Smart Agriculture System

Major Project (Planning & Literature Survey)
Submitted in partial fulfillment of the requirement for the award
of Degree of

BACHELOR OF ENGINEERING

IN

ELECTRICAL & ELECTRONICS ENGINEERING

Submitted to

RAJIV GANDHI PROUDYOGIKI VISHWAVIDHYALAYA,

BHOPAL (M.P.)

Submitted by

ABHISHEK KUMAR (0105EX161004)
ARPIT JAIN (0105EX161026)
BHARAT RAJPOOT (0105EX161031)
GOURAV SHARMA (0105EX161041)
HIMANSHU ARYA (0105EX161045)

Under the Supervision of

Prof. PRIYANKA MISHRA

(Assistant Professor)

Department of Electrical and Electronics Engineering

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

ORIENTAL INSTITUTE OF SCIENCE & TECHNOLOGY,

BHOPAL (M.P.)-462021, INDIA

Submission November 2019

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Oriental Campus, Thakral Nagar, Raisen Road, Bhopal-462 022 (M.P.) INDIA

BONAFIDE CERTIFICATE

This is to certify that the dissertation entitled **"Smart Agriculture System" has** been carried out by A**bhishek Kumar (0105EX161004), Arpit Jain (0105EX161026), Bharat Rajpoot (0105EX161031), Gourav Sharma (0105EX161041), Himanshu Arya (0105EX161045)** student of **"Bachelors of Engineering in Electrical and Electronics Engineering"** under our supervision and guidance in the **"Department of Electrical and Electronics Engineering.**

Date:

Place: Bhopal

APPROVED & SUPERVISED BY:

Guide Name
Prof. Priyanka Mishra
(Assistant Professor)
Electrical and Electronics Engineering
OIST, Bhopal

FORWARDED BY:

Dr. Monika Jain
(Professor and HOD)
EX, OIST, Bhopal

Dr. K. G. Sudhakar
Director
OIST, Bhopal

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Oriental Campus, Thakral Nagar, Raisen Road, Bhopal-462 022 (M.P.) INDIA

DECLARATION

We **Abhishek Kumar, Arpit Jain, Bharat Rajpoot, Gourav Sharma, Himanshu Arya** student of **Bachelors of Engineering** in **Electrical and Electronics Engineering, Oriental Institute of Science & Technology, Bhopal (M.P)**, hereby declare that the work presented in this dissertation entitled **"Smart Agriculture System" is** the outcome of my own work, is bonafide and correct to the best of my knowledge and this work has been carried out taking care of engineering ethics. The work presented does not infringe any patented work and has not been submitted to any other University or anywhere else for the award of any degree or any professional diploma.

ABHISHEK KUMAR (0105EX161004)
ARPIT JAIN (0105EX161026)
BHARAT RAJPOOT (0105EX161031)
GOURAV SHARMA (0105EX161041)
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DECLARATION

I hereby declare that the dissertation entitled "**Smart Agriculture System**" is being submitted on the partial fulfillment for the award of the degree of Master of Technology in "Electrical and Electronics Enguneering". The work has been carried out in the department of "Electrical and Electronics" (Oriental Institute of Science & Technology, Bhopal) is an authentic record of my own work carried under the guidance of "Prof. Priyanka Mishra" I have not submitted the matter embodied in this report for award of any degree.

I also declare that "A check for Plagiarism has been carried out on the thesis / project / dissertation and is found within the acceptable limit and report of which is enclosed herewith".

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Place: Bhopal

ABHISHEK KUMAR (0105EX161004)
ARPIT JAIN (0105EX161026)
BHARAT RAJPOOT (0105EX161031)
GOURAV SHARMA (0105EX161041)
HIMANSHU ARYA (0105EX161045)

Prof. Priyanka Mishra
(Assistant Professor)
(EX)
OIST, Bhopal

Director / Principal Sign with Seal

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I express my heartfelt and profound gratitude to **Dr. K. G. Sudhakar Director** OIST Bhopal for his valuable suggestions at all stages of my research work.

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Finally, I would like to say that I am indebted to my parents for everything that they have done for me. All of this would have been impossible without their constant support. And I also thank to God for being kind to me and driving me through this journey.

ABHISHEK KUMAR (0105EX161004)
ARPIT JAIN (0105EX161026)
BHARAT RAJPOOT (0105EX161031)
GOURAV SHARMA (0105EX161041)
HIMANSHU ARYA (0105EX161045)

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ABSTRACT

The project is designed to develop an automatic irrigation system which switches the pump motor ON/OFF on sensing the moisture content of the soil. In the field of agriculture, use of proper method of irrigation is important. The advantage of using this method is to reduce human intervention and still ensure proper irrigation. The project uses an 8051 series microcontroller which is programmed to receive the input signal of varying moisture condition of the soil through the sensing arrangement. This is achieved by using an op-amp as comparator which acts as interface between the sensing arrangement and the microcontroller. Once the controller receives this signal, it generates an output that drives a relay for operating the water pump. An LCD display is also interfaced to the microcontroller to display status of the soil and water pump. The sensing arrangement is made by using two stiff metallic rods inserted into the field at a distance. Connections from the metallic rods are interfaced to the control unit.

LITERATURE REVIEW

M.Nesa Sudha 2011 proposed a TDMA based MAC protocol used for collect data such as soil moisture and temperature for optimum irrigation to save energy. MAC protocol plays an important role to reduce energy consumption.

Anuj Nayak 2014 describe that sensor nodes batteries are charged by using harnessing wind energy. A routing algorithm named DEHAR is proposed to extend overall batteries power.

B. Balaji Bhan in 2014 proposed a system to develop WSN based soil moisture controllers that determine the water requirement by comparing soil moisture with predefined threshold value. An intelligent remote system consists of wireless sensor nodes and computer system in which data is transmitted to a server system from where the data accessed by individuals for decision making for automated control of irrigation for the yield productivity.

Vasif Ahmed in 2010 describe the design of low cost remote control irrigation system in which the information is exchanged in the form of message and miscalls between the system and user cell phone when normal conditions exist. The system provides automatic control based on parameter specified through SMS/miscalls or keyboard and provide protection against overcurrent, over voltage.

Shaohua Wan in 2012 proposed tree topology and cluster based multihop routing algorithm to reduce energy consumption while data transmission of nodes use of WSN for monitor and collect crop water requirements such as temperature, humidity, soil moisture and irrigation volume to built the machine learning model and data aggregation for collaborative signal processing

