EYE BLINK SENSOR
(ACCIDENT PREVENTION)

A

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May, 2017

CERTIFICATE

It is certified that the work contained in this Project entitled **"EYE BLINK SENSOR"** by Divyank Singh **(1130433016),** Guru Prakash Kushwaha **(1130433019)**, Ram Kumar Singh **(1130433048)**, Vikas Sharma **(11030433059)** for the award of **Bachelor of Technology** from Babu Banarasi Das University has been carried out under my supervision.

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ABSTRACT

"Driving to save lives, time, and money in spite of the conditions around you and the actions of others."- This is the slogan for Defensive Driving.

Vehicle accidents are most common if the driving is inadequate. These happen on most factors if the driver is drowsy or if he is alcoholic. Driver drowsiness is recognized as an important factor in the vehicle accidents. It was demonstrated that driving performance deteriorates with increased drowsiness with resulting crashes constituting more than 20% of all vehicle accidents. But the life lost once cannot be re-winded. Advanced technology offers some hope avoid these up to some extent.

This project involves measure and controls the eye blink using IR sensor. The IR transmitter is used to transmit the infrared rays in our eye. The IR receiver is used to receive the reflected infrared rays of eye. If the eye is closed means the output of IR receiver is high otherwise the IR receiver output is low. This to know the eye is closing or opening position. This output is give to logic circuit to indicate the alarm.

This project involves controlling accident due to unconscious through Eye blink. Here one eye blink sensor is fixed in vehicle where if anybody looses conscious and indicate through alarm.

A car simulator study was designed to collect physiological data for validation of this technology. Methodology for analysis of physiological data, independent assessment of driver drowsiness and development of drowsiness detection algorithm by means of sequential fitting and selection of regression models is presented.

ACKNOWLEDGEMENT

A seminar work owes its success from commencement to completion, to the people in love with researchers at various stages. Let us in this page express our gratitude to all those who helped us in various stage of this study. First, I would like to express my sincere gratitude indebtedness to **Mr. V. K. Maurya (Head of Department, Electrical Engineering of BBDU)** for allowing us to undergo the major project report in this semester from Jan, 2017 to March, 2017. We are grateful to our guide **Mr. V. K. Maurya**, for the help provided in completion of the project, which was assigned to us. Without their friendly help and guidance it was difficult to complete the assigned task. We are also thankful to Head of Department and all faculty members of Department of Electrical, for their true help, inspiration and for helping us to preparation of the final report and presentation. Last but not least, I pay my sincere thanks and gratitude to all the Staff Members of **Electrical Engineering Department**, for their support and for making our major project valuable and fruitful.

Signature of Students

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INTRODUCTION

The main objective of this project is to develop a system that can be used for preventing accident due to driver's tiredness or unconsciousness.

This project involves measure and controls the eye blink & alcohol content using IR sensor. The IR transmitter is used to transmit the infrared rays in our eye. The IR receiver is used to receive the reflected infrared rays of eye. If the eye is closed means the output of IR receiver is high otherwise the IR receiver output is low. This to know the eye is closing or opening position. This system uses microcontroller, LCD display, alcohol detector, GSM and buzzer. This output is given to logic circuit to indicate the alarm.

This project involves controlling accident due to unconscious through Eye blink. Here one eye blink sensor is fixed in vehicle where if anybody loses conscious and indicate through alarm, LCD and GSM.

The output of the sensors are in the analog nature which should be converted into digital format. This is done by the analog to digital converter of the microcontroller unit. The microcontroller controls the entire circuit. The LCD displays the message, GSM sends message and buzzer produces alarm. The working conditions and various constraints were properly studied before carrying out further steps.

BLOCK DIAGRAM

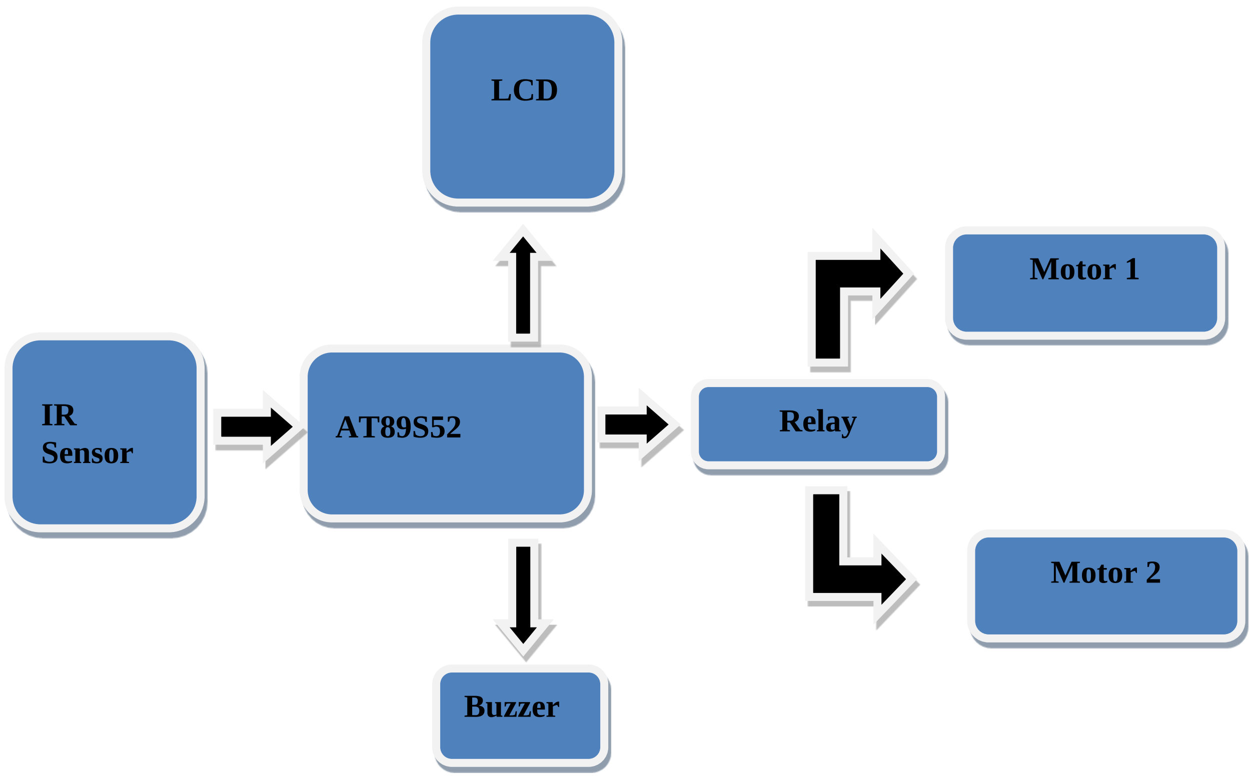


Fig. - 1

CHAPTER 2
COMPONENTS USED

The major components used in this project are

- **IR Sensor Pair**
- **LCD**
- **AT89S52 Microcontroller**
- **Buzzer**
- **RELAY**
- **Resistor**
- **Capacitor**
- **Reset Switch**
- **Regulator IC (78XX)**
- **Car Model consisting of DC Motor**
- **Power Supply For Microcontroller (Adapter 12V, 1Amp)**
- **Power Supply For Car Model (Battery 12V, 7Amp)**

CHAPTER 3

CIRCUIT DIAGRAM

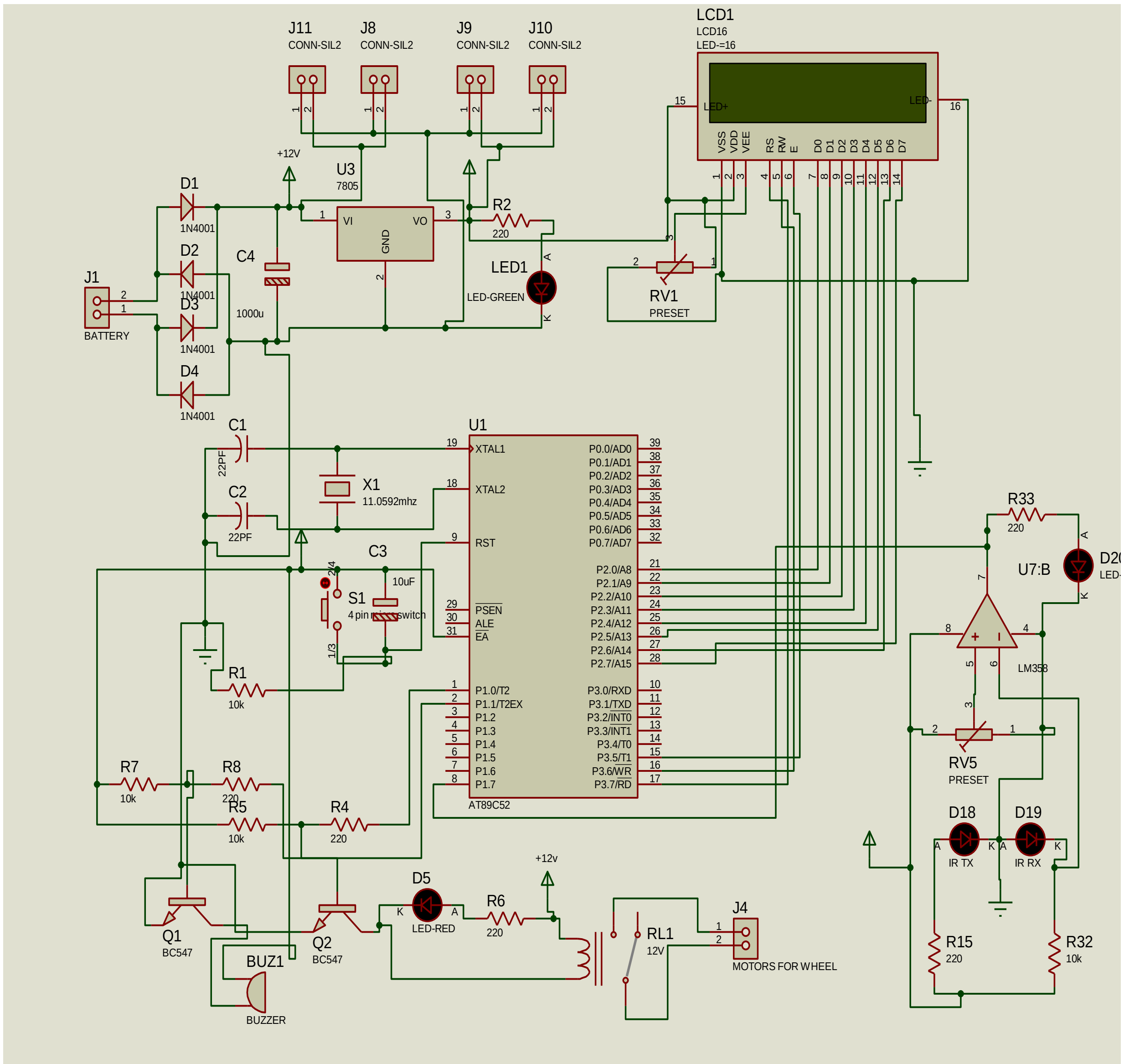


Fig. - 2

CHAPTER 4
HARDWARE DISCRIPTION

4.1 POWER SUPPLY:

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.

