

A

PROJECT REPORT ON

**“LPG GAS LEAKAGE, SMOKE DETECTOR AND AUTO
OFF CONTROLLING MAIN GAS VALVE”**

SUBMITTED TO



RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL (M.P.)

In Partial Fulfillment of the Degree of

BACHELOR OF ENGINEERING

IN

ELECTRICAL ENGINEERING

Under the Guidance of

Prof. ARUN K.S. TOMAR

DEPARTMENT OF ELECTRICAL ENGINEERING



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This is to certify that **Mr. SAURAV MISHRA (0902EE131054)**, students of Bachelor of Engineering (Electrical Engineering) VII semester has submitted a project synopsis on “**LPG GAS LEAKAGE, SMOKE DETECTOR AND AUTO OFF CONTROLLING MAIN GAS VALVE**” under the guidance of **PROF. ARUN K.S. TOMAR** in the partial fulfillment of the VII Semester of Bachelor of Engineering (Electrical Engineering) and submitted to the Department of Electrical Engineering of RustamJi Institute of Technology Tekanpur Gwalior(MP) is an authentic record of my own work carried out during a period from August 2016 to December 2016.

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This is to certify that the above statement made by the candidate is correct to the best of my knowledge. I/We wish him success in the future.

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CANDIDATE 'S DECLARATION

I hereby certify that the dissertation entitled “***LPG GAS LEAKAGE, SMOKE DETECTOR AND AUTO OFF CONTROLLING MAIN GAS VALVE***” which is being submitted in the partial fulfillment of the requirement for the award of “**Bachelor of Engineering in Electrical Engineering**” is a record of my own work carried out under the supervision and guidance of “**Prof. ARUN K.S.TOMAR**” Electrical Engineering Department, **Rustam Ji Institute of Technology, BSF Tekanpur Gwalior.**

The Matter presented in the dissertation has not been submitted elsewhere for the award of any Degree /Diploma.

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“Task successful...” this phrase makes everyone happy. But the happiness is gold without glitter if the person who supported us to make it a success is not acknowledged. Success will be crowned to people who made it a reality but the people whose constant guidance & encouragement made it a possible will be crowned first on the eve of success.

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I expressed my gratitude to my team members, my tech leads for their corporation to complete this project.

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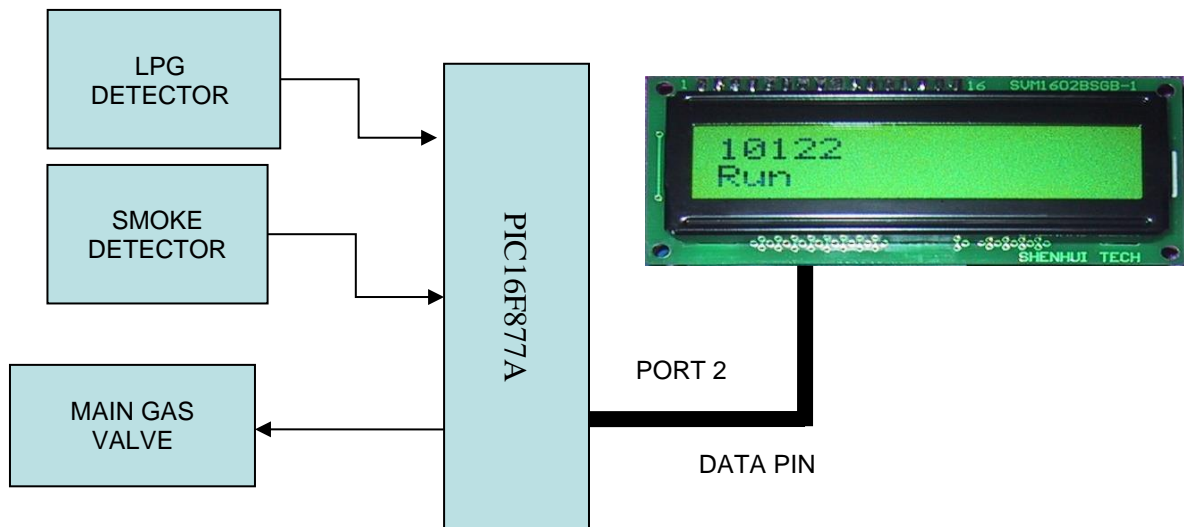
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1.Introduction:-

Our final year project the presence of dangerous LPG leakage in the cars or home, service station or in the storage tank environment can be detected using the Ideal Gas Sensor. This unit can be easily integrated into a unit that can sound an alarm or give a visual suggestion of the LPG concentration. The sensor has both admirable sensitivity and rapid response time. This sensor can also be used to sense other gases like iso-butane, propane, LNG and even cigarette smoke.

BLOCK DIAGRAM OF THE PROJECT/



2.Literature survey:-

The LPG is finding wide range in homes, industries and in automobiles as fuels. In the year 1910 LPG, first produced by Dr.Walter Snelling the U.S Bureau of mines investigated gasoline to see why it evaporated so fast and discovered that the evaporating gases were propane, butane and other light hydrocarbons. Both LPG and natural gas are environmental friendly they easily be detected These gases are normally stored in

pressurized Steel cylinders in liquid form and vaporize at normal temperatures. With comparison of air LPG is heavier therefore it flows along the floor and also settles in low points which make it difficult to disperse. LPG is a mixture of commercial butane and commercial propane having both saturated and unsaturated hydrocarbons. LPG marketed in India shall be governed by Indian Standard Code IS-4576 and the test methods by IS-1448.

Characteristics of this dangerous gas include (a) vapor pressure: The pressure inside a LPG storage vessel/ cylinder will be equal to the vapor pressure corresponding to the temperature of LPG in the storage vessel. The vapor pressure is dependent on temperature as well as on the ratio of mixture of hydrocarbons; (b) Flammability: LPG has an explosive range of 1.8% to 9.5% volume of gas in air. This is considerably narrower than other common gaseous fuels; (c) Combustion: The combustion reaction of LPG increases the volume of products in addition to the generation of heat. LPG requires up to 50 times its own volume of air for complete combustion; (d) Odour: LPG has only a very faint smell, and consequently, it is necessary to add some odourant, so that any escaping gas can vapor phase, but can, however, suffocate when in large concentrations due to the fact that it displaces oxygen.; (e) Toxicity: LPG even though slightly toxic, is not poisonous in can pose a serious effect if they leak. *Impacts:* LPG may leak as a gas or a liquid. If the liquid leaks it will quickly evaporate and form a relatively large cloud of gas which will drop to the ground, as it is heavier than air. LPG vapors can run for long distances along the ground and can collect in drains or basements Cylinders can explode if involved in a fire.

3.Motivation:-The health impact this dangerous gas can cause cold burns to the skin and it can act as an asphyxiant at high concentrations. Leak cause a negative effect to the health such that the hydrocarbons and other chemicals of the LPG causes very long sleep. It also causes irritated respiratory tract, nose and eyes.

Gas leakage leads to various accidents resulting into both financial loss as well as human injuries. In human's daily life, environment gives the most significant impact to their health issues. The risk of firing, explosion, suffocation all are based on their physical properties such flammability, toxicity etc. The number of deaths due to the explosion of

gas cylinders has been increasing in recent years. The reason for such explosion is due to sub standard cylinders, old valves, worn out regulators and lack of awareness using gas cylinders add to the risks.

Inspections by oil companies found that many LPG consumers are unaware of safety checks of gas cylinders. Another reason is illegal filling of gas cylinder also causes accidents. There is a need for a system to detect and also prevent leakage of LPG.

