

SECURITY FOR PISCICULTURE WITH WATER AND TEMPERATURE MONITORING USING AURDINO

Submitted in partial fulfilment of the requirements for the award of Bachelor of
Engineering degree in Electronics and Communication Engineering

by

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING**

SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A" by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

MARCH - 2021



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Vishnu Vamsi Koye (Reg. No. 37130442)** and **Vegi Durgesh Manikya Sai Pavan (37130429)** who carried out the project entitled **"SECURITY FOR PISCICULTURE WITH WATER AND TEMPERATURE MONITORING USING AUDRINO"** under my supervision from OCTOBER 2020 to MARCH 2021.

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DECLARATION

We, **Vishnu Vamsi Koye (Reg. No. 37130442)** and **Vegi Durgesh Manikya Sai Pavan (37130429)** hereby declare that the Project Report entitled “**SECURITY FOR PISCICULTURE WITH WATER AND TEMPERATURE MONITORING USING AURDINO**”, done by us under the guidance of **Dr.D.MARSHIANA, M.E., Ph.D.**, is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

DATE:

1)

PLACE:

2)

SIGNATURE OF THE CANDIDATES

ACKNOWLEDGEMENT

We are pleased to acknowledge our sincere thanks to Board of Management of **SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. We are grateful to them.

We convey our thanks to **Dr.N.M.NANDHITHA,M.E.,Ph.D.**,Dean School of Electrical and Electronics and **Dr. T. Ravi, M.E., Ph.D.**, Head of the Department of Electronics and Communication Engineering for providing us necessary support and details at the right time during the progressive reviews.

We would like to express our sincere and deep sense of gratitude to our Project Guide **Dr. D. MARSHIANA, M.E., Ph.D., Assistant Professor, Department of Electronics and Instrumentation Engineering** for his valuable guidance, suggestions and constant encouragement paved way for the successful completion of our project work.

We wish to express our thanks to all Teaching and Non-teaching staff members of the **Department of Electronics and Communication Engineering** who were helpful in many ways for the completion of the project.

We express our gratitude to our parents for their constant encouragement and support for the completion of the project.

ABSTRACT

The monitoring of the water standard is a complex process as it has several laboratory testing methods and time consuming in the existing methods. To overcome this difficulty, a real time monitoring of water goodness, temperature and security by using embedded systems has been proposed. In this project, embedded systems together with the Sensors govern the quality of water, monitor the temperature and secure the unit through different sensors and send the message to the user. The controller accesses the information which is monitored by the use of sensors (PH sensor, LM35, LDR). The accessed data are controlled by the usage of Arduino controller. In order to maintain the security we use a LASER along with an LDR (Light Dependent Resistor) which drives the buzzer, to maintain the water purity. The method uses a PH sensor, drives DC pump for water recycling automatically and to know the temperature. LM35 sensor is used so that a DC fan drives to maintain the temperature automatically. By using an embedded system, the information is collected by a strict mechanism. In addition, this system states an alert to the public and concerned sub-division or unit about the water.

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LIST OF ABBREVIATIONS

ALU	Arithmetic Logic Unit
CPU	Central Processing Unit
ADC	Analog to Digital Converter
AC	Alternating current
DC	Direct Current
DAC	Digital to Analog converter
EMI	Electromagnetic Interference
GND	Ground
FLG	Flag
ISP	Internet Service Provider
LABVIEW	Laboratory Virtual Instrument Engineering
LED	Light Emitting Diode
LDR	Light Dependent Resistor
PC	Program Counter
PCB	Printed Circuited Board
SRAM	Static Random-Access Memory
SP	Stack Pointer

CHAPTER1

INTRODUCTION

1.1. INTRODUCTION TO EMBEDDED SYSTEMS

An Embedded framework is a specific reason PC framework intended to perform one or a couple of devoted capacities, once in a while with ongoing figuring imperatives. It is generally embedded as a component of a total gadget including equipment and mechanical parts. Interestingly, a broadly useful PC, like a PC, can do various errands relying upon programming. Installed frameworks have become vital today as they control a significant number of the basic gadgets.

