VEHICLE SECURITY SYSTEM USING GSM TECHNOLOGY

A PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

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ABSTRACT

In this fast moving world it is necessary to have a security system for anything and everything to be secure. Hence we have decided to concentrate on the two wheeler security system at an affordable price. Our aim is to design and develop an Anti-Theft system that uses GSM technology and is totally in-built system.

The system is powered by a common power source taken out from the two outputs from the cutout. One output passes through a regulator and hence a lead is directly taken from the pin and given to power the system. Another lead is an un-regulated output; hence as the acceleration increases, the output also increases. Since the system electronics are designed to handle not more than 1A current, a signal conditioner circuit is added to condition the signal to the required range. This becomes a trigger pulse for the system. Thus the operating current within the circuit is a rectified continuous DC from the alternator-cutout setup. It senses the ignition by taking the input from the cutout as the trigger pulse. The trigger pulse is rectified since the output from the alternator is a pulsed output which is not viable to make the system work optimally. This pulse is fed to a pre-programmed microcontroller. The controller takes only the first second of the pulse and sends a clocked output to the relay. The relay is connected with the mobile phone's button to which the owner's number is assigned in speed dial mode. The mobile phone processor takes the pulse and makes a call to the owner's phone number stored in the mobile. In continuous running, the continuous pulse keeps generating but the microcontroller does not read until the engine switches OFF. As the engine switches OFF and then ON, the whole system reboots and is ready to take another dialing pulse.

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER – 1
INTRODUCTION

1.1 OVERVIEW:

In today's world with more and more people turning jobless everyday comes another great fear of increasing thefts, especially in developing countries and the underdeveloped ones. With growth in technology, theft has also grown to a professional scale. In today's world were the vehicle theft seems to be increasing exponentially we thought it is indeed the need of the hour to come out with a security system which will meet the needs of all classes and here it is. Everyday a new security system comes up a new way of breaking it also comes along.

The world of GSM is huge and can be put to use in a wide range of applications. When exploited fully it gives solution to many of our day-to-day constraints. There are quite a lot of security systems available but either they do not mate with the host or they fail to reach the masses.

The project is aimed at developing a security system that is fool-proof, and appealing to the masses. The system is based on GSM technology. So the system utilizes the SIM card in the mobile phone installed in the system to connect to the owner to alert him in case of any breach in security. It also helps to track down the vehicle by attending the call from the vehicle mobile. This can be done with the help of the Service Provider. The project aims to the hit the cheaper market since it was developed for two wheeler population alone. The system is compatible with all vehicles and is very compact. Hence it is not easily visible and hence totally in-built.

In case the system has to be installed to satisfy other security requirements, it can be done so with minute alterations in the input mode such that the system is made responsive enough to make a call to the owner in the quickest time possible.

1.2 EXISTING SECURITY SYSTEMS:

1.2.1 REMOTE-OPERATED TWO WHEELER SECURITY SYSTEM:

Cizon electronics gives total protection to bike against theft. Remote operation offers not only security; it also offers world-class convenience. The control of the system is shown in Fig 1.1.It includes features like: bike immobilizer - if unauthorized person is driving away your bike, you can stop the bike within 80 to 125 feet; easy - fast installation and operation; auto arming after 15 seconds the alarm will switch off and will be reset automatically; no fear of tampering with hooter due to unique inbuilt loud hooter; engine cut off - any attempt to drive away the bike disconnects the ignition and trigger the alarm; remote operation - let you arm or disarm the knight hawk from a distance of 80 to 125 feet, locate the bike in a parking lot sending as sos in emergency to attract attention; theft detection - any attempt to drive the vehicle or seal the parts such as carburetor, battery, etc.

Fig 1.1 Remote Operated Security System

Will trigger off alarm; blinker - signal lights blinks while locating the bike in parking lot ; it is water and heat resistant and is designed to withstand extreme environmental conditions; compact size - fits any two wheeler.

1.2.2 MICRO BIKE SECURITY SYSTEM (MICRO BSS):

Micro Technologies has recently launched a hardware based security system for motorbikes and scooters. Called the Micro Bike Security System (Micro BSS) the device is aimed at providing a reliable security system for two-wheeler segment in the market.

The two wheeler market in India is one of the biggest contributors to the automobile industry in the country, with a size of Rs. 100,000 million and recorded growth of about 25%. With this recent increase in the sales, especially during the festive seasons, the concern for security has grown. Around 2205 two wheelers were reported stolen in Mumbai out of which the recovery rate is has been only around 50%.

"Today, major chunk of the nation uses motorbikes. Security has become one of the biggest issues in the current scenario. Recognizing people's need, we have come up with a very cost-effective security system after extensive research to ensure security for two-wheeler vehicles. While a number of alarm and security systems are available, this device not only offers a proactive way of securing a two-wheeler vehicle, but also makes the owner aware of any tampering that their two-wheeler might be subjected to.

The device consists of a small hardware unit fitted on to the bike along with a small receiver unit. In the event of movement or tampering of the bike, the owner is immediately alerted through an alarm. It immediately informs the owner through an audio alert along with a vibrator in case if anyone opens the handle lock of the bike, removes side/main stand, tampers the ignition, or tries to start the bike by hotwiring.

1.2.3 AMSAKI 9110 (GSM BASED CAR SECURITY SYSTEM):

Rising crime rates heighten the need of people with regard to their Home, Shop, Stockroom and Car security. More people are now looking for an autocop for protecting their property against theft and burglary. Amsaki introduces, GSM based car security system shown in Fig 1.2

- *Vehicle Security*: In case of an 'Attempted Theft', it sends instant SMS to 4 mobile phones (GSM/CDMA) and calls one number.
- *Vehicle Tracking*: Gives location (last 4 GSM towers visited, along with time) of the vehicle through a SMS.

A unique wireless home/car security messaging device that gives instant alerts on your mobile phone the moment a security breach is detected.