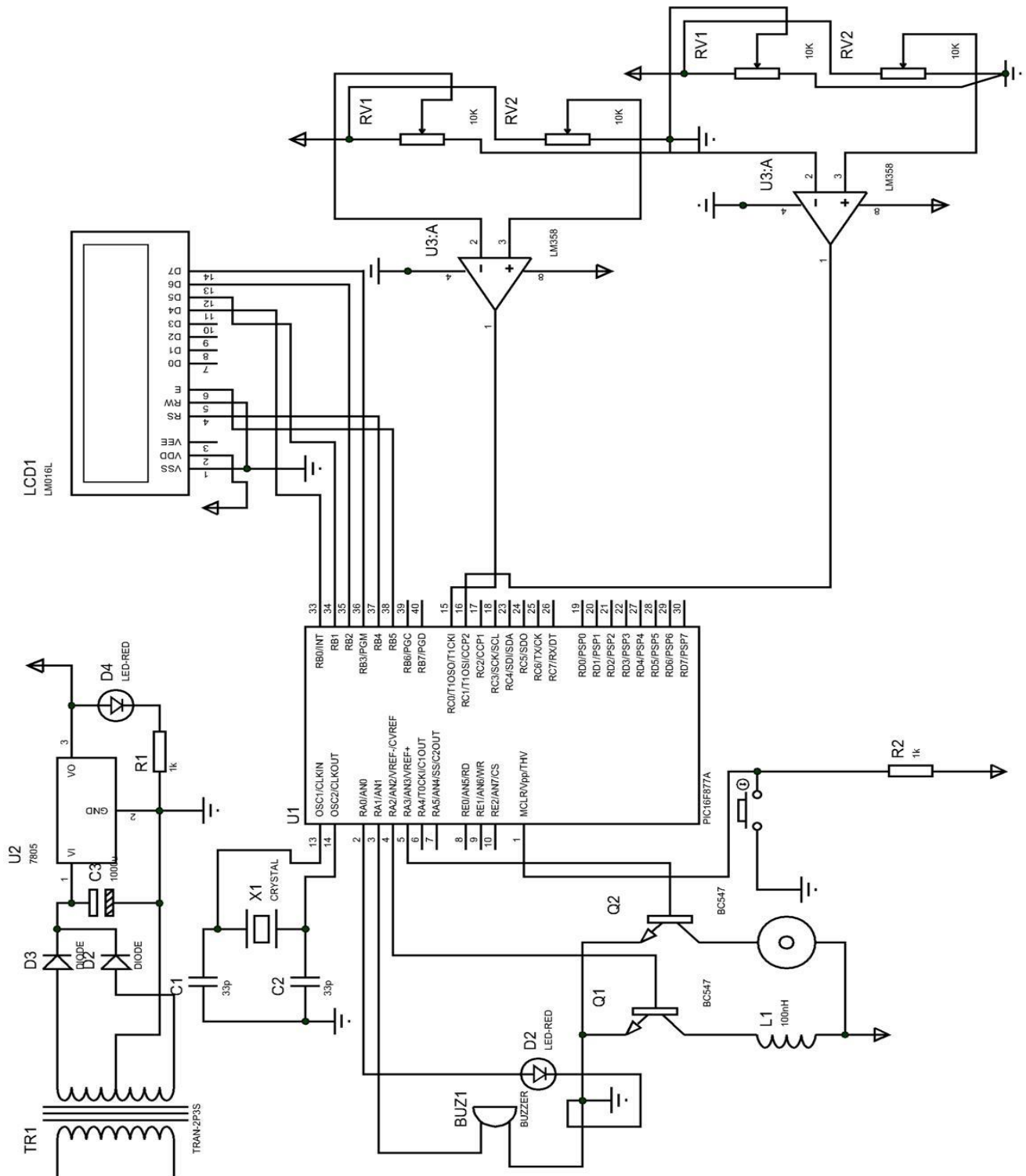
Necessity for detection: The consumers have to upgrade their safety standards, act in accordance with statutory requirements on

Environmental commitments and most importantly the basic function being prevented by accidents and protect life and property from disasters. Thus it takes nearly few min to detect when 1% of gas leak occurs. As a solution for the problem, a monitoring system of gas detector by wireless system needs to be developed in order to solve the problem. By monitoring system wirelessly, user can remotely view the condition of the home without them being there themselves.

Home security has been a major issue where crime is increasing and everybody wants to take proper measures to prevent intrusion. In addition there was a need to automate home so that user can take advantage of the technological The project is aimed at developing the security of Home against Intruders, Gas Leak and Fire.

4. Methodology:- Our project is very innovative project in this we modify a security system for home or industries purpose. In this project we use gas sensor for detection gas leakage and smoke at place where we place it and then we control main supply of gas source where it comes through solenoid valve. For accurate and real time operation in this whole project we use a microcontroller which control whole system itself as well as all inputs and outputs. In this project we use regulated power supply using DC voltage regulating IC 7805 for +5volt dc then we use MQ6 sensor which detect if there is gas leakage or smoke then these sensor sense and then signaling to microcontroller (PIC16F877A) to control other process or output process. When microcontroller get signal to the sensor module of gas leakage it gives output to the transistor (BC547) to switching main valve (solenoid valve) and also a buzzer which sound beep so we get that there is some gas leakage having. And finally in this we use a LCD (16x2) display which show

online status that gas leakage or not if buzzer is sound or not. So, we can see the status on display. That is our project in which we design automatic security system which allows to flow of gas or not depending on leakage or non-leakage condition with buzzer and display.



Circuit diagram

Alternating current differ from DC in the direction of electron flow , first in one direction for a short time , then reverse direction and flow again in opposite direction for short time . The flow of electrons in one direction and then in another direction is called a cycle of AC . The number of cycles occur in one second of time is called “Cycles/Second”. In our country the standard power line frequency is 50 Hz .

The major blocks of the power supply units are

- Step down transformer
- Rectifier diodes
- Filters
- Voltage regulators

Step down transformer

The instrument transformer for power supply in this project is to convert AC from 230V to required low level such as 5V AC . This transformer apart from stepping down AC voltage, gives isolation between power source and power supply circuitries.

Rectifier Unit

In a power supply unit , rectification is normally achieved by a solid state diode . Diode contains two electrodes called the anode and the cathode . A diode has the property that will let electron flow easily in one direction . As a result when AC is applied to a diode, electrons only flow when the anode is positive and cathode is negative. Reversing the polarity of voltage applied to a diode will not permit electron flow .The various method of rectifying AC to DC or half wave , full wave and bridge rectifications . This project employs a full wave bridge rectifier

which is most commonly used in industries. A bridge structure of four diodes is commonly used in power supply units to achieve full wave rectification. When AC voltage is applied to the primary winding of power transformer. It is stepped down to 5V AC across the secondary winding of the transformer. Normally one alteration of the input voltage will cause the polarities to reverse. Opposite end of the transformer will therefore, always be 180 degrees out of phase with each other. For positive cycle, two diodes connected to the top winding gets positive voltage and only one diode conducts for that cycle due to forward bias. At the same time one out of the other two diodes conducts, for the negative voltage being applied from the bottom winding due to forward bias for that diode DC of frequency 100Hz. In the next alteration the two diodes conducted from top winding and bottom winding as they are forward biased in this cycle. It is to be noted that the current flow through the load is always in one direction for each alteration of the applied AC input. This is of course, means that AC is rectified into DC. This DC output, in this case, has a ripple frequency of 100Hz, since each alternation produces a resulting output pulse, the ripple frequency or $2 \times 50 \text{ Hz} = 100\text{Hz}$. The output DC is not a pure DC. It is pulsating DC voltage.

<u>Filter</u>	<u>Unit</u>
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After pulsating DC has been produced by our rectifier, it must be filtered in or for it to be usable in a power supply. Filtering involves the ripple frequency. The power supply unit employed in this project used 7805 voltage regulator (for positive output voltages) and a 7905 regulator (for negative output voltage Resistors R1 and R2 maintain line load regulation. Capacitors C2 and C4 act as high frequency suppressors.