Since the Embedded framework is devoted to explicit assignments, plan specialists can advance it, lessening the size and cost of the item, or expanding the unwavering quality and execution. Some Embedded frameworks are mass-created, profiting by economies of scale.

1.2. CHARACTERISTICS OF EMBEDDED SYSTEM

- Speed (bytes/sec): Should be high speed
- Power (watts): Low force dissemination
- Size and weight: As far as conceivable little in size and low weight
- Accuracy (%error): Must be exact
- Adaptability: High versatility and openness
- Reliability: Must be solid throughout an extensive trench of time.

1.3. APPLICATIONS OF EMBEDDED SYSTEMS

In the Embedded World many Embedded items and everyday life to a great extent relies upon the legitimate working of these devices. TV, Radio, CD player, Washing Machine or Microwave Oven in kitchen, Card per users, Access Controllers, Palm gadgets of work space empower to do a significant number of errands adequately. Aside from all these, numerous regulators Embedded in your

vehicle deal with vehicle activities between the guards and the greater part of the occasions willing emerald is regard every one of these regulators.

- Advanced mechanics: modern robots, machine instruments, Robocop soccer robots
- Car: vehicles, trucks, trains
- Aviation: planes, helicopters Home and Building Automation
- Aerospace: rockets, satellites Energy
- frameworks: windmills, atomic plants
- Clinical frame works : prostheses, revalidation machine.

1.4. MICRO-CONTROLLERS FOR EMBEDDED SYSTEMS

In the Literature talking about microchips, regularly see the term Embedded System. Chip and Microcontrollers are generally utilized in embedded frame work items. An Embedded framework item utilizes a chip (or Microcontroller) to do one errand in particular. A printer is an illustration of embedded framework since the processor inside it performs one undertaking in particular; specifically getting the information and printing it. Difference this with a Pentium based PC. A PC can be utilized for quite a few applications, for example, word processor, print-worker, bank employee terminal, Video game, network worker, or Internet terminal. Programming for an assortment of utilizations can be stacked and run. Obviously the explanation can perform operands is that it has RAM memory and a working framework that heaps the application programming into RAM memory and allows the CPU to run it.

1.5. LITERATURE SURVEY

The task security for pisciculture with water and temperature checking utilizing arduino gives the Security for the whole lake, estimating the temperature and keeping up the water level and pH.

Ranchers are the structure squares of world, who makes a great deal of stomach full's are been confronting numerous troubles before, such as utilizing

tropical storms and lamps to remain close to the homesteads even in late evenings to ensure and further more for checking the efficiency of the homestead. Checking the lake's pH level and water level physically every time is an enormous time taken interaction.

Thus, we made every one of these simple by carrying out the fundamental modules utilizing arduino Uno. In this venture, installed frameworks along with the Sensors over see the nature of water, screen the temperature and secure the unit through various sensors and send the message to the client. The regulator gets to the data which is checked by the utilization of sensors (PH sensor, LM35, LDR). They got to information are constrained by the use of Arduino regulator. To keep up the security utilize a LASER alongside a LDR (Light Dependent Resistor) which drives the signal, to keep up the water immaculateness utilized a pH sensor and drives DC.

Siphon for water reusing consequently and to know the temperature utilized a LM35 sensor with the goal that a DC fan drives to keep up the temperature naturally. By utilizing an implanted framework, the data is gathered by a severe instrument given. Moreover, this framework expresses a caution to general society and concerned sub-division or unit about the water.

1.6. WORKING

AGSM modem gives the correspondence interface. It transports gadget conventions straight forwardly absurd through a sequential interface. A GSM modem is a remote modem that works with a GSM remote organization. This GSM Modem can acknowledge any GSM network administrator SIM card and act very much like a cell phone with its own exceptional telephone number.