Fig 1.2 Amsaki 9110 Security System

Designed to alert you wirelessly through SMS as soon as your burglar alarm system intercepts an intrusion, Amsaki Security Companion brings to you the next generation of security solutions.

1.2.4 AMSAKI H1 (BURGLAR ALARM WITH GSM DIALER):

Amsaki H1 is a 3-Zone Intruder Alarm Panel cum Monitoring Station with inbuilt GSM Dialer as shown in Fig 1.3. In case of Intrusion; it sends instant SMS alert to 4 mobile phones and 2 distant Amsaki H1.A combinations of 2 Amsaki H1's increases the audible range of the Electronic Siren to hundreds of kilometers.

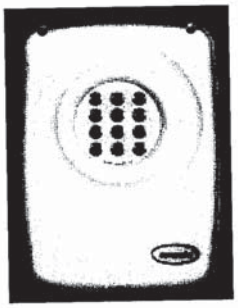

Fig 1.3 Amsaki H1 System

Mission Critical Features:

- In-built GSM dialer
- All communication with the user is through a dedicated & wireless Dialer. There is no fear of cutting of wires (as in Landline based dialers)
- Long Distance Siren
- Feature to automatically Arm and Dis-Arm the system daily, at a pre-defined time, and confirmation to the owner by SMS

2.1 HEROHONDA SPLENDOR PLUS:

The wiring diagram shows the connection from the alternator to the battery and head lamp via cutout from which the two outputs are taken from two separate leads. Normally when the engine starts to run the alternator coupled with the engine also starts to operate but it will produce an alternating current. This alternating current is converted to pulsed direct current through a rectifier unit in the alternator to battery line. We need only a nonpulsed direct current for the operation of the circuit so we have used a normal power supply circuit to make it has a pulsed one and use it in our circuit. We have taken the input for the power supply circuit from the power line going to the headlamp. The trigger signal required to make a call is taken from the recharging line from the alternator to battery as shown in Fig 2.1. We have taken the trigger signal required from this line as the current starts to flow through this line every time when the engine starts so that the phone call is made every time the vehicle is being kick started. There are two options as the input signal and the trigger signal required can be taken from the alternator to battery line itself or it can be taken from the headlamp line itself. In our project we have taken the input signal from the headlamp line and the trigger signal required from the alternator to battery line.

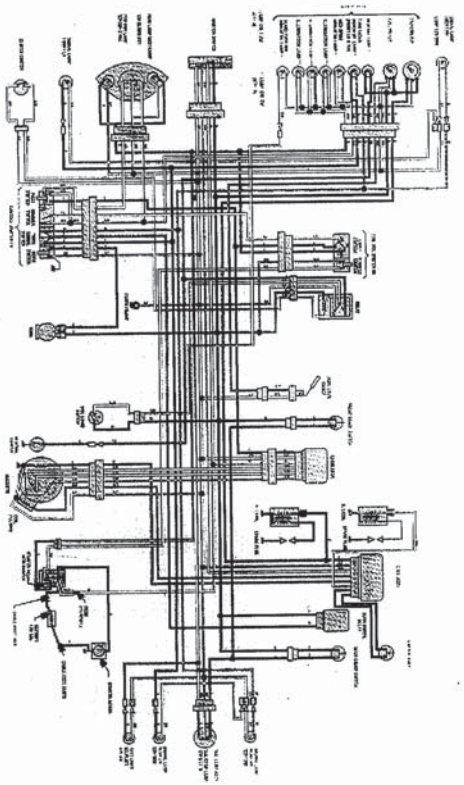

Fig. 2.1 WIRING DIAGRAM OF HERO HONDA SPLENDOR PLUS

2.2 CIRCUIT DIAGRAM DESCRIPTION:

The system consists of two parts.

- One is the power supply circuit
- The other is the trigger cum dialing circuit.

The system is powered by a common power source taken out from the two outputs from the cutout which is sourced by the alternator. One output passes through a regulator to remove the noises in the signal due to conversion from AC to DC voltage and hence it is tapped to power the system. Another output, an un-regulated output; hence as the acceleration increases, the output also increases. This becomes a trigger pulse for the system. Thus the operating current within the circuit is a rectified continuous DC from the alternator-cutout setup. It senses the ignition by taking the input from the cutout as the trigger pulse. The trigger pulse is rectified since the output from the alternator is a pulsed output which is not viable to make the system operate optimally. This pulse is fed to a pre-programmed microcontroller as shown in Fig 2.2. The controller takes only the first second of the pulse and sends a clocked output to the relay. The relay is connected with the mobile phone's button to which the owner's number is assigned in speed dial mode. The mobile phone processor takes the pulse and makes a call to the owner's phone number stored in the mobile. In continuous running, the continuous pulse keeps generating but the microcontroller does not read until the engine switches OFF. As the engine switches OFF and then ON, the whole system reboots and is ready to take another dialing pulse.