At secondary side of transformer

Applied voltage	=	5
Conducting drop across diodes	=	2*0.6
	=	1.2V

Without capacitor

$$V_{avg} = (5 - 1.2) = 3.8 \text{ V pulsating DC}$$

$$\text{Frequency} = 100 \text{ Hz}$$

With capacitor

$$V = V_{avg} \times 1.414$$

$$= 5.373 \text{ V}$$

$$\text{Frequency} = 0 \text{ Hz}$$

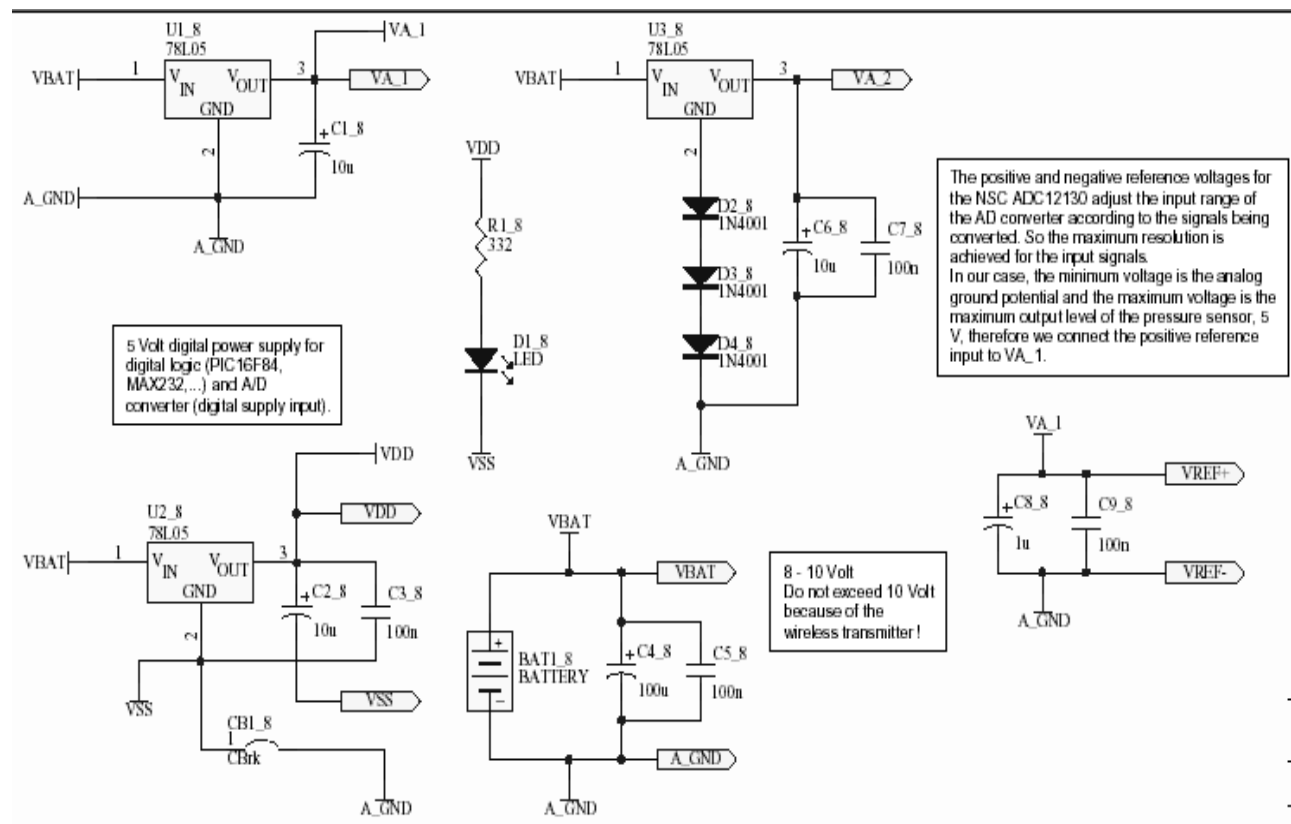
With 7805 voltage regulator

$$V = +5 \text{ V}$$

With 7905 voltage regulator

$$V_o = -5 \text{ V}$$

Circuit



5.Components:-

- PIC16F877A (MICROCONTROLLER)
- LM7805 Voltage Regulator +5V

- Capacitor
- 1N4007 DIODE
- Resistor
- Potentiometer
- Crystal Oscillator
- Transistor
- Switch
- Transformer
- LCD Display(16x2)
- MQ3 (SMOKE SENSOR)
- MQ6 (LPG DETECTOR SENSOR)
- LM358
- SOLENOID VALVE
- Buzzer
- PCB (Printed Circuit Board)

6.PIC16F877A (Microcontroller):-

PIC16F877A devices are available only in 40-pin packages. All devices in the PIC16F7X family share common architecture, with the following differences. *This document contains device specific information about the following devices:*

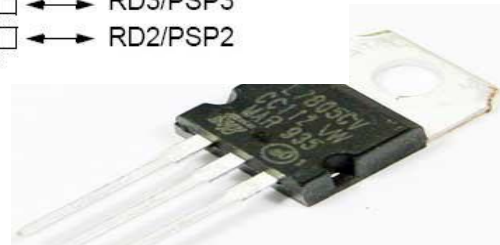
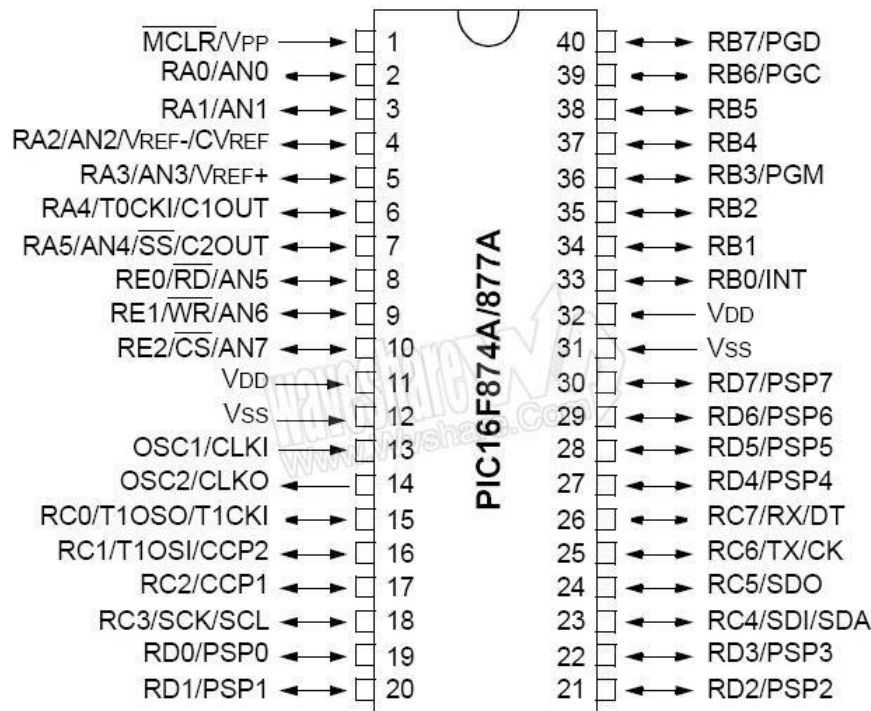
- PIC16F877A

PIC16F874A/877A devices are available in 40-pin and 44-pin packages. *All devices in the PIC16F87XA family share common architecture with the following differences:*

- The PIC16F873A and PIC16F874A have one-half of the total on-chip memory of the PIC16F876A and PIC16F877A.

- The 28-pin devices have three I/O ports, while the 40/44-pin devices have five.
- The 28-pin devices have fourteen interrupts, while the 40/44-pin devices have fifteen.
- The 28-pin devices have five A/D input channels, while the 40/44-pin devices have eight.
- The Parallel Slave Port is implemented only on the 40/44-pin devices.