1.7. BLOCKDIAGRAM

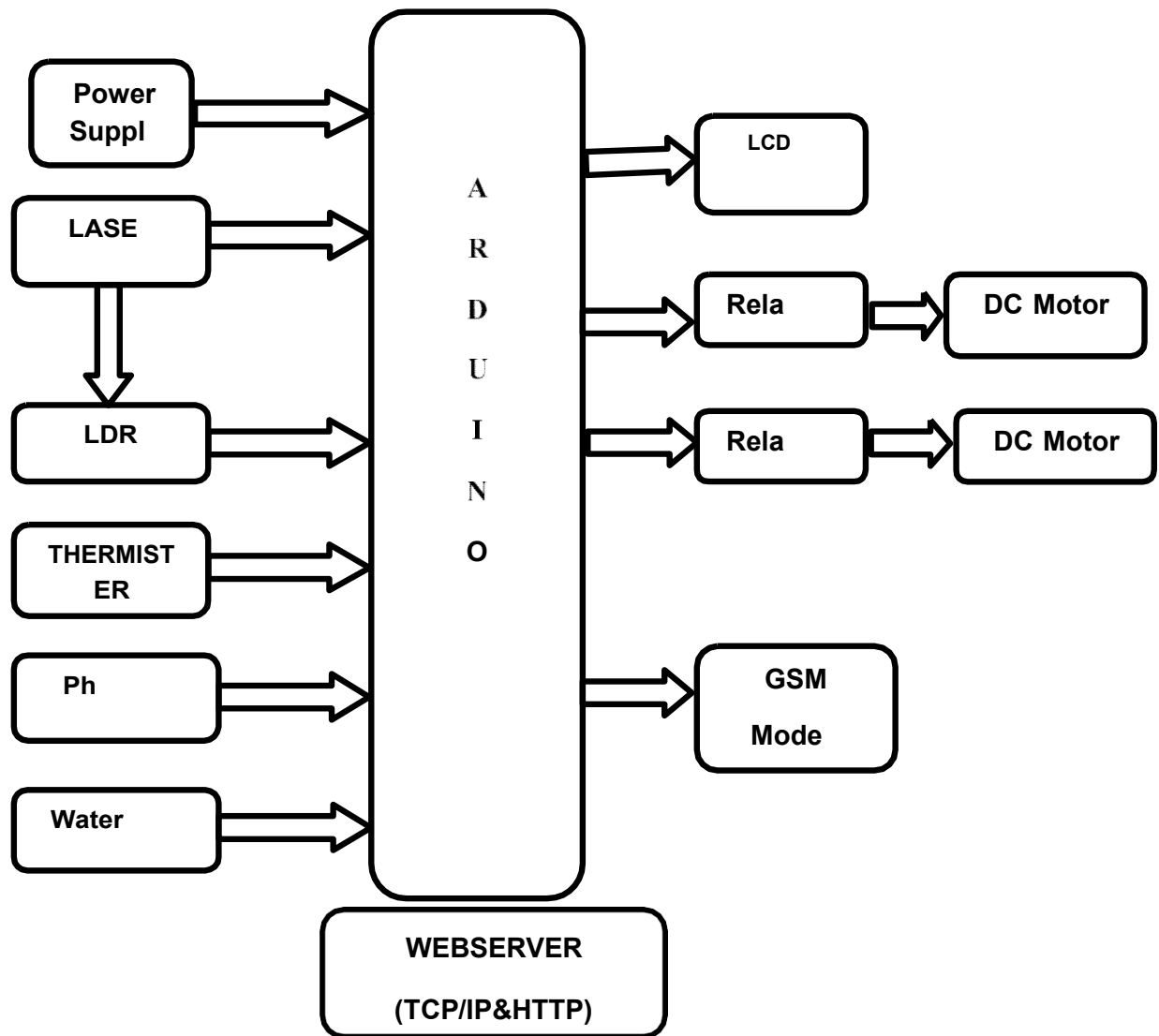


Fig.1.1.1. Square Diagram of Security for piciculture with water and temperature observing utilizing Arduino

