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Collision Vigilant With Automatic Dialer

C.Swetha, S.Suganya, V.Shobana, S.Sivaranjini, B.Pradeep Raja

Abstract— Security in travel is primary concern for everyone. New generation of cars are improved in such a way that the number of accidents decreases. Innovative ideas has implemented and emerged in order to reduce the risk of accident.This Project describes a design of effective alarm system that can monitor an automotive / vehicle / car condition in travelling. The project name "COLLISION VIGILANT WITH AUTOMATIC DIALLER" is designed along with a DTMF to prevent the accident and to inform emergency about an accident that has occurred.

Keywords - Sensors,DTMF,Microcontroller 8051

I. INTRODUCTION

This project uses a glass breakage sensor to detect the breakage of glass and smoke detector to detect any smoke due to fire in the vehicle. These sensors send a signal to microcontroller. A DTMF dialler is connected to the microcontroller. A basic telephone unit is interfaced to the DTMF dialler chip that sends call to the predefined mobile or emergency number and informs about this accident.

Sometimes, vehicles large in size (i.e. trucks, loading vehicles) have problems in driving the vehicle. There are some points which are not visible from driver's seat, these are called blind points. Some time, objects or vehicles very near to truck got accident. This problem is called blind spot. In Some cases due to fog vehicles are not visible up to very less distance,and also while driving at night there can be a short nap to driver due to which accident can occur. Sometimes there are 4 wheelers having one headlight not working due to this, they appear to be 2 wheelers and tend to cause accidents. To prevent the vehicle from accident, proximity detector used in this project that detect an object through its range and alert the driver.

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II

1.CONSTRUCTION AND WORKING

The construction and working of the project can be shown as a block diagram given below.

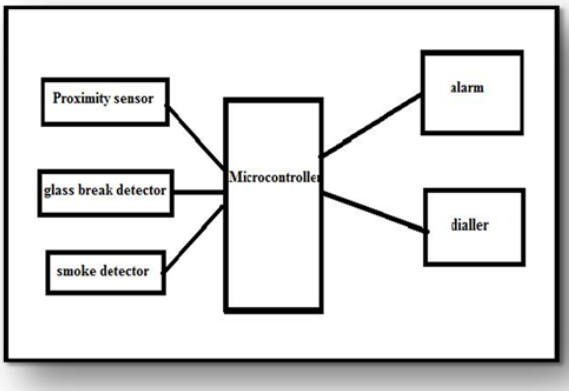
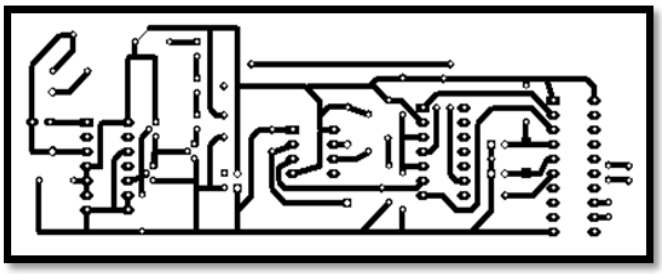


Fig 2.1 Block diagram of the system

PCBlayout:



The major Systems used in this project are:

1 .Power supply system
2. Sensors
3. Buffer Ic
4. Microcontroller
5.Dialer System

The block diagram shown in power supply system is the main contents used in the project. The supply used here is provided with 9v power. At the input of microprocessor, three detector circuits are used. According to their output, the alarm and dialer circuit works.

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1 POWER SUPPY SYSTEM

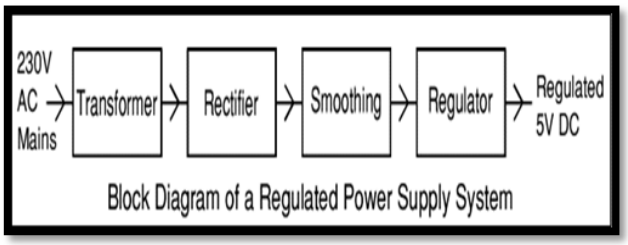
Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

Types of Power Supply

There are many types of power supply. Most are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can be broken down into a series of blocks, each of which performs a particular function.

Some electronic circuits require a power supply with positive and negative outputs as well as zero volts (0V). This is called a 'dual supply' because it is like two ordinary supplies connected together.