40-Pin PDIP



LM7805 Voltage Regulator +5V

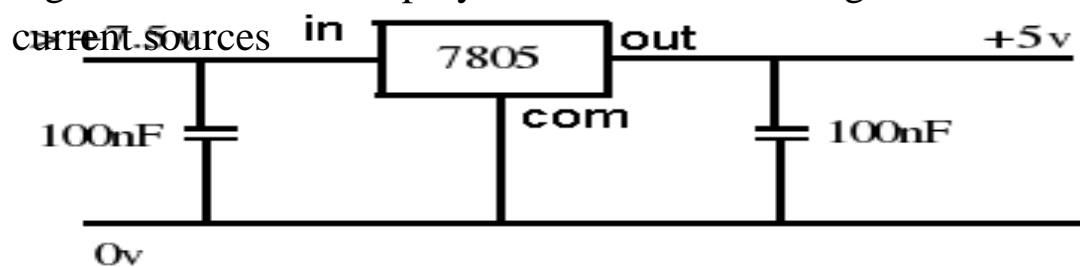
A voltage regulator is designed to automatically maintain a constant voltage level. A voltage regulator may be a simple "feed-forward" design or may include negative feedback control loops. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.

The 78xx (sometimes LM78xx) is a family of self-contained fixed linear voltage regulator integrated circuits. The 78xx family is commonly used in electronic circuits requiring a regulated power supply due to their ease-of-use and low cost. For ICs within the family, the xx is replaced

with two digits, indicating the output voltage (for example, the 7805 has a 5 volt output, while the 7812 produces 12 volts). The 78xx line are positive voltage regulators: they produce a voltage that is positive relative to a common ground.

7.Circuits of Voltage Regulating IC'S :-

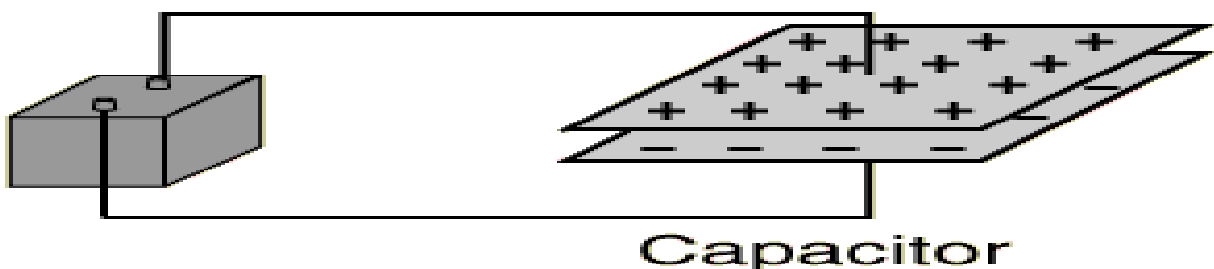
The 78XX series of voltage regulator are intended to provide a fixed voltage for use with a variety of different circuits. They are available in a range of different voltages as shown below and, although only the positive variety are considered here, there is a complimentary range of negative regulators that are essentially identical. The voltage regulators are capable of providing currents of up to 1.5A with adequate heat-sinking and internal protection circuitry makes them almost indestructible. In other configurations and with extra components, these regulators can be employed as variable voltage sources or constant



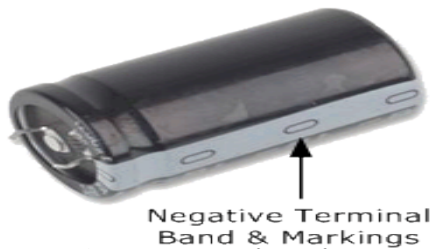
Capacitor Capacitors are components that are used to store an electrical charge. Sometimes capacitors are used to smooth a current in a circuit.

When power is supplied to a circuit that includes a capacitor - the capacitor charges up. When power is turned off the capacitor discharges its electrical charge slowly.

Symbols of capacitors



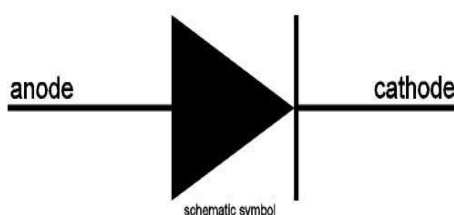
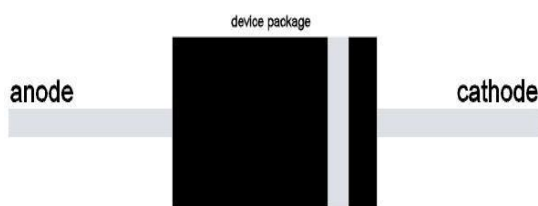
A battery will transport charge from one plate to other until the voltage produced by the charge buildup is equal to the battery voltage.



Capacitor **Polarization** generally refers to the electrolytic type capacitors but mainly the Aluminium Electrolytic's, with regards to their electrical connection. The majority of electrolytic capacitors are polarized types, that is the voltage connected to the capacitor terminals must have the correct

Polarity, i.e. positive to positive and negative to negative.

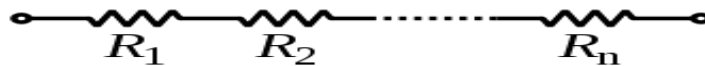
1N4007 DIODE The most common function of a diode is to allow an electric current to pass in one direction (called the diode forward direction), while blocking current in the opposite direction (the *reverse* direction). Thus, the diode can be viewed as an electronic version of a *check valve*. This unidirectional behavior is called *rectification*, and is used to convert *alternating current* to *direct current*, including extraction of modulation from radio signals in radio receivers these diodes are forms of rectifiers.



Resistor A resistor is a component of an electrical circuit that resists the flow of electrical current. A resistor has two terminals across which electricity must pass, and is designed to drop the voltage of the current. A resistor is primarily used to create and maintain a known safe current within an electrical component. Resistance is measured in ohms, after Ohm's law. This rule states that electrical resistance is equal to the drop in voltage across the terminals of the resistor divided by the current being applied to the resistor. A high ohm rating indicates a high resistance to current. This rating can be written in a number of different ways depending on the ohm rating. For example- 81R represents 81 ohms, while 81K represents 81,000 ohms.

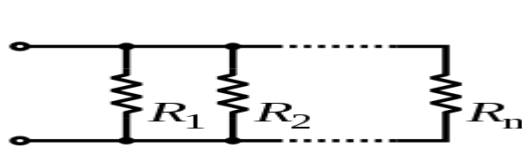
Series and parallel connection of resistors

In a series configuration, the current through all of the resistors is the same, but the voltage across each resistor will be in proportion to its resistance. The potential difference (voltage) seen across the network is the sum of those voltages, thus the total resistance can be found as the sum of those resistances:



$$R_{eq} = R_1 + R_2 + \dots + R_n$$

The parallel equivalent resistance can be represented in equations by two vertical lines "||" (as in geometry) as a simplified notation. Occasionally two slashes "/" are used instead of "||", in case the keyboard or font lacks the vertical line symbol. For the case of two resistors in parallel, this can be calculated using:



$$R_{eq} = R_1 || R_2 = \frac{R_1 R_2}{R_1 + R_2}$$

8.Potentiometer (POT / Variable Resistor) :-

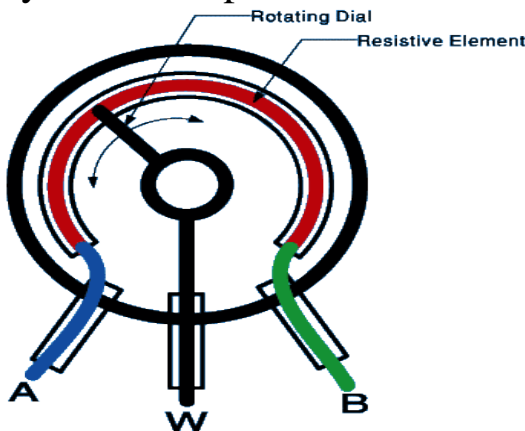
A POT in electronics technology is a component. A three terminal resistor with a sliding contact that forms an adjustable voltage divider. If only two terminals are used, one end and the wiper, it acts as a *variable resistor* or *rheostat*. A potentiometer measuring instrument is essentially a voltage divider used for measuring electric potential (voltage); The component is an implementation of the same principle, hence its name.