INTRODUCTION

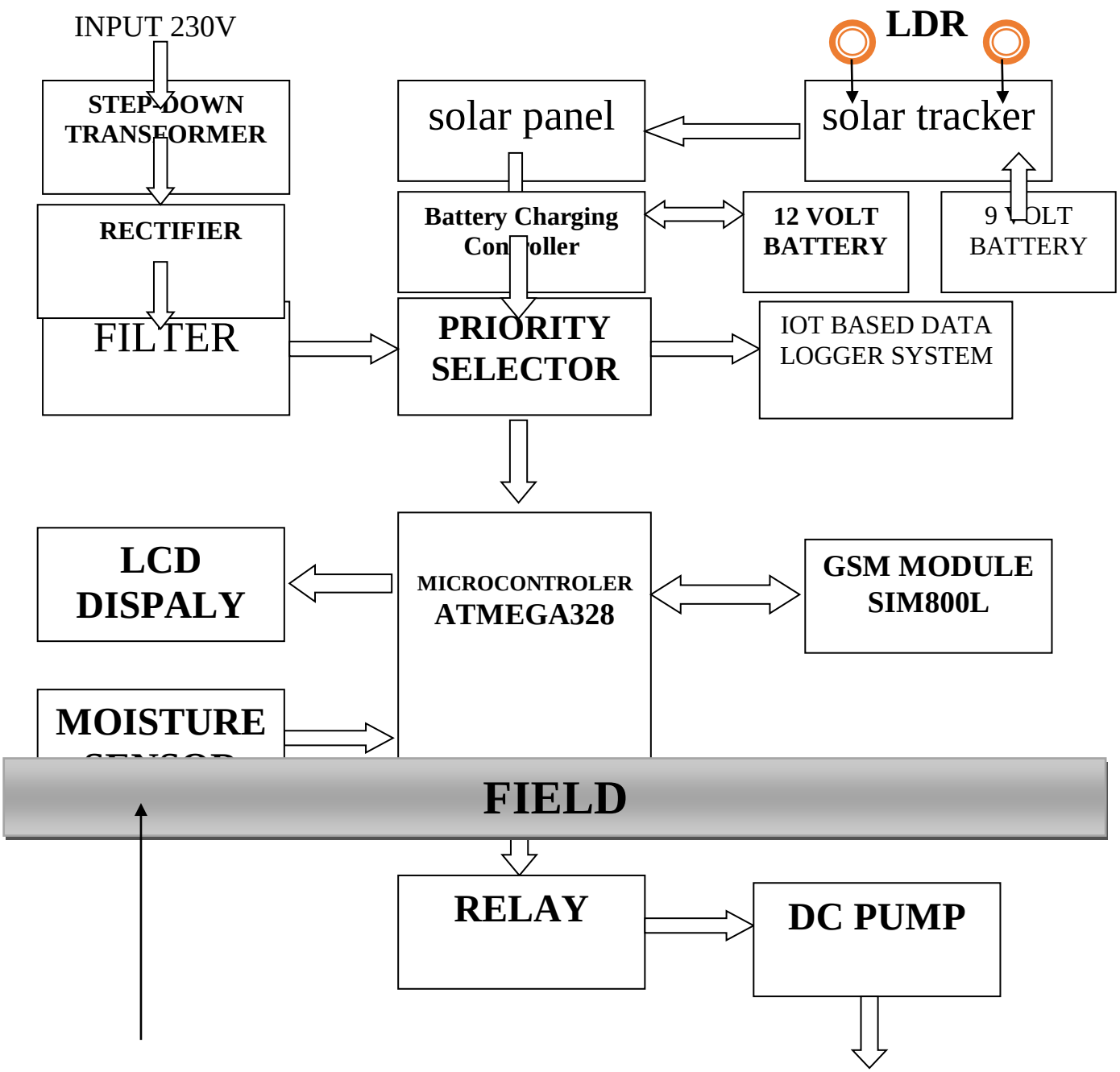
My project deal with fully automatic irritation system , in which hybrid power supply used . For hybrid power supply solar power , battery power and supply mains uses on the basis of preset priority . In this system first priority on the solar power because it's eco friendly and natural resources of energy . Second priority set on the battery power and last one is on supply main. with the help of IOT all data of field and supply system can be fetch through internet from anywhere . esp8266 Wi-Fi module use for internet connection with the help of preset HOTSPOT ID and PASSWORD. This system also operates by using GSM network , for turn on the pump send SMS (#A. pump on*) to contact no. Of sim Card that insert in to GSM module sim 800l. By using GSM module system send all notification to the particular contact no. That set in to program code. for maximum solar energy use solar tracking system also use .

HIGHLIGHT OF SYSTEM

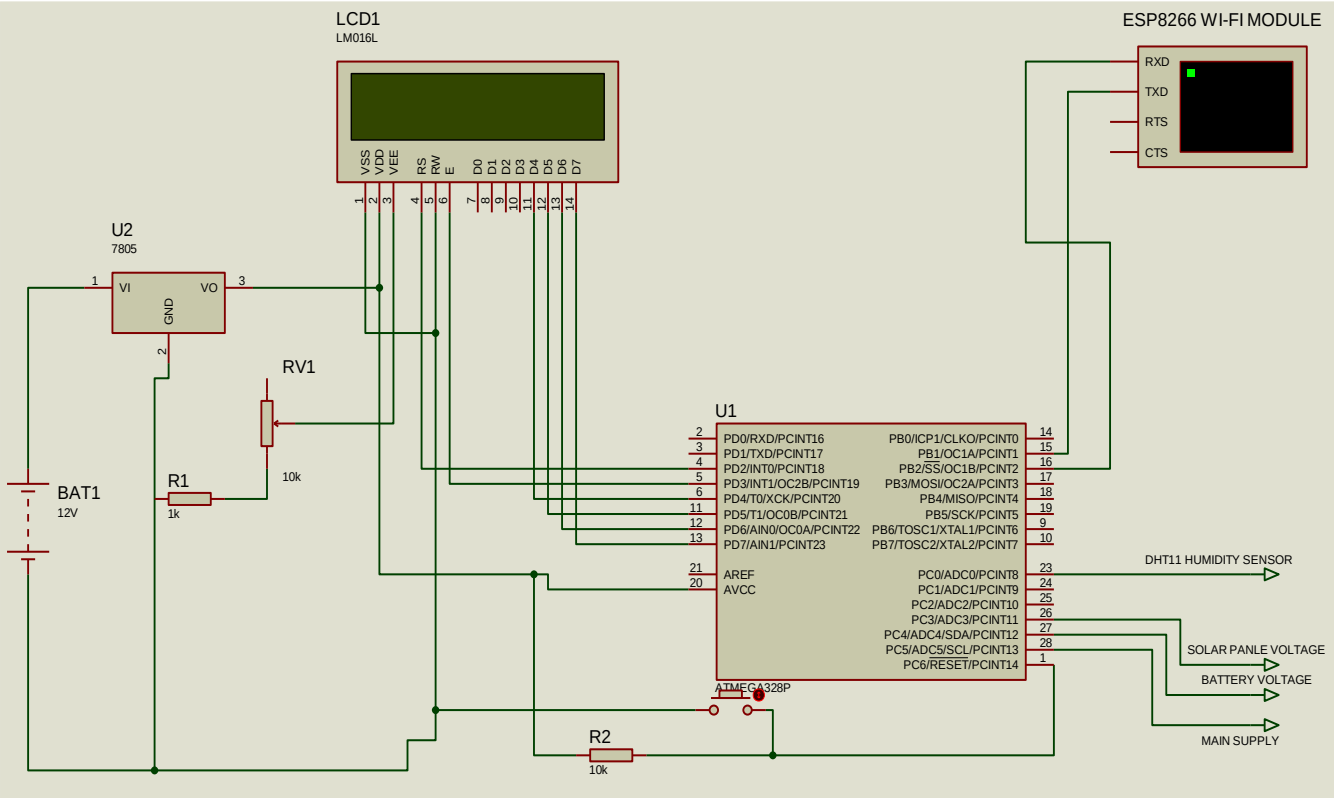
1:- All data available on Internet.
2:-Solar tracking system available.
3:-Pump can be operated by using GSM NETWORK.
4:- ALL notification available on LCD DISPLAY and on the particular mobile number.
5:- Pump automatic turn off on the basis of moisture level of the field.
6:- Priority based supply system use for irrigation .