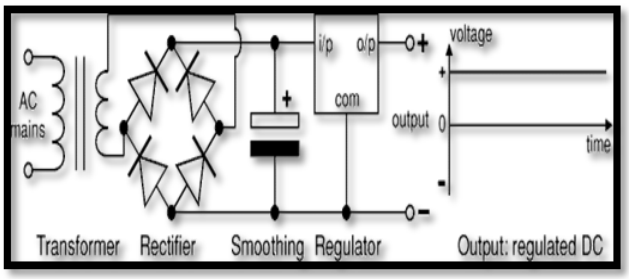
Fig.2.2 block diagram of regulated power supply system



The main blocks in construction are:-

1. Transformer
2. Rectifier
3. Smothing
4. Regulator

Fig.2.3 power supply circuit



1.1 TRANSFORMER

Transformers convert AC electricity from one voltage to another with little loss of power. Transformers work only with AC and this is one of the reasons why mains electricity is AC. Step-up transformers increase voltage, step-down transformers reduce voltage. Most power supplies use a step-down transformer to reduce the dangerously high mains voltage (230V in UK) to a safer low voltage.

There is no electrical connection between the two coils; instead they are linked by an alternating magnetic field created in the soft-iron core of the transformer. The two lines in the middle of the circuit symbol represent the core.

Transformers waste very little power so the power out is (almost) equal to the power in. Note that as voltage is stepped down current is stepped up.

The ratio of the number of turns on each coil, called the turn's ratio, determines the ratio of the voltages. A step-down transformer has a large number of turns on its primary (input) coil which is connected to the high voltage mains supply, and a small number of turns on its secondary (output) coil to give a low output voltage.

1.2 RECTIFIER:

A bridge rectifier can be made using four individual diodes, but it is also available in special packages containing the four diodes required. It is called a full-wave rectifier because it uses the entire AC wave (both positive and negative sections). 1.4V is used up in the bridge rectifier because each diode uses 0.7V when conducting and there are always two diodes conducts

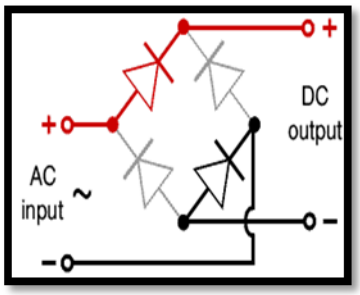
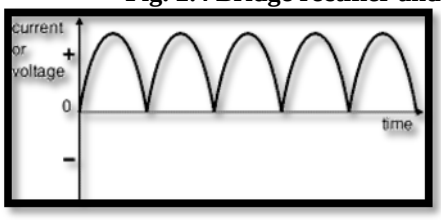


Fig. 2.4 Bridge rectifier and output



1.3 Smoothing

It is performed by a large value electrolytic capacitor connected across the DC supply to act as a reservoir, supplying current to the output when the varying DC voltage from the rectifier is falling.

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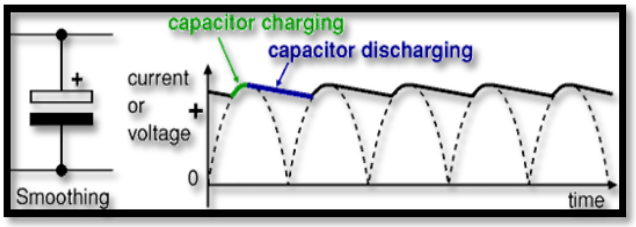
The diagram shows the unsmoothed varying DC (dotted line) and the smoothed DC (solid line). The capacitor charges quickly near the peak of the varying DC, and then discharges as it supplies current to the output