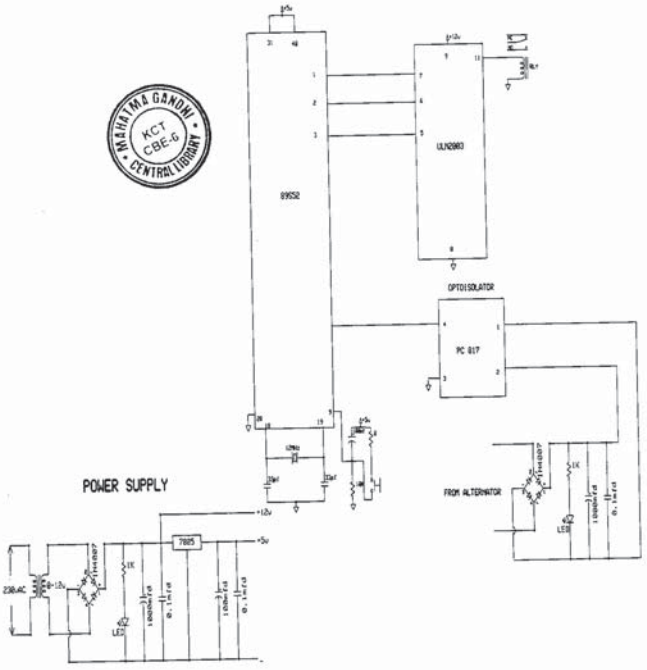

Fig 2.2 Circuit Diagram

CHAPTER - 3

COMPONENTS USED IN CIRCUIT

3.1 PCB DESIGN:

The manufacturing process consists of two methods; print and etch, plate and etch. The single sided PCBs are usually made using the print and etch method. The double-sided plate through-hole (PTH) boards are made by the print plate and etch method. The production of multi layer boards uses both the methods. The inner layers are printed and etch while the outer layers are produced by print, plate and etch after pressing the inner layers. The software used in our project to obtain the schematic layout is Programming in *Embedded and VB*.

Here the schematic transformed in to the working Positive/Negative films. The circuit is repeated conveniently to accommodate economically as many circuits as possible in a panel, which can be operated in every sequence of subsequent steps in the PCB process. This is called *Penalisation*.

Very small holes are drilled with high speed CNC drilling machines. The holes drilled in the board are treated both mechanically and chemically before depositing the copper by the electro less copper platting process. Once a multilayered board is drilled and electro less copper deposited, the image available in the form of a film is transferred on the outside by photo printing process. The boards are then electrolytic plated on to the circuit pattern with copper and tin. The tin plated deposit serves an etch resist when copper in the unwanted area is removed by the conveyorised spray etching machines with chemical etchants. The etching machines are attached to an automatic dosing equipment, which analyses and controls etchants concentrations.

3.1.1 SOLDERING TECHNIQUES:

The procedure to be adopted while soldering to ensure better soldering of joints is as follows,

- All parts must be clean and free from dirt and grease.
- Try to secure the work firmly.
- "Tin" the iron tip with a small amount of solder. Do this immediately, with new tips being used for the first time.
- Clean the tip of the hot soldering iron on a damp sponge.
- Many people then add a tiny amount of fresh solder to the cleansed tip.
- Heat all parts of the joint with the iron for under a second or so.
- Continue heating and then apply sufficient solder only, to form an adequate joint.
- Remove and return the iron safely to its stand.
- It only takes two or three seconds at most, to solder the average P.C.B. joint.
- Do not move parts until the solder has cooled.

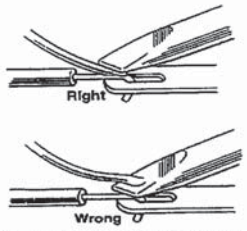

Fig 3.1 Soldering Technique

3.1.1.1 SOLDERING SETTINGS:

In order to raise the temperature of solder above its melting point, soldering tip temperatures are usually set between 700 degrees F and 800 degrees F. Why such a high temperature when the most commonly used solders has a melting point less than 400 degrees F Using a higher temperature stores heat in the tip which speeds up the melting process. The operator can then complete the solder connection without applying too much pressure on the joint. This practice also allows a proper formation of an intermetallic layer of the parts and solder. This is critical for reliable electrical and mechanical solder joints.

Solder is a metal or metallic alloy used, when melted, to join metallic surfaces together. The most common alloy is some combination of tin and lead. Certain tin-lead alloys have a lower melting point than the parent metals by themselves. The most common alloys used for electronics work are 60/40 and 63/37. The chart below shows the differences in melting points of some common solder alloys.

Tin/Lead	Melting Point
40/60	460 degrees F (230 degrees C)
50/50	418 degrees F (214 degrees C)
60/40	374 degrees F (190 degrees C)
63/37	364 degrees F (183 degrees C)

3.1.1.2 OPERATOR'S EFFECT:

The operator has a definite effect on the manual soldering process. The operator controls the factors during soldering that determine how much

of the soldering iron's heat finally goes to the connection. Besides the soldering iron configuration and the shape of the iron's tip, the operator also affects the flow of heat from the tip to the connection. The operator can vary the iron's position and the time on the connection, and pressure of the tool against the pad and lead of the connection.

When the tip of the iron contacts the solder connection, the tip temperature decreases as thermal energy transfers from the tip to the connection. The ability of the soldering iron to maintain a consistent soldering temperature from connection to connection depends on the iron's overall ability to transfer heat as well as the operator's ability to repeat proper technique.

3.1.1.3OPTIMUM SOLDERING:

a) Minimum amount of solder

b) Optimal

c) Excessive solders

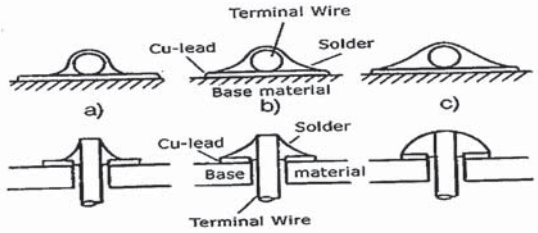

Fig 3.2 Optimum Soldering

3.1.1.4 SOLDERABILITY:

a) Improper soldering of terminal wire

b) Improper soldering of PCB

c) Improper soldering of terminal wire and PCB

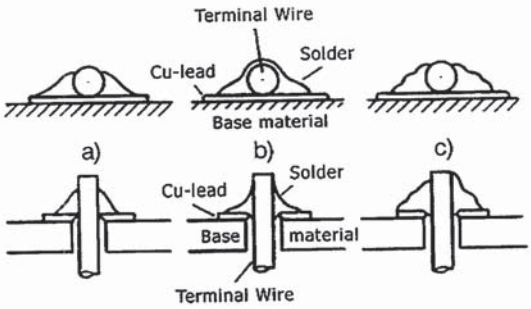

Fig 3.3 Solderability

3.2 RESISTOR:

Fig 3.4 Resistor Representation

The resistor symbol is shown in Fig 3.4

Resistors used in the circuit:

- 4 nos* 1000? resistors
- 1 no* 10000? resistor
- 1 no* 10? resistor

Each color corresponds to a certain digit, progressing from darker to lighter colors, as shown in Fig 3.5.