1.8. Schematic Diagram:

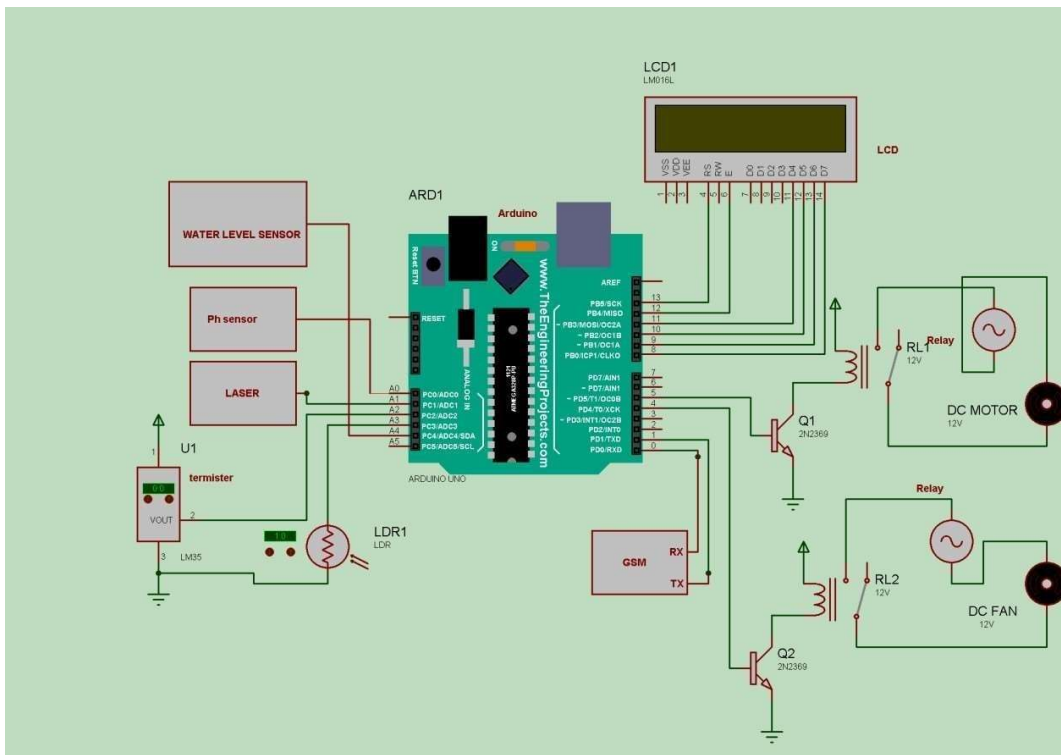


Fig1.2: schematic diagram

1.9. ARDUINO UNO BOARD:

The Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ATmega328P microcontroller, a USB connection, a power jack, an ICSP header, and a reset button. It contains all that is needed to help the microcontroller; basically connect it to a PC with a USB connection or power it with an AC-to-DC converter or battery to start.

The Uno differs from all previous boards in that it doesn't use the FTDI USB-to-UART bridge chip. Taking everything into account, it incorporates the Atmega16U2 (Atmega8U2 up to interpretation R2) changed as a USB-to-UART converter.

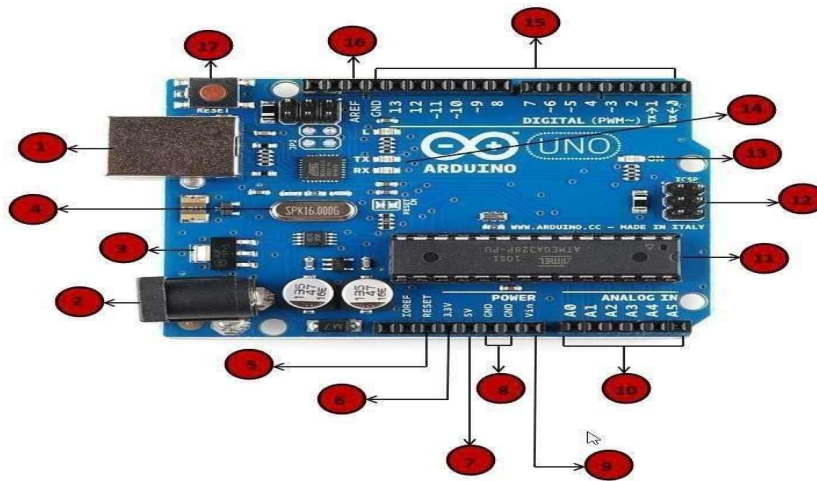


Fig 1.3:Arduino uno board

1.9.1. Technical Specifications:

FEATURE	SPECIFICATION
Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by boot loader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