Here in our application we need a 5v DC power supply for all electronics involved in the project. This requires step down transformer, rectifier, voltage regulator, and filter circuit for generation of 5v DC power. Here a brief description of all the components is given as follows:

4.1.1 TRANSFORMER:

A transformer is a device that transfers electrical energy from one circuit to another through inductively coupled conductors — the transformer's coils or "windings". Except for air-core transformers, the conductors are commonly wound around a single iron-rich core, or around separate but magnetically-coupled cores. A varying current in the first or "primary" winding creates a varying magnetic field in the core (or cores) of the transformer.

This varying magnetic field induces a varying electromotive force (EMF) or "voltage" in the "secondary" winding. This effect is called mutual induction.

Fig. - 3

If a load is connected to the secondary circuit, electric charge will flow in the secondary winding of the transformer and transfer energy from the primary circuit to the load connected in the secondary circuit.

The secondary induced voltage V_S, of an ideal transformer, is scaled from the primary V_P by a factor equal to the ratio of the number of turns of wire in their respective windings:

$$\frac{V_S}{V_P} = \frac{N_S}{N_P}$$

By appropriate selection of the numbers of turns, a transformer thus allows an alternating voltage to be stepped up — by making N_S more than N_P — or stepped down, by making it

BASIC PARTS OF A TRANSFORMER

In its most basic form a transformer consists of:

- A primary coil or winding.
- A secondary coil or winding.
- A core that supports the coils or windings.

Refer to the transformer circuit in figure as you read the following explanation: The primary winding is connected to a 60-hertz ac voltage source.

The magnetic field (flux) builds up (expands) and collapses (contracts) about the primary winding. The expanding and contracting magnetic field around the primary winding cuts the secondary winding and induces an alternating voltage into the winding.

This voltage causes alternating current to flow through the load. The voltage may be stepped up or down depending on the design of the primary and secondary windings.

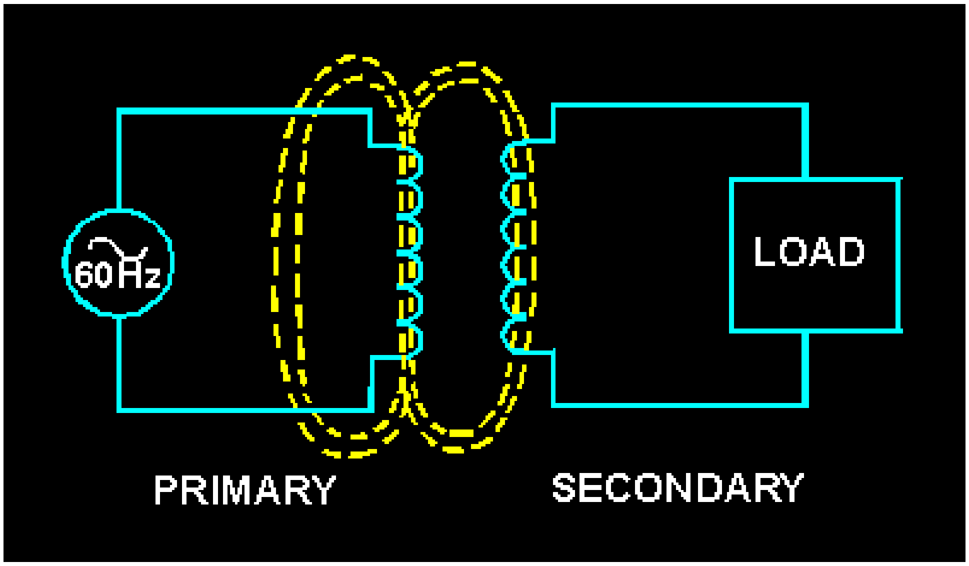


Fig. - 4

THE COMPONENTS OF A TRANSFORMER

Two coils of wire (called windings) are wound on some type of core material. In some cases the coils of wire are wound on a cylindrical or rectangular cardboard form. In effect, the core material is air and the transformer is called an AIR-CORE TRANSFORMER.

Transformers used at low frequencies, such as 60 hertz and 400 hertz, require a core of low-reluctance magnetic material, usually iron. This type of transformer is called an IRON-CORE TRANSFORMER. Most power transformers are of the iron-core type. The principle parts of a transformer and their functions are:

- The CORE, which provides a path for the magnetic lines of flux.
- The PRIMARY WINDING, which receives energy from the ac source.
- The SECONDARY WINDING, which receives energy from the primary winding and delivers it to the load.
- The ENCLOSURE, which protects the above components from dirt, moisture, and mechanical damage.

4.1.2 BRIDGE RECTIFIER

A bridge rectifier makes use of four diodes in a bridge arrangement to achieve full-wave rectification. This is a widely used configuration, both with individual diodes wired as shown and with single component bridges where the diode bridge is wired internally.

BASIC OPERATION

According to the conventional model of current flow originally established by Benjamin Franklin and still followed by most engineers today, current is assumed to flow through electrical conductors from the **positive** to the **negative** pole.

In actuality, free electrons in a conductor nearly always flow from the **negative** to the **positive** pole. In the vast majority of applications, however, the actual direction of current flow is irrelevant. Therefore, in the discussion below the conventional model is retained.

In the diagrams below, when the input connected to the **left** corner of the diamond is **positive**, and the input connected to the **right** corner is **negative**, current flows from the **upper** supply terminal to the right along the **red** (positive) path to the output, and returns to the **lower** supply terminal via the **blue** (negative) path.

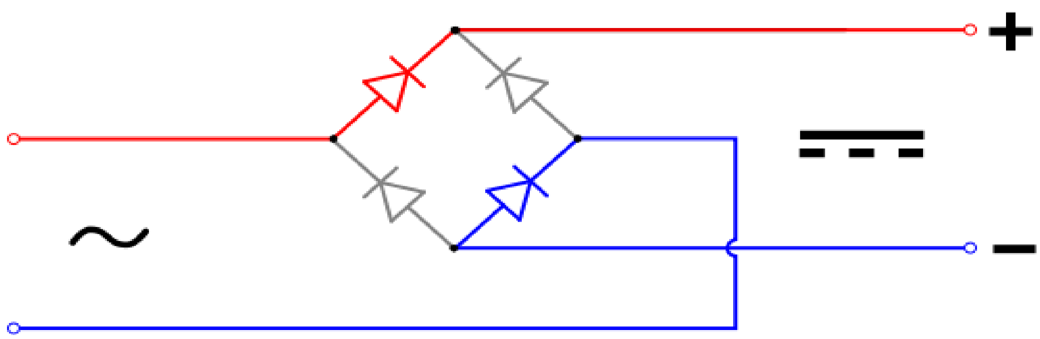


Fig. – 5.1

When the input connected to the **left** corner is **negative**, and the input connected to the **right** corner is **positive**, current flows from the **lower** supply terminal to the right along the **red** path to the output, and returns to the **upper** supply terminal via the **blue** path.

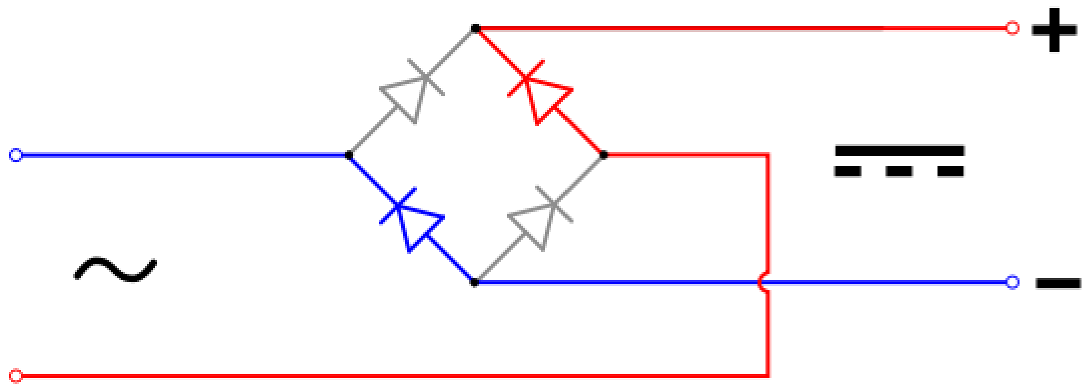


Fig. – 5.2

In each case, the upper right output remains positive and lower right output negative. Since this is true whether the input is AC or DC, this circuit not only produces a DC output from an AC input, it can also provide what is sometimes called "reverse polarity protection". That is, it permits normal functioning of DC-powered equipment when batteries have been installed backwards, or when the leads (wires) from a DC power source have been reversed, and protects the equipment from potential damage caused by reverse polarity.

Prior to availability of integrated electronics, such a bridge rectifier was always constructed from discrete components. Since about 1950, a single four-terminal component containing the four diodes connected in the bridge configuration became a standard commercial component and is now available with various voltage and current ratings.

**OUTPUT SMOOTHING*

For many applications, especially with single phase AC where the full-wave bridge serves to convert an AC input into a DC output, the addition of a capacitor may be desired because the bridge alone supplies an output of fixed polarity but continuously varying or "pulsating" magnitude (see diagram above).

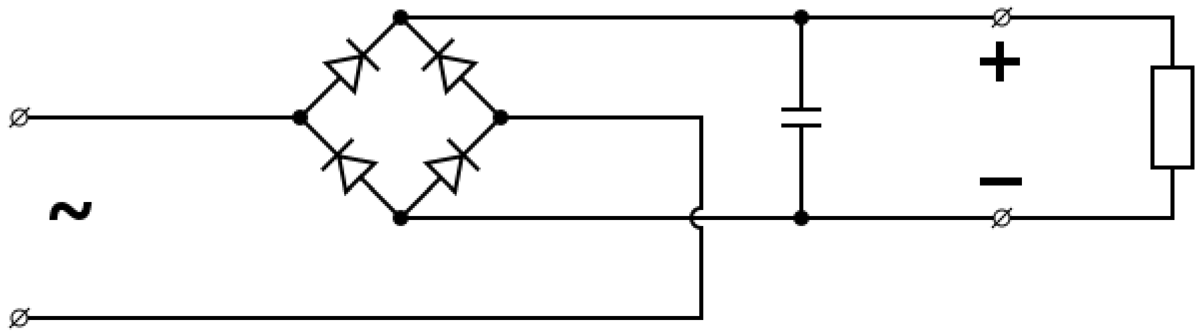


Fig. – 5.3

The function of this capacitor, known as a reservoir capacitor (or smoothing capacitor) is to lessen the variation in (or 'smooth') the rectified AC output voltage waveform from the bridge. One explanation of 'smoothing' is that the capacitor provides a low impedance path to the AC component of the output, reducing the AC voltage across, and AC current through, the resistive load.