BLOCK DIAGRAM

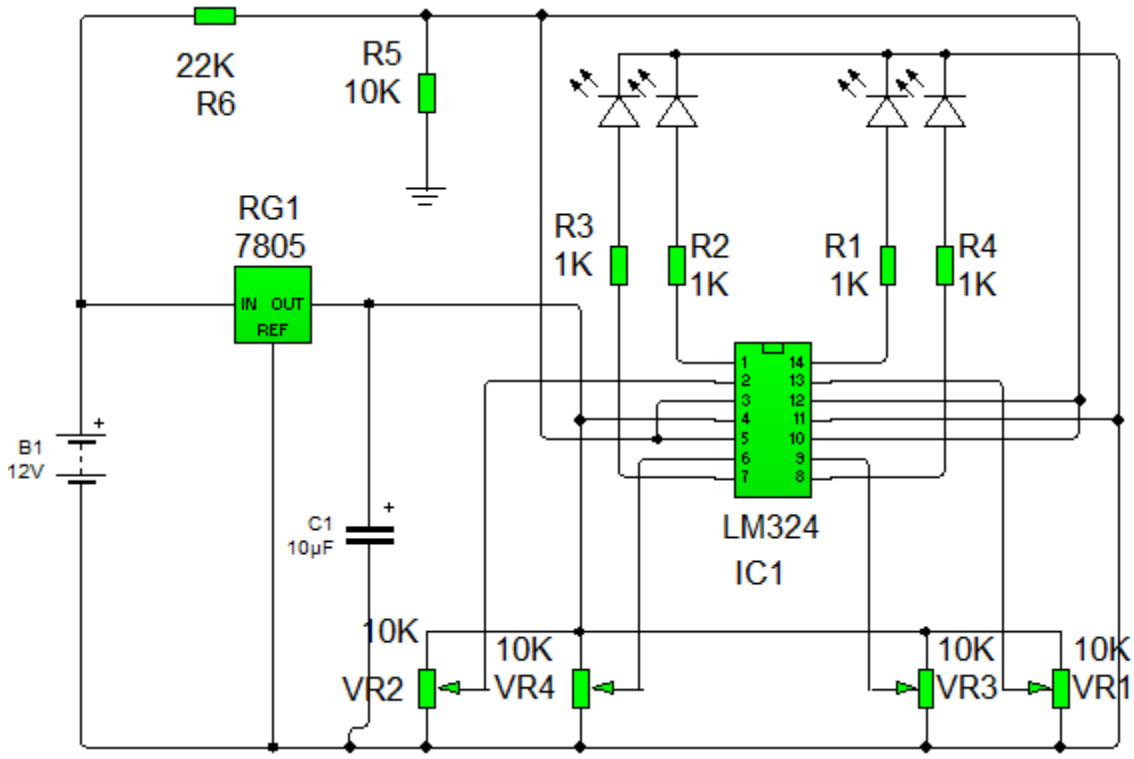
1:-BLOCK DIAGRAM OF WHOLE SYSTEM



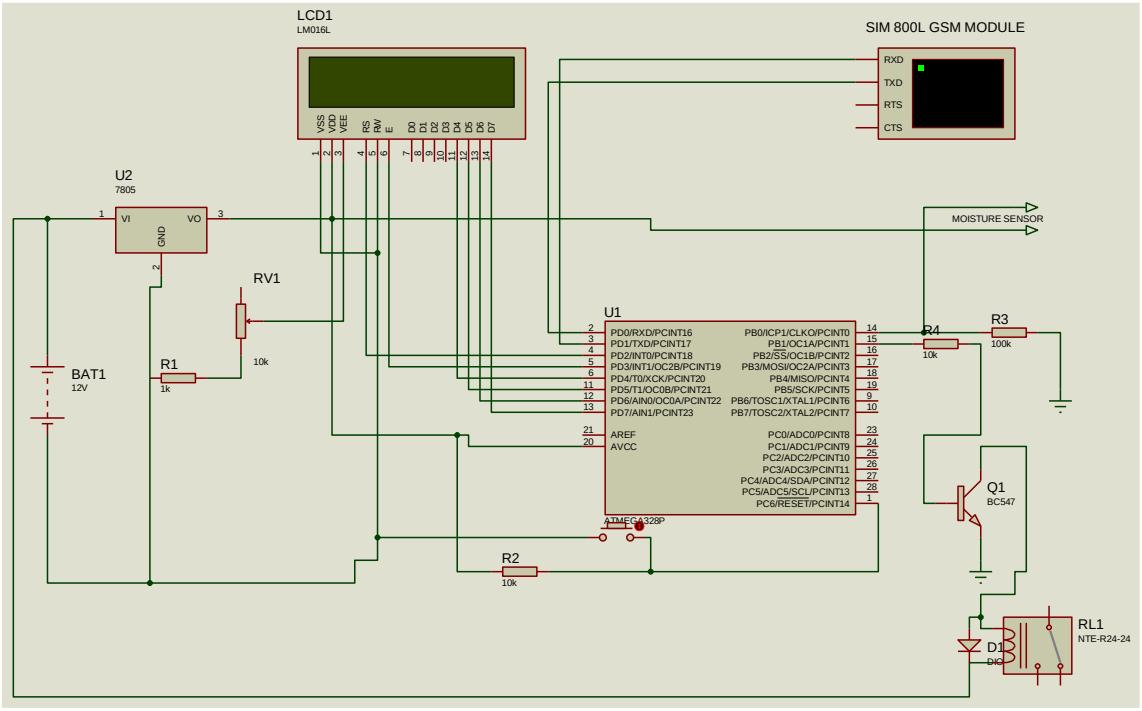
1:-DATA LOGGER SYSTEM



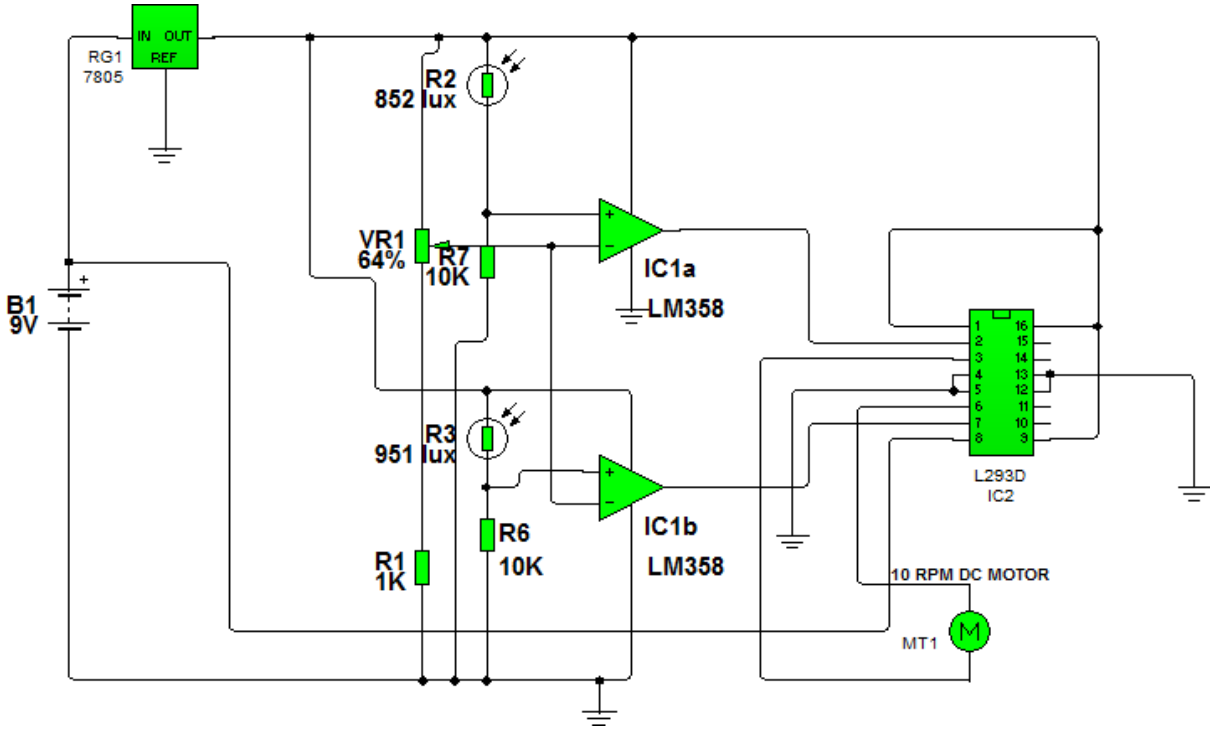
2:- BATERY LEVEL INDICATOR



3:- GSM BASED PUMP CONTROLLER

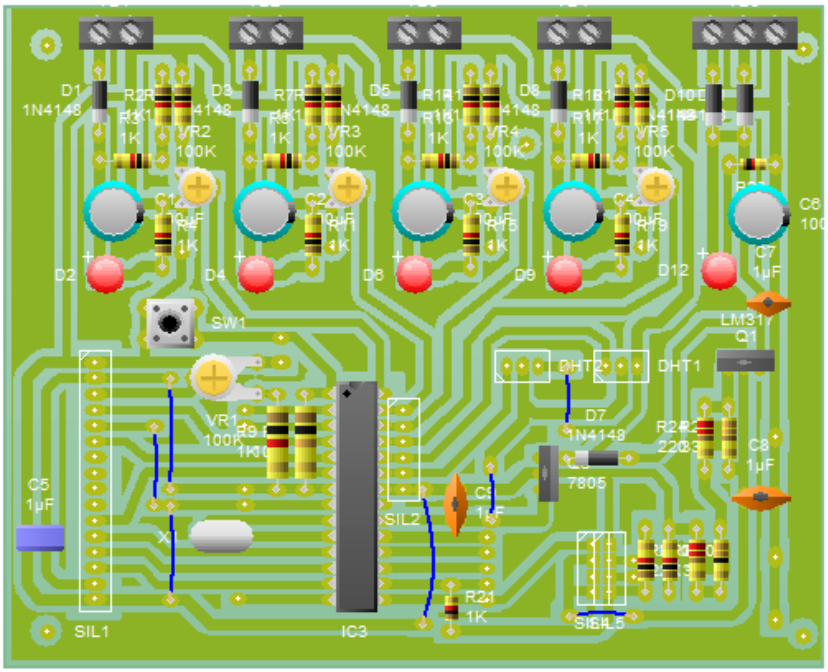


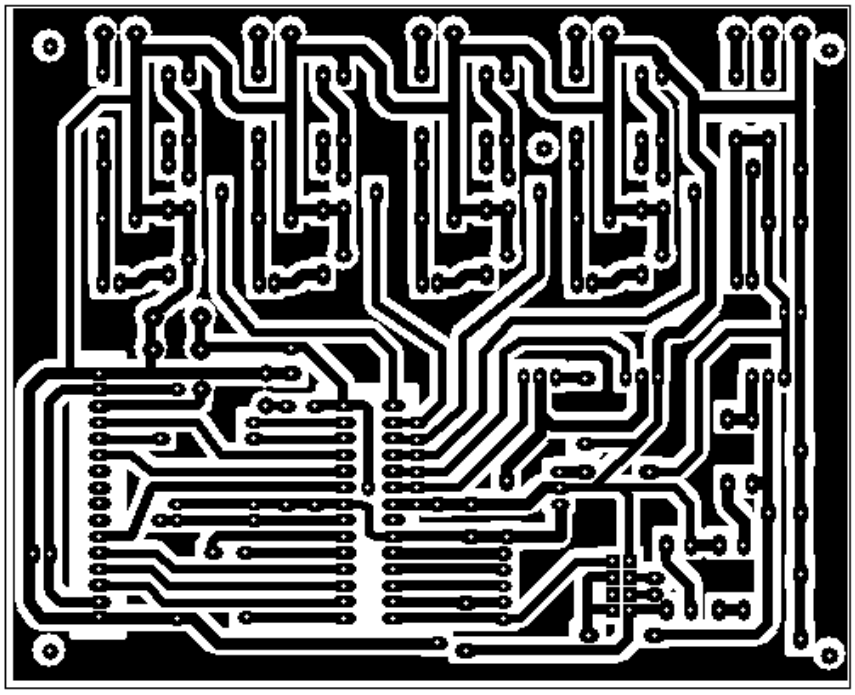
4:-SOLAR TRACKER SYSTEM



PCB LAYOUT