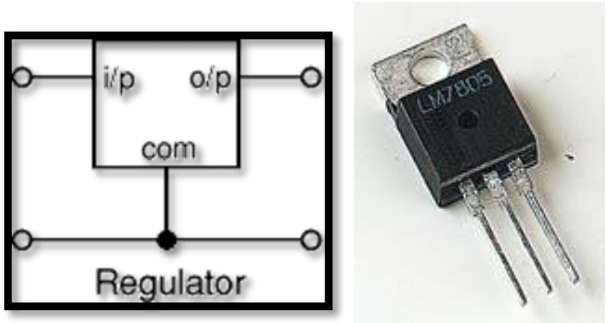
Fig:2.5 Smoothing Output



1.4 Regulator –

Voltage regulator ICs are available with fixed (typically 5, 12 and 15V) or variable output voltages. They are also rated by the maximum current they can pass. Negative voltage regulators are available, mainly for use in dual supplies. Most regulators include some automatic protection from excessive current ('overload protection') and overheating ('thermal protection'). Many of the fixed voltage regulator ICs has 3 leads and look like power transistors, such as the 7805 +5V 1A regulator shown on the right. They include a hole for attaching a heat sink if necessary.

Fig. 2.6 circuit of regulator



2. SENSORS

A sensor is a device which measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument. For example, a mercury thermometer converts the measured temperature into expansion and contraction of a liquid which can be read on a calibrated glass tube. A thermocouple converts temperature to an output voltage which can be read by a voltmeter. For accuracy, all sensors need to be calibrated against known standards.

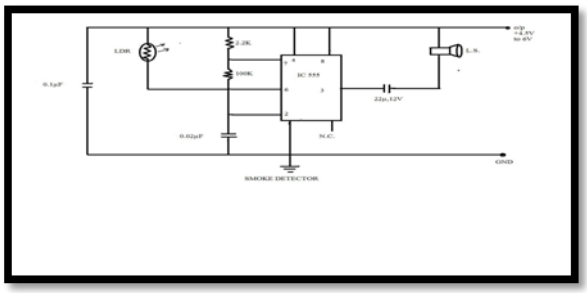
The sensors used in project are given below:-

1. Smoke detector
2. Proximity sensor
3. Glass breakage detector

2.1 SMOKE DETECTOR

In smoke detecting sensor the smoke detector circuit is used to detect any smoke in the particular range. Smoke detector circuit uses an timer IC 555 . This circuit uses a very simple approach to detecting smoke in the air. It uses an LDR (Light Dependent Resistor) as a light detector. As fire smoke comes across the LDR range, the resistance of the LDR changes, which in turn trigger an alarm.

Fig. 2.7 Smoke detector circuit



IC NE 555 DESCRIPTION

The NE555 is a highly stable controller capable of producing accurate timing pulses. With Monostable operation, the time delay is controlled by one external resistor and capacitor. With Astable operation, the frequency and duty cycle is accurately controlled with two external resisters and one capacitor.

Features

- High Current Drive Capability (200mA)
- Adjustable Duty Cycle
- Timing From msec to Hours
- Turn off Time Less than 2sec

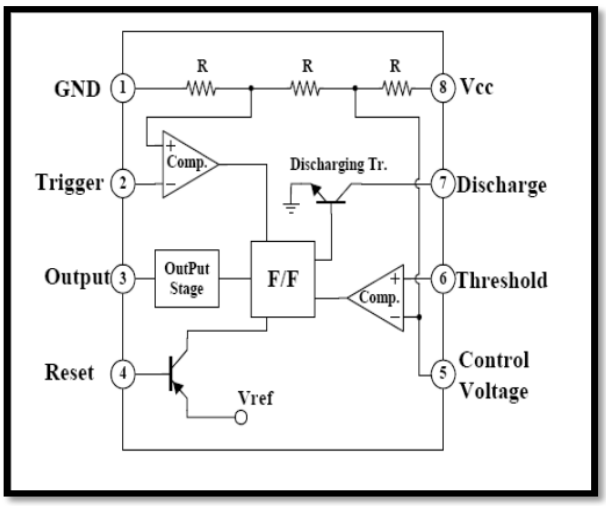


Fig 2.8Block diagram of NE555

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Applications

- Monostable Operation
- Astable Operation
- Frequency divider
- Pulse Width Modulation(PWM)
- Pulse Position Modulation(PPM)
- Linear Ramp

LIGHT DEPENDENT RESISTOR (LDR)

A light-dependent resistor, alternatively called an LDR, is a variable resistor whose value decreases with increasing incident light intensity.