SYMBOLS OF VARIABLE RESISTOR

Linear taper potentiometer

linear taper potentiometer (*linear* describes the electrical characteristic of the device, not the geometry of the resistive element) has a resistive element of constant cross-section, resulting in a device where the resistance between the contact (wiper) and one end terminal is proportional to the distance between them. Linear taper potentiometers are used when the division ratio of the potentiometer must be proportional to the angle of shaft rotation (or slider position), for example, controls used for adjusting the centering of an analog cathode-ray oscilloscope



Connection Leads



Crystal Oscillator

A **crystal oscillator** is an electronic oscillator circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. This frequency is commonly used to keep track of time (as in quartz wristwatches), to provide a stable clock signal for digital integrated circuits, and to stabilize frequencies for radio transmitters and receivers. The most common type of piezoelectric resonator used is the quartz crystal, so oscillator circuits incorporating them became known as crystal oscillators, but other piezoelectric materials including polycrystalline ceramics are used in similar circuits. Quartz crystals are manufactured for frequencies from a few tens of kilohertz to tens of megahertz. More than two billion crystals are manufactured annually. Most are used for

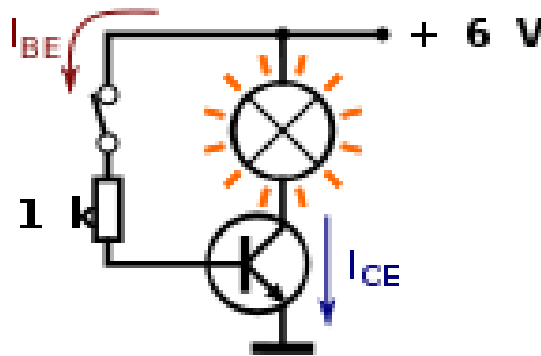


consumer devices such as wristwatches, clocks, radios, computers, and cell phones. Quartz crystals are also found inside test and measurement equipment, such as counters, signal generators, and oscilloscopes.

9. Transistor (BC547)

A **transistor** is a semiconductor device used to amplify and switch electronic signals and electrical power. It is composed of semiconductor material with at least three terminals for connection to an external circuit. A voltage or current applied to one pair of the transistor's terminals changes the current flowing through another pair of terminals. Because the controlled (output) power can be higher than the controlling (input) power, a transistor can amplify a signal. Today, some transistors are packaged individually, but many more are found embedded in integrated circuits.

Transistor as a switch



BJT used as an electronic switch, in grounded-emitter configuration. Transistors are commonly used as electronic switches, both for high-power applications such as switched-mode power supplies and for low-power applications such as logic gates. In a grounded-emitter transistor circuit, such as the light-switch circuit shown, as the base voltage rises, the emitter and collector currents rise exponentially. The collector voltage drops because of the collector load resistance (in this example, the resistance of the light bulb). If the collector voltage were zero, the collector current would be limited only by the light bulb resistance and the supply voltage. The transistor is then said to be *saturated* - it will have a very small voltage from collector to emitter. Providing sufficient base drive current is a key problem in the use of bipolar transistors as switches. The transistor provides current gain, allowing a relatively large current in the collector to be switched by a much smaller current into the

base terminal. The ratio of these currents varies depending on the type of transistor, and even for a particular type, varies depending on the collector current. In the example light-switch circuit shown, the resistor is chosen to provide enough base current to ensure the transistor will be saturated. In any switching circuit, values of input voltage would be chosen such that the output is either completely off, or completely on. The transistor is acting as a switch, and this type of operation is common in digital circuits where only "on" and "off" values are relevant.

Switch

In electrical engineering, a **switch** is an electrical component that can break an electrical circuit, interrupting the current or diverting it from one conductor to another. The most familiar form of switch is a manually operated electromechanical device with one or more sets of electrical contacts, which are connected to external circuits. Each set of contacts can be in one of two states: either "closed" meaning the contacts are touching and electricity can flow between them, or "open", meaning the contacts are separated and the switch is nonconducting. The mechanism actuating the transition between these two states (open or closed) can be either a "*toggle*" (flip switch for continuous "on" or "off") or "*momentary*" (push-for "on" or push-for "off") type.



10. Transformer

(STEP

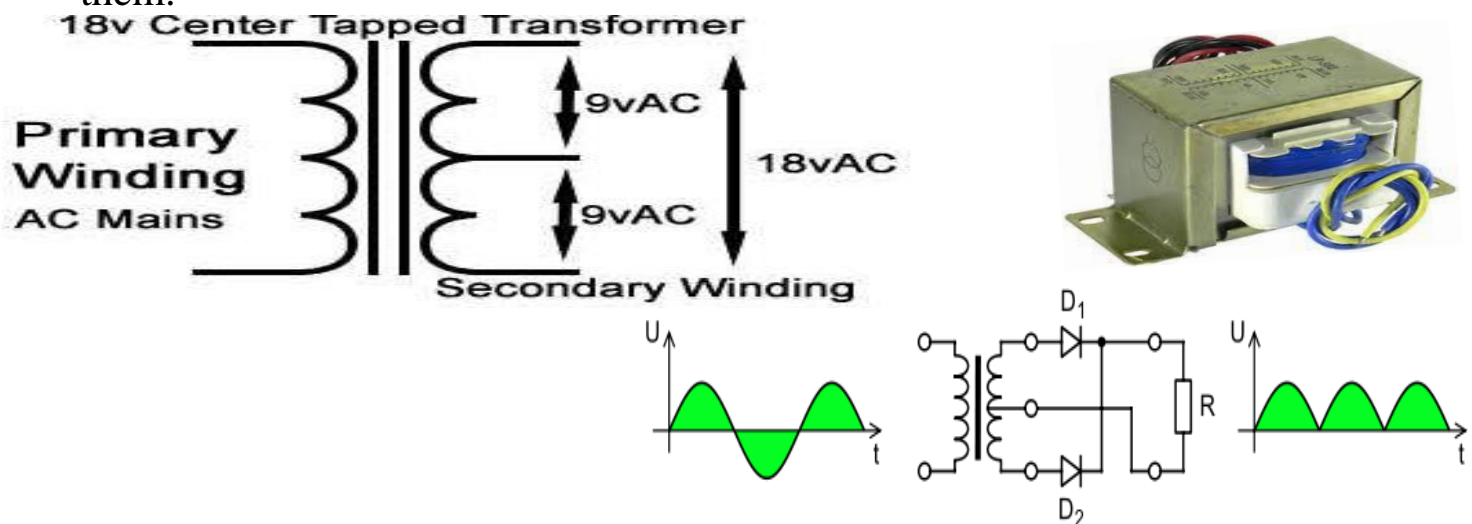
DOWN):-

In electronics, a **center tap** is a connection made to a point halfway along a winding of a transformer or inductor, or along the element of a resistor or a potentiometer. Taps are sometimes used on inductors for the coupling of signals, and may not necessarily be at the half-way point, but rather, closer to one end. A common application of this is in the Hartley oscillator. Inductors with taps also permit the transformation of the amplitude of alternating current (AC) voltages for the purpose of power conversion, in which case, they are referred to as

autotransformers, since there is only one winding. An example of an autotransformer is an automobile ignition coil. Potentiometer tapping provides one or more connections along the device's element, along with the usual connections at each of the two ends of the element, and the slider connection. Potentiometer taps allow for circuit functions that would otherwise not be available with the usual construction of just the two end connections and one slider connection.