1:-DATA LOGGER SYSTEM





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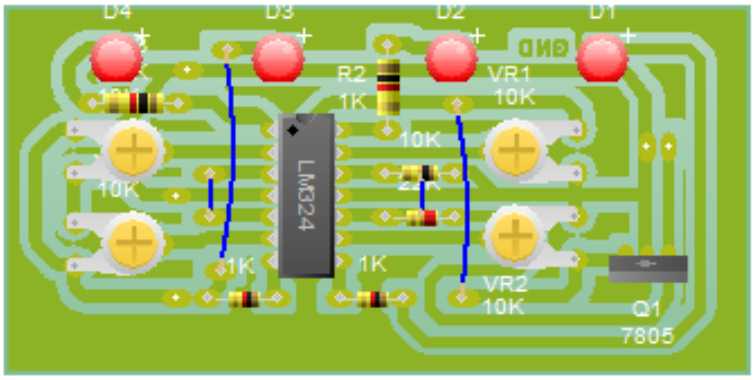

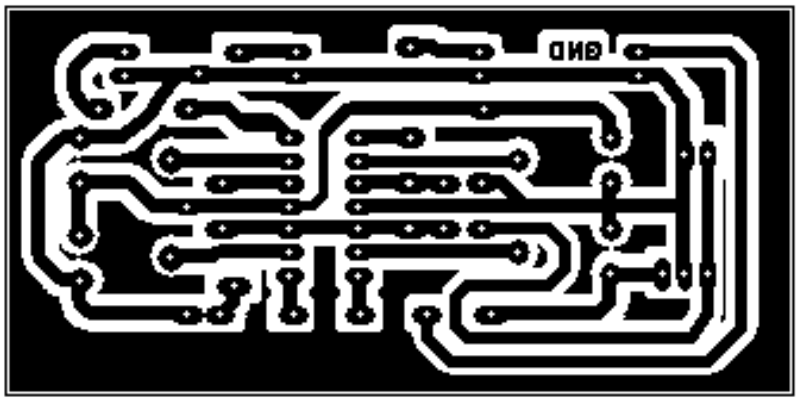

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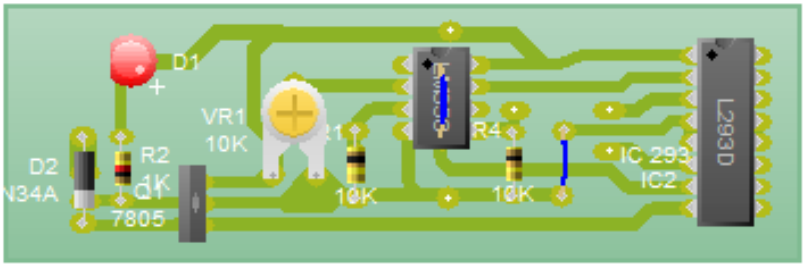
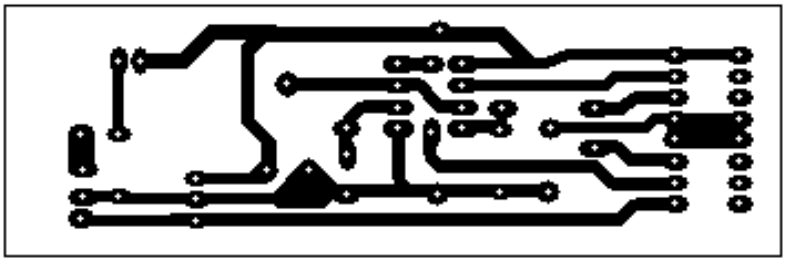
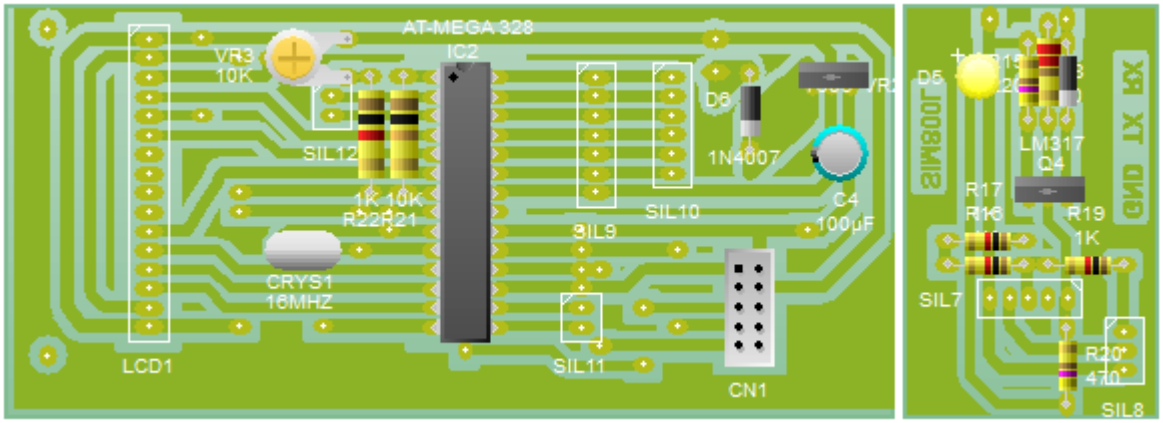
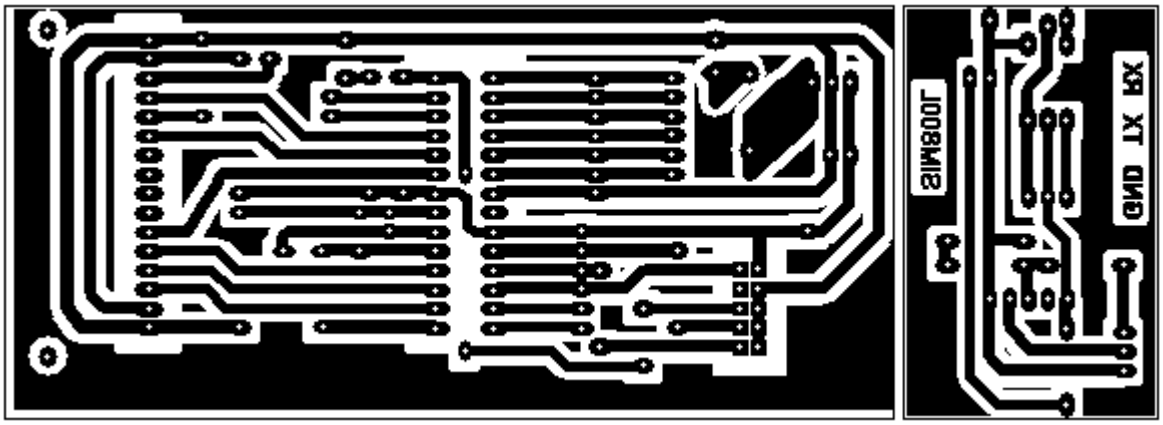




