second generation, the sharing of control functions is distributed across the multiple systems connected to each other using Local Area Network (LAN). Hence, these were termed as distributed SCADA systems. These individual stations were used to share real-time information and command processing for performing control tasks to trip the alarm levels of possible problems.

The cost and size of the station were reduced compared to the first generation system, as each system of the second generation was responsible for performing a particular task with reduced size and cost.

But even in the second generation systems also the network protocols were not standardized. The security of the SCADA installation was determined by a very few people beyond the developers, as the protocols were proprietary. But generally the security of the SCADA installation was ignored.

3.6.3. Networked SCADA Systems:

The current SCADA systems are generally networked and communicate using Wide Area Network (WAN) Systems over data lines or phone. These systems use Ethernet or Fiber Optic Connections for transmitting data between the nodes frequently. These third generation SCADA systems use Programmable Logic Controllers (PLC) for monitoring and adjusting the routine flagging operators only in case of major decisions requirement.

The first and second generation SCADA systems are limited to single site networks or single building called as sealed systems. In these systems, we cannot have any risk compared to the third generation SCADA systems which are

connected to the internet causing the security risks. There will be several parallel working distributed SCADA systems under a single supervisor in network architecture.

3.6.4. Internet of Things:

In fourth generation, the infrastructure cost of the SCADA systems is reduced by adopting the internet of things technology with the commercially available cloud computing. The maintenance and integration is also very easy for the fourth generation compared to the earlier SCADA systems.

SCADA predates IoT by a long time... a really long time. Short for Supervisory Control and Data Acquisition, when one says "SCADA" they are almost always referring to computerized systems for controlling and monitoring physical infrastructure, most often in a manufacturing or environmental control setting.

Honestly, given the poor security track records of these systems, I wouldn't want most SCADA installations connected to the Internet considering the kind of physical damage that could be done if any of these systems got hacked. That's why most SCADA setups have traditionally relied on an air-gapped network (e.g. literally no connection between the computer controlling the SCADA equipment and the outside world) -- though even then there have been plenty of reports of viruses inadvertently passed along via a compromised USB thumb drive, etc. (the famous hacking of Iran's Uranium enrichment centrifuges comes to mind).

Pile on top of that the steaming mess that is IoT security today, and you could imagine the potential for havoc if these systems were connected up to the Internet!

CHAPTER - 4

4. CONCLUSION & FEATURE WORK:

In this project we have manually controlled the traffic density along highways. Using this we can adjust the traffic flow under some emergency circumstances like when an ambulance passes through the road. Since we have used SCADA, it provided the option of viewing and controlling the traffic flow directly from the control room and also the DTMF provided the location of emergency vehicles. Using this we can locate the emergency vehicles whenever we want so that we can provide assistance to it if needed.

Our proposal of great important at present due to the bad state of traffic management in India. In the past decades although there have been technological improvements in almost all fields the state at traffic management technologies is still at a primitive level. In future for all over development of the it is important that infrastructure of which road traffic is a very important plan should be made state of the art. This makes the study very valid in the present conditions.

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