In less technical terms, any drop in the output voltage and current of the bridge tends to be canceled by loss of charge in the capacitor. This charge flows out as additional current through the load.

Thus the change of load current and voltage is reduced relative to what would occur without the capacitor. Increases of voltage correspondingly store excess charge in the capacitor, thus moderating the change in output voltage / current.

The simplified circuit shown has a well-deserved reputation for being dangerous, because, in some applications, the capacitor can retain a lethal charge after the AC power source is removed.

If supplying a dangerous voltage, a practical circuit should include a reliable way to safely discharge the capacitor. If the normal load cannot be guaranteed to perform this function, perhaps because it can be disconnected, the circuit should include a bleeder resistor connected as close as practical across the capacitor.

This resistor should consume a current large enough to discharge the capacitor in a reasonable time, but small enough to minimize unnecessary power waste.

Because a bleeder sets a minimum current drain, the regulation of the circuit, defined as percentage voltage change from minimum to maximum load, is improved. However in many cases the improvement is of insignificant magnitude.

The capacitor and the load resistance have a typical time constant $\tau = RC$ where C and R are the capacitance and load resistance respectively. As long as the load resistor is large enough so that this time constant is much longer than the time of one ripple cycle, the above configuration will produce a smoothed DC voltage across the load.

In some designs, a series resistor at the load side of the capacitor is added. The smoothing can then be improved by adding additional stages of capacitor–resistor pairs, often done only for sub-supplies to critical high-gain circuits that tend to be sensitive to supply voltage noise.

The idealized waveforms shown above are seen for both voltage and current when the load on the bridge is resistive. When the load includes a smoothing capacitor, both the voltage and the current waveforms will be greatly changed.

While the voltage is smoothed, as described above, current will flow through the bridge only during the time when the input voltage is greater than the capacitor voltage. For example, if the load draws an average current of n Amps, and the diodes conduct for 10% of the time, the average diode current during conduction must be 10n Amps. This non-sinusoidal current leads to harmonic distortion and a poor power factor in the AC supply.

In a practical circuit, when a capacitor is directly connected to the output of a bridge, the bridge diodes must be sized to withstand the current surge that occurs when the power is turned on at the peak of the AC voltage and the capacitor is fully discharged.

Sometimes a small series resistor is included before the capacitor to limit this current, though in most applications the power supply transformer's resistance is already sufficient.

Output can also be smoothed using a choke and second capacitor. The choke tends to keep the current (rather than the voltage) more constant. Due to the relatively high cost of an effective choke compared to a resistor and capacitor this is not employed in modern equipment.

Some early console radios created the speaker's constant field with the current from the high voltage ("B +") power supply, which was then routed to the consuming circuits, (permanent magnets were then too weak for good performance) to create the speaker's constant magnetic field. The speaker field coil thus performed 2 jobs in one: it acted as a choke, filtering the power supply, and it produced the magnetic field to operate the speaker.

4.2 REGULATOR IC (78XX)

It is a three pin IC used as a voltage regulator. It converts unregulated DC current into regulated DC current.

Fig. - 6

Normally we get fixed output by connecting the voltage regulator at the output of the filtered DC (see in above diagram). It can also be used in circuits to get a low DC voltage from a high DC voltage (for example we use 7805 to get 5V from 12V).

There are two types of voltage regulators 1. fixed voltage regulators (78xx, 79xx) 2. variable voltage regulators (LM317) In fixed voltage regulators there is another classification 1. +ve voltage regulators 2. Negative voltage regulators POSITIVE VOLTAGE REGULATORS. This include 78xx voltage regulators. The most commonly used ones are 7805 and 7812. 7805 gives fixed 5V DC voltage if input voltage is in (7.5V, 20V).

4.3 THE CAPACITOR FILTER

The simple capacitor filter is the most basic type of power supply filter. The application of the simple capacitor filter is very limited. It is sometimes used on extremely high-voltage, low-current power supplies for cathode ray and similar electron tubes, which require very little load current from the supply.

The capacitor filter is also used where the power-supply ripple frequency is not critical; this frequency can be relatively high. The capacitor (C1) shown in figure 4-15 is a simple filter connected across the output of the rectifier in parallel with the load.

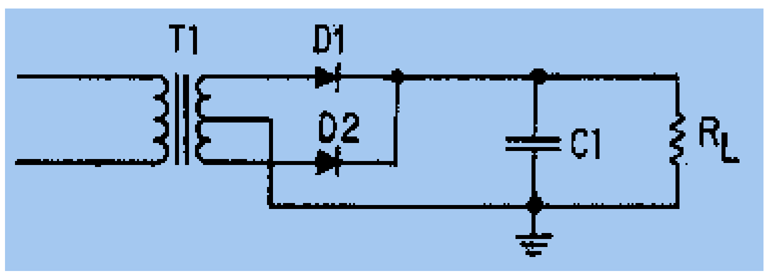


Fig. – 7.1 Full-wave rectifier with a capacitor filter.

When this filter is used, the RC charge time of the filter capacitor (C1) must be short and the RC discharge time must be long to eliminate ripple action. In other words, the capacitor must charge up fast, preferably with no discharge at all.

Better filtering also results when the input frequency is high; therefore, the full-wave rectifier output is easier to filter than that of the half-wave rectifier because of its higher frequency.

For you to have a better understanding of the effect that filtering has on E_{avg}, a comparison of a rectifier circuit with a filter and one without a filter is illustrated in views A and B of figure 4-16.

The output waveforms in figure 4-16 represent the unfiltered and filtered outputs of the half-wave rectifier circuit. Current pulses flow through the load resistance (R_L) each time a diode conducts. The dashed line indicates the average value of output voltage.

For the half-wave rectifier, E_{avg} is less than half (or approximately 0.318) of the peak output voltage. This value is still much less than that of the applied voltage.

With no capacitor connected across the output of the rectifier circuit, the waveform in view A has a large pulsating component (ripple) compared with the average or dc component.

When a capacitor is connected across the output (view B), the average value of output voltage (E_{avg}) is increased due to the filtering action of capacitor C1.

- UNFILTERED

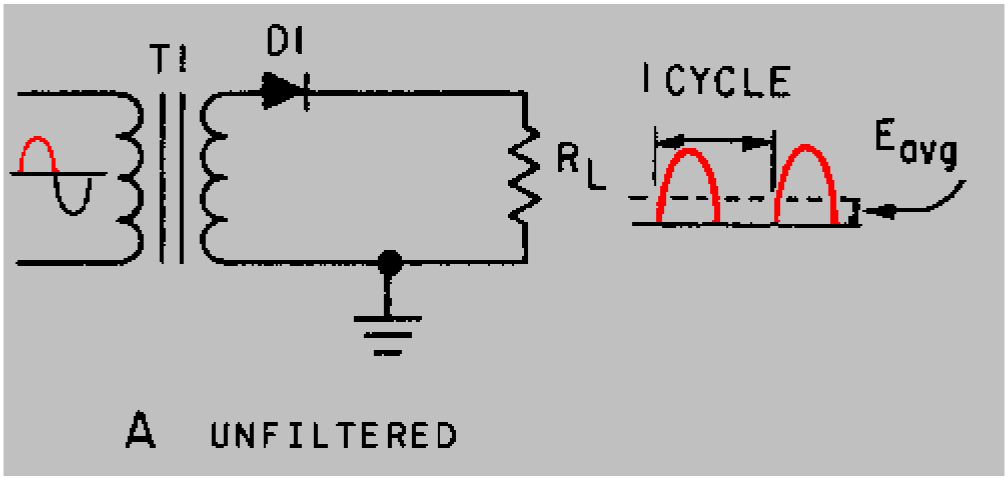


Fig. – 7.2 Half-wave rectifier with and without filtering.

- FILTERED

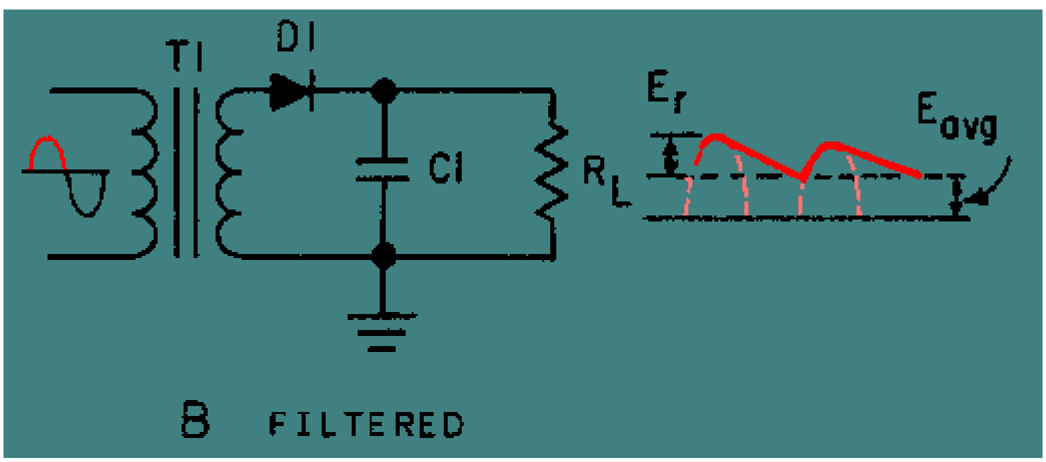


Fig. – 7.3

The value of the capacitor is fairly large (several microfarads), thus it presents a relatively low reactance to the pulsating current and it stores a substantial charge.

The rate of charge for the capacitor is limited only by the resistance of the conducting diode, which is relatively low. Therefore, the RC charge time of the circuit is relatively short.

As a result, when the pulsating voltage is first applied to the circuit, the capacitor charges rapidly and almost reaches the peak value of the rectified voltage within the first few cycles. The capacitor attempts to charge to the peak value of the rectified voltage anytime a diode is conducting, and tends to retain its charge when the rectifier output falls to zero. (The capacitor cannot discharge immediately).