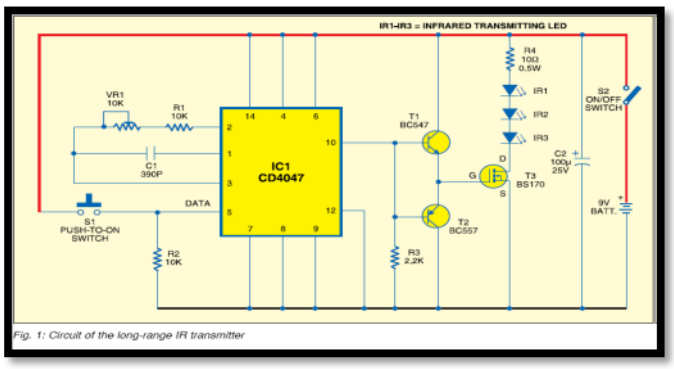
An LDR used in circuit, is made of a high-resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance. In the circuit, as the LDR detect the light variations due to smoke, it gives the output to the IC555 and timer IC produce a trigger alarm.

LDRs have wide spectral response. They have low cost and the optimum temperature range is wide. Hence these are commonly used in circuits like light operated relays, automatic light control etc.

2.2 PROXIMITY SENSOR

The proximity sensor used in the project is a long range IR transmitter circuit. This is an ULTRASONIC SENSOR work on a principal similar to radar. Here a detector circuit is used that will give long range detection.

Fig. 2.9 Proximity sensor circuit



CIRCUIT DISCRIPTION

The circuit uses three infrared transmitting LEDs (IR1, IR2, and IR3) in series to increase the radiated power. Further to increase directivity and power density, in circuit, IR LEDs inside the reflector of torch can be assembled.

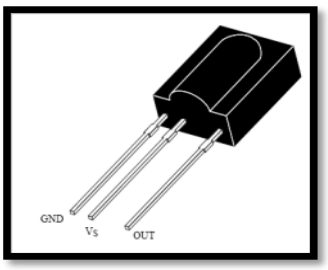
For increasing the efficiency a MOSFET (BS170) is used, which acts as a switch and thus reduce the power loss that would result if a transistor were used. To avoid any dip during its "ON/OFF" operation, a 100µF reservoir capacitor C2 is used across the power supply. Capacitor C2 supplies extra charge during switch on operation. As the MOSFET exhibits large capacitance across gate source terminals, a special drive arrangement has been made using NPN-PNP DARLINGTON PAIR of BS547 and BS557 (as emitter follower), to avoid the distortion to the gate drive input.

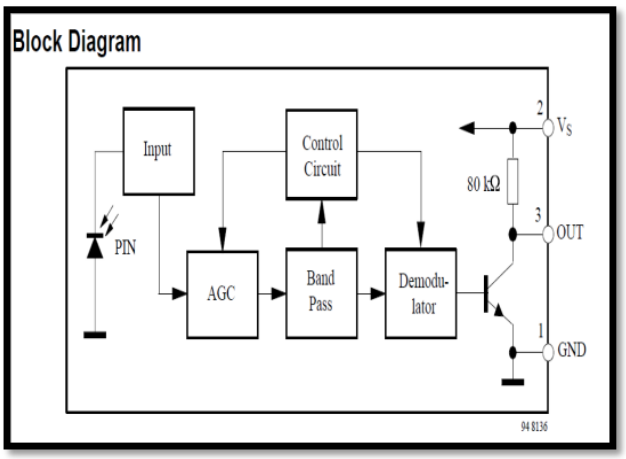
Data to be transmitted is used for modulating the 38 kHz frequency generator by CD4047 (IC1).In the receiver section, TSOP1738 is used for efficient reception. The transmitter circuit transmits the IR waves towards the target and in receiver section, receiver receives the IR signals with variations and give suitable output to the microprocessor.

TSOP1738

The TSOP1738 is miniaturized receiver for infrared remote control system. Pin diode and preamplifiers are assembled on lead frame, the epoxy package is designed as IR filter. The demodulated output signal can directly be decoded by a microprocessor. TSOP17.. Series is standard IR control receiver series, supporting all major transmission codes.