4:- GSM BASED PUMP CONTROLLER

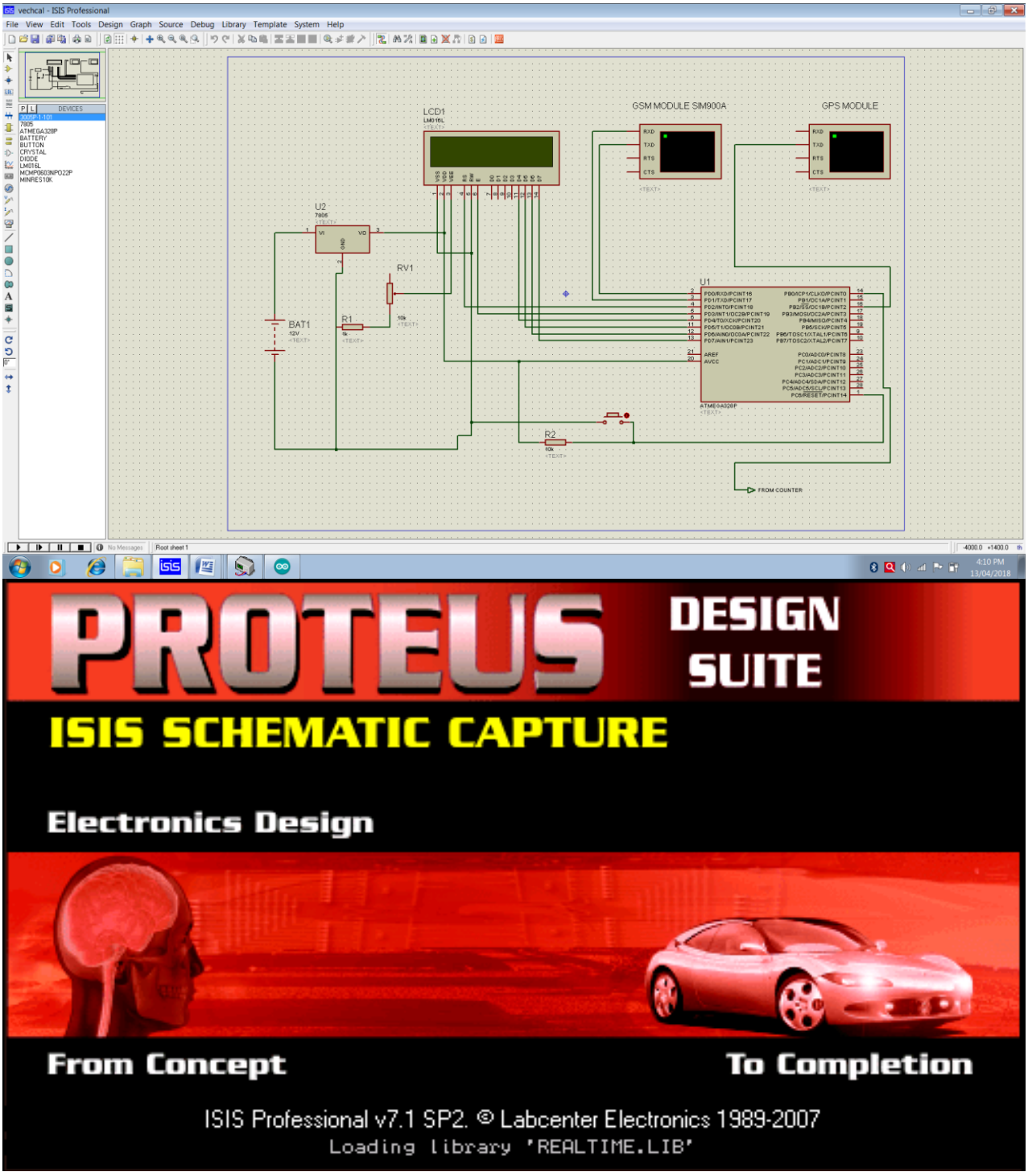




SOFTWARE USE IN PROJECT

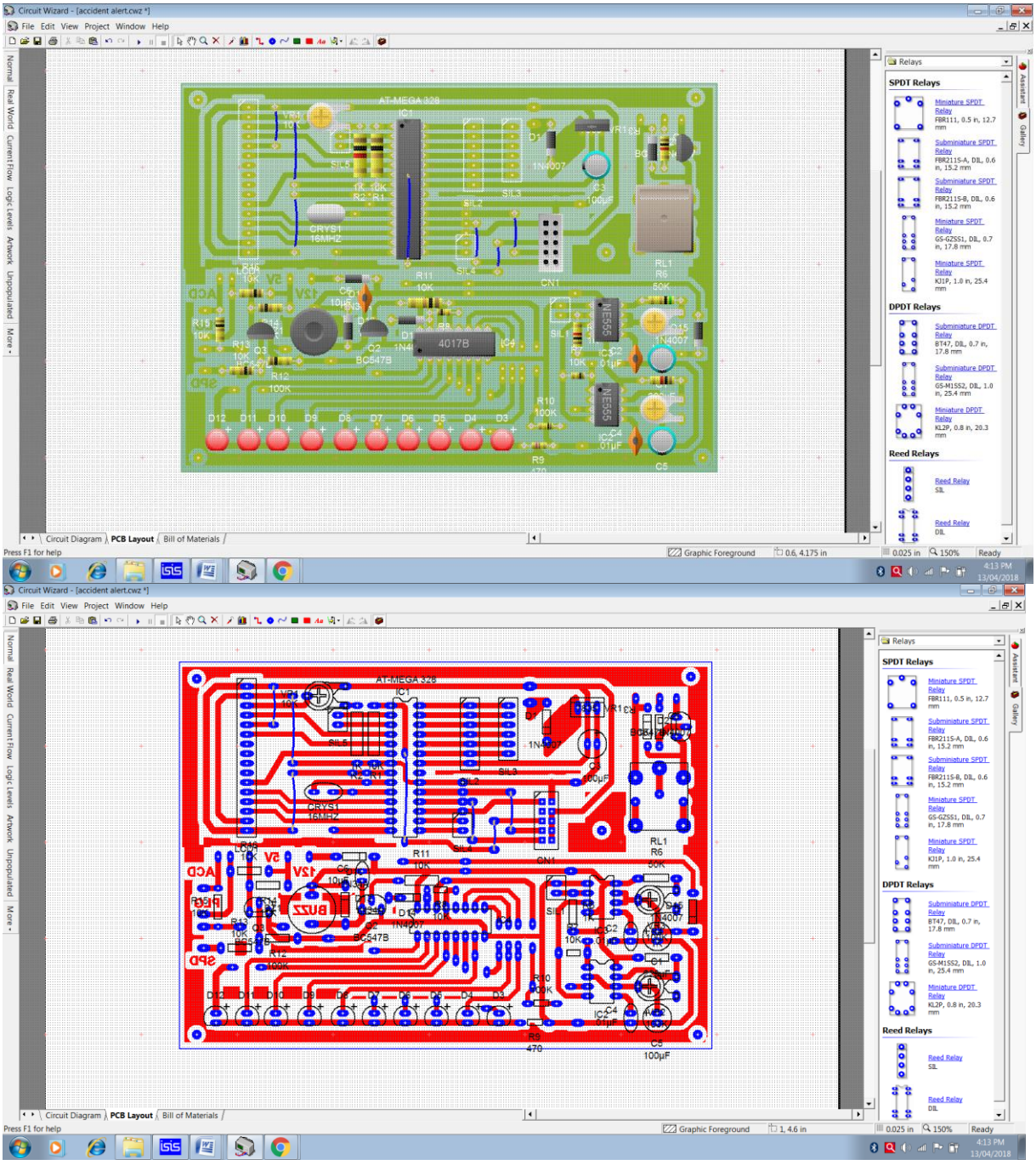
SOFTWARE USE FOR CIRCUIT DESIGN

1:-PROTEUS



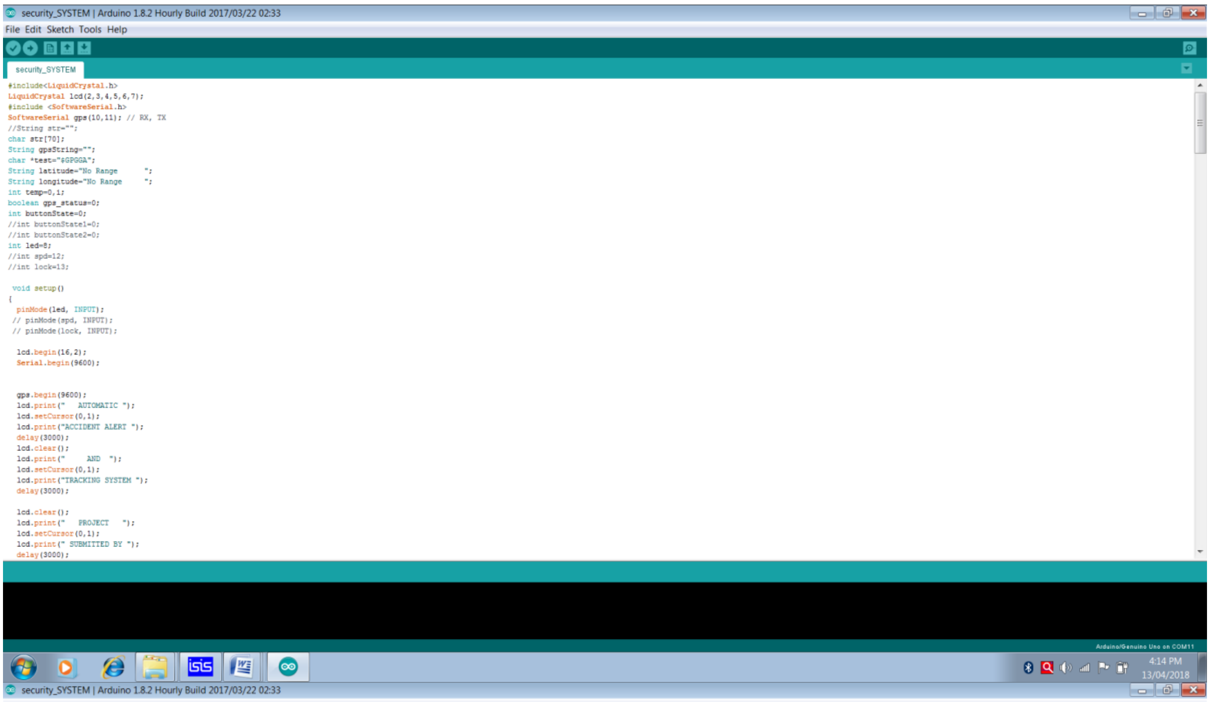
SOFTWARE USE FOR PCB LAYOUT DESIGN

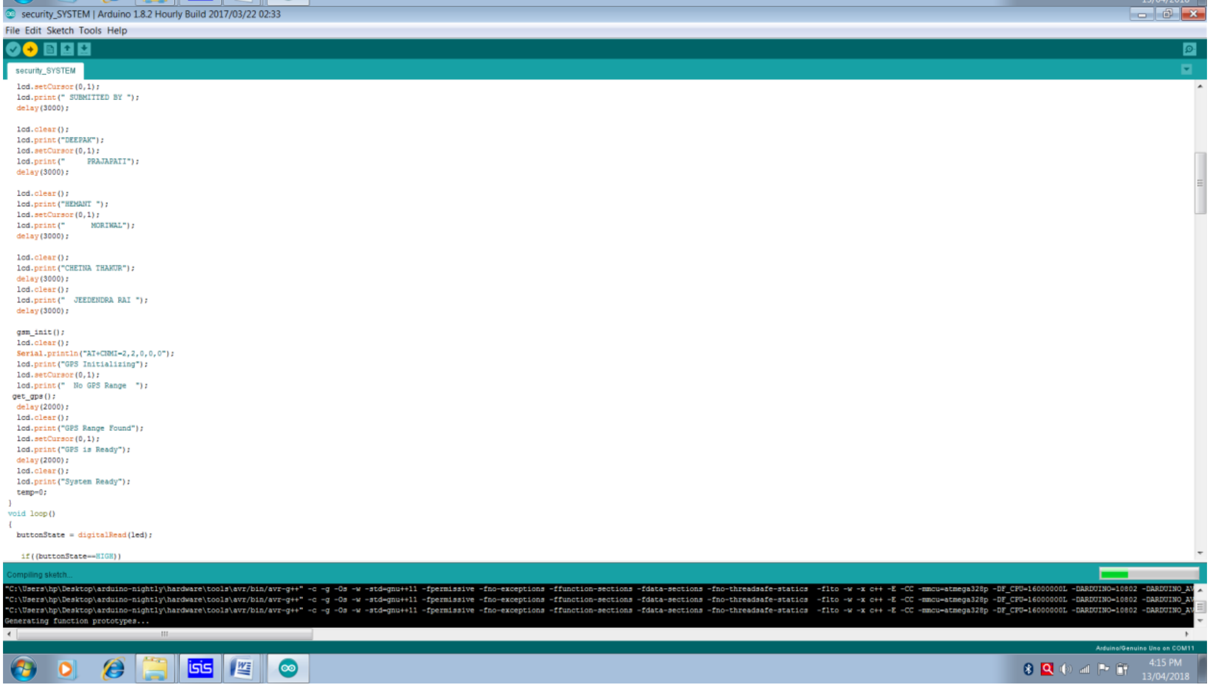
1:-CIRCUIT WIZARD



SOFTWARE USE FOR PROGRAMING

1:-Arduino Id





PRINTED CIRCUIT BOARD DESIGN

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. It is also referred to as printed wiring board (PWB) or etched wiring board. A PCB populated with electronic components is a printed circuit assembly (PCA), also known as a printed circuit board assembly (PCBA). Printed circuit boards are used in virtually all but the simplest commercially-produced electronic devices.

PCBs are inexpensive, and can be highly reliable. They require much more layout effort and higher initial cost than either wire wrap or point-to-point construction, but are much cheaper and faster for high-volume production; the production and soldering of PCBs can be done by totally automated equipment. Much of the electronics industry's PCB design, assembly, and quality control needs are set by standards that are published by the IPC organization.

➢ Chemical etching

Chemical etching is done with ferric chloride, ammonium per sulfate, or sometimes hydrochloric acid. For PTH (plated-through holes), additional steps of electro less deposition are done after the holes are drilled, then copper is electroplated to build up the thickness, the boards are screened, and plated with tin/lead. The tin/lead becomes the resist leaving the bare copper to be etched away.

