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GSM BASED INTELLIGENT VEHICLE MANAGEMENT SYSTEM

A Project Report

Submitted by

Kiruthika P	-	0710105027
Kumar M	-	0710105028
Sathishkumar E	-	0710105045
Venkatesh G	-	0710105056

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BONAFIDE CERTIFICATE

Certified that this project report entitled " **GSM BASED INTELLIGENT VEHICLE MANAGEMENT SYSTEM**" is the bonafide work of

Kiruthika P	-	Register No. 0710105027
Kumar M	-	Register No. 0710105028
Sathish Kumar E	-	Register No. 0710105045
Venkatesh G	-	Register No. 0710105056

who carried out the project work under my supervision.

Signature of the Head of the Department
Dr.Rani Thottungal

Signature of the Guide
Prof.M.Mohanraj
Asst.Professor (SRG)/EEE

Certified that the candidates with University Register Nos. 0710105027, 0710105028, 0710105045, 0710105056 were examined in project viva voce Examination held on 18/04/2011

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Internal Examiner

18.04.11

External Examiner

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
KUMARAGURU COLLEGE OF TECHNOLOGY, COIMBATORE 641 049.

ABSTRACT

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The increase of automobiles during several decades has resulted in the need for carefull monitoring of vehicles. It is essential to ensure the safety of the vehicle. The theft of vehicles is increasing day-by-day. The major issue is that, accidents are increasing to greater extent mainly due to carelessness or loss of concentration of drivers. After an extensive survey in the field of Intelligent Vehicle Management System (IVMS), different alternatives are analyzed to solve this dilemma and the concept of Intelligent Vehicle Management System is proposed as the best solution.

Also, there is a need for monitoring of different zones and automatic control of vehicles for corresponding zones. Adding to these, some more features are also essential to ensure safety of vehicle. Several solutions have emerged to solve this problem, but the concept of "Intelligent Vehicle Management System" appears to be the most attractive one.

This is possible with the help of microcontroller, GSM modem and several other electrical and electronic components.

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ABBREVIATIONS

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GSM	Global System for Mobile communication
TDMA	Time Division Multiple Access
CDMA	Code Division Multiple Access
HLR	Home Location Register
VLR	Visitor Location Register
EIR	Equipment Identity Register
AUC	Authentication Center
SMS SC	SMS Serving Center
GMSC	Gateway MSC
CBC	Chargeback Center
TRAU	Transcoder and Adaptation Unit
BSS	Base Switching System
BSC	Base Station Controller
BTS	Base Transceiver Station
OSS	Operation and Support System
MSN	Mobile Service Node
IN	Intelligent Network
RFID	Radio Frequency Identification
UART	Universal Asynchronous Receiver/Transmitter
RAM	Random Access Memory
EEPROM	Electrically Erasable Programmable Read Only Memory
LED	Light Emitting Diode
LCD	Liquid Crystal Display
MCU	MicroController Unit
TTL	Transistor-Transistor Latch

CHAPTER 1

CHAPTER 1
INTRODUCTION

1.1 GENERAL:

The entire world is moving towards sophistication with the advancement through its cader. Hence, with one of the existing technology GSM-Global System for Mobile communication, we have designed a circuit to be installed in the vehicles which performs numerous function according to the driver's and societal convenience.

Among the numerous technologies available, GSM technology is chosen to implement the special functions since mobile phones are used widely nowadays. Since every man in the society right from the lay man to the most civilised man of the society. This project, hence deals with the management of the vehicle using the mobile phone technology, that is, GSM.

1.2 OBJECTIVE:

The objective of the project is to design a circuit and thus a module which can be implemented in any vehicle to perform certain functions based on GSM.

The key features of this module are,

- Concentration check and fuel ignition
- Accident identification
- Theft detection
- Digital fuel level display
- Regulation of the head light in highways and city roads.
- Regulation of the sound in hospital and school zone.

1.3 ORGANISATION OF THE REPORT:

This report has been organized into seven chapters

- The complete overview of GSM technology is explained in the Chapter 2.
- The power supply circuit is described in the Chapter 3
- The Chapter 4 deals with the Intelligent Vehicle Technologies.
- The block diagram an its description is presented in Chapter 5.
- The circuit operation and experimental setup of the proposed scheme is presented in the Chapter 6.
- The Chapter 7 summarizes the conclusions of the project and envisages scope of the project work.

CHAPTER 2

CHAPTER 2
GSM TECHNOLOGY

2.1 INTRODUCTION:

GSM (Global System for Mobile communication) is a digital mobile telephone system that is widely used in Europe and other parts of the world. GSM uses a variation of Time Division Multiple Access (TDMA) and is the most widely used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1,800 MHz frequency band.

GSM is the de facto wireless telephone standard in Europe. GSM has over one billion users worldwide and is available in 190 countries. Since many GSM network operators have roaming agreements with foreign operators, users can often continue to use their mobile phones when they travel to other countries.

2.2 GSM ARCHITECTURE:

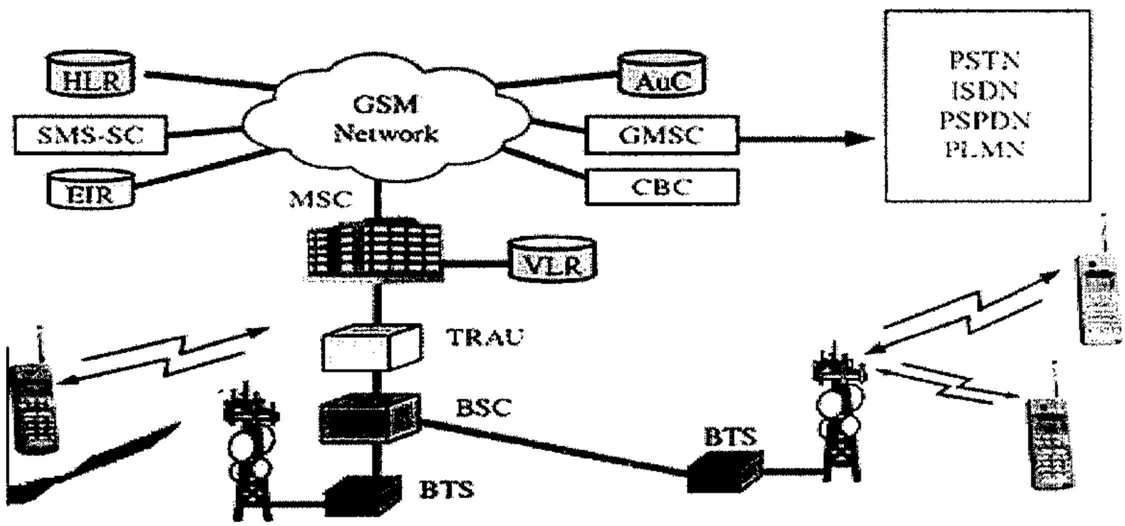


Fig 2.1 Architecture of GSM

The added components of the GSM architecture include the functions of the databases and messaging systems:

- Home Location Register (HLR)
- Visitor Location Register (VLR)
- Equipment Identity Register (EIR)
- Authentication Center (AuC)
- SMS Serving Center (SMS SC)
- Gateway MSC (GMSC)
- Chargeback Center (CBC)
- Transcoder and Adaptation Unit (TRAU)

The MS and the BSS communicate across the Um interface, also known as the air interface or radio link. The BSS communicates with the Network Service Switching center across the interface.

2.3 COMPONENTS OF GSM:

2.3.1 The Switching System (SS):

Home Location Register (HLR) – A database which stores data about GSM subscribers, including the Individual Subscriber Authentication Key (Ki) for each Subscriber Identity Module (SIM).

Mobile Services Switching Center (MSC) – The network element which performs the telephony switching functions of the GSM network. The MSC is responsible for toll ticketing, network interfacing, common channel signaling.

Visitor Location Register (VLR) – A database which stores temporary information about roaming GSM subscribers.

Authentication Center (AUC) – A database which contains the International Mobile Subscriber Identity (IMSI) the Subscriber Authentication key (Ki), and the defined algorithms for encryption.

Equipment Identity Register (EIR) – A database which contains information about the identity of mobile equipment in order to prevent calls from stolen, unauthorized, or defective mobile stations.

2.3.2 The Base Station System (BSS):

Base Station Controller (BSC) – The network element which provides all the control functions and physical links between the MSC and BTS. The BSC provides functions such as handover, cell configuration data, and control of radio frequency (RF) power levels in Base Transceiver Stations.

Base Transceiver Station (BTS) – The network element which handles the radio interface to the mobile station. The BTS is the radio equipment (transceivers and antennas) needed to service each cell in the network.

2.3.3 The Operation and Support System (OSS):

Message Center (MXE) – A network element which provides Short Message Service (SMS), voice mail, fax mail, email, and paging.

Mobile Service Node (MSN) – A network element which provides mobile intelligent network (IN) services.

Gateway Mobile Services Switching Center (GMSC) – A network element used to interconnect two GSM networks.

GSM Interworking Unit (GIWU) – The network element which interfaces to various data networks.

CHAPTER 3

CHAPTER 3
POWER SUPPLY

3.1 INTRODUCTION:

Since all electronic circuits work only with low D.C. voltage we need a power supply unit to provide the appropriate voltage supply. This unit consists of transformer, rectifier, filter and regulator. A.C. voltage typically 230V rms is connected to a transformer which steps that AC voltage down to the level to the desired AC voltage. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a DC voltage. This resulting DC voltage usually has some ripple or AC voltage variations. regulator circuit can use this DC input to provide DC voltage that not only has much less ripple voltage but also remains the same DC value even the DC voltage varies some what, or the load connected to the output DC voltage changes. The power supply unit is a source of constant DC supply voltage. The required DC supply is obtained from the available AC supply after rectification, filtration and regulation.