The capacitor slowly discharges through the load resistance (R_L) during the time the rectifier is non-conducting.

The rate of discharge of the capacitor is determined by the value of capacitance and the value of the load resistance. If the capacitance and load-resistance values are large, the RC discharge time for the circuit is relatively long.

A comparison of the waveforms shown in figure 4-16 (view A and view B) illustrates that the addition of C1 to the circuit results in an increase in the average of the output voltage (E_{avg}) and a reduction in the amplitude of the ripple component (E_r) which is normally present across the load resistance.

Now, let's consider a complete cycle of operation using a half-wave rectifier, a capacitive filter (C1), and a load resistor (R_L). As shown in view A of figure 4-17, the capacitive filter (C1) is assumed to be large enough to ensure a small reactance to the pulsating rectified current. The resistance of R_L is assumed to be much greater than the reactance of C1 at the input frequency.

When the circuit is energized, the diode conducts on the positive half cycle and current flows through the circuit, allowing C1 to charge. C1 will charge to approximately the peak value of the input voltage. (The charge is less than the peak value because of the voltage drop across the diode (D1)). In view A of the figure, the heavy solid line on the waveform indicates the charge on C1. As illustrated in view B, the diode cannot conduct on the negative half cycle because the anode of D1 is negative with respect to the cathode.

During this interval, C1 discharges through the load resistor (R_L). The discharge of C1 produces the downward slope as indicated by the solid line on the waveform in view B. In contrast to the abrupt fall of the applied ac voltage from peak value to zero, the voltage across C1 (and thus across R_L) during the discharge period gradually decreases until the time of the next half cycle of rectifier operation.

Keep in mind that for good filtering, the filter capacitor should charge up as fast as possible and discharge as little as possible.

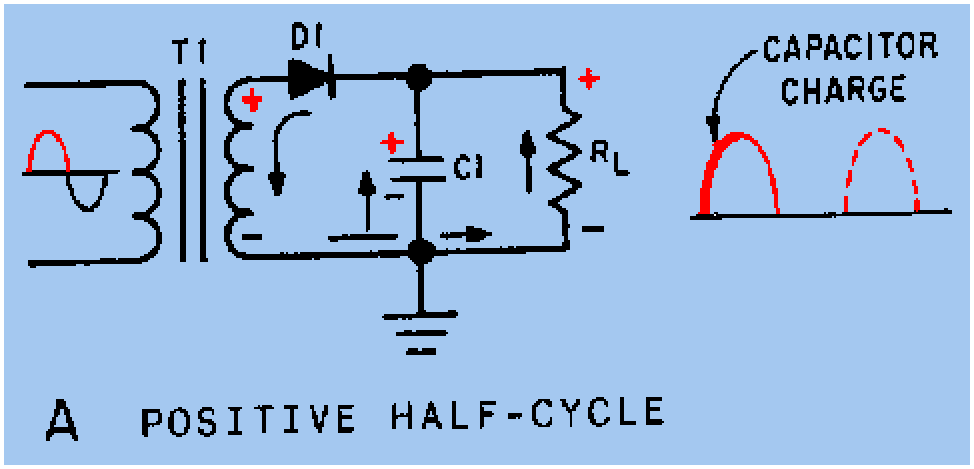


Figure 7.4A Capacitor filter circuit (positive and negative half cycles). POSITIVE HALF-CYCLE

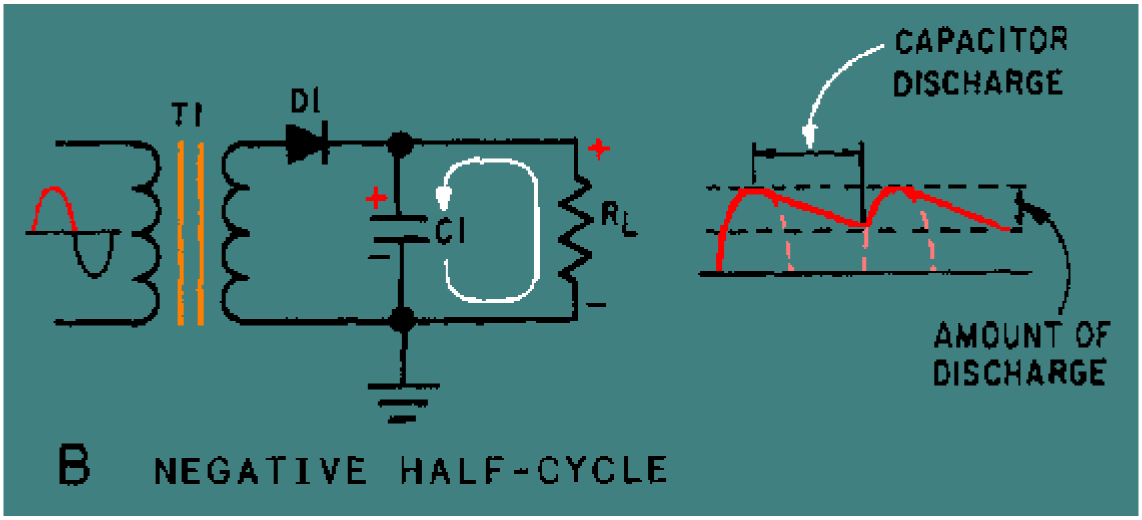


Figure 7.4B - Capacitor filter circuit (positive and negative half cycles). NEGATIVE HALF-CYCLE

Since practical values of C1 and R_L ensure a more or less gradual decrease of the discharge voltage, a substantial charge remains on the capacitor at the time of the next half cycle of operation. As a result, no current can flow through the diode until the rising ac input voltage at the anode of the diode exceeds the voltage on the charge remaining on C1. The charge on C1 is the cathode potential of the diode.

When the potential on the anode exceeds the potential on the cathode (the charge on C1), the diode again conducts, and C1 begins to charge to approximately the peak value of the applied voltage.

After the capacitor has charged to its peak value, the diode will cut off and the capacitor will start to discharge. Since the fall of the ac input voltage on the anode is considerably more rapid than the decrease on the capacitor voltage, the cathode quickly become more positive than the anode, and the diode ceases to conduct.

Operation of the simple capacitor filter using a full-wave rectifier is basically the same as that discussed for the half-wave rectifier. Referring to figure 4-18, you should notice that because one of the diodes is always conducting on either alternation, the filter capacitor charges or discharges during each half cycle.

(Note that each diode conducts only for that portion of time when the peak secondary voltage is greater than the charge across the capacitor.)

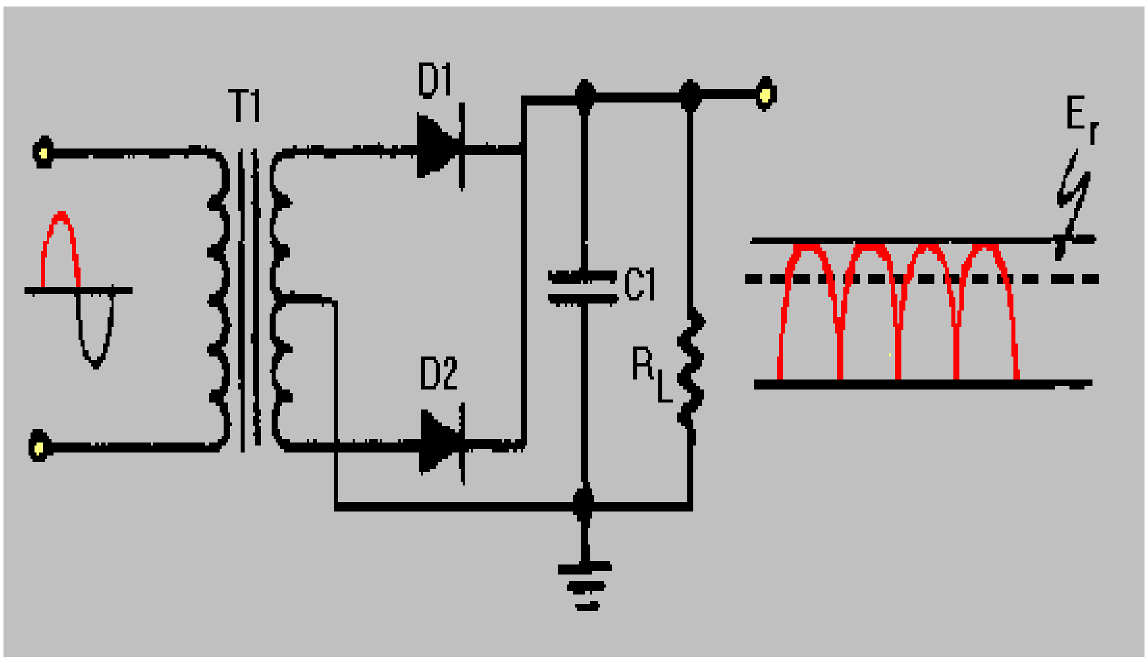


Figure – 7.5 Full-wave rectifier (with capacitor filter).

Another thing to keep in mind is that the ripple component (E_r) of the output voltage is an ac voltage and the average output voltage (E_{avg}) is the dc component of the output.

Since the filter capacitor offers relatively low impedance to ac, the majority of the ac component flows through the filter capacitor.

The ac component is therefore bypassed (shunted) around the load resistance, and the entire dc component (or E_{avg}) flows through the load resistance.

This statement can be clarified by using the formula for X_C in a half-wave and full-wave rectifier. First, you must establish some values for the circuit.

HALFWAVE RECTIFIER

FREQUENCY AT
RECTIFIER OUTPUT: 60 Hz

VALUE OF FILTER
CAPACITOR: 30µF

LOAD RESISTANCE: 10kΩ

$$X_C = \frac{1}{2\pi f C}$$

$$X_C = \frac{.159}{fC}$$

$$X_C = \frac{.159}{60 \times .000030}$$

$$X_C = \frac{.159}{.0018}$$

$$X_C = 88.3\Omega$$

FREQUENCY AT
RECTIFIER OUTPUT: 120Hz

VALUE OF FILTER
CAPACITOR: 30μF

LOAD RESISTANCE: 10kΩ

$$X_C = \frac{1}{2\pi fC}$$

$$X_C = \frac{.159}{fC}$$

$$X_C = \frac{.159}{120 \times .000030}$$

$$X_C = \frac{.159}{.0036}$$

$$X_C = 44.16\Omega$$

As you can see from the calculations, by doubling the frequency of the rectifier, you reduce the impedance of the capacitor by one-half. This allows the ac component to pass through the capacitor more easily.

As a result, a full-wave rectifier output is much easier to filter than that of a half-wave rectifier. Remember, the smaller the X_C of the filter capacitor with respect to the load resistance, the better the filtering action. Since

$$X_C = \frac{1}{2\pi fC}$$

the largest possible capacitor will provide the best filtering.