	Black	0	0	x1	-
	Brown	1	1	x10	1%
	Red	2	2	x100	2%
	Orange	3	3	x1,000	3%
	Yellow	4	4	x10,000	4%
	Green	5	5	x100,000	-
	Blue	6	6	x1,000,000	-
	Violet	7	7	-	-
	Grey	8	8	-	-
	White	9	9	-	-
	Gold	-	-	x0,1	5%
	Silver	-	-	x0,01	10%

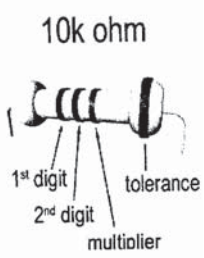

Fig 3.5 Resistor Color Coding Chart

There are totally 6 resistors used in the circuit according to the requirement. It ranges from 10 K? to 10? resistor

3.3 SOLID STATE RELAY:

A *Solid State Relay (SSR)* is a solid state electronic component that provides a similar function to an electromechanical relay but does not have any moving components, increasing long-term reliability. With early SSR's, the tradeoff came from the fact that every transistor has a small voltage drop across it. This voltage drop limited the amount of current a given SSR could handle. The working of the solid state relay is explained as in Fig 3.6. As transistors improved, higher current SSR's, able to handle 100 to 1,200 amps, have become commercially available. Compared to electromagnetic relays, they may be falsely triggered by transients. With early SSR's, the tradeoff came from the fact that every transistor has a small voltage drop across it. This voltage drop limited the amount of current a given SSR could handle

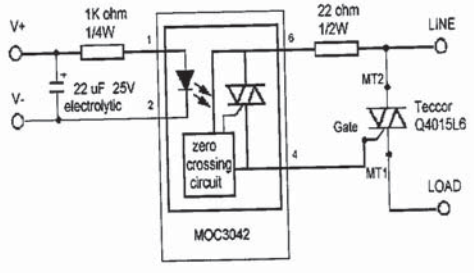

Fig 3.6 Circuit Diagram of Solid State Relay

3.4 RECTIFIER DIODE:

The diode used in our project – IN4007 as shown in Fig 3.7.These diodes are used to convert AC into DC these are used as half wave rectifier or full wave rectifier. Three points must he kept in mind while using any type of diode.

1. Maximum forward current capacity
2. Maximum reverse voltage capacity
3. Maximum forward voltage capacity

The number and voltage capacity of some of the important diodes available in the market are as follows: Diodes of number IN4001, IN4002, IN4003, IN4004, IN4005, IN4006 and IN4007 have maximum reverse bias voltage capacity of 50V and maximum forward current capacity of 1 Amp. Diode of same capacities can be used in place of one another. IN4001 or IN4002 can not be used in place of IN4007.The diode BY125made by company BEL is equivalent of diode from IN4001 to IN4003. BY 126 is equivalent to diodes IN4004 to 4006 and BY 127 is equivalent to diode IN4007.

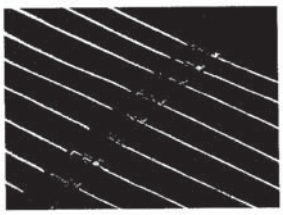

Fig 3.7 IN4007 Diode

3.5 CAPACITORS:

Capacitors Used In Our Project

- 1000µf * 2 nos
- 100µf * 1 no
- 10µf *1no

The above three are electrolytic capacitors.

Ceramic Disc Capacitors

- 104/AEC * 3nos – 104 pf (Pico farad), 50V
- 33/AEC * 2nos – 33pf, 50V

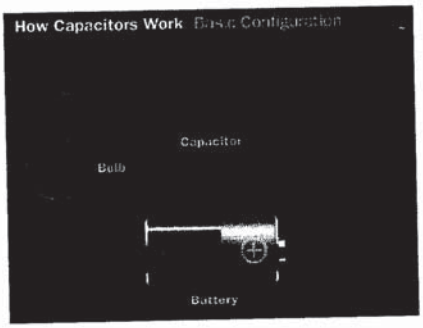

Fig 3.8 Basic Construction

The Fig 3.8 shows the basic construction of the electrolytic capacitors by means of using an electric bulb.

3.5.1 CONFIGURATION:

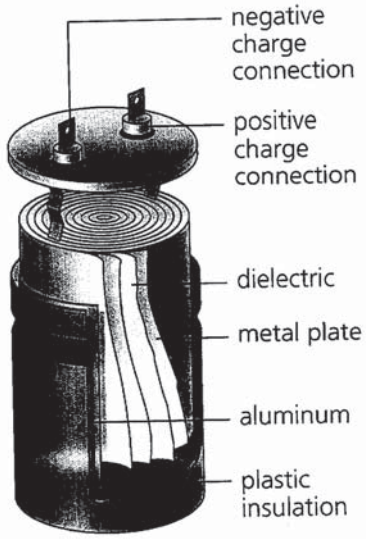

Fig 3.9 Internal Configuration of a Capacitor

The Fig 3.9 shows the internal configuration of the electrolytic capacitor used in our project. It contains two lids at the top one is for negative connection and other is for positive connection. The inner side consists of alternate strands of metal plate &di-electric. It is insulated with a plastic medium. In between the strands and the insulation there is a layer of aluminium.