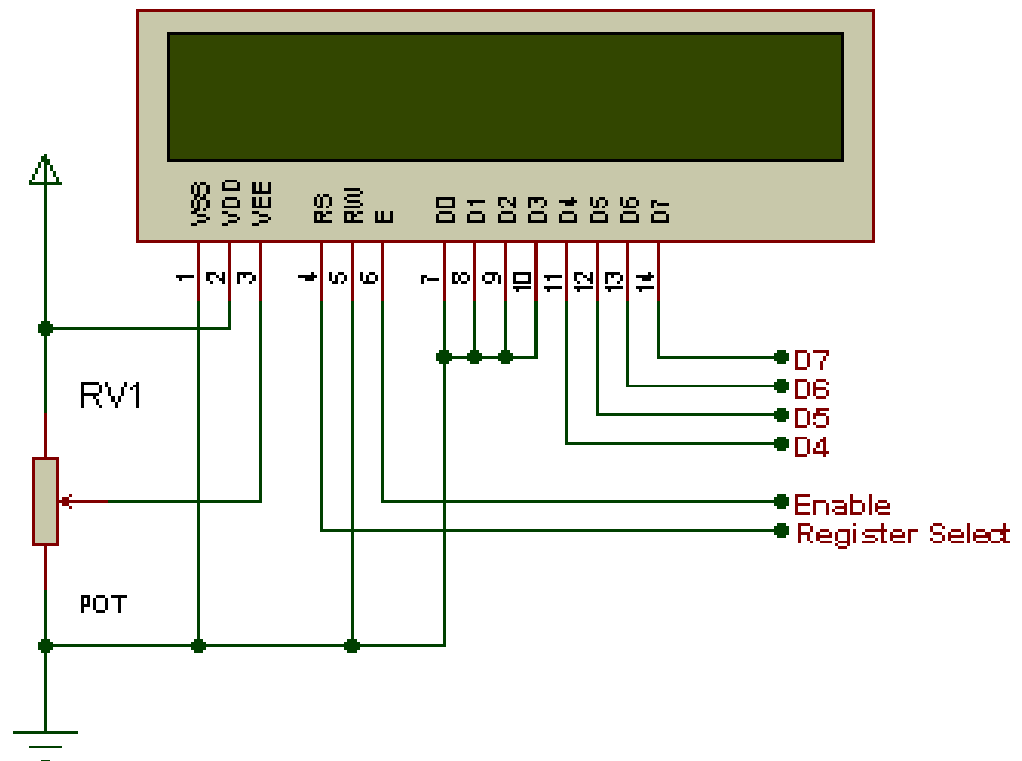
11. Volts center tapped:-

Volts center tapped (VCT) describes the voltage output of a center tapped transformer. For example: A 24 VCT transformer will measure 24 VAC across the outer two taps (winding as a whole), and 12 VAC from each outer tap to the center-tap (half winding). These two 12 VAC supplies are 180 degrees out of phase with each other, thus making it easy to derive positive and negative 12 volt DC power supplies from them.



12. LCD Display(16x2):- CD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

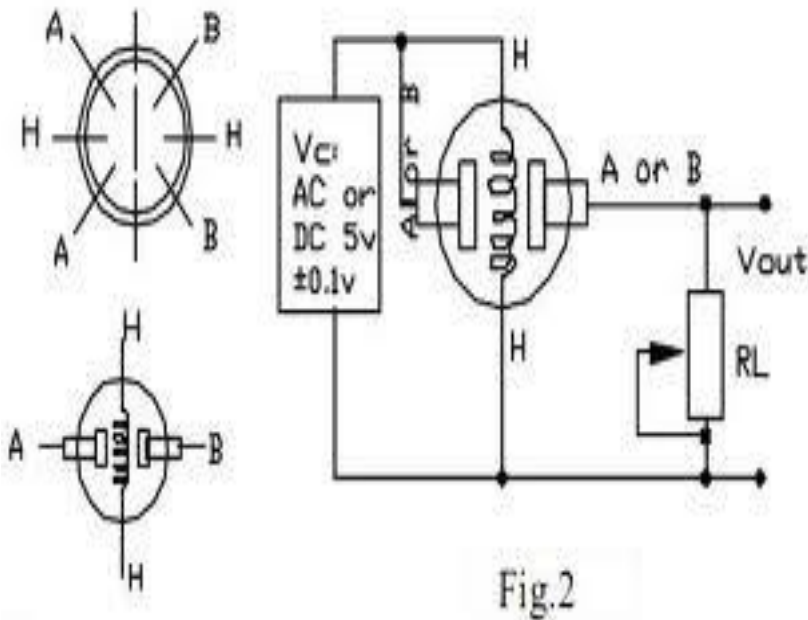
The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.



Pin Description:

Pin No	Function	Name
1	Ground (0V)	Ground
2	Supply voltage; 5V (4.7V – 5.3V)	Vcc
3	Contrast adjustment; through a variable resistor	VEE
4	Selects command register when low; and data register when high	Register Select
5	Low to write to the register; High to read from the register	Read/write
6	Sends data to data pins when a high to low pulse is given	Enable
7	8-bit data pins	DB0
8		DB1
9		DB2
10		DB3
11		DB4
12		DB5
13		DB6
14		DB7
15	Backlight VCC (5V)	Led+
16	Backlight Ground (0V)	Led-

13.MQ6 (LPG DETECTOR SESNOR):-



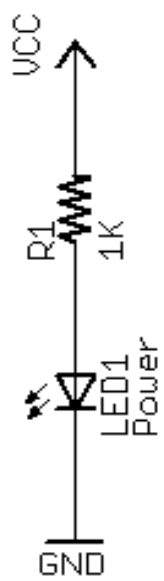
FEATURES

- High sensitivity to LPG, iso-butane, propane
- Small sensitivity to alcohol, smoke.
- * Fast response . * Stable and long life * Simple drive circuit

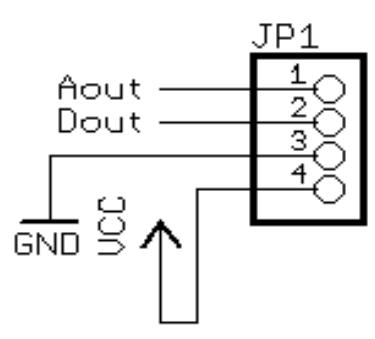
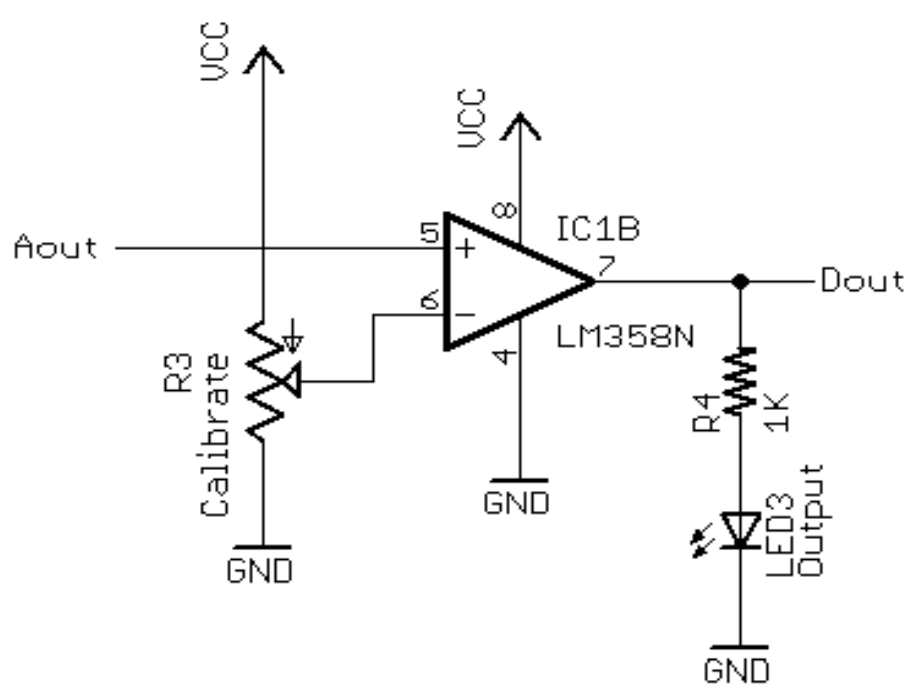
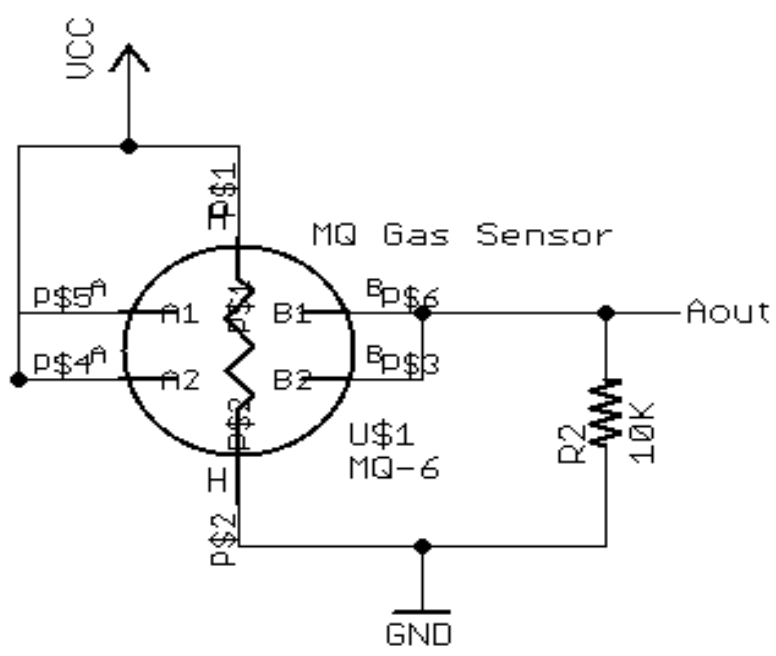
14.Application:-