Remember, also, that the load resistance is an important consideration. If load resistance is made small, the load current increases, and the average value of output voltage (E_{avg}) decreases.

The RC discharge time constant is a direct function of the value of the load resistance; therefore, the rate of capacitor voltage discharge is a direct function of the current through the load.

The greater the load current, the more rapid the discharge of the capacitor, and the lower the average value of output voltage. For this reason, the simple capacitive filter is seldom used with rectifier circuits that must supply a relatively large load current.

Using the simple capacitive filter in conjunction with a full-wave or bridge rectifier provides improved filtering because the increased ripple frequency decreases the capacitive reactance of the filter capacitor.

CIRCUIT DIAGRAM OF POWER SUPPLY

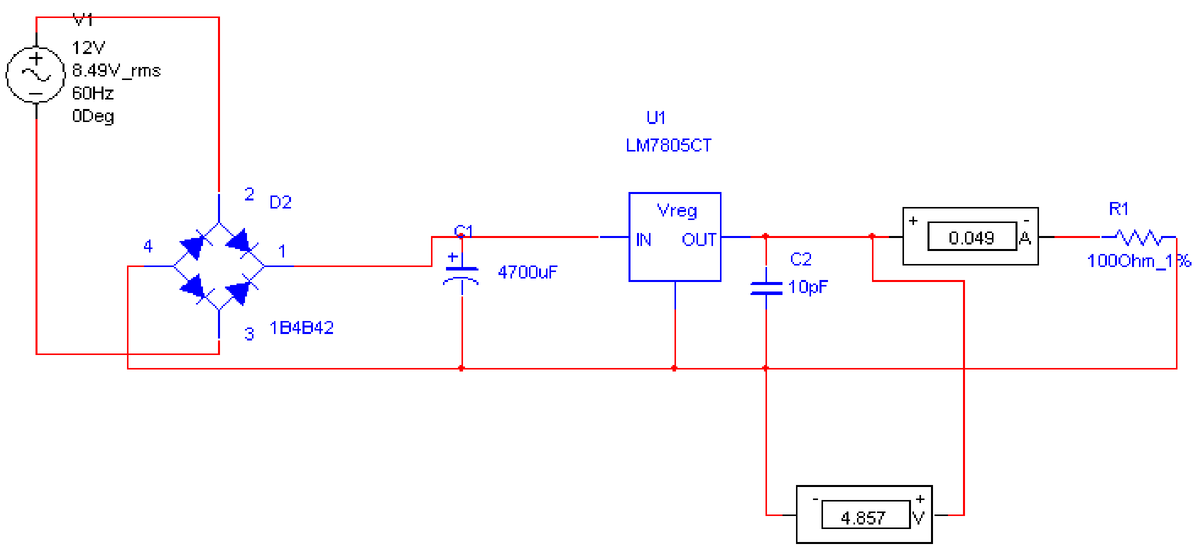


Fig. – 8

4.4 DIODE

The diode is a p-n junction device. Diode is the component used to control the flow of the current in any one direction. The diode widely works in forward bias.

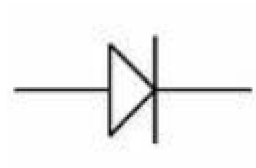


Fig. – 9

When the current flows from the P to N direction. Then it is in forward bias. The Zener diode is used in reverse bias function i.e. N to P direction.
Visually the identification of the diode`s terminal can be done by identifying he silver/black line. The silver/black line is the negative terminal (cathode) and the other terminal is the positive terminal (cathode).

APPLICATION

•Diodes: Rectification, free-wheeling, etc

•Zener diode: Voltage control, regulator etc.

•Tunnel diode: Control the current flow, snobbier circuit, etc

4.5 RESISTORS

The flow of charge through any material encounters an opposing force similar in many respects to mechanical friction. This opposing force is called resistance of the material. In some electric circuit resistance is deliberately introduced in form of resistor.

Resistor used fall in three categories , only two of which are color coded which are metal film and carbon film resistor .the third category is the wire wound type ,where value are generally printed on the vitreous paint finish of the component.

Resistors are in ohms and are represented in Greek letter omega, looks as an upturned horseshoe. Most electronic circuit require resistors to make them work properly and it is obliviously important to find out something about the different types of resistors available.

Resistance is measured in ohms, the symbol for ohm is an omega ohm. 1 ohm is quite small for electronics so resistances are often given in Kohm and Mohm.
Resistors used in electronics can have resistances as low as 0.1 ohm or as high as 10 Mohm.

Fig. – 10.1

FUNCTION

Resistor restrict the flow of electric current, for example a resistor is placed in series with a light-emitting diode (LED) to limit the current passing through the LED.

TYPES OF RESISTORS

- FIXED VALUE RESISTORS

It includes two types of resistors as carbon film and metal film .These two types are explained under

- CARBON FILM RESISTORS

During manufacture, at in film of carbon is deposited onto a small ceramic rod. The resistive coating is spiraled away in an automatic machine until the resistance between there two ends of the rods is as close as possible to the correct value. Metal leads and end caps are added, the resistors is covered with an insulating coating and finally painted with colored bands to indicate the resistor value

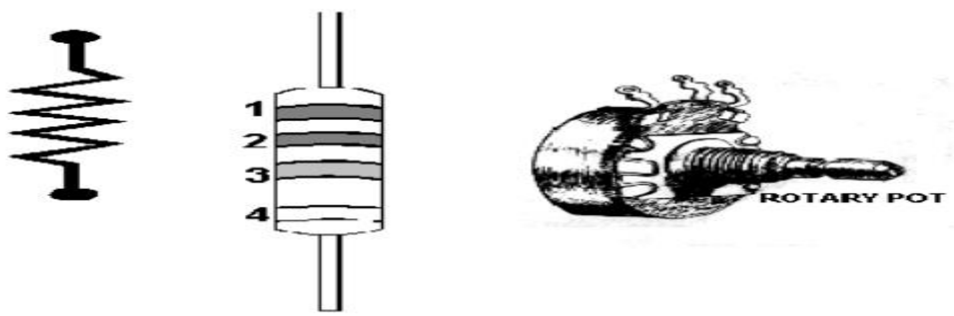


Fig. – 10.2 Carbon Film Resistors

Another example for a Carbon 22000 Ohms or 22 Kilo-Ohms also known as 22K at 5% tolerance: Band 1 = Red, 1st digit Band 2 = Red, 2nd digit Band 3 = Orange, 3rd digit, multiply with zeros, in this case 3 zero's Band 4 = Gold, Tolerance, 5%

- METAL FILM RESISTORS

Metal film and metal oxides resistors are made in a similar way, but can be made more accurately to within ±2% or ±1% of their nominal vale there are some difference in performance between these resistor types, but none which affects their use in simple circuit.

- WIRE WOUND RESISTOR

A wire wound resistor is made of metal resistance wire, and because of this, they can be manufactured to precise values. Also, high wattage resistors can be made by using a thick wire material. Wire wound resistors cannot be used for high frequency circuits. Coils are used in high frequency circuit. Wire wound resistors in a ceramic case, strengthened with special cement.

They have very high power rating, from 1 or 2 watts to dozens of watts. These resistors can become extremely hot when used for high power application, and this must be taken into account when designing the circuit.

TESTING

Resistors are checked with an ohm meter/millimeter. For a defective resistor the ohm-meter shows infinite high reading.

4.6 CAPACITORS

In a way, a capacitor is a little like a battery. Although they work in completely different ways, capacitors and batteries both store electrical energy. If you have read How Batteries Work, then you know that a battery has two terminals. Inside the battery, chemical reactions produce electrons on one terminal and absorb electrons at the other terminal.

BASIC

Like a battery, a capacitor has two terminals. Inside the capacitor, the terminals connect to two metal plates separated by a dielectric. The dielectric can be air, paper, plastic or anything else that does not conduct electricity and keeps the plates from touching each other.

You can easily make a capacitor from two pieces of aluminum foil and a piece of paper. It won't be a particularly good capacitor in terms of its storage capacity, but it will work.
In an electronic circuit, a capacitor is shown like this:

Fig. – 11

When you connect a capacitor to a battery, here's what happens:

•The plate on the capacitor that attaches to the negative terminal of the battery accepts electrons that the battery is producing.

•The plate on the capacitor that attaches to the positive terminal of the battery loses electrons to the battery.

TESTING

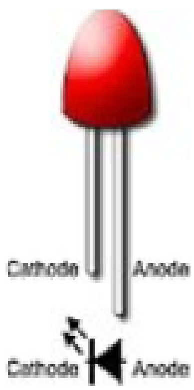
To test the capacitors, either analog meters or specia
l. digital meters with the specified function are used. The non-electrolyte capacitor can be tested by using the digital meter.

Multi – meter mode : Continuity Positive probe : One end Negative probe : Second end Display : `0`(beep sound occur) `OL` Result : Faulty OK

4.7 LED

LED falls within the family of P-N junction devices. The light emitting diode (LED) is a diode that will give off visible light when it is energized.

In any forward biased P-N junction there is, with in the structure and primarily close to the junction, a recombination of hole and electrons. This recombination requires that the energy possessed by the unbound free electron be transferred to another state. The process of giving off light by applying an electrical source is called electroluminescence.



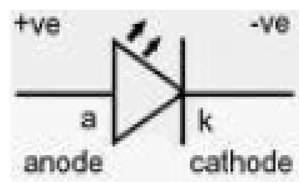


Fig. – 12.1

LED is a component used for indication. All the functions being carried out are displayed by led .The LED is diode which glows when the current is being flown through it in forward bias condition. The LEDs are available in the round shell and also in the flat shells. The positive leg is longer than negative leg.

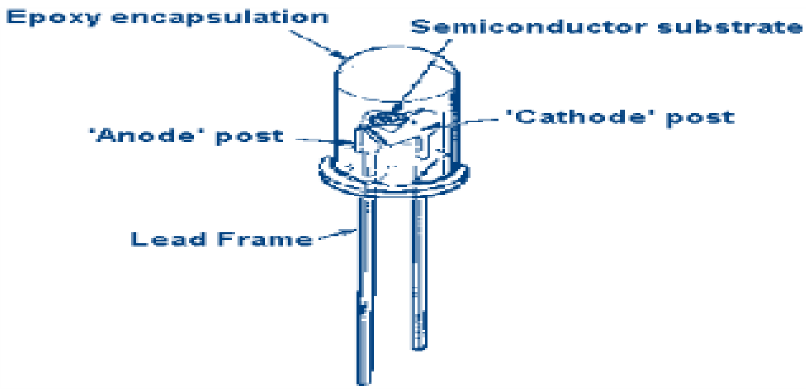


Fig. – 12.2

4.8 DC MOTOR

DC Motor has two leads. It has bidirectional motion

- If we apply +ve to one lead and ground to another motor will rotate in one direction, if we reverse the connection the motor will rotate in opposite direction.
- If we keep both leads open or both leads ground it will not rotate (but some inertia will be there).
- If we apply +ve voltage to both leads then braking will occurs.