3.6 CERAMIC CAPACITORS:

A ceramic capacitor is a two-terminal, non-polar device as shown in Fig 3.10. The classical ceramic capacitor is the "disc capacitor". This device pre-dates the transistor and was used extensively in vacuum-tube equipment from c.a 1930 through the 1950s, and in discrete transistor equipment from the 1950s through the 1980s. As of 2007, ceramic disc capacitors are in widespread use in electronic equipment, providing high capacity & small size at low price compared to other low value capacitor types. Ceramic capacitors come in various shapes and styles, including:

- disc, resin coated, with through-hole leads
- bare leadless disc, sits in a slot in the PCB and is soldered in place, used for UHF work
- tube shape, not popular now

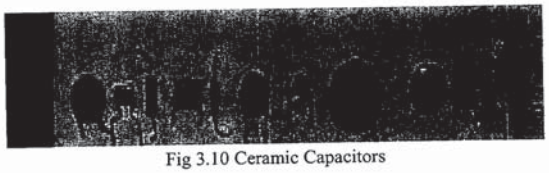

Fig 3.10 Ceramic Capacitors

High Frequency Use

Ceramic capacitors are suitable for moderately high-frequency work (into the high hundreds of megahertz range, or, with great care, into the low gigahertz range), as modern ceramic caps are fairly non-inductive compared to the other major classes of capacitors. Capacitor technologies with higher self-resonant frequencies tend to be expensive and esoteric.

3.7 PIEZO-ELECTRIC CRYSTAL OSCILLATOR:

Range of crystal used in our project is 12 kHz. It is used in the timing circuit required to set the timings for every operation in the microcontroller.

A crystal is a solid in which the constituent atoms, molecules, or ions are packed in a regularly ordered, repeating pattern extending in all three spatial dimensions. The resonant frequency depends on size, shape, elasticity, and the speed of sound in the material. High-frequency crystals are typically cut in the shape of a simple, rectangular plate as shown in Fig 3.11. Low-frequency crystals, such as those used in digital watches, are typically cut in the shape of a tuning fork. For applications not needing very precise timing, a low-cost ceramic resonator is often used in place of a quartz crystal.

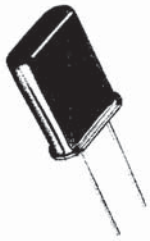

Fig 3.11 Piezoelectric Crystal Oscillator

When a crystal of quartz is properly cut and mounted, it can be made to distort in an electric field by applying a voltage to an electrode near or on the crystal. This property is known as piezoelectricity. When the field is removed, the quartz will generate an electric field as it returns to its previous shape, and this can generate a voltage. The result is that a quartz crystal behaves like a circuit composed of an inductor, capacitor and resistor, with a precise resonant frequency as shown in Fig 3.12.

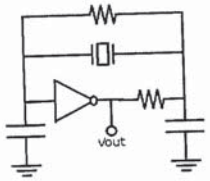

Fig 3.12 Internal Circuit Diagram:

Quartz has the further advantage that its elastic constants and its size change in such a way that the frequency dependence on temperature can be very low. The specific characteristics will depend on the mode of vibration and the angle at which the quartz is cut (relative to its crystallographic axes).Therefore, the resonant frequency of the plate, which depends on its size, will not change much, either. This means that a quartz clock, filter or oscillator will remain accurate. For critical applications the quartz oscillator is mounted in a temperature-controlled container, called a crystal oven, and can also be mounted on shock absorbers to prevent perturbation by external mechanical vibrations.

Quartz timing crystals are manufactured for frequencies from a few tens of kilohertz to tens of megahertz. More than two billion (2×10^9) crystals are manufactured annually. Most are small devices for consumer devices such as wristwatches, clocks, radios, computers, and cell phones. Quartz crystals are also found inside test and measurement equipment, such as counters, signal generators, and oscilloscopes.

3.8 OPTO-ISOLATOR:

In electronics, an opto-isolator (or optical isolator, optocoupler, photocoupler, or photoMOS) is a device that uses a short optical transmission path to transfer a signal between elements of a circuit, typically a transmitter and a receiver as shown in Fig 3.13, while keeping them electrically isolated — since the signal goes from an electrical signal to an optical signal back to an electrical signal, electrical contact along the path is broken.

Fig 3.13 OPTO Isolator

The opto-isolator is simply a package that contains both an infrared LED and a photodetector such as silicon diode, transistor Darlington pair, or SCR. The wave-length response of each device is tailored to be as identical as possible to permit the highest measure of coupling possible.

3.8.1 CONFIGURATION:

A common implementation involves a LED and a phototransistor, separated so that light may travel across a barrier but electrical current may not. When an electrical signal is applied to the input of the opto-isolator, its LED lights, its light sensor then activates, and a corresponding electrical signal is generated at the output. Unlike a transformer, the opto-isolator allows for DC coupling and generally provides significant protection from serious overvoltage conditions in one circuit affecting the other as shown in Fig 3.14. With a photodiode as the detector, the output current is proportional to the amount of incident light supplied by the emitter. The diode can be used in a photovoltaic mode or a photoconductive mode.

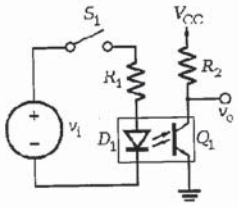

Fig 3.14 Opto-isolator Circuit

In photovoltaic mode, the diode acts like a current source in parallel with a forward-biased diode. The output current and voltage are dependent on the load impedance and light intensity. In photoconductive mode, the diode is connected to a supply voltage, and the magnitude of the current conducted is directly proportional to the intensity of light. The optical path may be air or a dielectric waveguide. The transmitting and receiving

elements of an optical isolator may be contained within a single compact module, for mounting, for example, on a circuit board; in this case, the module is often called an *Optoisolator* or *Opto-Isolator*. The optical sensor may be a photocell, phototransistor, or an optically triggered SCR or TRIAC as shown in Fig 3.15. Occasionally, this device will in turn operate a power relay or contactor. For analog isolation, special "analog" optoisolators are used. These devices have two independent, closely matched phototransistors, one of which is typically used to linearize the response using negative feedback

Among other applications, opto-isolators can help cut down on ground loops, block voltage spikes, and provide electrical isolation.