3.2 BLOCK DIAGRAM:

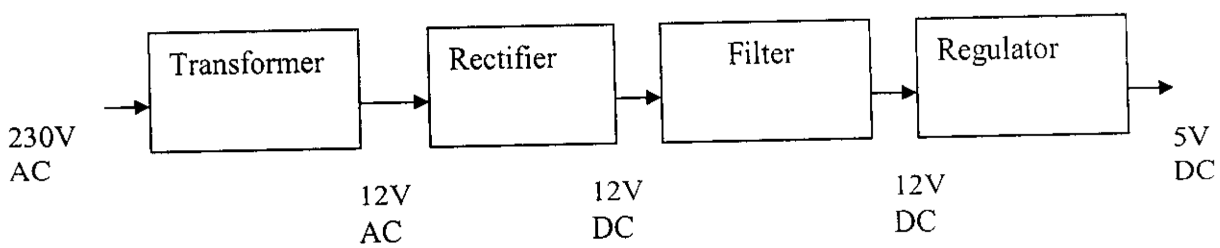


Fig 3.1 Power supply Block diagram

The main components used in the power supply unit shown in fig 5.5 are Transformer, Rectifier, Filter, and Regulator. The 230V ac supply is converted into 12V ac supply through the transformer. The output of the transformer has the same frequency as in the input ac power. This ac power is converted into dc power through the diodes. Here the bridge diode is used to convert the ac supply to the dc power supply. This converted dc power supply has the ripple content and for the normal operation of the circuit, the ripple content of the dc power supply should be as low as possible. Because the ripple content of the power supply will reduce the life of circuit.

So to reduce the ripple content of the dc power supply, the filter is used. The filter is nothing but the large value capacitance. The output waveform of the filter capacitance will almost be the straight line.

This filtered output will not be the regulated voltage. For the normal operation of the circuit it should have the regulated output. Specifically for the microcontroller IC regulated constant 5V output voltage should be given. For this purpose 78xx regulator should be used in the circuit. In that number of IC, the 8 represents the positive voltage and if it is 9, it will represent the negative voltage. The xx represents the voltage. If it is 7805, it represent 5V regulator, and if it is 7812, it represent 12V regulator. Thus the regulated constant output can be obtained. The brief description of the blocks above is as follows.

3.2.1 TRANSFORMER:

Transformer is a device used either for stepping-up or stepping-down of the AC supply voltage with a corresponding decreases or increases in the current. Here, a center-tapped transformer is used for stepping-down the voltage so as to get a voltage that can be regulated to get a constant 12V. In this project, to satisfy these requirements, we make use of 1.0A, 12V-0-12V transformer.

3.2.2 RECTIFIER:

A rectifier is a device such as a semiconductor capable of converting sinusoidal input waveform units into a unidirectional waveform, with a non-zero average component.

3.2.3 FILTERS:

Capacitors are used as filters in the power supply unit. Shunting the load with the capacitor, effects filtering. The action of the system depends upon the fact the capacitor stores energy during the conduction period and delivers this energy to the load during the inverse or non-conducting period. In this way, time during which the current passes through the load is prolonged and ripple is considerably reduced.

3.2.4 FIXED VOLTAGE REGULATOR:

An IC7805 fixed voltage regulator is used in this circuit. The function of this regulator is to provide a +5V constant DC supply, even if there are fluctuations to the regulator input. This regulator helps to maintain a constant voltage throughout the circuit operation.

CHAPTER 4

CHAPTER 4

INTELLIGENT VEHICLE TECHNOLOGIES

Although the automotive industry has always been a leading force behind many engineering innovations, this trend has become especially apparent in recent years. The competitive pressure creates an unprecedented need for innovation to differentiate products and reduce cost in a highly saturated automotive market to satisfy the ever increasing demand of technology savvy customers for increased safety, fuel economy, performance, convenience, entertainment, and personalization. With innovation thriving in all aspects of the automotive industry, the most visible advancements are probably in the area of vehicle controls enabled by the proliferation of on-board electronics, computing power, wireless communication capabilities, and sensor and drive-by-wire technologies.

The increasing sophistication of modern vehicles is also accompanied by the growing complexity of required control models. Therefore, it is not surprising that numerous applications of methodologies generally known as "intelligent", "soft computing", "computational intelligence", "artificial intelligence"(AI) can be found in practically all spheres of the automotive industry, starting from vehicle on-board systems through the value chain and including vehicle design, manufacturing and after-market service. The focus of most of those technologies is to find more effective alternatives to conventional engineering methods.

Intelligent Vehicle Technologies telematics comprise electronic, electromechanical, and electromagnetic devices - usually silicon micromachined components operating in conjunction with computer controlled devices and radio transceivers to provide precision repeatability functions (such as in robotics artificial intelligence systems) emergency warning-validation performance reconstruction.

Intelligent vehicle technologies commonly apply to car safety systems and self-contained autonomous electromechanical sensors generating warnings that can be transmitted within a specified targeted area of interest, say within 100 meters of the emergency warning system for vehicles transceiver. In ground applications, intelligent vehicle technologies are utilized for safety and commercial communications between vehicles or between a vehicle and a sensor along the road.

Intelligent vehicle technologies provide instantaneous on the road information to the motorist who wishes to map a route to a specific destination and expects the system to assist in determining the best course of travel. The information provided by the in-vehicle system updates approximately every minute (depending on the speed of the vehicle) all the transmitter beacon information self-recorded by the vehicle while traveling on the road. That is, all vehicles traveling on the highway update such information to the local mile markers via DSRCtelematics. The mile markers in turn communicate with the regional monitoring station and upload data so as to populate statistical bar graph trend of traffic flow progression. The information further made available for access to the date collected by the system established data exchange format through standard Internet protocol IP address communications links.

Total system intelligence means total accountability of every motorized vehicle traveling on the road. Therefore, Intelligent Vehicle Technologies takes into account gathered beacon information from every vehicle traveling on the road. The vehicle itself provides that information gathered from the road to determine lane specific vehicle usage and to further provide for remote communications of virtual lane closures (in-vehicle notification warning) to the vehicle such as for construction zones, emergency scenarios, etc. as the need arises.

Intelligent vehicle technologies and systems are designed for intelligent beacon information assistance to the autonomous robotic vehicle and provide for guidance, safety, and convenience in vehicle travel. Intelligent Beacon Systems are special non-destructive RFID passive transceivers embedded into the road in the center of each lane every three meters provide for total accountability of all vehicles (regardless of size) traveling on the road.

Intelligent vehicle technologies target transmission capable beacons provide for information signal data that are employed infrastructure to vehicle and vehicle to vehicle for exclusive precision remote communications to the specific one vehicle traveling in a given lane on the highway, for example – or a convoy of vehicles in a given travel lane, or multiple vehicles traveling in all affected lanes. All lanes are beacon tagged so as the vehicle travels down the road the ground beacon maintains communication with the vehicle for that particular lane – so it is therefore possible for example, for law enforcement to direct and provide for specific in-vehicle aural and/or visual information to a target vehicle traveling in a given lane (or multiple vehicle in multiple lanes – as desired).

Vehicles traveling in the vicinity of an accident scenario, for example, are simultaneously queried by the in-vehicle police intelligent beacon system computer which repeatedly updates and processes all dynamic passing vehicle data received, identifying and classifying all passing vehicles in real-time – for example, an aural visual command instruction is sent to all the in-vehicle emergency warning beacon system computers as a reminder that no rubbernecking, for example, or viewing of the accident is permitted and vehicles are instructed to safely maintain a given speed limit. Ease of managing, operating, and reducing traffic congestion of the transportation system is therefore achieved.

An operational example of the system is given where a motorist traveling on the center lane of highway, RFID CODE-ID-LN-2-W80-MM37.77-beacon001877649) on I-80 westbound is directed by the officer (from his vehicle via Telematics) to pull over to the right shoulder—information displayed on the instrument panel indicates an expired registration of the vehicle. How does [Intelligent Vehicle Technologies] system operate? Through the application of in-vehicle beacon transceiver, and the RFID transmitters installed throughout the surface of the road that are similar to light reflector tags currently mounted on the surface of the road infrastructure. In conjunction with the vehicle in close proximity to the intelligent beacon radio frequency identification tag the system detects the vehicle's position, serial number, make, model, color, unit identification, and orientation (identification, serial number and attributes of the vehicle are stored in the in-vehicle computer permanent memory portion of the system. Anonymous pseudorandom computer real-time information data is constantly updated, self-recorded, then uploaded to the telematics mile marker by the vehicle's transceiver so as to maintain real-time on-command intra-vehicle communication operations on the spot anywhere. No in-vehicle beacon information system, no operation of a motor vehicle.