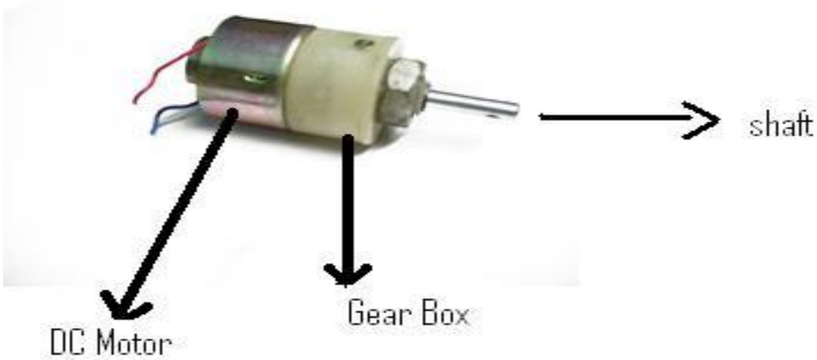


Fig. – 13.1

A DC motor is designed to run on DC electric power. Two examples of pure DC designs are Michael Faraday's homopolar motor (which is uncommon), and the ball bearing motor, which is (so far) a novelty.

By far the most common DC motor types are the brushed and brushless types, which use internal and external commutation respectively to create an oscillating AC current from the DC source—so they are not purely DC machines in a strict sense.

The classic DC motor design generates an oscillating current in a wound rotor, or armature, with a split ring commutator, and either a wound or permanent magnet stator.

A rotor consists of one or more coils of wire wound around a core on a shaft; an electrical power source is connected to the rotor coil through the commutator and its brushes, causing current to flow in it, producing electromagnetism.

The commutator causes the current in the coils to be switched as the rotor turns, keeping the magnetic poles of the rotor from ever fully aligning with the magnetic poles of the stator field, so that the rotor never stops (like a compass needle does) but rather keeps rotating indefinitely (as long as power is applied and is sufficient for the motor to overcome the shaft torque load and internal losses due to friction, etc.)

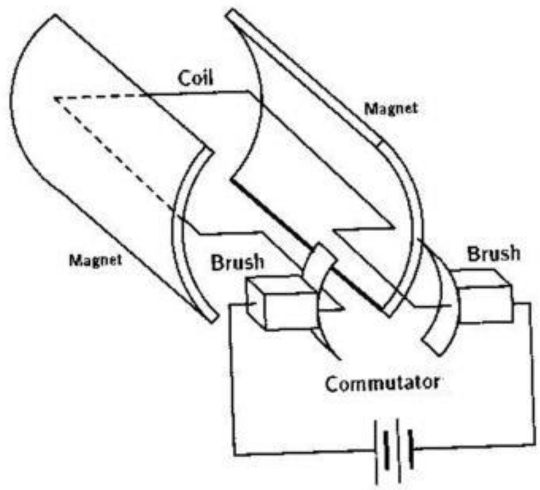


Fig. – 13.2

CHAPTER 5

Microcontroller

A microcontroller is a computer with most of the necessary support chips on-board. All computers have several things in common, namely:

.

- A central processing unit (CPU) that 'executes' programs.
- Some random-access memory (RAM) where it can store data that is variable.
- Some read only memory (ROM) where programs to be executed can be stored.
- Input and output (I/O) devices that enable communication to be established with the outside world i.e. connection to devices such as keyboard, mouse, monitors and other peripherals.

There are a number of other common characteristics that define microcontrollers. If a computer matches a majority of these characteristics, then it can be classified as a 'microcontroller'. Microcontrollers may be:

- 'Embedded' inside some other device (often a consumer product) so that they can control the features or actions of the product. Another name for a microcontroller is therefore an 'embedded controller'.
- Dedicated to one task and run one specific program. The program is stored in ROM and generally does not change.
- A low-power device, a battery-operated microcontroller might consume as little as 50 milli-watts.
- A microcontroller may take an input from the device it is controlling and controls the device by sending signals to different components in the device.
- A microcontroller is often small and low cost. The components may be chosen to minimize size and to be as inexpensive as possible.

Microcontrollers usually contain from several to dozens of general purpose input/output pins (GPIO). GPIO pins are software configurable to either an input or an output state. When GPIO pins are configured to an input state, they are often used to read sensors or external signals. Configured to the output state, GPIO pins can drive external devices such as LEDs or motors, often indirectly, through external power electronics.

Many embedded systems need to read sensors that produce analog signals. This is the purpose of the analog-to-digital converter (ADC). Since processors are built to interpret and process digital data, i.e. 1s and 0s, they are not able to do anything with the analog signals that may be sent to it by a device.

So the analog to digital converter is used to convert the incoming data into a form that the processor can recognize. A less common feature on some microcontrollers is a digital-to-analog converter (DAC) that allows the processor to output analog signals or voltage levels.

In addition to the converters, many embedded microprocessors include a variety of timers as well. One of the most common types of timers is the Programmable Interval Timer (PIT). A PIT may either count down from some value to zero, or up to the capacity of the count register, overflowing to zero.

Once it reaches zero, it sends an interrupt to the processor indicating that it has finished counting. This is useful for devices such as thermostats, which periodically test the temperature around them to see if they need to turn the air conditioner on, the heater on, etc.

A dedicated Pulse Width Modulation (PWM) block makes it possible for the CPU to control power converters, resistive loads, motors, etc., without using lots of CPU resources in tight timer loops.

The actual processor used to implement a microcontroller can vary widely. In many products, such as microwave ovens, the demand on the CPU is fairly low and price is an important consideration.

In these cases, manufacturers turn to dedicated microcontroller chips – devices that were originally designed to below-cost, small, low-power, embedded CPUs.

The Intel 8051 is good examples of such chip. A typical low-end microcontroller chip might have 1000 bytes of ROM and 20 bytes of RAM on the chip, along with eight I/O pins.

Micro-controllers may not implement an external address or data bus as they integrate RAM and non-volatile memory on the same chip as the CPU. Using fewer pins, the chip can be placed in a much smaller, cheaper package.

Integrating the memory and other peripherals on a single chip and testing them as a unit increases the cost of that chip, but often results in decreased net cost of the embedded system as a whole.

Even if the cost of a CPU that has integrated peripherals is slightly more than the cost of a CPU and external peripherals, having fewer chips typically allows a smaller and cheaper circuit board, and reduces the labor required to assemble and test the circuit board.

Microcontrollers usually contain from several to dozens of general purpose input/output pins (GPIO). GPIO pins are software configurable to either an input or an output state. When GPIO pins are configured to an input state, they are often used to read sensors or external signals. Configured to the output state, GPIO pins can drive external devices such as LEDs or motors, often indirectly, through external power electronics.

A micro-controller is a single integrated circuit, commonly with the following features:

- Central processing unit - ranging from small and simple 4-bit processors to complex 32- or 64-bit
- Volatile memory (RAM) for data storage
- ROM, EPROM, EEPROM or Flash memory for program and operating parameter storage
- Discrete input and output bits, allowing control or detection of the logic state of an individual package pin
- Serial input/output such as serial ports (UART)
- Other serial communications interfaces like I²C, Serial Peripheral Interface etc,
- Peripherals such as timers, event counters, PWM generators etc.
- Clock generator - often an oscillator for a quartz timing crystal, resonator or RC circuit
- Many include analog-to-digital converters, some include digital-to-analog converters
- In-circuit programming and debugging support.

CHAPTER 6

LCD INTERFACING

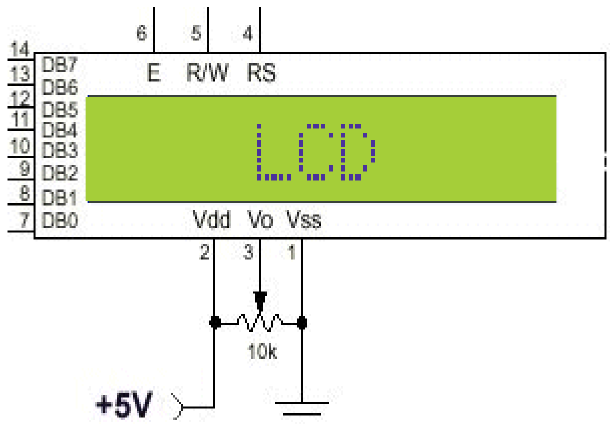


Fig. – 14

Above is the quite simple schematic. The LCD panel's *Enable* and *Register Select* is connected to the Control Port. The Control Port is an open collector / open drain output. Therefore by incorporating the two 10K external pull up resistors, the circuit is more portable for a wider range of computers, some of which may have no internal pull up resistors.

We make no effort to place the Data bus into reverse direction. Therefore We had wire the *R/W* line of the LCD panel, into write mode.

This will cause no bus conflicts on the data lines. As a result I cannot read back the LCD's internal Busy Flag which tells us if the LCD has accepted and finished processing the last instruction. This problem is overcome by inserting known delays into my program. The 10k Potentiometer controls the contrast of the LCD panel. Nothing fancy here.

I used a power supply of 5volt. The user may select whether the LCD is to operate with a 4-bit data bus or an 8- bit data bus. If a 4-bit data bus is used, the LCD will require a total of 7 data lines.

If an 8-bit data bus is used, the LCD will require a total of 11 data lines [20]. LCD with 8-bit data bus is used for this design. The three control lines are **EN**, **RS**, and **RW**.

EN line must be raised/lowered before/after each instruction sent to the LCD regardless of whether that instruction is read or write text or instruction. In short, I manipulate EN when communicating with the LCD.

Features:

- 5 x 8 dots with cursor
- Built-in controller (KS 066 or Equivalent)
- + 5V power supply (Also available for + 3V)
- 1/16 duty cycle
- B/L to be driven by pin 1, pin 2 or pin 15, pin 16 or A.K (LED)
- N.V. optional for + 3V power supply

PIN NUMBER	SYMBOL	FUNCTION
1	V_{SS}	GND
2	V_{DD}	+ 3V or + 5V
3	Vo	Contrast Adjustment
4	RS	H/L Register Select Signal
5	R/W	H/L Read/Write Signal
6	E	H?L Enable Signal
7	DB0	H/L Data Bus Line
8	DB1	H/L Data Bus Line
9	DB2	H/L Data Bus Line
10	DB3	H/L Data Bus Line
11	DB4	H/L Data Bus Line
12	DB5	H/L Data Bus Line
13	DB6	H/L Data Bus Line
14	DB7	H/L Data Bus Line
15	A/V_{EE}	+ 4.2V for LED/Negative Voltage Output
16	K	Power Supply for B/L (OV)

Table - 1

LCD PIN Description

CHAPTER 7
THE AT89S52

AT89S52:

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out.