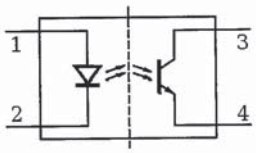

Fig 3.15 Internal Configuration of Opto-Isolator

One of the requirements of the MIDI (musical instrument digital interface) standard is that input connections be opto-isolated. They are used to isolate low-current control or signal circuitry from transients generated or transmitted by power supply and high-current control circuits. The latter are used within motor and machine control function blocks. Most switched-mode power supplies utilise optocouplers for mains isolation.

3.9 ULN2003AN IC

The Fig 3.16 shows the specification chart for the ULN2003AN IC used in our security system. It shows the details of the required voltage, status, other names for the IC etc,

Technical/Catalog Information	**ULN2003AN**
Category	Integrated Circuits (ICs)
Number of Drivers/Receivers	-
Type	Darlington Array
Voltage - Supply	5V
Package / Case	16-DIP
Packaging	Tube
Protocol	-
Lead Free Status	Lead Free
Other Names	ULN2003AN ULN2003AN 296 1979 5 ND 29619795ND 296-1979-5

Fig 3.16 ULN2003AN IC Specification Sheet

The IC used in our project is ULN2003AN IC. This IC is setup in between the 89S52 microcontroller and the relay unit to transfer the signals in the optimum level. The Fig 3.17 shows the overall diagram of the ULN2003AN IC used in our project.

Fig 3.17 ULN2003AN IC

3.9.1 PIN CONFIGURATION:

The Fig 3.18 shows the pin details of the ULN2003AN IC used in our security system project. The pin details are very much necessary in order to use it in the circuit. It contains 7 INPUT pins, 7 OUTPUT pins, 1 for GROUND and 1 for COMMON free wheeling diodes.

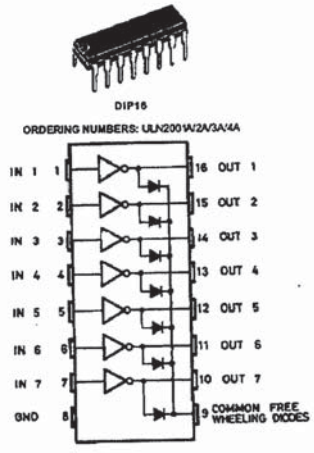

Fig 3.18 Pin Configuration of ULN2003AN IC

The pin number starts from 1 to 7 in INPUT side, 10 to 16 for OUTPUT side, 8 for GROUND and 9 for COMMON point. The output of the IC goes to the relay unit.

3.10 LIGHT EMITTING DIODE – LED:

The transducers produce electrical signals from light; the opposite is done by a light-emitting diode. The cathode lead is nearer the 'flat' at the base of the LED and some, but by no means all, manufacturers make it shorter than the anode lead.

An LED consists of a junction diode made from the semiconducting compound gallium arsenide phosphide. It emits light when light when forward biased, the color depending on the composition and impurity content of the compound. A typical internal configuration is shown in Fig 3.19

Fig 3.19 LED – Light Emitting Diode

At present red, yellow and green LEDs are available. When a p-n junction diode is forward biased, electrons move across the junction from the n-type side to the p-type side where they recombine with holes near the junction. The same occurs with holes going across the junction from the

p-type side. Every recombination results in the release of a certain amount of energy, causing, in most semiconductors, a temperature rise.

Unless LED is of the 'constant-current type (Incorporating an integrated circuit regulator use on a 2 to 18 V d.c. or a.c. supply), Taking the voltage drop (V_f) across a conducting LED to be about 1.7V,

R can be calculated approximately from:

R = (Supply Voltage – 1.7) V/.01A

For example, on a 5 V supply, R = 3.3/0.01 = 330Ω.

LEDs are used as indicator lamps, particularly in digital electronic circuits to show whether the output is 'high' or 'low'. One way of using an LED is to test for a 'high' output (9V in this case) and for a 'low' output (0V). In the first case the output acts as the 'source' of the LED current and in the second it has to be able to accept or 'sink' the current. If the output is unable to supply the current required by the LED, the circuit of can be employed. Here the output supplies the small base current to the transistor, which then drives the LED.

Many electronic calculators, clocks, each registers and measuring instruments have seven-segment red or green LED displays as numerical indicators. Each segment is an LED and depending on which segments are energized, the display lights up the numbers 0 to 9. Such displays are usually designed to work on a 5 V supply. Each segment needs a separate current-limiting resistor and all the cathodes (or anodes) are joined together to form a common connection. The advantages of LEDs are small size, reliability, long small current requirement and high operating speed.

CHAPTER – 4

MICRO CONTROLLER 89S52

4.1 ARCHITECTURE:

The major Features of 8-bit Micro controller *ATMEL 89S52*:

- 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
- Uses CMOS Technology

4.2 MEMORY ORGANIZATION:

All ATMEL Flash micro controllers have separate address spaces for program and data memory. 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.

4.3 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 AT89S52 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.

4.4 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 AT89S52 and other compatible micro controllers. However, upgrades to the AT89S52 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.

4.5 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 divided by two flip flops 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 2 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. Since the input to the clock generator is divided by two flip flops there are no requirements on the duty cycle of the external oscillator signal. 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.

4.6 BLOCK DIAGRAM:

The Fig 4.1 depicts the architectural diagram if the microcontroller 89S52 which is explained in the paragraph 4.1 in which the architecture of the controller is described briefly.