CHAPTER 5

CHAPTER 5
HARDWARE DESCRIPTION

5.1 OVERALL BLOCK DIAGRAM:

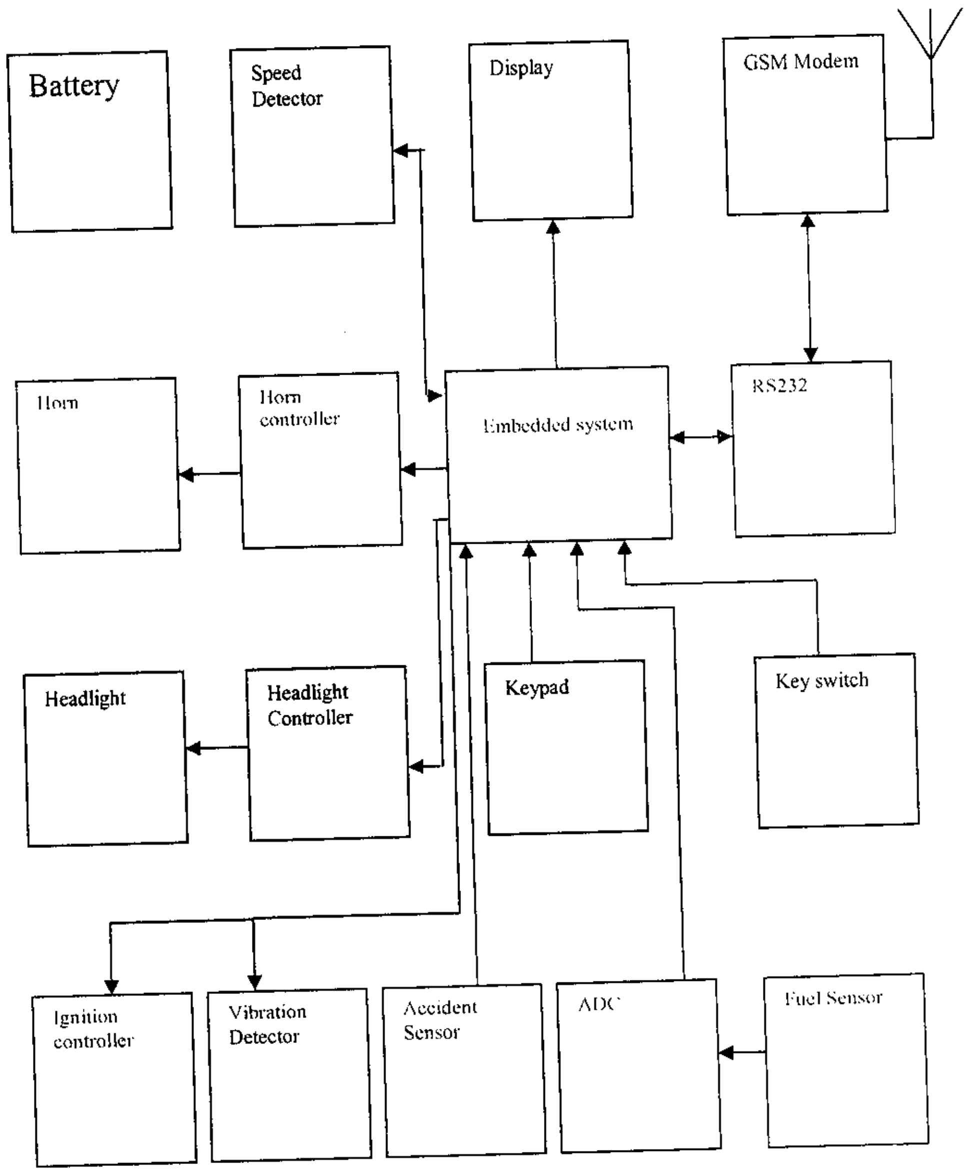


Fig 5.1 OVERALL BLOCK DIAGRAM

5.2 INTRODUCTION:

The components used in the arrangement of the IVMS are listed below:

- 89s52 microcontroller of 8051 family
- LCD
- Key switch
- Accident sensor
- Piezoelectric sensor
- Boyd float
- ULN2003 relay driver
- ADC (successive approximation type)
- Relay
- GSM modem

5.3 DESCRIPTION OF THE COMPONENTS USED:

5.3.1 ANALOG TO DIGITAL CONVERTER:

ADC 0809 analog to digital converter is a successive approximation type analog to digital converter. The successive approximation technique uses a very efficient code search strategy to complete n-bit conversion in just n-clock periods. The circuit uses a successive approximation register to find the required value by trial and error. The ADC0809 data acquisition component is a monolithic CMOS device with an 8-bit analog-to-digital converter, 8-channel multiplexer and microprocessor compatible control logic. The converter features a high impedance chopper stabilized comparator, a 256R voltage divider with analog switch tree and a successive approximation register.

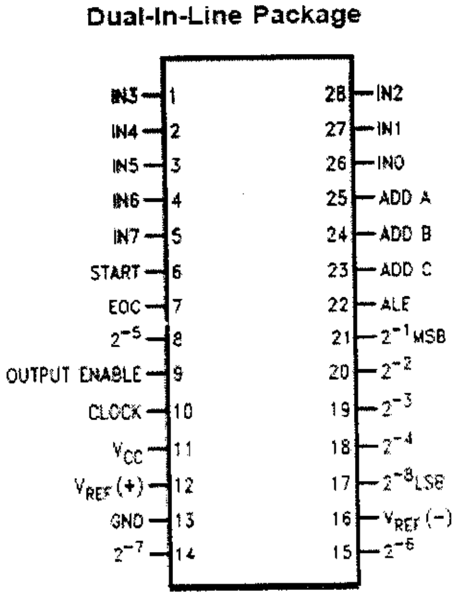


Fig 5.2 Diagram of ADC0809

5.3.1.1 Operation of the Circuit:

With the arrival of START command, the SAR sets the MSB d1=1 with all other bits to zero so that the trial code is 10000000. The output of the ADC is now compared with analog input. If input is greater than the DAC output then 10000000 is less than the correct digital representation. The MSB is left at '1' and the next lower significant bit is made '1' and further tested. However, if input is less than the DAC output, then 10000000 is greater than the correct digital representation. So reset MSB to '0' and go on to the next lower significant bit. This procedure is repeated for all subsequent bits, one at a time, until all bit positions have been tested.

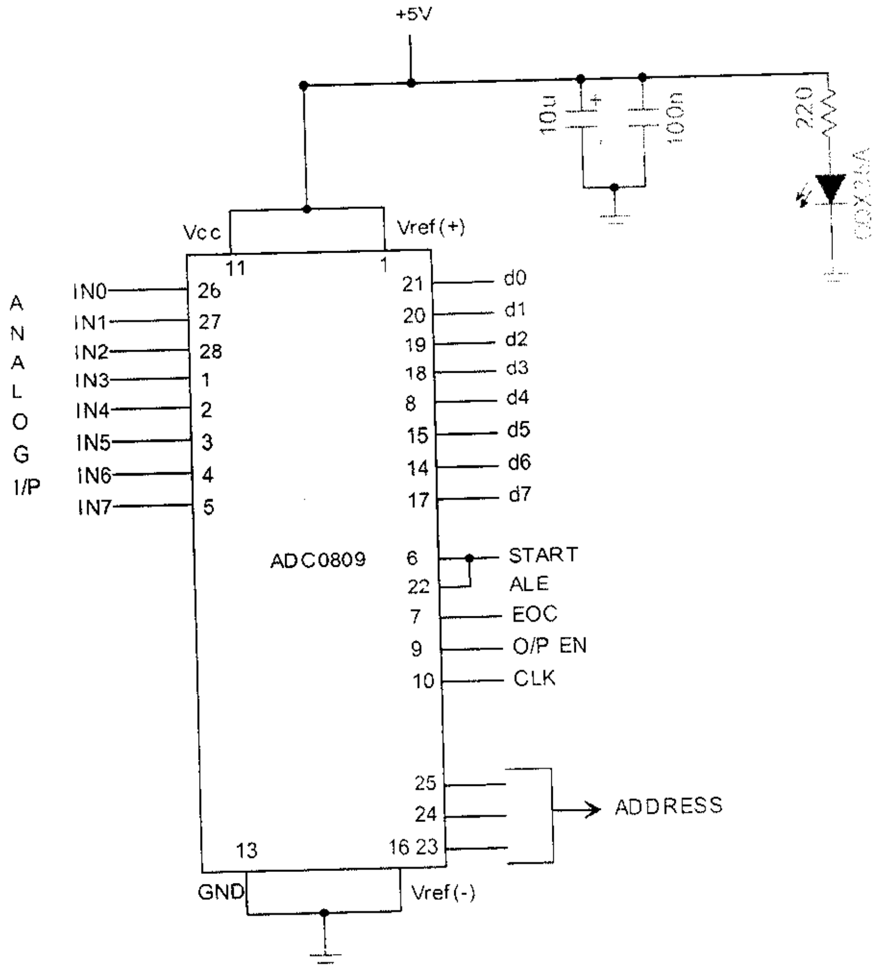


Fig 5.3: A/D converter Circuit Diagram

5.3.1.2 Circuit Description:

The output from the filter is given to pin 26 of ADC 0809 shown in fig .The address channels A, B, C are grounded so that channel 1 is enabled. The digitized output from the converter is given to port 0 of micro controller. The filter capacitors in the circuit remove the low and high frequency noises. The control signals from the ADC are given to port 2 of the Microcontroller. This circuit follows the principle of successive approximation method and when the start of conversion goes high, it marks the beginning of the process and high end of conversion marks the end of it.

5.3.2 BUZZER:

A buzzer or beeper is a signalling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise). Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board. Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Sonalert which makes a high-pitched tone. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed the sound on and off.

In game shows it is also known as a "lockout system," because when one person signals ("buzzes in"), all others are locked out from signalling. Several game shows have large buzzer buttons which are identified as "plungers".

The word "buzzer" comes from the rasping noise that buzzers made when they were electromechanical devices, operated from stepped-down AC line voltage at 50 or 60 cycles. Other sounds commonly used to indicate that a button has been pressed are a ring or a beep.