Fig:2.10 TSOP1738 and internal block diagram





FEATURES

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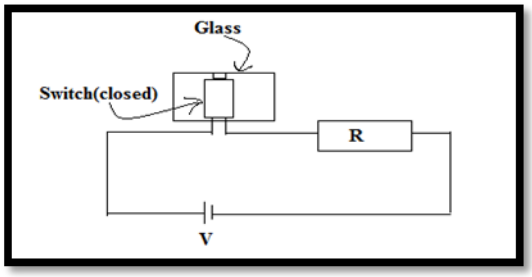
- Photo detector and preamplifier in one package
- Active low output
- Low power consumption
- Internal filter for PCM frequency
- Improved shielding against electric field disturbance
- TTL and CMOS compatibility
- High immunity against ambient light
- Continuous data transmission possible

2.3 GLASS BREAKAGE DETECTOR

Schematic diagram of glass breakage detector is shown in the fig. below

Fig: 2.11 Glass breakage detector

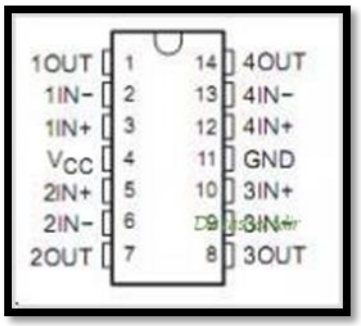


A switch is fitted in closed condition below glass. As far as switch is closed current is flowing through resistor R and output is 1. When glass breakage occurs, switch gets open and output is 0, which is detected by microcontroller. According to the output of glass breakage detector, microcontroller gives automatic dialing.

3. BUFFER IC

The project use buffer IC LM324 to make compatibility of the circuit with microcontroller 8051. The LM324 consists of four independent, high gains; internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages.

FIG. 2.12 Buffer IC PIN configurations



Features:

- Internally frequency compensated for unity gain
- Wide bandwidth (unity gain) 1 MHz (temperature compensated)
- Large output voltage swing 0V to V^+ - 1.5V
- Internally frequency compensated for unity gain
- Large DC voltage gain 100 dB
- Wide power supply range: Single supply 3V to 32V or dual supplies ±1.5V to ±16V
- Very low supply current drain (700 µA)-essentially independent of supply voltage
- Low input biasing current 45 nA (temperature compensated)
- Low input offset voltage 2 mV and offset current: 5 nA
- Input common-mode voltage range includes ground
- Differential input voltage range equal to the power supply voltage
- Large output voltage swing 0V to V^+ - 1.5V

4. MICROCONTROLLER

Microcontroller is a on-chip computer or single chip computer. This small device is used to control event, processes and objects. Another term to describe micro-controller is embedded controller because the microcontroller and its support circuits are often built into, or embedded in, devices they control.Any device that measures, stores, controls, calculates and displays information is a candidate for putting microcontroller inside. Microcontroller contains memory, I/O interfaces in addition to the C.P.U. Because the amount of memory and interfaces is limited so microcontrollers are used for smaller system
In this project, microcontroller 8051 is used

MICROCONTROLLER 8051:

Features

- Internal ROM and RAM
- I/O ports with programmable pins
- Timers and counters
- Serial data communication

Fig:2.13 PIN CONFIGURATION:

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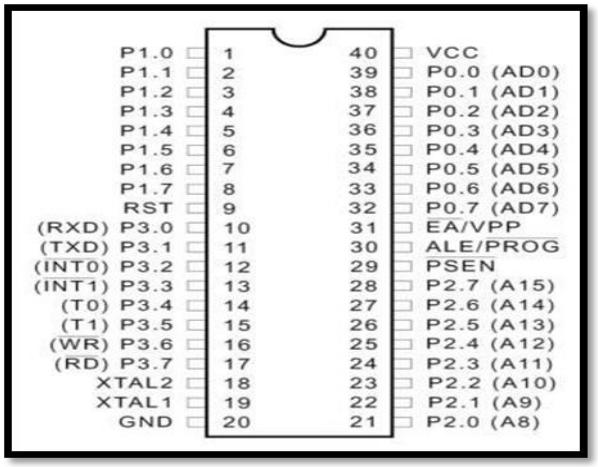

4.i PINS AND THEIR DESCRIPTION:

VCC - Supply voltage

GND –Ground

PORT0(P0.0-P0.7) -These are 8bit bi-directional I/P Port Pins.They are bit addressable.They can sink up to eight LS TTL logic gates.