Table1.4:Arduino uno specifications

The Arduino Uno can be fueled through the USB association or with an outside power supply. The force source is chosen consequently. External (non-USB) power can come either from an AC-to-DC connector (divider mole) or battery. The connector can be related by interfacing a 2.1mm center positive fitting to the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector. The board can deal with an external stock of 6 to 20 volts. At whatever point gave under 7V, regardless, the 5V pin may supply under five volts and the board may be sensitive. In case using more than 12V, the voltage regulator may overheat and hurt the board. The endorsed reach is 7 to 12 volts.

1. **USB Interface:** Arduino board can be controlled by utilizing the USB link from PC. It should simply interface the USB link to the USB association

2. External force supply: Arduino boards can be energized clearly from the AC mains power supply by plugging it to the power supply (Barrel Jack)
3. Voltage Regulator: The function of the voltage regulator is to control the voltage given to the Arduino board and settle the DC voltages used by the processor and various segments.
4. Crystal Oscillator: The valuable stone oscillator helps Arduino in overseeing time issues. The proper reaction is, by using the valuable stone oscillator. The number engraved on top of the Arduino valuable stone is 16.000H9H. It uncovers that the repeat is 16,000,000 Hertz or 16MHz.
5. Arduino Reset: It can reset your Arduino board, i.e., starts your program from the beginning. It can reset the UNO board. First by using the reset button (17) on the board. Second, can interface an external reset catch to the Arduino pin named RESET(5)
6. 6-9.Pins(3,3,5,GND,Vin):3.3V(6):Supply 3.3 yield volt 5V(7):Supply 5 yield volt. Most of the parts utilized with Arduino board turns out great with 3.3 volt and 5 volt. GND (8)(Ground): There are a few GND pins on the Arduino, any of which can be utilized to ground circuit.
Vin (9): This pin additionally can be utilized to control the Arduino board from an outside power source, similar to AC mains power supply.
7. Analog pins: The Arduino UNO board has five basic information pins A0 through A5. These pins can examine the sign from a straight forward sensor like the dampness sensor or temperature sensor and convert it into an automated regard that can be scrutinized by the chip.
8. Main microcontroller: Each Arduino board has its own microcontroller (11). You can expect it as the mind of board. The principal IC (incorporated circuit) on the Arduino is somewhat not the same as board to board. The microcontrollers are normally of the ATMEGA Company. You should understand what IC your board has prior to stacking another program from the Arduino IDE. This data is accessible on the highest point of the IC. For additional insights regarding the IC development and capacities, you can allude to the information sheet.