Some systems, such as the one used on Jeopardy!, make no noise at all, instead using light. Another example is the buzzer at the end of each stage in Sasuke, Kunoichi, and Viking. These buzzers do not make a sound or turn on a light; instead, they stop a nearby digital clock, briefly fire two smoke cannons on each side of the stage exit, and open the exit. However, at the end of the Heartbreaker in Viking, the buzzer is replaced with a sword that, when removed, causes two contacts to touch, closing the circuit and causing the latter two actions above to occur.

Nowadays some people use the word "buzzer" as to describe a person who's able to create a big buzz around a brand, an event or a company.

5.3.3 LIQUID CRYSTAL DISPLAY:

Liquid crystal cell displays (LCDs) are used in similar applications where LEDs are used. These applications are display of display of numeric and alphanumeric characters in dot matrix and segmental displays.

LCDs are of two types:

I. Dynamic scattering type
II. Field effect type

The construction of a dynamic scattering liquid crystal cell. The liquid crystal material may be one of the several components, which exhibit optical properties of a crystal though they remain in liquid form. Liquid crystal is layered between glass sheets with transparent electrodes deposited on the inside faces.

When a potential is applied across the cell, charge carriers flowing through the liquid disrupt the molecular alignment and produce turbulence. When the liquid is not activated, it is transparent. When the liquid is activated the molecular turbulance causes light to be scattered in all directions and the cell appears to be bright.

This phenomenon is called dynamic scattering.

The construction of a field effect liquid crystal display is similar to that of the dynamic scattering type, with the exception that two thin polarizing optical filters are placed at the inside of each glass sheet. The liquid crystal material in the field effect cell is also of different type from employed in the dynamic scattering cell. The material used is twisted nemayic type and actually twists the light passing through the cell when the latter is not energised.

Liquid crystal cells are of two types:

i. Transmittive type:

In the transmittive type cell, both glass sheets are transparent, so that light from a rear source is scattered in the forward direction when the cell is activated.

ii. Reflective type:

In reflective type cell has a reflecting surface on one side of glass sheets. The incident light on the front surface of the cell is dynamically scattered by an activated cell. Both types of cells appear quite bright when activated even under ambient light conditions.

The liquid crystals are light reflectors are transmitters and therefore they consume small amounts of energy (unlike light generators).

The seven segment display, the current is about 25micro Amps for dynamic scattering cells and 300micro amps for field effect cells. Unlike LEDs which can work on d.c. the LCDs require a.c. voltage supply. A typical voltage supply to dynamic scattering LCD is 30v peak to peak with 50 Hz.

5.3.4 MICROCONTROLLER:

5.3.4.1 INTRODUCTION TO ATMEL MICROCONTROLLER:

SERIES: 89S51 Family, **TECHNOLOGY:** CMOS

KEY FEATURES:

The major Features of 8-bit Micro controller **ATMEL 89S51**:

- 8 Bit CPU optimized for control applications
- Extensive Boolean processing (Single - bit Logic) Capabilities.
- On - Chip Flash Program Memory
- On - Chip Data RAM
- Bi-directional and Individually Addressable I/O Lines
- Multiple 16-Bit Timer/Counters
- Full Duplex UART
- Multiple Source / Vector / Priority Interrupt Structure
- On - Chip Oscillator and Clock circuitry.
- On - Chip EEPROM
- SPI Serial Bus Interface
- Watch Dog Timer

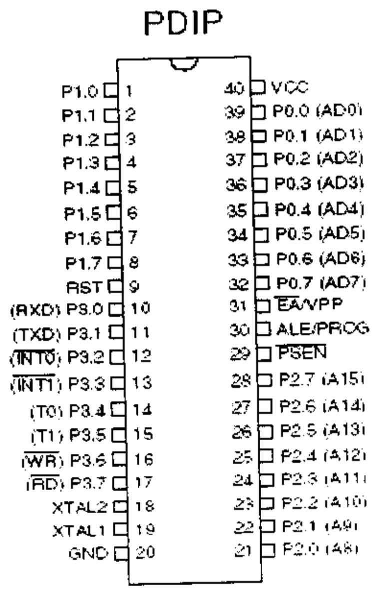


Fig 5.4 Pin diagram of ATMEL 89S52

5.3.4.2 Input/ Output Ports:

There are four I/O ports available in AT89S51. They are port 0, port 1, port 2, and port 3. All these ports are eight bit ports. All these ports can be controlled as eight-bit port or it can be controlled individually. One of the main feature of this micro controller is it can control the port pins individually. For example to control a LED we need to use one I/O line in Micro processor with 8255 we have to use an eight bit port. In micro controller we can use only. In 89S51 port 1 is available for users Port 3 is combined with interrupts. This can be used as interrupts (or) I/O ports, ports 2 & port 0 is combined with address bus & data bus.

All these port lines are available with internal pull-ups except port 0. If we want to use port 0 as I/O port we have to use pull up resistors.

This Micro controller is working in a speed of maximum of 24MHz. This micro controller is available with inbuilt oscillator; just we have to connect the crystal to its terminal.

The manner in which the use of micro controllers is shaping our lives is breathtaking. Today, this versatile device can be found in a variety of control applications. CVTs, VCRs, CD players, microwave ovens, and automotive engine systems are some of these.

A micro controller unit (MCU) uses the microprocessor as its central processing unit (CPU) and incorporates memory, timing reference, I/O peripherals, etc on the same chip. Limited computational capabilities and enhanced I/O are special features.

The micro controller is the most essential IC for continuous process- based applications in industries like chemical, refinery, pharmaceutical automobile, steel, and electrical, employing programmable logic systems (DCS). PLC and DCS thrive on the programmability of an MCU.

There are many MCU manufacturers. To understand and apply general concepts, it is necessary to study one type in detail. This specific knowledge can be used to understand similar features of other MCU.

Micro controller devices have many similarities. When you look at the differences, they are not so great either. Most common and popular MCU are considered to be mature and well-established products, which have their individual adherents and devotees. There are a number of variants within each family to satisfy most memory, I/O, data conversion, and timing needs of end user applications.

The MCU is designed to operate on application-oriented sensor data-for example, temperature and pressure of a blast furnace in an industrial process that is fed through its serial or operated on under the control of software and stored in ROM. Appropriate signals are fed via output ports to control external devices and systems.

Incoming data can be from a variety of external devices sensors. Priority for receiving and operating on the data can be established using the interrupt-control circuitry. The microcontroller operates with external circuitry to perform control-oriented tasks, using a control program in ROM. The instruction set is simpler than that of a microprocessor, since most of its instructions will move code and data from internal memory to ALU (arithmetic logic unit).

The use many input/output (I/O) pins allows data to be moved between the microcontroller and external devices, often as single bits. Operation on single bits, such as logical operations, is unique to microcontrollers; microprocessors operate generally on bytes or large data groups.

5.3.5 SERIAL INTERFACE:

Serial data is any data that is sent one bit at a time using a single electrical signal. In contrast, parallel data is sent 8, 16, 32, or even 64 bits at a time using a signal line for each bit. Data that is sent without the use of a master clock is said to be asynchronous serial data.

Several communications standards exist for the transfer of asynchronous serial data. Common PC's transfer data using the EIA RS-232C (also known as V.28 or V.24). Updated versions of this standard include RS-232D and EIA/TIA-232E, but most literature still refers to the RS-232C or RS-232 standard.

The baud rate for a serial connection is the number of bits that are transmitted per second. It is specified in bits/second or baud. For example, a 110 baud serial link transfers 110 bits of data per second.

The EIA RS-232C standard permits data rates up to 19200 bps and cable lengths up to 400 meters (but not both).

Although the specification only defines rates up to 19200 bps, communication using data rates as high as 230400 bps and a short (less than 2 meter) cable are common. Standard modems communicate with computers at up to 115200 bps.

When a microprocesser communicates with the outside world, it provides the data in byte-sized chunks. In some cases, such as printers, the information is simply grabbed from the 8-bit data bus and presented to the 8-bit data bus of the printer. This can work only if the cable is not too long, since long cables diminish and even distort signals. Further, an 8-bit data path is expensive. For these reasons, serial communication is used for transferring data between two systems located at distances of hundreds of feet to millions of miles apart.

In serial communication a single data is used instead of the 8-bit data line of parallel communication makes it not only much appear but also makes it possible for two computers located in two different cities to communicate over the telephone.

5.3.5.1 DATA TRANSFER RATE:

The rate of data transfer in serial data communication is stated in bps(bits per second). Another widely used terminology for bps is baud rate. Baud rate is defined as the number of signal changes per second. In modems, there are occasions when a single change of signal transfers several bits of data. As far as the conductor wire is concerned,
the baud rate and bps are the same. It must be noted that in asynchronous serial data communication, the baud rate is generally limited to 100,000 bps.

5.3.5.2 RS232 STANDARDS:

To allow compatibility among data communication equipment made by various manufactures, an interfacing standard called RS232 was set by the Electronics Industries Association (EIA) in 1960. RS232 is the most widely used serial I/O interfacing standard.
Since the RS232 standard was set long before the advent of the TTL logic family, its input and output voltage levels are not TTL compatible. In RS232, a 1 is represented by
-3 tc -25 V, while a 0 bit is +3 to +25 V, making -3 to +3 undefined. For this reason, to connect any Rs232 to a microcontroller system we must use voltage convertors such as MAX232 to convert any RS232 the TTL logic levels to the RS232 voltage level, and vice versa. MAX232 IC chips are commonly referred to as line drivers.

5.3.5.3 MAX232:

Since the RS232 is not compatible with today's microprocessors and microcontrollers, we need a line driver(voltage convertor) to convert the RS232's signals to the TTLvoltage levels that will be acceptable to the 8051's TxD and RxD pins. The MAX232 converts from RS232 voltage levels to TTL voltage levels, and vice versa. One advantage of the MAX232 chip is that it uses a +5 V power source which is the same as the source voltage for the 8051. In other words, with a single +5 V power supply we can power both the 8051 and MAX232, with no need for the dual power supplies that are common in many older systems.