The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory pro-grammar. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller, which provides a highly flexible and cost-effective solution to many, embedded control applications.

The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry.

In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM con-tents but freezes the oscillator, disabling all other chip functions until the next interrupt.

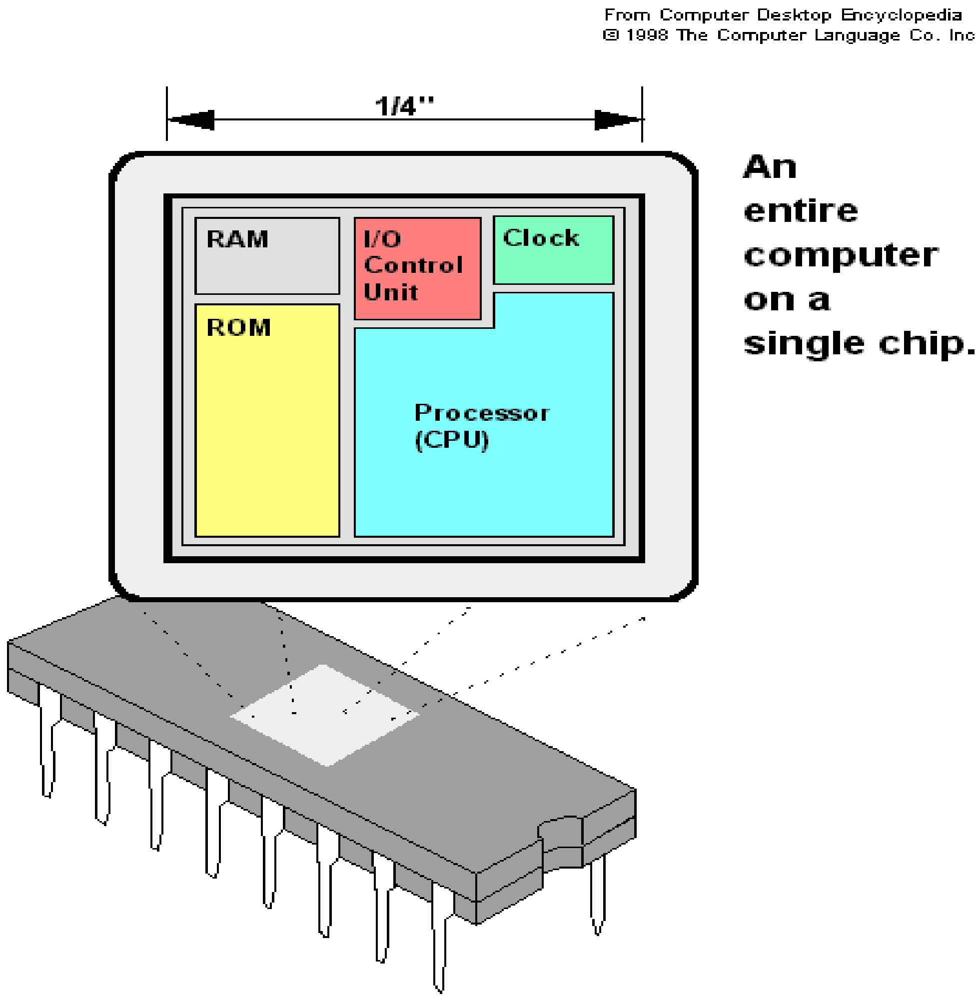


Fig. –15.1

The hardware is driven by a set of program instructions, or software. Once familiar with hardware and software, the user can then apply the microcontroller to the problems easily.

The pin diagram of the 8051 shows all of the input/output pins unique to microcontrollers:

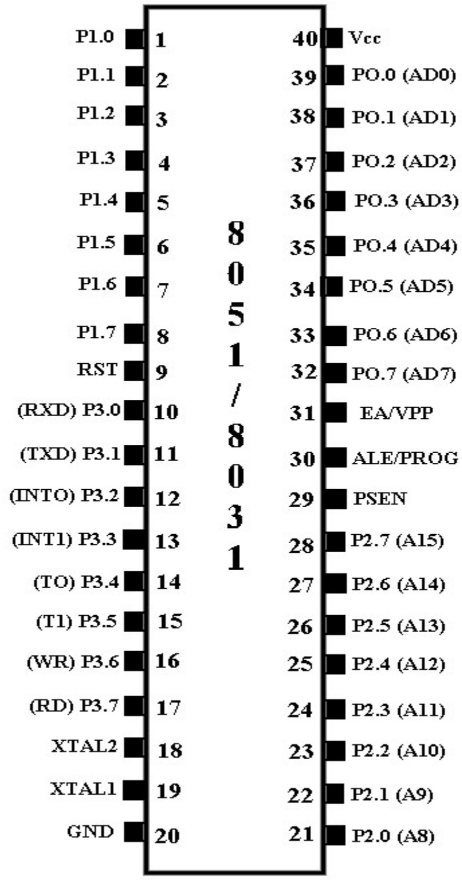


Fig. – 15.2

The following are some of the capabilities of 8051 microcontroller.

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

The 8051 architecture consists of these specific features:

- 16 bit PC &data pointer (DPTR)
- 8 bit program status word (PSW)
- 8 bit stack pointer (SP)
- Internal ROM 4k
- Internal RAM of 128 bytes.
- 4 register banks, each containing 8 registers
- 80 bits of general purpose data memory
- 32 input/output pins arranged as four 8 bit ports: P0-P3
- Two 16 bit timer/counters: T0-T1
- Two external and three internal interrupt sources Oscillator and clock circuits.

CHAPTER 8

PARTS OF THE SYSTEM

8.1 IR Sensing Circuit:

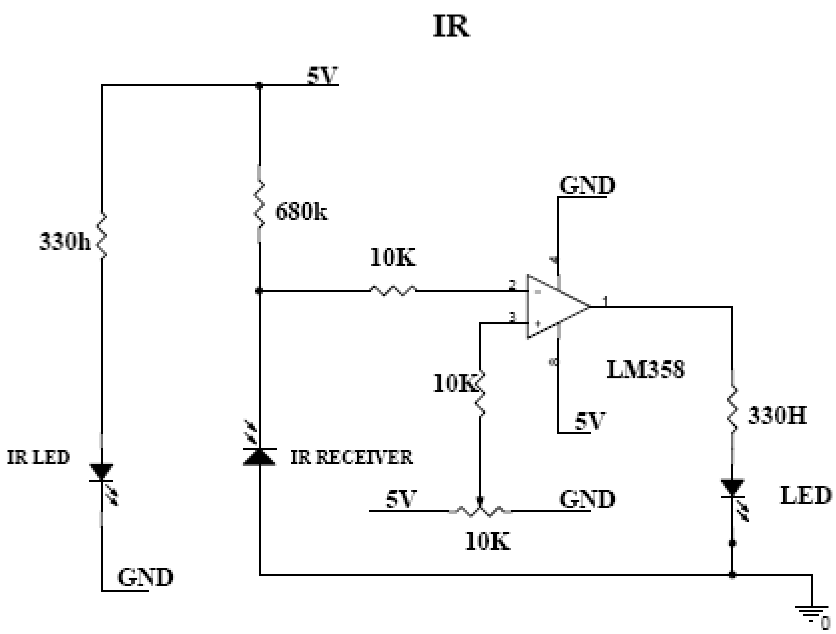


Fig. – 16

Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmitted by the IR transmitter. One important point is both IR transmitter and receiver should be placed straight line to each other.

The transmitted signal is given to IR transmitter whenever the signal is high, the IR transmitter LED is conducting it passes the IR rays to the receiver. The IR receiver is connected with comparator.

The comparator is constructed with LM 358 operational amplifier. In the comparator circuit the reference voltage is given to inverting input terminal. The non-inverting input terminal is connected IR receiver. When interrupt the IR rays between the IR transmitter and receiver, the IR receiver is not conducting.

So the comparator non inverting input terminal voltage is higher than inverting input. Now the comparator output is in the range of +5V. This voltage is given to microcontroller or PC and led so led will glow.

When IR transmitter passes the rays to receiver, the IR receiver is conducting due to that non inverting input voltage is lower than inverting input. Now the comparator output is GND so the output is given to microcontroller or PC. This circuit is mainly used to for counting application, intruder detector etc.

8.2 Alarm Circuit

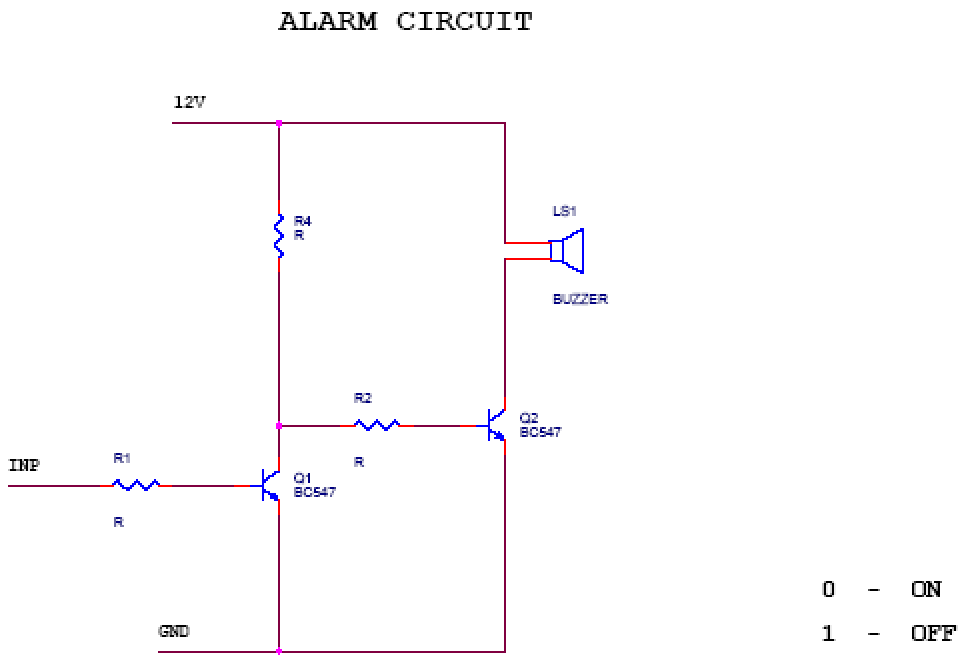


Fig. – 17

8.2.1 Buzzer:

A **buzzer** or **beeper** is a signaling 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.