They are used in gas leakage detecting equipments in family and industry, are suitable for detecting of LPG, iso-butane, propane, LNG, avoid the noise of alcohol and cooking fumes and cigarette smoke.

Structure and configuration of MQ-6 gas sensor is (Configuration A or B), sensor composed by micro AL₂O₃ ceramic tube, Tin Dioxide (SnO₂) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-6 have 6 pin ,4 of them are used to fetch signals, and other 2 are used for providing heating current.



Power Indicator



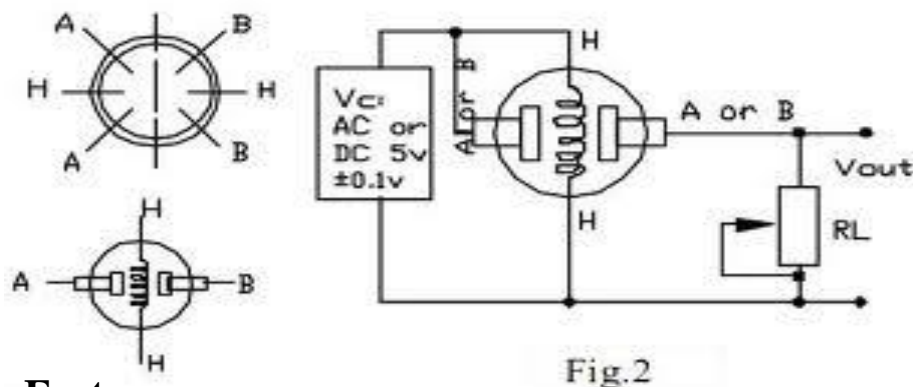
-  H1 MOUNT-HOLE2.8
-  H2 MOUNT-HOLE2.8
-  H3 MOUNT-HOLE2.8
-  H4 MOUNT-HOLE2.8

15.Sensitivity Adjustment:-

Resistance value of MQ-6 is difference to various kinds and various concentration gases. So, When using this components, sensitivity adjustment is very necessary. we recommend that you calibrate the detector for 1000ppm of LPG concentration in air and use value of Load resistance (R_L) about $20K\Omega$ ($10K\Omega$ to $47K\Omega$). When accurately measuring, the proper alarm point for the gas detector should be determined after considering the temperature and humidity influence.



16.MQ2 (Smoke Sensor):-



Features

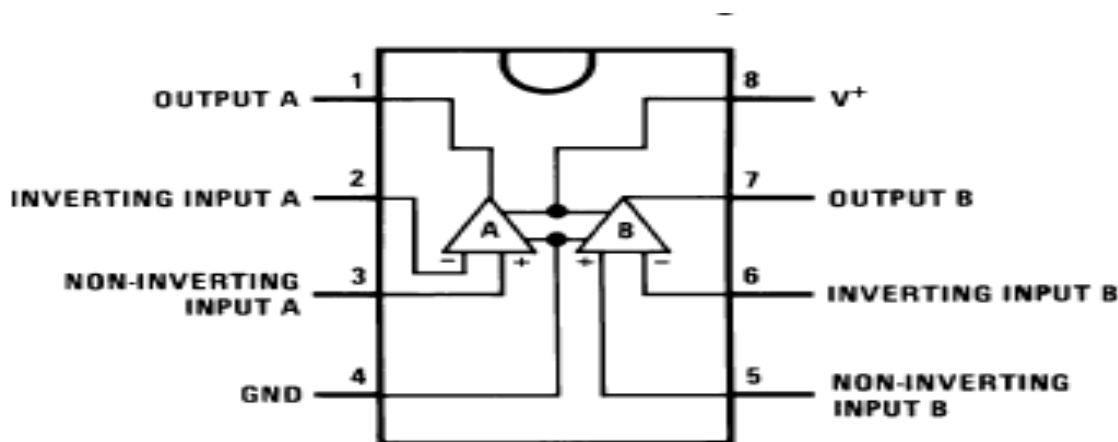
- High sensitivity to LPG, iso-butane, propane
- Small sensitivity to alcohol, smoke.
- * Fast response . * Stable and long life * Simple drive circuit

Application

They are used in gas leakage detecting equipments in family and industry, are suitable for detecting of LPG, iso-butane, propane, LNG, avoid the noise of alcohol and cooking fumes and cigarette smoke.

Structure and configuration of MQ-2 gas sensor is (Configuration A or B), sensor composed by micro AL₂O₃ ceramic tube, Tin Dioxide (SnO₂) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-6 have 6 pin, 4 of them are used to fetch signals, and other 2 are used for providing heating current.

17.LM358 (Low Power Dual Operational Amplifiers):-



- Internally frequency compensated for unity gain
- Large dc voltage gain: 100 dB
- Wide bandwidth (unity gain): 1 MHz (temperature compensated)
- Wide power supply range:
 - Single supply: 3V to 32V
 - or dual supplies: $\pm 1.5\text{V}$ to $\pm 16\text{V}$
- Very low supply current drain (500 μA) — essentially independent of supply voltage
- Low input offset voltage: 2 mV
- Input common-mode voltage range includes ground
- Differential input voltage range equal to the power supply voltage
- Large output voltage swing Two internally compensated op amps
- Eliminates need for dual supplies
- Allows direct sensing near GND and VOUT also goes to GND
- Compatible with all forms of logic

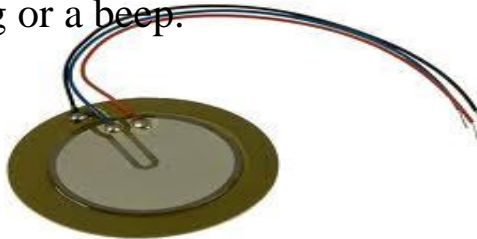
Power drain suitable for battery operation.

18.Buzzer:- A **buzzer** or **beeper** is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke.



19.Piezoelectric:-

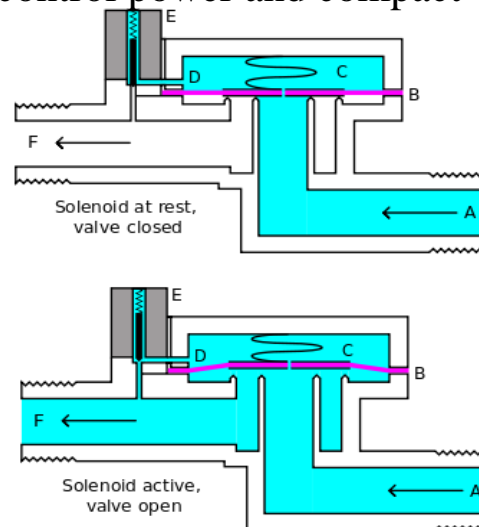
A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep.