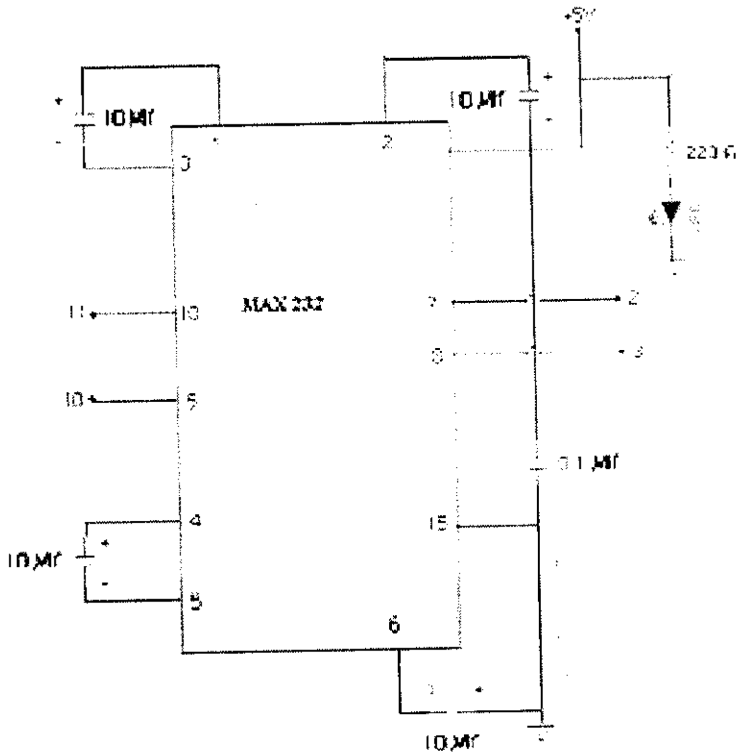


Fig 5.5 Pin diagram of MAX232

5.3.6 RELAY DRIVER CIRCUIT:

The relay is the inductive load. The current capability for the inductive load is higher than any other load. The low signal from the parallel port does not have such current capability for driving the inductive loads such as relay. So it is necessary to use the relay driver circuit to drive the relay.

5.3.6.1 OPERATION:

All relay operates using the same basic principle .The four pin relay is used .A control circuit has a small control coil while the load circuit has a switch. The coil controls the operation of the switch. When no voltage is applied to pin 1,there is no current flow through the coil. Due to which the magnetic field will not be developed. And the switch will be open. When voltage is supplied to pin 1, current flow through the coil which creates the magnetic field needed to close the switch allowing continuity between pin 2 and 4.

5.3.6.2 RELAY ENERGISED:

Current flowing through the control circuit coil (pin 1 and 3) creates a small magnetic field which causes the switch to close, pin 2 and 4.The switch, which is part of the load circuit, is used to control an electrical circuit that may connect to it. Current now flows through pins 2 and 4, when the relay is energized.

5.3.6.3 RELAY DE-ENERGISED:

When current stops through the control circuit, pin 1 and 3, the relay becomes de- energized .Without the magnetic field, the switch opens and current is prevented from flowing through pins 2 and 4.The relay is now OFF.

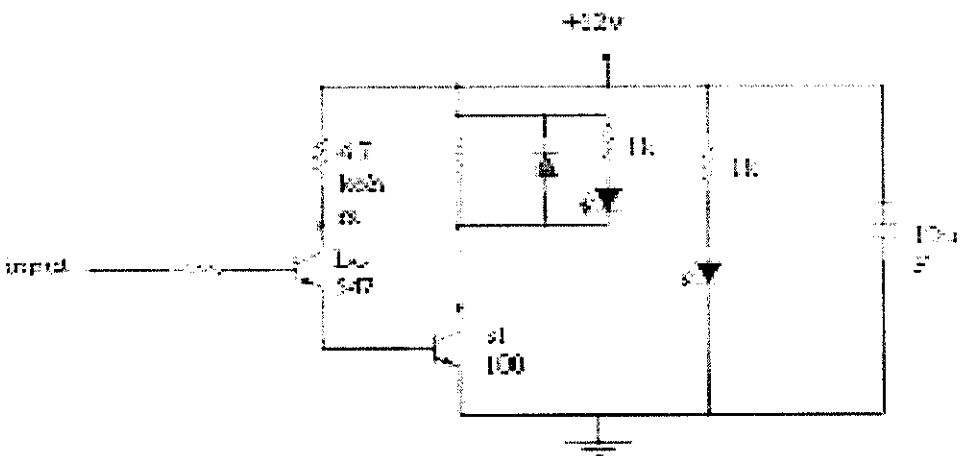


Fig 5.6 Relay driver circuit

CHAPTER 6

CHAPTER 6

CIRCUIT DESCRIPTION AND OPERATION :

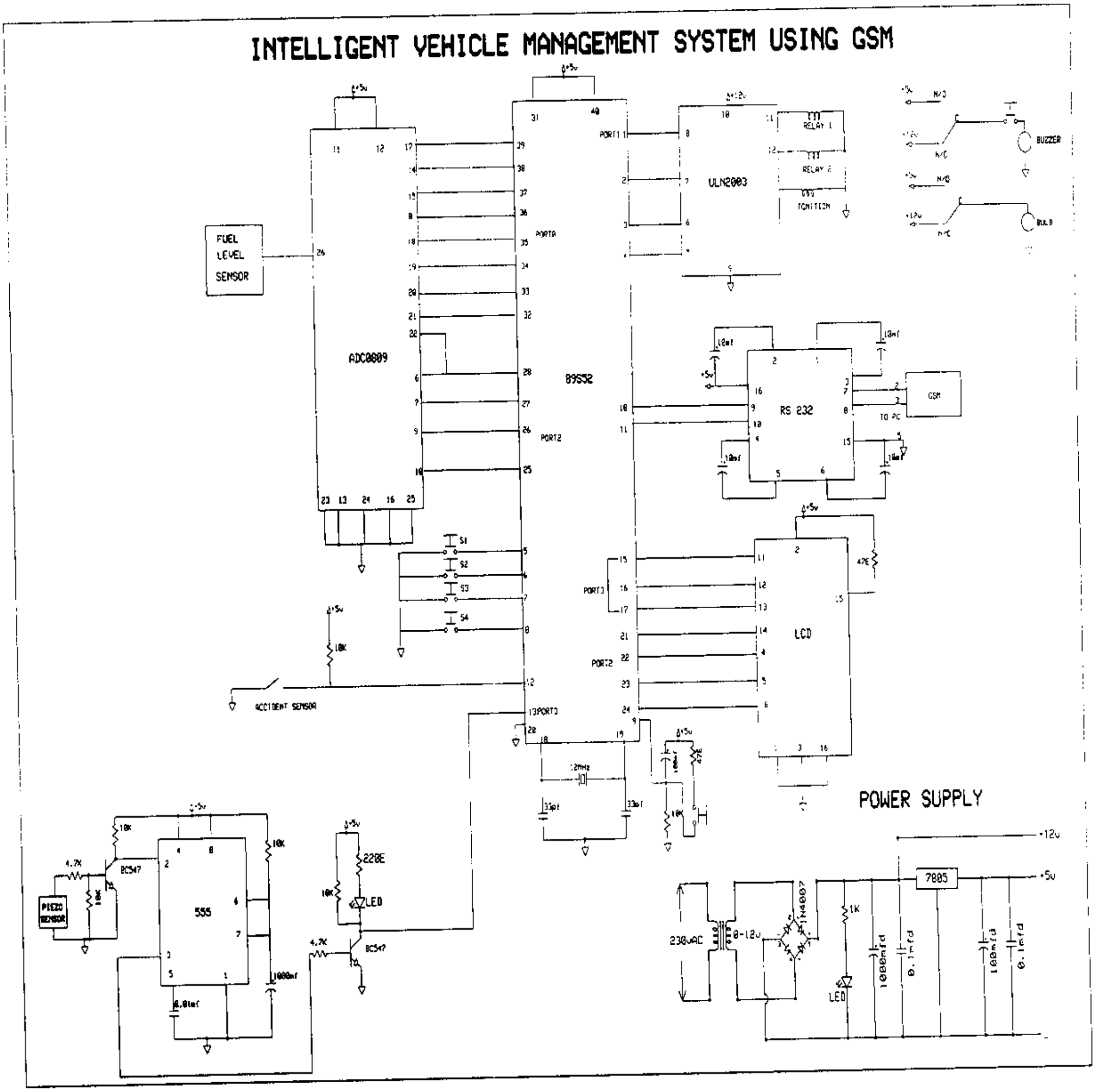


Fig 6.1 Microcontroller based circuit diagram

6.1 DESCRIPTION OF THE MODULES:

6.1.1 CONCENTRATION CHECK:

Whenever the key is inserted, the backlight of the LCD glows, and a password (4 digit number glows) is displayed, then the driver should enter the password and if both matches then one of the relay that controls the ignition opens.

Advantages:

i. This avoids the drunken drive.

ii. Also, avoids the accidental hijack of the vehicle by the mentally retarded persons.

iii.Avoids theft to certain extent.

6.1.2 ACCIDENT IDENTIFICATION:

If any accident takes place to the IVMS equipped vehicle, then the message that is the text already fed to the microcontroller is sent to the close relatives mobile numbers which are installed already.