PORT 1(P1.0-P1.7)- -Port 1 is an 8 – bit bi directional I/O port. Port pins p1.2 to P1.7 provides internal pull - ups. P1.0 and P1.1 require external pull- ups. P1.0 and P1.1 also serves as positive input and negative input.

PORT 2(P2.0-P2.7)- This is also an 8 bit bi-directional I/O with internal pull-ups.this also has an alternate function of higher-order address byte,while accessing the external memory.In all other feature,it is same as port 1.

.**PORT 3(P3.0-P3.7)** - Port 3 pins P3.0 to P3.5, P3.7 are 8 bit- bi directional I/O pins with internal pull-ups.P3.6 is hard wired as an input to output of the on chip comparator and is not accessing with general purpose I/O pin.Port 3 also receives some control signals for flash programming and verification

.

P3.0-RXD(serial input)
P3.1-TXD(serial output)
P3.2-INT0(External interrupt)
P3.3-INT1(External interrupt)
P3.4-T0(Timer 0 external I/P)
P3.5-T1(Timer 1 external I/P)
P3.6-WR(External data memory write strobe)
P3.7-RD(External data memory read Strobe)

RST - Reset input

XTAL1 - Input to the inverting oscillator amplifier and input to the internal Clock operating circuit.

XTAL2 - Output from inverting oscillator amplifier.

5. DIALER SYSTEM

Dialer system in this project is used to dial the number which is prescribed or predefined. As the microcontroller produces the active output for the dialer, to starts automatic dialing to the predefined number that is stored in the dialer system . DTMF dialer chip UM91214C is used in the project for DTMF dialing.

DTMF Dialer:

- ***Dual-tone multi-frequency signaling (DTMF)*** is used for telecommunication signaling over analog telephone lines in the voice-frequency band between telephone handsets and other communications devices and the switching center.

- DTMF Dialer chip UM91214c is used for automatic dialing in this project.

Fig 2.14 DTMF DIALER:

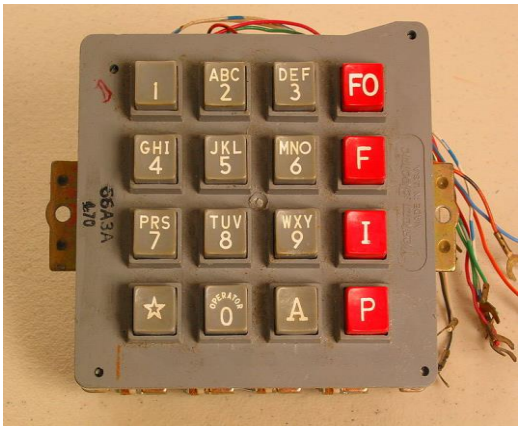

Fig 2.15:GENERATION OF SIGNAL

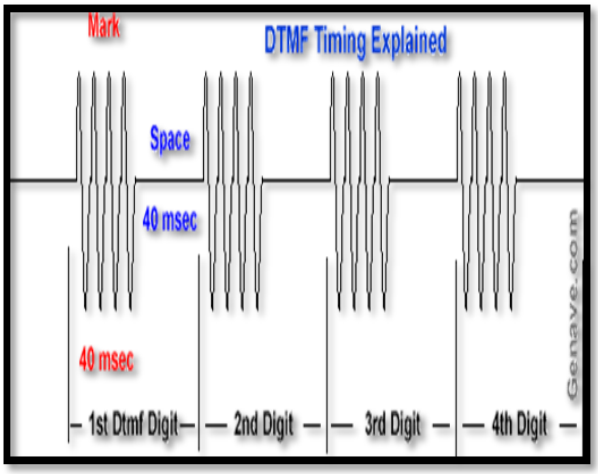

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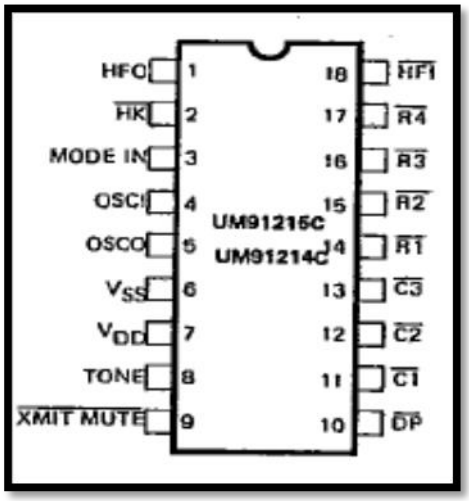
TABLE WITH HIGH AND LOW FREQUENCY