The simplest method, used for small scale production and often by hobbyists, is immersion etching, in which the board is submerged in etching solution such as ferric chloride. Compared with methods used for mass production, the etching time is long. Heat and agitation can be applied to the bath to speed the etching rate. In bubble etching, air is passed through the etchant bath to agitate the solution and speed up etching. Splash etching uses a motor-driven paddle to splash boards with etchant; the process has become commercially obsolete since it is not as fast as spray etching. In spray etching, the etchant solution is distributed over the boards by nozzles, and recirculated by pumps. Adjustment of the nozzle pattern, flow rate, temperature, and etchant composition gives predictable control of etching rates and high production rates.

As more copper is consumed from the boards, the etchant becomes saturated and less effective; different etchants have different capacities for copper, with some as high as 150 grams of copper per litre of solution. In commercial use, etchants can be regenerated to

restore their activity, and the dissolved copper recovered and sold. Small-scale etching requires attention to disposal of used etchant, which is corrosive and toxic due to its metal content.

The etchant removes copper on all surfaces exposed by the resist. "Undercut" occurs when etchant attacks the thin edge of copper under the resist; this can reduce conductor widths and cause open-circuits. Careful control of etch time is required to prevent undercut. Where metallic plating is used as a resist, it can "overhang" which can cause short-circuits between adjacent traces when closely spaced. Overhang can be removed by wire-brushing the board after etching.

➢ Lamination

Some PCBs have trace layers inside the PCB and are called multi-layer PCBs. These are formed by bonding together separately etched thin boards.

➢ Drilling

Holes through a PCB are typically drilled with small-diameter drill bits made of solid coated tungsten carbide. Coated tungsten carbide is recommended since many board materials are very abrasive and drilling must be high RPM and high feed to be cost effective. Drill bits must also remain sharp to not mar or tear the traces. Drilling with high-speed-steel is simply not feasible since the drill bits will dull quickly and thus tear the copper and ruin the boards. The drilling is performed by automated drilling machines with placement controlled by a drill tape or drill file. These computer-generated files are also called numerically controlled drill (NCD) files or "Excellon files". The drill file describes the location and size of each drilled hole. These holes are often filled with annular rings (hollow rivets) to create vias. Vias allow the electrical and thermal connection of conductors on opposite sides of the PCB.

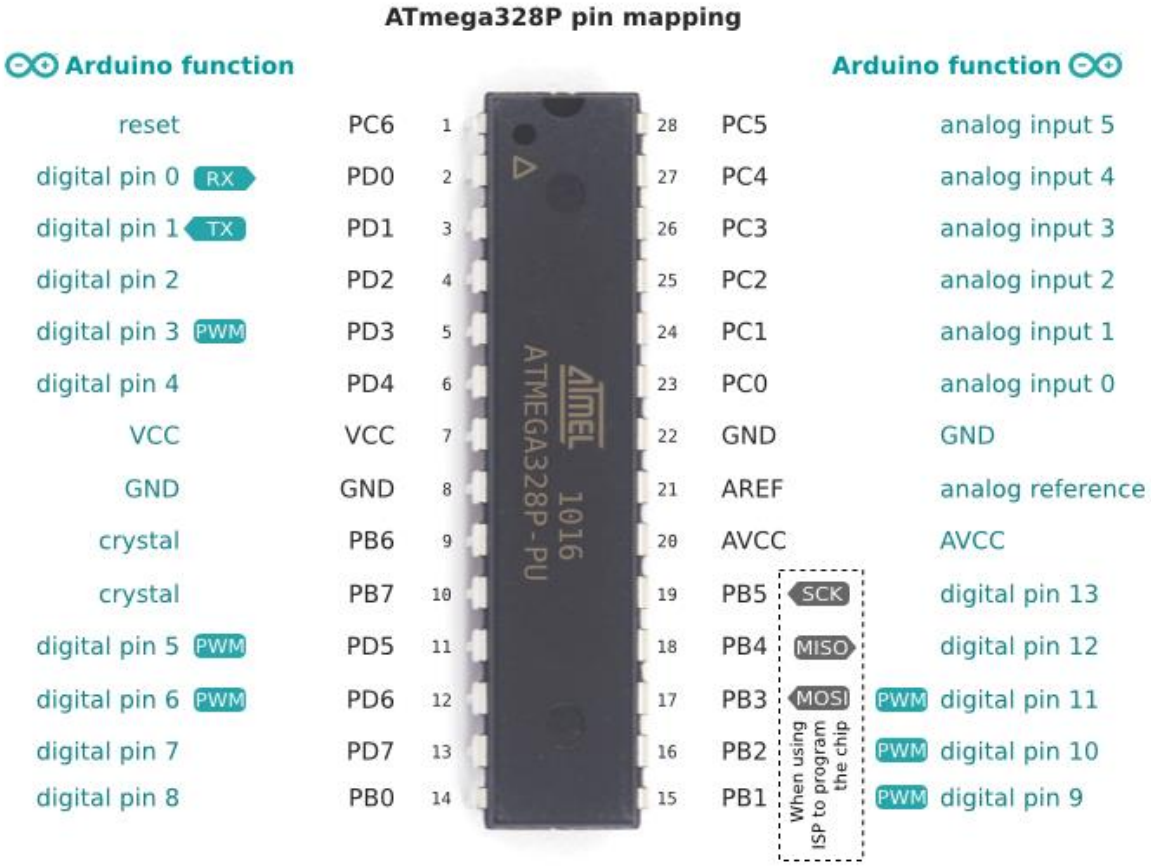
When very small vias are required, drilling with mechanical bits is costly because of high rates of wear and breakage. In this case, the vias may be evaporated by lasers. Laser-drilled vias typically have an inferior surface finish inside the hole. These holes are called micro vias.

It is also possible with controlled-depth drilling, laser drilling, or by pre-drilling the individual sheets of the PCB before lamination, to produce holes that connect only some of the copper layers, rather than passing through the entire board. These holes are called blind vias when they connect an internal copper layer to an outer layer, or buried vias when they connect two or more internal copper layers and no outer layers.

The walls of the holes, for boards with 2 or more layers, are made conductive then plated with copper to form plated-through holes that electrically connect the conducting layers of the PCB. For multilayer boards, those with 4 layers or more, drilling typically produces a smearof the high temperature decomposition products of bonding agent in the laminate system. Before the holes can be plated through, this smear must be removed by a chemical de-smear process, or by plasma-etch. Removing (etching back) the smear also reveals the interior conductors as well.

PARTS USE IN PROJECT

- **Microcontroller Atmega328**

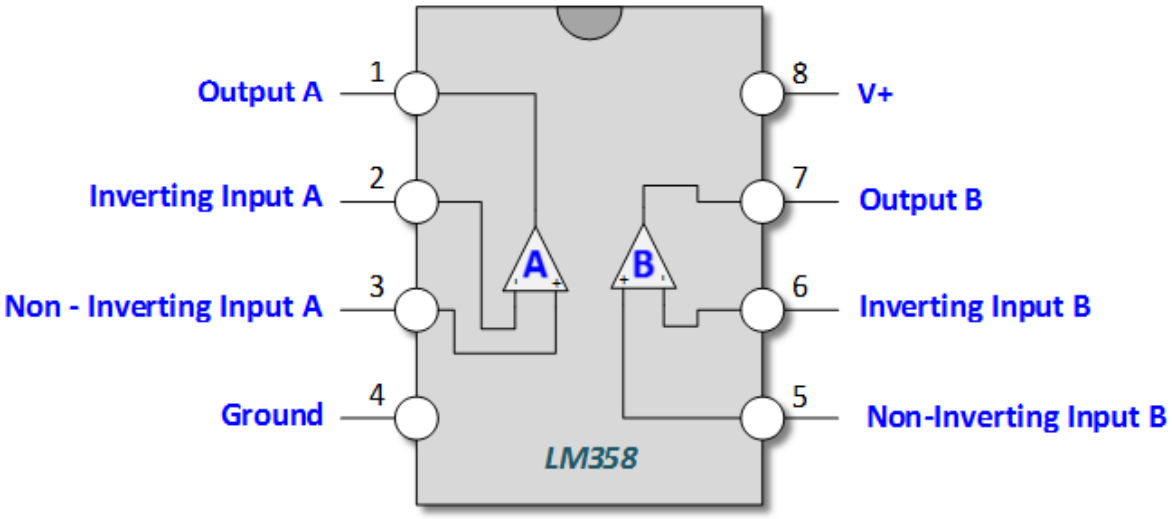


SPECIFICATION

✓Microcontroller	Atmel ATmega328
✓Operating Voltage (logic level)	5 V
✓Input Voltage (recommended)	7-12 V
✓Input Voltage (limits)	6-20 V
✓Digital I/O Pins	14 (of which 6 provide PWM output)
✓Analog Input Pins	8
✓Analog Input Pins	8
✓Flash Memory	32 KB (of which 2KB used by bootloader)
✓SRAM	2 KB
✓EEPROM	1 KB
✓Clock Speed	16 MHz
✓Dimensions	0.70" x 1.70"

ATMEGA 328

➢ IC LM 358



The LM358 is a great, easy-to-use dual-channel opamp. Opamps have so many applications we figured we should probably carry at least one in a DIP package. LM358 applications include transducer amplifiers, DC gain blocks and all the conventional opamp circuits.