The accident is identified by placing the lead pair at four to five places of the vehicle so that if accident takes place, the leads touch each other thus short circuit is made and the signal is sent to microcontroller which sends the message via GSM.

Advantages:

i. Helps to identify the place and the person in danger, which thus serves the purpose of saving lives out of risk.

ii. It can also be programmed in such a way that within TN zone, message can be sent to 108 thus alerting the heating zone also.

6.1.3 HORN CONTROLLER:

When the vehicle is rode along the hospital or school zone which is identified by the GSM, the microcontroller instructs or drives the relay such that the horn operates in the less amplified mode.

Advantages:

i. Thus, avoids the unwanted disturbance to the patients or the sick ones in the hospital.

ii. It also avoids the unwanted distraction of the students in the classes.

6.1.4 HEADLIGHT CONTROLLER:

In the city roads, the street light along the either side of the road itself is sufficient in providing the illumination and thus the visibility for the drivers to ride the vehicle whereas in the highways, the head light is a must without which it could be impossible for the drivers to ride the vehicle.

Thus, microcontroller is programmed in such a way that it enables the headlight to glow in highways and disables it in the city roads.

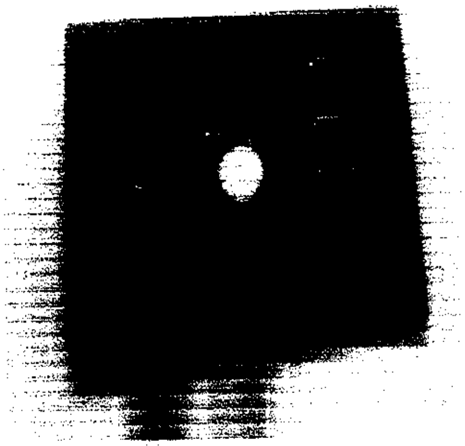
Advantages:

i. Thus, it saves the battery of the vehicle and avoids the unnecessary usage of the battery. Ensures "long-standing" battery.

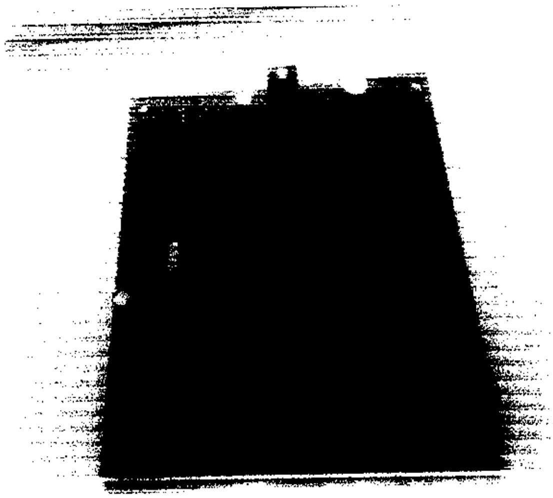
6.1.5 THEFT IDENTIFICATION:

555 timer under the mode of astable multivibrator with a piezo sensor detects the vibrations, whenever any thief attempts to break the lock and thus delivering the output to microcontroller which is programmed in such a way to send the message "ALERT"[2] to the installed number.

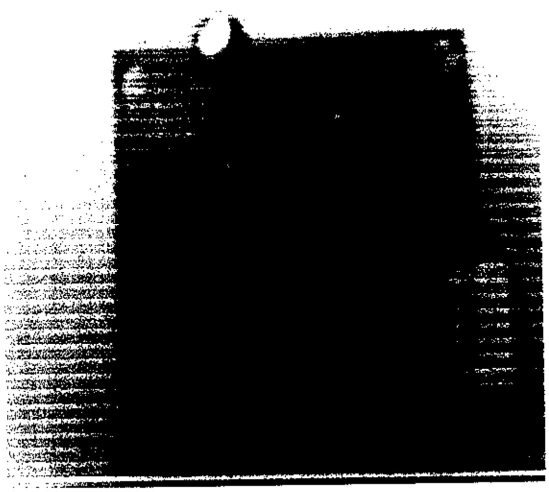
6.2 EXPERIMENTAL SETUP:



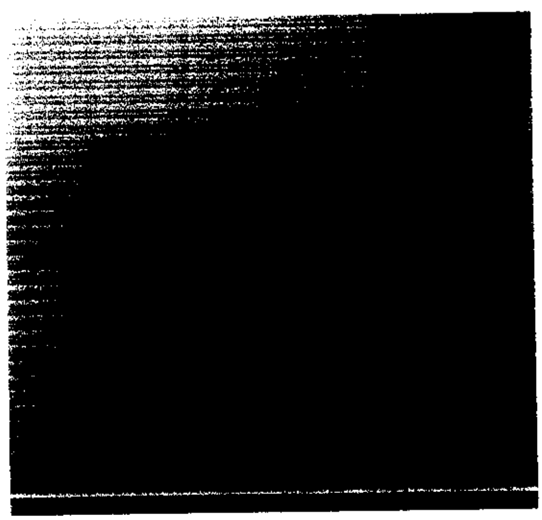
POWER SUPPLY



MICROCONTROLER

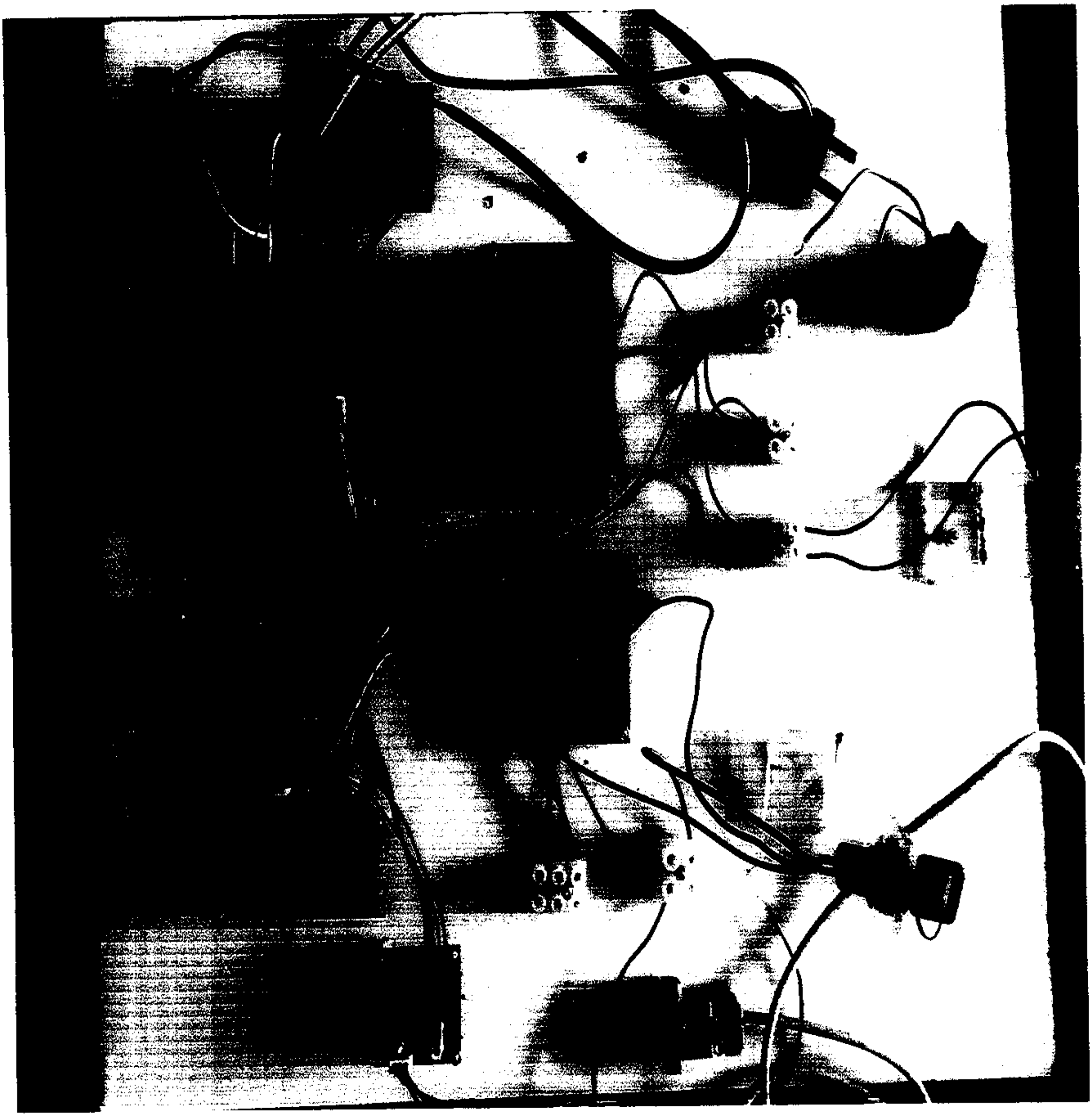


RS 232



555 TIMER

OVERALL HARDWARE:



CHAPTER 7

CHAPTER 7
CONCLUSION

7.1 CONCLUSION:

With this discussion of the merits and demerits listed above, this module would definitely promise the mankind to be of ultimate use as merits of it overweigh the demerits, undoubtedly with the new concepts revealing themselves into existence with the assistance of the emerging aspirant engineers, the world is also expecting astonishing ideas that would assist mankind effectively and efficiently. This GSM based Intelligent Vehicle Management System would definitely satisfy such an expectation with all its incorporated features and would make driving more feasible by protecting the vehicle from theft and also saves life at the accidental dangerous situations.