Here are the signals you send when you press your Touchtone phone keys:

DIGIT	LOW FREQUENCY	HIGH FREQUENCY
1	697	1209
2	697	1336
3	697	1477
4	770	1209
5	770	1336
6	770	1477
7	852	1209
8	852	1336
9	8	1477
0	941	1336
*	941	1209
#	941	1477

Mark and Space refer to the duration a Dtmf tone is produced, as well as the duration of the silence between individual digits.

Fig. 2.16. Pin Diagram



5.1WORKING OF DTMF:

The telephone is interfaced with the dialer chip. Once the sensors detect the smoke or glass breakage it triggers the dialer chip as a result of which the respective pins are activated and corresponding numbers are dialed.

I)Storage of numbers:

The numbers have been stored as pre-defined numbers. When a particular key is pressed corresponding number is dialed

.

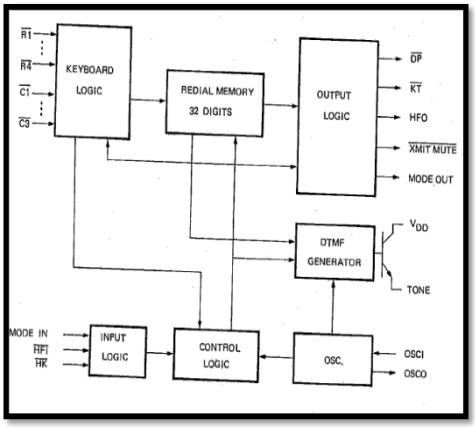
II)Manually dialing the number:

Pin 1 helps us to get the numbers and store it and dial for further processing.

III)Tone/Pulse switching operation :

Pin 3 is known as the mode selection pin. It is always checked for tone or pulse mode .Dialing can be switched from pulse to tone mode but switching of tone to pulse mode is not possible .It will automatically insert a 2.2. second pause before dialing is done.

Fig 2.17:Internal Block diagram



Keyboard matrix assignment:

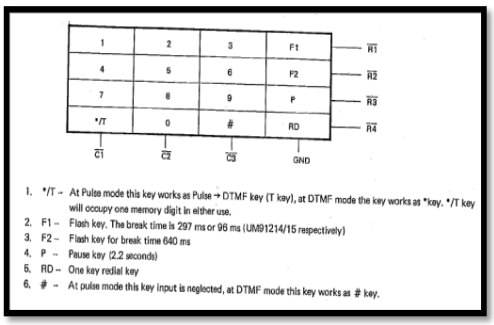
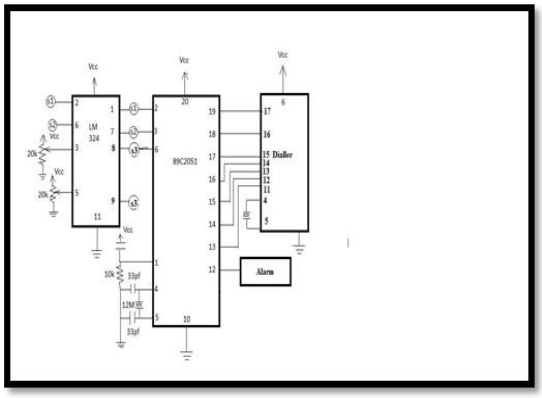


Fig 2.18:DIALER CIRCUIT WITH CONTROLLER



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III

APPLICATION AND ADVANTAGES

APPLICATION

1. Automotive and transport vehicles.
2. With advance technology, it can be use in broad areas of transporting

ADVANTAGES

1. Sophisticated security.
2. Monitor all hazards and threats.
3. Mobile number can be changed with changing some settings.
4. Alert the driver about any threat by giving alarm.

IV

CONCLUSION

Thus we conclude that with the help of this project we can reduce occurrence of accident . We can also implement other types of sensors like ***Alcoholic Sensor*** *in order to detect whether the driver has consumed alcohol or not ,****pressure sensors,distance sensors*** *can also be used depending on our requirements.*

IV

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