Features:

- Two internally compensated op-amps
- 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: +/-1.5V to +/-16V

➢Battery

An electric **battery** is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices. A discharging battery has a positive terminal, or cathode, and a negative terminal, or anode.

- **Electrical resistance**

The electrical resistance of an electrical conductor is the opposition to the passage of an electric current through that conductor.

The resistance (R) of an object is defined as the ratio of voltage across it (V) to current through it (I), while the conductance (G) is the inverse:

$$R = \frac{V}{I}, \qquad G = \frac{I}{V}, \qquad G = \frac{1}{R}$$

In other situations, the derivative $\frac{dV}{dI}$ may be most useful; this is called the "differential resistance

- **Capacitor**

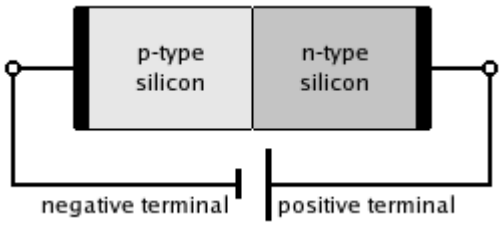
A capacitor (originally known as a condenser) is a passive two-terminal electrical component used to store energy electrostatically in an electric field. The forms of practical capacitors vary widely, but all contain at least two electrical conductors (plates) separated by a dielectric (i.e., insulator).

- P–n junction diode

A p–n junction is a boundary or interface between two types of semiconductor material, p-type and n-type, inside a single crystal of semiconductor. It is created by doping,

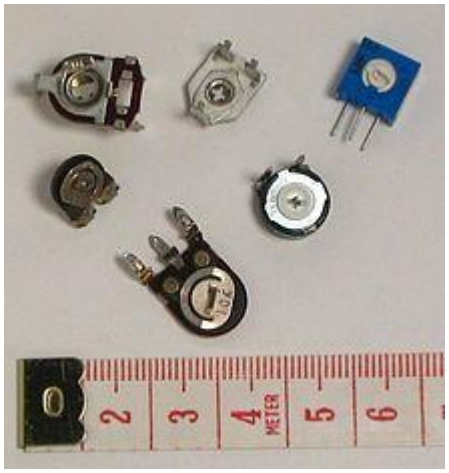
Properties of a p–n junction

The p–n junction possesses some interesting properties that have useful applications in modern electronics. A p-doped semiconductor is relatively conductive. The same is true of an n-doped semiconductor, but the junction between them can become depleted of charge carriers, and hence non-conductive, depending on the relative voltages of the two semiconductor regions. By manipulating this non-conductive layer, p–n junctions are commonly used as diodes:



- **Potentiometer**

A potentiometer informally a pot, is 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.



- **Voltage regulator ic**

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.

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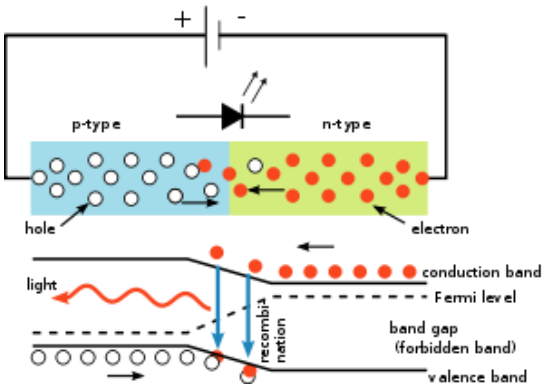
- **Light-emitting diode**

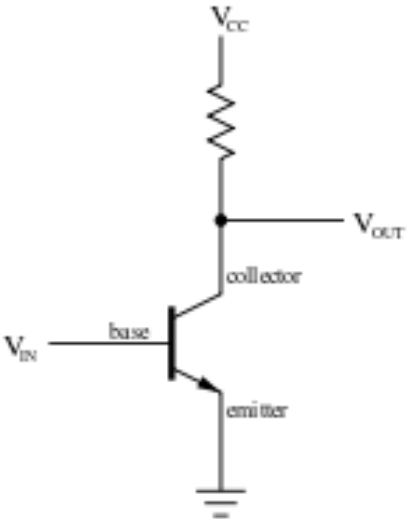
A light-emitting diode (LED) is a two-lead semiconductor light source that resembles a basic pn-junction diode, except that an LED also emits light.



The inner workings of an LED, showing circuit (top) and band diagram (bottom

- **Transistor**

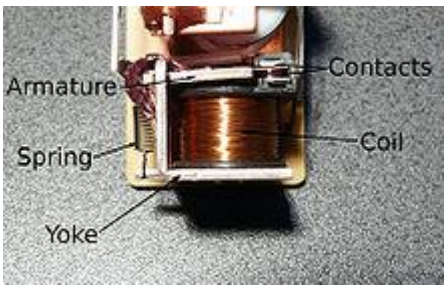
A transistor is a semi-conductor device used to amplify and switch electronic signals and electrical power. It is composed of semiconductor material with at least three terminals for connection to an external circuit.



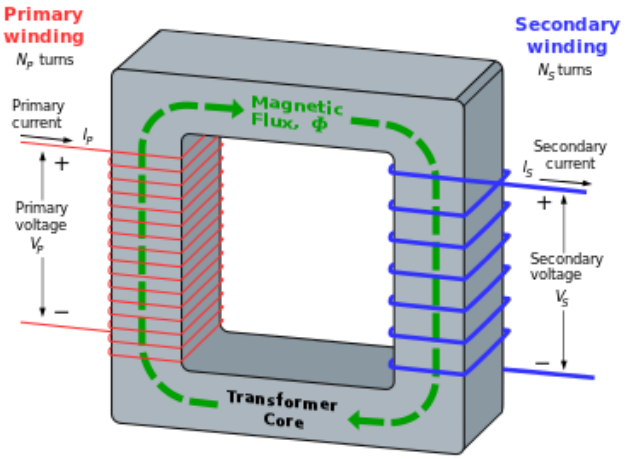
- **Relay**

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal..

Basic design and operation



➢ Transformer



A transformer is an electrical device that transfers energy between two circuits through electromagnetic induction. A transformer may be used as a safe and efficient voltage converter to change the AC voltage at its input to a higher or lower voltage at its output. Other uses include current conversion, isolation with or without changing voltage and impedance conversion.

APPLICATION

- In Agriculture.
- In Domestic Purpose.
- Pump Houses.
- Farm Houses & Many More .

COMPARISION WITH OTHER SYSTEM

1} Price is very less .
2} Fully automatic .
3} Without password system will not turn on .
4} Motor protected .
5} Very small in size .
6} Running cost is 2 rs /month .

ADVANTAGES

1} Only 12 watt of power consumption .
2} Fully automatic .
3} Electricity saver .
4} Water saver .
5} Motor fully protected .
6} Motor easily start & stop by the mobile with the help of password.
7} Easier to operate .
8} ALL INDICATION Shows By L.E.D Indicator .
9}SMS alert available.

CONCLUSION

In modern time, we can see around us the quantity of water is very less only 2% drinking water Available on earth which is not enough for present and future uses .it is a optional way to save the water and electricity. By using this project we can reduce the wastage of water and also reduce the wastage of electricity.

REFERENCES

BOOKS

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Other

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