20.Solenoid Valve:- A **solenoid valve** is an electromechanically operated valve. The valve is controlled by an electric current through a solenoid: in the case of a two-port valve the flow is switched on or off; in the case of a three-port valve, the outflow is switched between the two outlet ports. Multiple solenoid valves can be placed together on a manifold. Solenoid valves are the most frequently used control elements in fluidics. Their tasks are to shut off, release, dose, distribute or mix fluids. They are found in many application areas. Solenoids offer fast and safe switching, high reliability, long service life, good medium compatibility of the materials used, low control power and compact design.

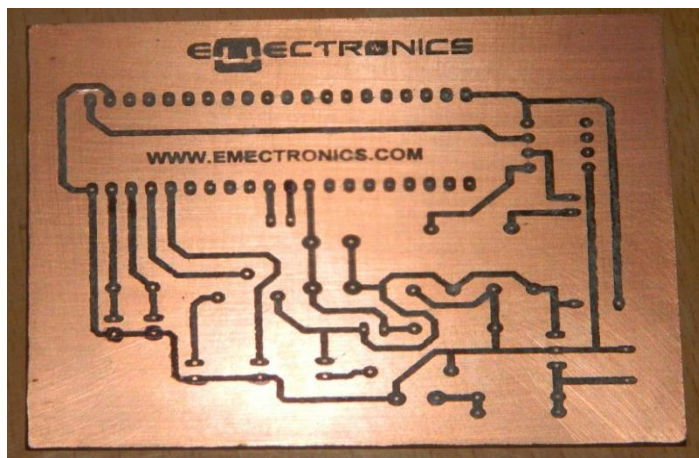


Operation

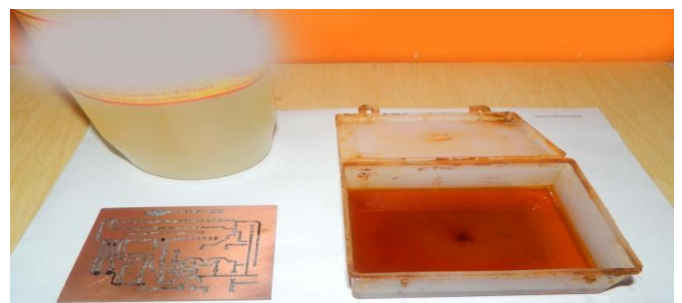


21.PCB (Printed Circuit Board):-A **printed circuit board**, or **PCB**, is used to mechanically support and electrically connect electronic components using conductive pathways, tracks or signal traces etched from copper sheets laminated onto a non-conductive substrate. When the board has only copper tracks and features, and no circuit elements such as capacitors, resistors or active devices have been manufactured into the actual substrate of the board, it is more correctly referred to as **printed wiring board (PWB)** or **etched wiring board**. Use of the term **PWB** or **printed wiring board** although more accurate and distinct from what would be known as a true **printed circuit board**, has generally fallen by the wayside for many people as the distinction between **circuit** and **wiring** has become blurred. Today printed wiring (circuit) boards are used in virtually all but the simplest commercially produced electronic devices, and allow fully automated assembly processes that were not possible or practical in earlier era tag type circuit assembly processes.

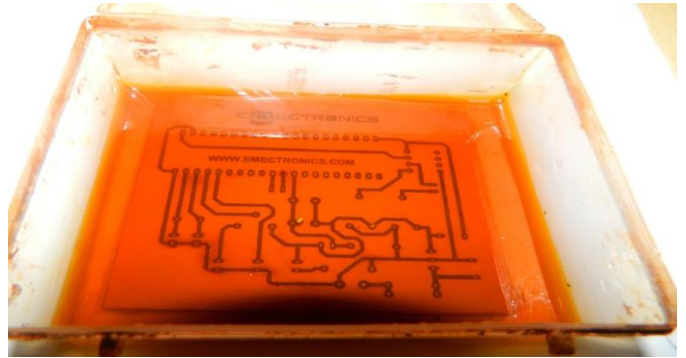
PCB FABRICATION First we print layout on copper clad board.



Prepare solution for itching layout



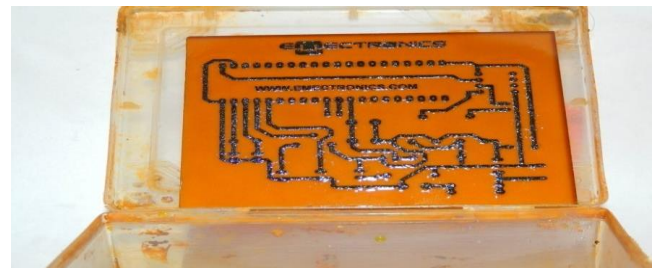
Now drop printed circuit board into solution



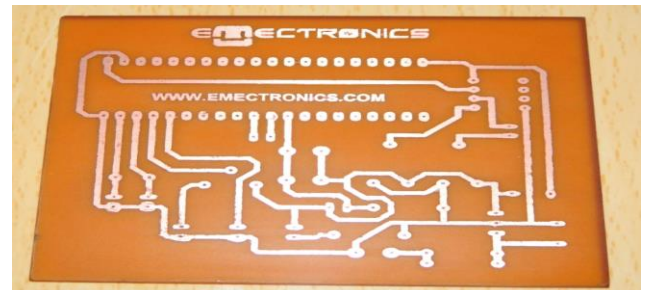
Wait for 3 minutes for complete cleaning extra copper on board



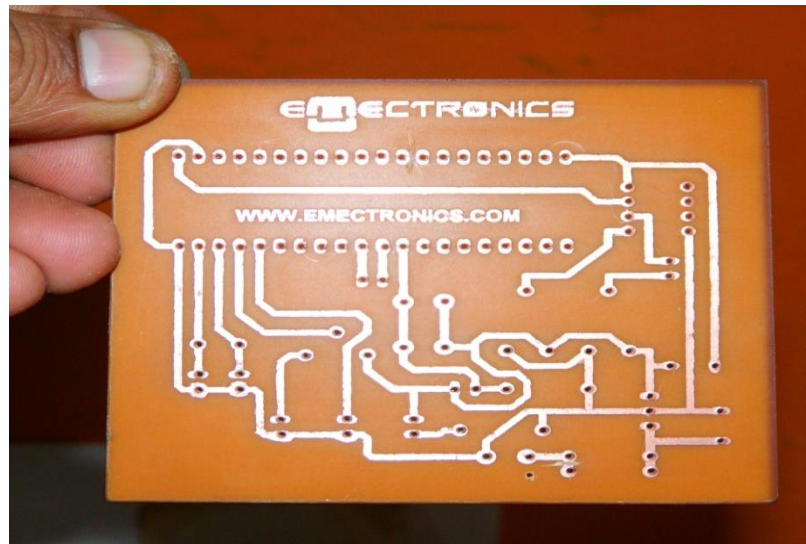
Take out from solution when completing process of itching



Clean all black colour from trace of layout



After cleaning of pcb drill whole hole for soldering components over its



22.Conclusion:- In recent households, the use of LPG is taking a big toll. From the use of cylinder up to the use of petroleum pipelines. The biggest threat in using this technology is security. And our project will prove to be boom for households and industries. The system provides control action by closing the regulator knob. This monitoring and detection system is proposed mainly to meet the safety standards and to avoid fire accidents because of leakage.

23.Future work:- This monitoring system can be further enhanced by using Bluetooth in place of GSM to send the alert messages to user, which supports the another real-time application. For industrial purposes mobile robot can be developed for detecting multiple gas concentrations. Addition to gas sensor temperature sensor can also be used which detects the high pressure gas in cylinder pipe, display the alert SMS when high temperature is reached.

20.References:-

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- www.learnengineering.org
- **National Conference on Synergetic Trends in engineering and Technology (STET-2014) International Journal of Engineering and Technical Research ISSN: 2321-0869, Special Issue**
- *IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) e-ISSN: 2278-2834,p- ISSN: 2278-8735.Volume 9, Issue 1, Ver. VI (Feb. 2014), PP 53-58 www.iosrjournals.org*