7.2 FUTURE IMPROVEMENTS:

I. To achieve greater mobility and safety in highway travel, the Intelligent vehicle management system concept links the vehicle, driver, highway, and traffic management team using advanced communications and computer-controlled technology.

II. In the near future we will see considerable change in the basic nature of the driving task and the way traffic is managed .

III. Human factors considerations are critical in the design and operation of Intelligent vehicle management system.

IV. The driver-vehicle and driver-highway interfaces will be altered and thus be optimized.

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REFERENCES:

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APPENDIX A

APPENDIX A

AT89S52 ATMEL MICROCONTROLLER CODING AND DETAILS:

CODE:

```
prs         equ 0a0h        ;register select
prw         equ 0a1h        ;read/write
pen         equ 0a2h        ;enable

lcd_d4      equ 0a3h        ;databit4
lcd_d5      equ 0a4h        ;databit5
lcd_d6      equ 0a5h        ;databit6
lcd_d7      equ 0a6h        ;databit7

data        equ 70h         ;data storage to command LCD and display characters


baudnum     equ 0f3h           ;2400


horn        equ 90h            ;horn control relay
light       equ 91h            ;light control relay
speedrelay  equ 93h            ;speed control relay
irelay      equ 92h            ;ignition control relay

asensor     equ 80h            ;accident sensor
ksensor     equ 81h             ;key sensor
vsensor     equ 82h            ;vibration sensor

            org 0000h
            mov p0,#0ffh
            mov p1,#00h
```

```
mov p2,#00h
mov p3,#0ffh

        clr horn
        clr light
        clr speedrelay
        clr irelay

        mov 30h,#00h
        mov 31h,#00h
        mov 32h,#00h
        mov 33h,#00h
        mov 34h,#00h
        mov 40h,#00h
mov 41h,#00h
mov 42h,#00h
mov 43h,#00h
mov 44h,#00h
mov 45h,#00h
mov 46h,#00h
mov 47h,#00h

mov 50h,#00h
mov 51h,#00h
mov 52h,#00h
mov 53h,#00h
mov 54h,#00h
mov 55h,#00h
mov 56h,#00h
mov 57h,#00h

mov 60h,#00h
```

```
mov 61h,#00h
mov 62h,#00h
mov 63h,#00h
mov 64h,#00h
mov 65h,#00h
mov 66h,#00h
mov 67h,#00h

        anl tcon,#0cfh
        anl tmod,#0f0h
        orl tmod,#05h


        anl pcon,#7fh           ;set SMOD bit to 0 for Buad*32 rate
        anl tmod,#3fh           ;alter timer T1 configuration only
        orl tmod,#20h           ;set timer T1 as an 8-bit autoload

        mov th1,#baudnum            ;TH1 set for divide clock by 13d

        setb tr1            ;T1 running at 1E6/13=76923Hz
        mov scon,#40h

        setb ren

        acall delay

        mov a,#"t"
        acall xmit

        mov a,#"e"
        acall xmit
```

```
                mov a,#"s"
                acall xmit

                mov a,#"t"
                acall xmit

                acall delay

        acall initialise_lcd

                mov dptr,#wel
                acall cont
                acall delay
                acall delay
                acall delay

start           jnb vsensor,l1
        acall delay
        jnb vsensor,l1
        mov 30h,#"1"
        sjmp l1_1

l1      mov 30h,#"0"

l1_1    jnb asensor,l2
        acall delay
        jnb asensor,l2
        mov 31h,#"1"
        sjmp l2_1

l2      mov 31h,#"0"
```

```
l2_1    jnb ksensor,l3
        acall delay
        jnb ksensor,l3
        mov 32h,#"1"
        sjmp l3_1

l3      mov 32h,#"0"

l3_1    jnb ri,xx5
                acall receiveloop

xx5             acall sec1delay

                mov a,#"S"
                acall xmit

                mov a,30h
                acall xmit

                mov a,31h
                acall xmit

                mov a,32h
                acall xmit

                ajmp start

receiveloop
                acall receive

                cjne a,#"1",x1
                setb speedrelay
```

```
                mov dptr,#school
                acall cont
                ret

x1              cjne a,#"2",x2
                setb horn
                mov dptr,#hospital
                acall cont
                ret

x2              cjne a,#"3",x3
                setb light
                mov dptr,#highway
                acall cont
                ret

x3              cjne a,#"4",x4
                mov dptr,#oneway
                acall cont
                ret

x4              cjne a,#"5",x5
                setb irelay
                ret

x5              cjne a,#"6",x6
                clr irelay
                ret

x6              cjne a,#"7",x7
                mov dptr,#nores
                acall cont
```

```
                clr horn
                clr light
                clr speedrelay
                ret

x7              ret

send_data
        acall hex_to_decimal

        mov a,51h
        swap a
        anl a,#0fh
        acall convert
        acall xmit

        mov a,51h
        anl a,#0fh
        acall convert
        acall xmit

        mov a,50h
        swap a
        anl a,#0fh
        acall convert
        acall xmit

        mov a,50h
        anl a,#0fh
        acall convert
        acall xmit
        ret
```

```
hex_to_decimal

            ;mov 41h,#00h      ;second byte ffh
                    ;mov 40h,#00h     ;first byte  07h
                    mov 50h,#00h      ;first byte
                    mov 51h,#00h      ;second byte
                    mov 52h,#00h      ;third byte
                    mov r0,#10h
nxtbit        mov a,40h
                    add a,40h
                    mov 40h,a
                    mov a,41h
                    addc a,41h
                    mov 41h,a
                    mov a,50h
                    addc a,50h
                    da a
                    mov 50h,a
                    mov a,51h
                    addc a,51h
                    da a
                    mov 51h,a
                    mov a,52h
                    addc a,52h
                    da a
                    mov 52h,a
                    djnz r0,nxtbit
                    mov r1,50h        ;first byte
                    mov r2,51h        ;second byte
                    mov r3,52h        ;third byte


                    ret
```

```
xmit
                mov sbuf,a
xmit1
                jbc ti,return
                nop
                sjmp xmit1

return      ret

receive
                clr ri
                mov a,sbuf

                ret

delay      mov r0,#01h
                sjmp din2

sec1delay      mov r0,#08h
din2    mov r1,#0f2h
din1    mov r2,#00h
dwait           djnz r2,dwait
        djnz r1,din1
        djnz r0,din2

        ret

initialise_lcd
                mov a,#2ch        ;4bits/char,2 rows,5x10 dots/char
                acall command
                mov a,#0ch              ;screen on,cursor off and no blink
```

```
        acall command
        mov a,#06h              ;shift cursor right
        acall command
        mov a,#01h              ;clear memory and home cursor
        acall command
        mov a,#80h              ;move cursor to space(0) 0,line 1(8)
        acall command

        ret

cont    mov a,#00h
        movc a,@a+dptr
        inc dptr

        cjne a,#80h,d1          ;move cursor to space(0) 0,line 1(8)
        acall command
        sjmp cont

d1      cjne a,#0c0h,d2         ;move cursor to space(0) 0,line 2(c)
        acall command
        sjmp cont

d2      cjne a,#0ffh,d3         ;displayed
        ret

d3      acall display
        sjmp cont


command acall ready
        clr prs
        clr prw
```

```
                acall dout_lcd
                ret

display         acall ready
                setb prs
                clr prw
                acall dout_lcd
                ret

ready           acall lcddelay
                ret

lcddelay        mov 34h,#00h
lcdwait         djnz 34h,lcdwait
                ret
dout_lcd        clr prw

                mov data,a

                mov a,data              ;first send upper nibble
                swap a

                mov c,acc.0
                mov lcd_d4,c

                mov c,acc.1
                mov lcd_d5,c

                mov c,acc.2
                mov lcd_d6,c

                mov c,acc.3
```

```
        mov lcd_d7,c

        setb pen
        clr pen

        mov a,data          ;second lower nibble

        mov c,acc.0
        mov lcd_d4,c

        mov c,acc.1
        mov lcd_d5,c

        mov c,acc.2
        mov lcd_d6,c

        mov c,acc.3
        mov lcd_d7,c

        setb pen
        clr pen

        ret

wel     db 80h,"    VEHICLE     "
        db 0c0h,"MANAGEMENT SYSTEM"
        db 0ffh

school  db 80h,"  SCHOOL ZONE   "
        db 0c0h,"    GO SLOW     "
        db 0ffh
```

```
hospital        db 80h, "  HOSPITAL ZONE  "
                db 0c0h,"   LOW HORN       "
                db 0ffh

highway         db 80h, "    HIGHWAY     "
                db 0c0h," NO HIGH BEAM   "
                db 0ffh

oneway          db 80h, "    ONE WAY     "
                db 0c0h,"                "
                db 0ffh

nores           db 80h, " NO RESTRICTION  "
                db 0c0h,"                "
                db 0ffh



convert         inc a                           ;CONVERT    1
                movc a,@a+pc                            ;1
                ret                                 ;2

                db 30h          ;0
                db 31h          ;1
                db 32h          ;2
                db 33h          ;3
                db 34h          ;4
                db 35h          ;5
                db 36h          ;6
                db 37h          ;7
                db 38h          ;8
```

```
db 39h          ;9

db 41h          ;A
db 42h          ;B
db 43h          ;C
db 44h          ;D
db 45h          ;E
db 46h          ;F
```

APPENDIX B

APPENDIX B

AT89S52 ATMEL MICROCONTROLLER:

MEMORY ORGANIZATION:

* Logical Separation of Program and Data Memory *

All Atmel Flash micro controllers have separate address spaces for program and data memory as shown in Fig 1.The logical separation of program and data memory allows the data memory to be accessed by 8 bit addresses. This can be more quickly stored and manipulated by an 8 bit CPU Nevertheless 16 Bit data memory addresses can also be generated through the DPTR register.