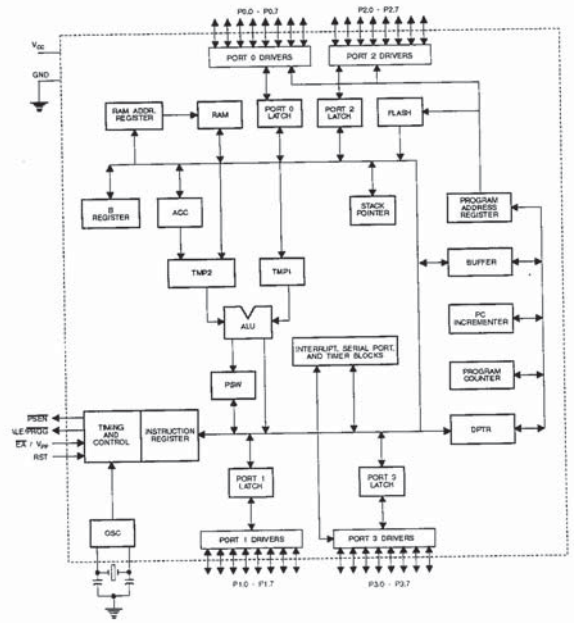

Fig 4.1 Block Diagram of Microcontroller 89S52

4.7 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.

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 89S52 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.

4.8 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

4.9 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.

4.10 INPUT/ OUTPUT PORTS:

There are four I/O ports available in AT89S52. 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 89S52 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. 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.

4.11 DEVELOPMENTS MADE IN MICRO CONTROLLER:

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.

The micro controller is designed to allow programming for single-task operations, which is ideal for applications requiring large product volumes. For instance, microcontroller- based automatic washing machines monitor and control external parameters (such as water level and temperature) according to the requirements of the wash cycle. Such RAM to store transient data, and a large ROM to accommodate the control program. The microcontroller includes registers (not only used by its CPU but by timer), interrupt control units, port latches, etc. There are a number of variants within each family to satisfy most memory, I/O, data conversion, and timing needs of end user applications.

4.12 PIN CONFIGURATION:

The Fig 4.2 shows the pin details of the microcontroller used in our security system. It contains a total of 40 pins n which 7 are INPUT pins, 7 are OUTPUT pins, 1 pin for ground and 1 act as a common point.

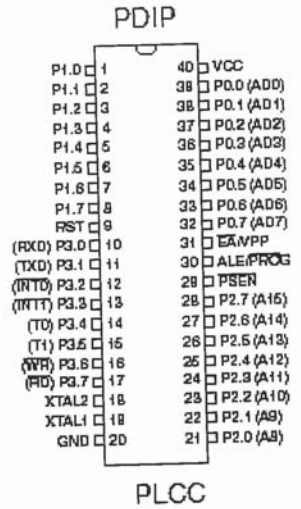

Fig 4.2 Pin Diagram of Microcontroller 89S52

There are 2 pins for connecting the microcontroller with the external devices such as XTAL1 and XTAL2.

4.13 89S52 MICROCONTROLLER WITH IC:

The Fig 4.3 shows the circuit connection in which the 89S52 microcontroller is connected with IC and other components in the circuit. In this circuit it has reset switch which is used to reset the microcontroller to the initial condition.

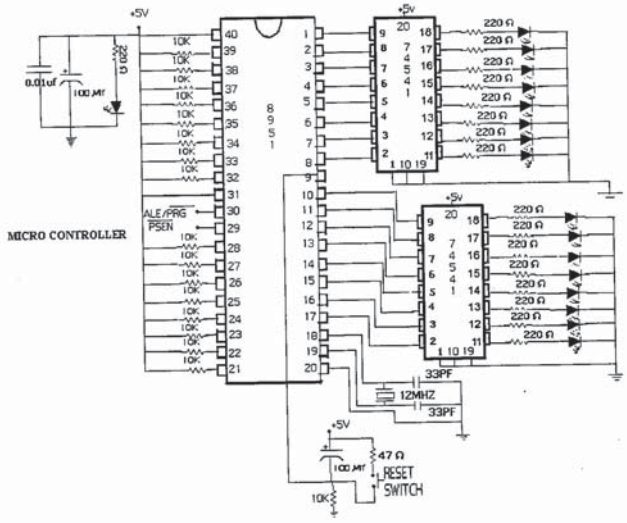

Fig 4.3 89S52 Microcontroller with IC

This circuit contains various other microcontrollers connected with 89S52 microcontroller.

CHAPTER - 5

POWER SUPPLY

5.1 INTRODUCTION:

All electronic circuits work only with low D.C. voltage, hence 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.

5.2 BLOCK DIAGRAM:

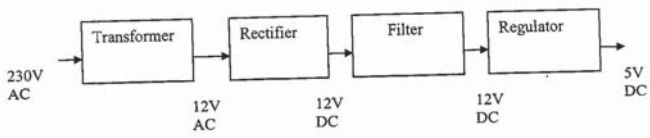

Fig 5.1 Power supply Block diagram

The main units of the power supply unit are Transformer, Rectifier, Filter, and Regulator as shown in Fig 5.1.

The main components used in the power supply unit shown in Fig 5.2 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.

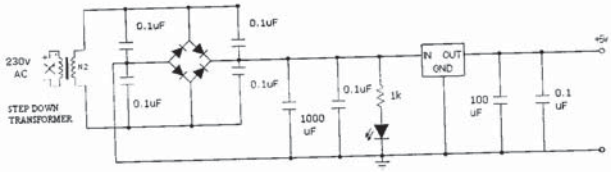

Fig 5.2 Power Supply Circuit Diagram

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.

5.3 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.

5.4 FILTERS:

Capacitors are used as filters in the power supply unit. Shunting the load with the capacitor will effect 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.