8.2.2 Circuit description:

The circuit is designed to control the buzzer. The buzzer ON and OFF is controlled by the pair of switching transistors (BC 547). The buzzer is connected in the Q2 transistor collector terminal.

When high pulse signal is given to base of the Q1 transistors, the transistor is conducting and close the collector and emitter terminal so zero signals is given to base of the Q2 transistor. Hence Q2 transistor and buzzer is turned OFF state.

When low pulse is given to base of transistor Q1 transistor, the transistor is turned OFF. Now 12v is given to base of Q2 transistor so the transistor is conducting and buzzer is energized and produces the sound signal.

8.3 LM358 Comparator:

8.3.1 Description:

The LM358 consist of two independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltage. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

Application areas include transducer amplifier, DC gain blocks and all the conventional OP-AMP circuits which now can be easily implemented in single power supply systems.

8.3.2 Features:

- Internally Frequency Compensated for Unity Gain
- Large DC Voltage Gain: 100dB
- Wide Power Supply Range: LM358 3V~32V (or ±1.5V~ 16V)
- Input Common Mode Voltage Range Includes Ground
- Large Output Voltage Swing: 0V DC to Vcc -1.5V DC
- Power Drain Suitable for Battery Operation.

8.3.3. Internal Block Diagram:

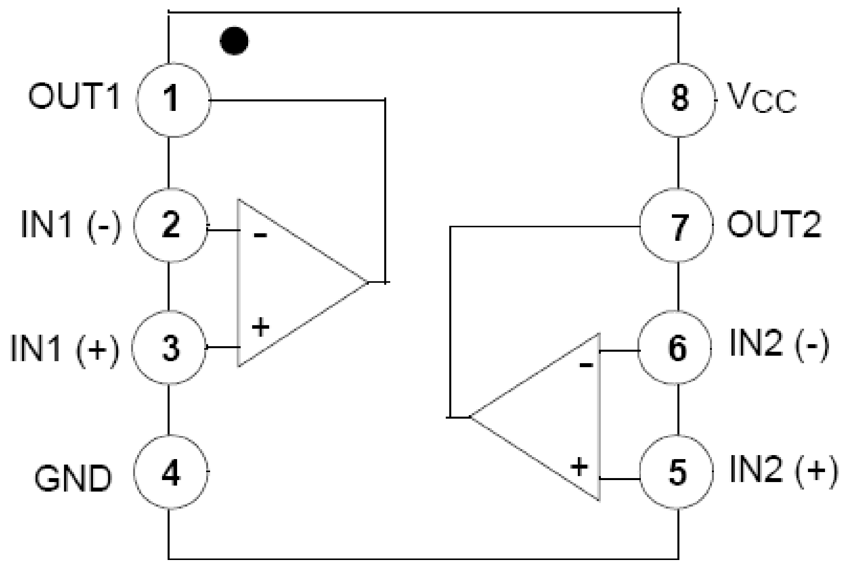


Fig. – 18

CHAPTER 9

SIMULATOR

KEIL Micro Vision is an integrated development environment used to create software to be run on embedded systems (like a microcontroller). It allows for such software to be written either in assembly or C programming languages and for that software to be simulated on a computer before being loaded onto the microcontroller. The software used is c programming.

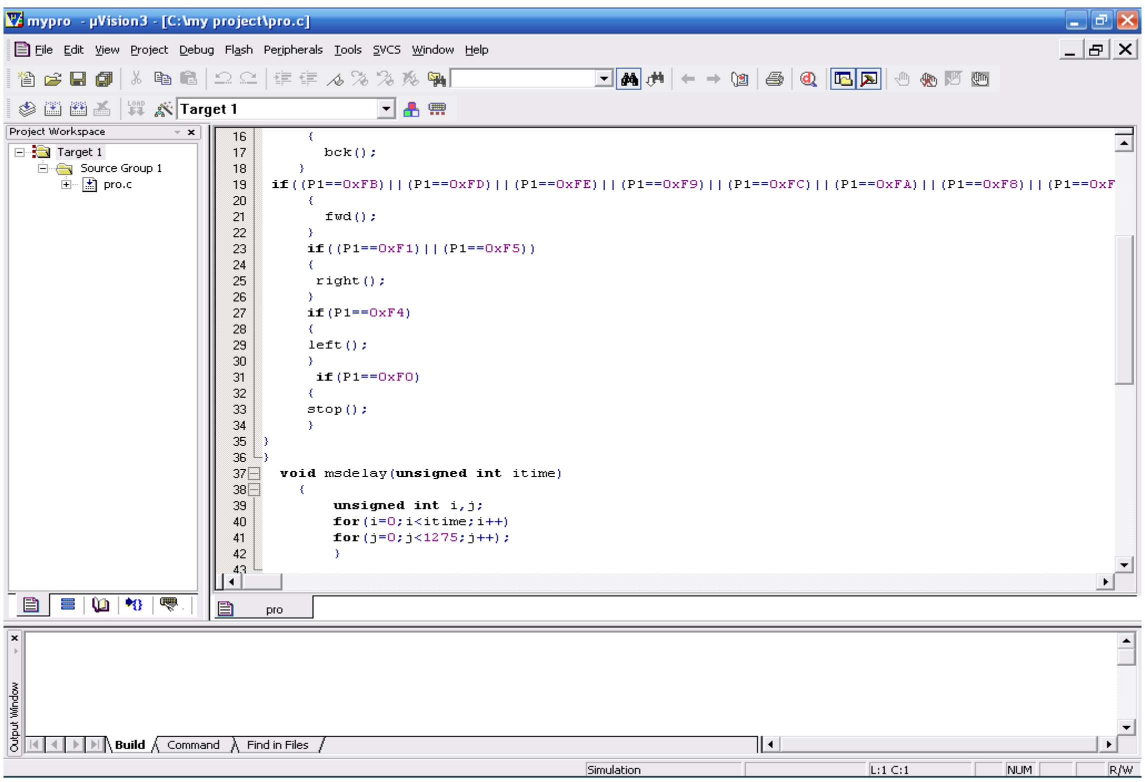


Fig. – 19

µVision, the popular IDE from Keil Software, combines Project Management, Source Code Editing, Program Debugging, and Flash Programming in a single, powerful environment. It provides an overview of the most commonly used µVision3 features including:

- Project Management, Device Setup, and Tool Configuration.
- Editor facilities for Creating, Modifying, and Correcting Programs.
- Target Debugging or CPU & Peripheral Simulation.

µVision3 is an IDE (Integrated Development Environment) that helps write, compile, and debug embedded programs.

It encapsulates the following components:

- A project manager.
- A make facility.
- Tool configuration.
- Editor.
- A powerful debugger.

CHAPTER 10

CODING

```
#include <reg52.h>
#include<stdio.h>
sbit EN=P3^5;
sbit RS=P3^7;
sbit RW=P3^6;
sbit relay=P1^0;
sbit s1=P1^7;
sbit buzz=P1^1;
unsigned int x=0,y=0,z=0;
void delay(unsigned long int ) ;
void cmddata(unsigned char );
void senddata(unsigned char );
void stringdata(unsigned char *);

void ini()
{
cmddata(0X01);
 delay(10);
 cmddata(0X38);
 delay(10);
 cmddata(0X80);
 delay(10);
 cmddata(0X06);
 delay(10);
 cmddata(0X0F);
}
```

```
void cmddata(unsigned char k)
{
P2=k;
RS=0;
RW=0;
EN=1;
delay(10);

EN=0;
delay(10);
}
void senddata(unsigned char ch)
{
P2=ch;
RS=1;
RW=0;
EN=1;
delay(10);

EN=0;
delay(10);
}

void stringdata(unsigned char *str)
{
unsigned int i=0;
while(str[i]!='\0')
{
senddata(str[i]);
i++;
}
```

```
}


void main(void)
{
P1=0xf0;
P2=0x00;
P3=0x0f;
relay=1;
buzz=0;
ini();
delay(100);
loop:
stringdata("   WELCOME  TO ");
cmddata(0X80);
delay(1000);
cmddata(0XC2);
stringdata("JAGUAR X4 CAR ");
while(s1==0);
if(s1==1)
{
delay(3000);
if(s1==1)
{
ini();
delay(100);
buzz=1;
cmddata(0X82);
stringdata("DON'T SLEEP ");
cmddata(0X84);
delay(1000);
```

```
cmddata(0XC4);
stringdata("WAKE UP ");
relay=0;
delay(1000);
buzz=0;
relay=0;
while(1);
}

else
{
goto loop;
}
}  }


void delay(unsigned long int count)
{
   unsigned int i;
   while(count)
         {
      i = 115;
                  while(i>0)
                  i--;
      count--;
   }
         }
```

CHAPTER 11
APPLICATIONS AND LIMITATIONS

11.1 APPLICATIONS:

- The prime purpose is to provide safety measures.
- It can be used in wireless technology.
- The eye blink module of the project can separately be used for RFID detection in industries.
- Focus on the driver, which is a direct way of detecting the drowsiness
- A real time system that detects face, iris, blink and driver drowsiness.
- A completely non-intrusive system.

11.2 LIMITATIONS:

- The system does not function if there is light falling directly on sensors.
- The system fails if the driver brings any object like another sunglasses in between the eye and the IR sensor.
- IR sensors are a bit costly

CHAPTER 12
CONCLUSION

- Now a day's accidents are increasing at a large pace, and various technologies are being introduced to reduce the accidents. In this project we provide means of accident prevention using eye blink wherein the vehicle is stopped immediately and intimated wherever needed.

- It can result in causing lesser number of accidents on roads.

- It can also be used for security alerts where 24 hours of surveillance is required.

- The proposed system detects eye blinks with 99% accuracy and a 1% false positive rate.

CHAPTER 13
FUTURE SCOPE

This project can also be extended by adding alcohol detection.
Which means that if a person is drunk then the device will sense and the vehicle will be stopped immediately.

This system uses PIC16F877A provides a unique method to curb drunken people. The system has an alcohol sensor embedded on the steering of the car. Whenever the driver starts ignition, the sensor measures the content of the alcohol in his breath and automatically switches off the car if he is drunken.

In this system the sensor delivers a current with a linear relationship to the alcohol molecules from zero to very high concentration. The output of the sensor is fed to the pic-microcontroller for comparison. If the measured value reaches the threshold, relay cut off automatically and the buzzer produces sound.

CHAPTER 14

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