Program memory can only be read. There can be up to 64K bytes of directly addressable program memory. The read strobe for external program memory is the Program Store Enable Signal (PSEN) Data memory occupies a separate address space from program memory. Up to 64K bytes of external memory can be directly addressed in the external data memory space. The CPU generates read and write signals, RD and WR, during external data memory accesses. External program memory and external data memory can be combined by a applying the RD and PSEN signal to the inputs of AND gate and using the output of the fate as the read strobe to the external program/data memory.

PROGRAM MEMORY:

After reset, the CPU begins execution from location 0000h. Each interrupt is assigned a fixed location in program memory. The interrupt causes the CPU to jump to that location, where it executes the service routine. External Interrupt 0 for example, is assigned to location 0003h. If external Interrupt 0 is used, its service routine must begin at location 0003h. If the interrupt in not used its service location is available as general-purpose program memory.

The interrupt service locations are spaced at 8 byte intervals 0003h for External interrupt 0, 000Bh for Timer 0, 0013h for External interrupt 1,001Bh for Timer1, and so on. If an Interrupt service routine is short enough (as is often the case in control applications) it can reside entirely within that 8-byte interval. Longer service routines can use a jump instruction to skip over subsequent interrupt locations. If other interrupts are in use. The lowest addresses of program memory can be either in the on-chip Flash or in an external memory. To make this selection, strap the External Access (EA) pin to either Vcc or GND. For example, in the AT89S51 with 4K bytes of on-chip

Flash, if the EA pin is strapped to Vcc, program fetches to addresses 0000h through 0FFFh are directed to internal Flash. Program fetches to addresses 1000h through FFFFh are directed to external memory.

DATA MEMORY:

The Internal Data memory is dived into three blocks namely,

The lower 128 Bytes of Internal RAM.

The Upper 128 Bytes of Internal RAM.

Special Function Register.

Internal Data memory Addresses are always 1 byte wide, which implies an address space of only 256 bytes. However, the addressing modes for internal RAM can in fact accommodate 384 bytes. Direct addresses higher than 7Fh access one memory space, and indirect addresses higher than 7Fh access a different Memory Space.

The lowest 32 bytes are grouped into 4 banks of 8 registers. Program instructions call out these registers as R0 through R7. Two bits in the Program Status Word (PSW) Select, which register bank, is in use. This architecture allows more efficient use of code space, since register instructions are shorter than instructions that use direct addressing.

The next 16-bytes above the register banks form a block of bit addressable memory space. The micro controller instruction set includes a wide selection of single - bit instructions and this instruction can directly address the 128 bytes in this area. These bit addresses are 00h through 7Fh. either direct or indirect addressing can access all of the bytes in lower 128 bytes. Indirect addressing can only access the upper 128. The upper 128 bytes of RAM are only in the devices with 256 bytes of RAM.

The Special Function Register includes Port latches, timers, peripheral controls etc., direct addressing can only access these register. In general, all Atmel micro controllers have the same SFRs at the same addresses in SFR space as the AT89S51 and other compatible micro controllers. However, upgrades to the AT89S51 have additional SFRs. Sixteen addresses in SFR space are both byte and bit Addressable. The bit Addressable SFRs are those whose address ends in 000B. The bit addresses in this area are 80h through FFh.

OSCILLATOR AND CLOCK CIRCUIT:

XTAL1 and XTAL2 are the input and output respectively of an inverting amplifier which is intended for use as a crystal oscillator in the pierce configuration, in the frequency range of 1.2 Mhz to 12 Mhz. XTAL2 also the input to the internal clock generator.

To drive the chip with an internal oscillator, one would ground XTAL1 and XTAL2. Since the input to the clock generator is divide by two flip flop there are no requirements on the duty cycle of the external oscillator signal. However, minimum high and low times must be observed.

The clock generator divides the oscillator frequency by 12 and provides a tow phase clock signal to the chip. The phase 1 signal is active during the first half to each clock period and the phase 2 signals are active during the second half of each clock period.

CPU TIMING:

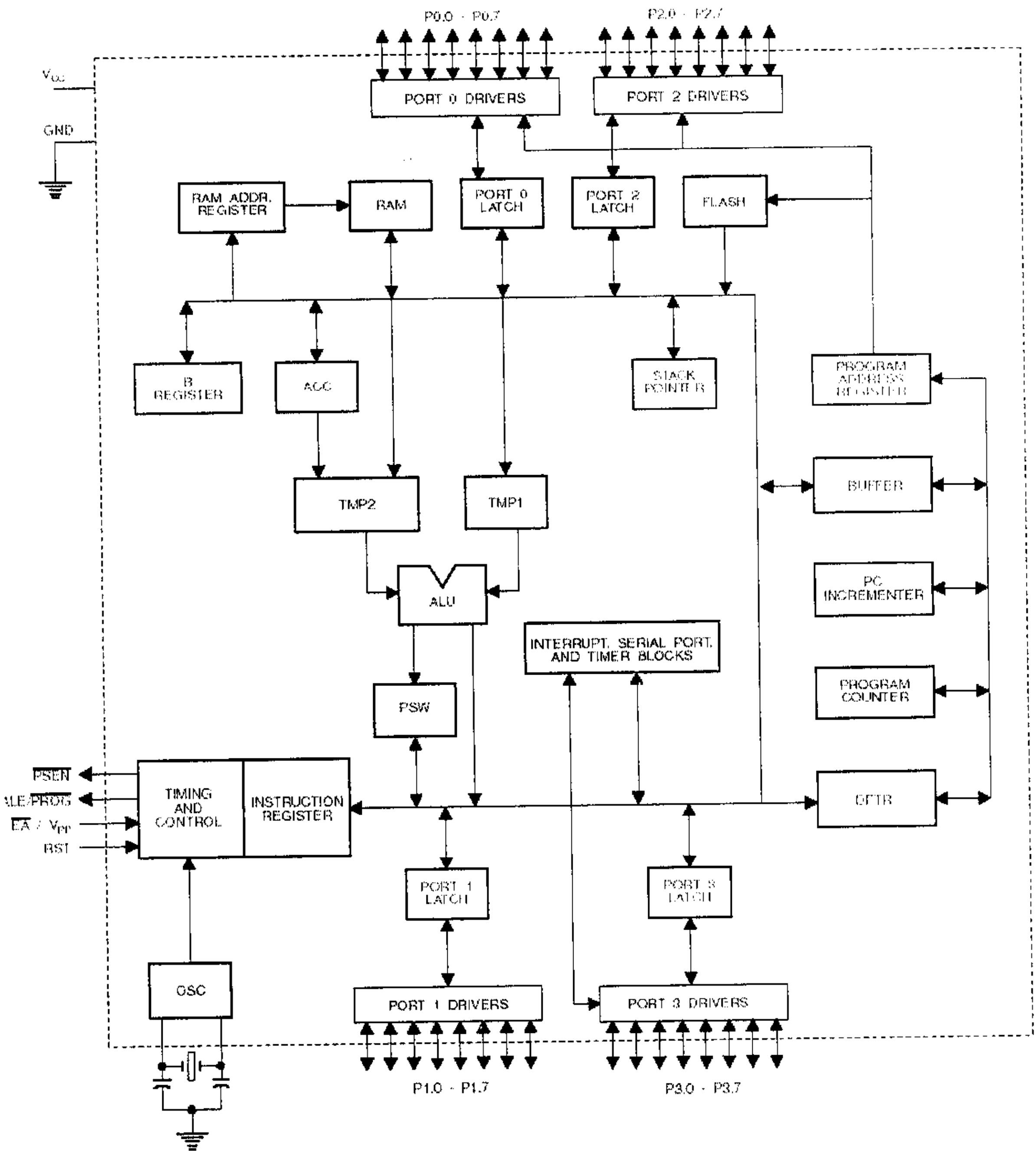
A machine cycle consists of 6 states. Each stare is divided into a phase / half, during which the phase 1 clock is active and phase 2 half. Arithmetic and Logical operations take place during phase1 and internal register - to register transfer take place during phase 2

MICRO CONTROLLER:

The difference between Microprocessor and Micro controller is Microprocessor can only process with the data, Micro controller can control external device. That is if you want switch "ON" or "OFF" a device, you need peripheral ICs to do this work with Micro controller you can directly control the device.

Like Microprocessor, Micro controller is available with different features. It is available with inbuilt memory, I/O lines, timer and ADC. The micro controller, which we are going to use, is 89S51 it is manufactured by Atmel, MC, USA. This is advanced version of 8031. This Micro controller have inbuilt 4K bytes of flash ROM, 256 bytes of RAM, 32 I/O lines (4 bit ports) and 6 vectored interrupts

Block Diagram



FLASH ROM:

4-kilo byte ROM is available in the Micro controller. It can be erased and reprogrammed. If the available memory is not enough for your program, you can interface the external ROM with this

IC, it has 16 address lines, so maximum of (2^16) i.e. 64 bytes of ROM can be interfaced with this Micro controller. Both internal and external ROM cannot be used simultaneously.

For external accessing of ROM, A pin is provided in Micro controller itself is i.e. pin no.31 EA should be high to use internal ROM, low to use external ROM

RAM:

Internal 256 bytes of RAM are available for user. These 256 bytes of RAM can be used along with the external RAM. Externally you can connect 64-kilo bytes of RAM with micro controller. In internal RAM first 128 bytes of RAM is available for user and the remaining 128 bytes are used as special function registers (SFR). These SFR's are used as control registers for timer, serial port etc.