5.5 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 – 6

PROGRAM

6.1 PROGRAM STATEMENT:

```
sensor      equ 80h
relay       equ 90h

      org 0000h
      mov p0,#0ffh
      mov p1,#00h
      mov p2,#00h
      mov p3,#00h
setb sensor
clr relay

l1      acall delay
        jb sensor,l1
        acall delay
        jb sensor,l1
setb relay
        acall delay1
        acall delay1
        clr relay
        acall delay

l2      acall delay
        jnb sensor,l2
        acall delay
        jnb sensor,l2
        sjmp l1
delay1
      mov r0,#08h
       sjmp din2

delay       mov r0,#01h
din2        mov r1,#00h
din1        mov r2,#00h
dwait       djnz r2,dwait

        djnz r1,din1
        djnz r0,din2
         ret
```

6.2 PROGRAM DESCRIPTION:

To program microcontrollers, the trend is to use the *C language*, due to its efficiency and ease of use relative to the Assembly language makes most things possible using the least amount of memory (code and date) and time, and offers increased productivity.

Typically, a software developer can write more codes to do more things using *C* language than when using Assembly. This is important because at least half the cost of developing a *Micro Controller Unit (MCU)* application is in paying people to develop the software.

Since *C* language source code is standardized and portable, many people know hoe to program in *C* language. it can be written anywhere and then complied for the target processor of choice. Writing microcontroller software often requires knowledge of bits, registers, etc. *C* language is considered to be a good language for real-time control applications, as it has more or less compactness and speed features of the high-level language features of portability. Also flow control is more flexible and easy to use.

There is still a place for Assembly as many applications (such as microwave ovens, coffee machines, and VCRs) need small and cheap microcontrollers in order to keep the price reasonable. These applications use *MCUs* with limited memory resources. To get the best of both worlds, programmers use both *C Language* and *Assembly Languages* when speed is critical. *C* language has a provision to allow Assembly language code to be embedded within it. An application code with time-critical sections in Assembly and the rest in *C* language is one option.

CHAPTER -7

COST ESTIMATION

1.	AT89S52 MICROCONTROLLER	1	45
2.	ULN2003AN IC	1	12
3.	OPTOISOLATOR	1	9
4.	12V-5V VOLTAGE REGULATOR	1	2
5.	4 PIN SS RELAY	1	5
6.	IN4007 PN JUNCTION DIODE	8	3
7.	RESISTORS	6	2
8.	CAPACITORS	9	4
9.	12 kHz CRYSTAL OSCILLATOR	1	15
10.	LEDs	3	2
11.	MOBILE PHONE	1	550
12.	PCB & TRACK PRINTING	1	50
NET RATE			Rs.699

CHAPTER - 8

PROJECT PHOTOS

Fig 8.1 System Connected With The Vehicle

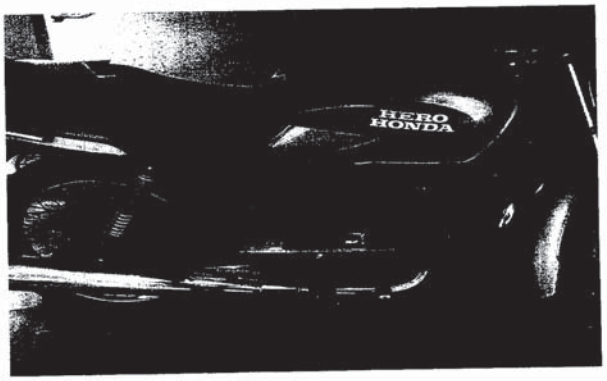

Fig 8.2 System Connected With The Vehicle – Full View

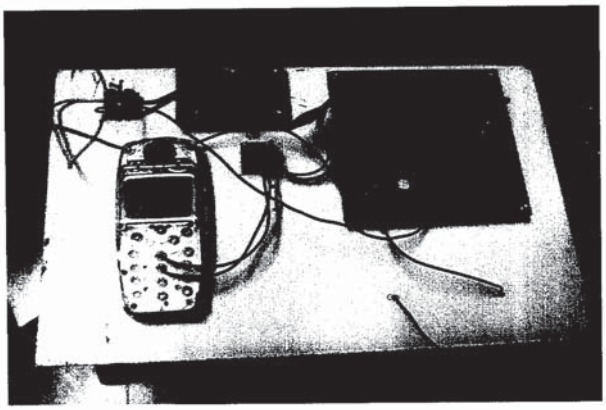

Fig 8.3 Complete Circuit of the System

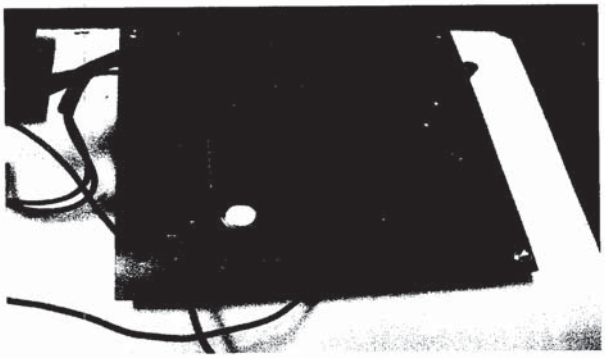

Fig 8.4 Microcontroller Unit

CHAPTER -9

CONCLUSION

Our project circles around only the two wheeler segment in the market. In today's world were the vehicle theft seems to be increasing exponentially we thought it is indeed the need of the hour to come out with a security system which will meet the needs of all classes and here we have come out with this idea.

Initially we have tried out the basic setup by installing it the HERO HONDA SPLENDOR which has given us *POSITIVE RESULTS* meanwhile in the due course we have made some future improvements too to the basic setup so that it will figure out well in the market. Now we are trying to install the same setup in different vehicles and analyzing the performances.

As a future enhancement we are trying to make it a security system for the bank lockers & for house doors too. In Bank lockers the input for the power supply circuit is taken from the external source such has battery whereas the trigger signal is taken from the movement of the handle in the bank lockers and from the house doors.

Moreover we are filing up the patent for our project titled "*Vehicle Security System Using GSM Technology*" in the area from where the input is being taken up to operate the circuit. Our main aim at the start of the project was to find out a system that is most economical and we have come out with positive results. We are hoping to make more enhancements so that it will be worth more.

CHAPTER – 10

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3. http://www.powerlock.com/
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