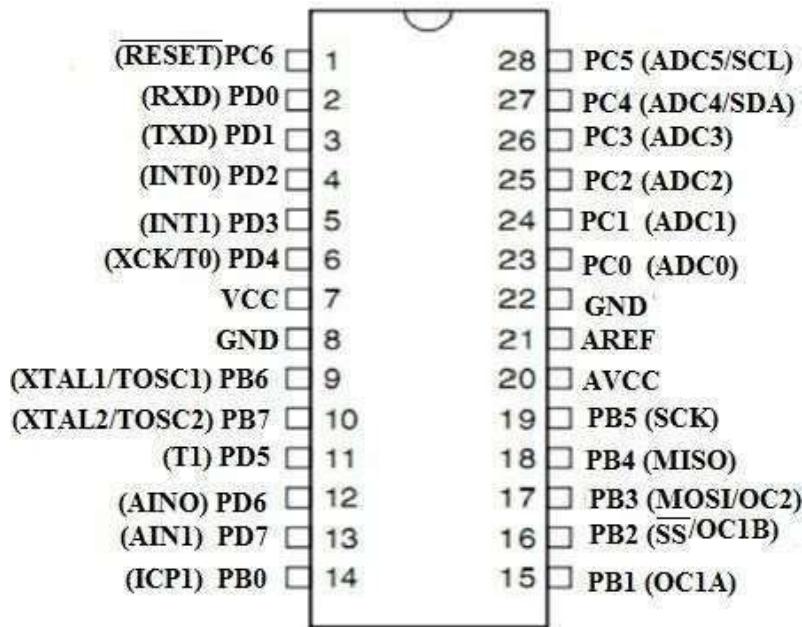


Fig1.5. :Pin diagram

1.9.2. Pin Description:

- **VCC:** Digital supply voltage.
- **GND:** Ground.
- **PortB (PB[7:0])XTAL1/XTAL2/TOSC1/TOSC2:**

Port B is a 8-cycle bi-directional I/O port with inside pull-up resistors (chosed for each piece). The Port B yield cushions have balanced drive attributes with both high sink and source capacity. As data sources, Port B sticks that are remotely pulled low will source current if the draw up resistors are actuated. The Port B pins are tri-expressed when are set condition becomes dynamic, regardless of whether the clock is n't running.

Contingent upon the clock choice wire settings, PB6 can be utilized as contribution to the upsetting Oscillator enhancer and contribution to the inward clock working circuit. Contingent upon the clock determination meld settings, PB7 can be utilized as yield from the altering Oscillator enhancer. On the off chance that the Internal Calibrated RC Oscillator is utilized as chip clock source, PB[7:6] is utilized as TOSC[2:1] contribution for the AsynchronousTimer/Counter 2 if the AS2 chomped in ASSR is set.

- **Port C(PC[5:0]):**

Port C is a 7-piece bi-directional I/O port with inside pull-up resistors (chosed for each piece). The PC[5:0] yield cushions have even drive attributes with both high

sink and source ability. As information sources, Port C pins that are remotely pulled low will source current if the draw up resistors are initiated. The Port C pins are tri-expressed when a reset condition becomes dynamic, regardless of whether the clock is n't running.

- **PC6/RESET:**

- In the event that the RSTDISBL Fuse is modified, PC6 is utilized as an I/O pin. Note that the electrical qualities of PC6 contrast from those of different pins of Port C.
- In the event that the RSTDISBL Fuse is unprogrammed, PC6 is utilized as a Reset input. A low level on this pin for more than the base heartbeat length will produce a Reset, regardless of whether the clock isn't running. More limited heartbeats are not ensured to produce a Reset.
- Port D(PD[7:0]):
- Port D is a 8-digit bi-directional I/O port with inner draw up resistors (chosed for each piece).The Port D yield cradles have balanced drive qualities with both high sink and source ability. As data sources, Port D pins that are remotely pulled low will source current if the draw up resistors are initiated. The Port D pins are tri-expressed when are set condition becomes dynamic, regardless of whether the clock isn't running.
- AVCC: AVCC is the inventory voltage pin for the A/D Converter, PC[3:0], and PE[3:2]. It ought to be remotely associated with VCC, regardless of whether the ADC isn't utilized. In the event that the ADC is utilized, it ought to be associated with VCC through a low-pass channel. Note that PC[6:4] utilize advanced stock pile voltage, VCC.
- AREF: AREF is the simple reference pin for the A/D Converter.
- ADC [7:6] (TQFP and VFQFN Package Only): In the TQFP and VFQFN bundle, ADC [7:6] fill in as simple contributions to the A/D converter. These pins are fueled from the simple stock and fill in as 10-bit ADC channels.
- ICSP pin: Mostly, ICSP (12) is an AVR, a minuscule programming header for the Arduino comprising of MOSI, MISO, SCK, RESET, VCC and GND. It is frequently all included to as a SPI (Serial Peripheral Interface), which could be considered as an "extension" of the yield. All things considered the yield gadget to the expert of the SPI transport.
- Power LED indicator: This LED should illuminate when you plug your Arduino into a force source to show that your block is fueled accurately. On the off

chance that this light doesn't turn on, there is a major issue with the association.

- TX and RX LEDs: On your board, you will discover two marks: TX (communicate) and RX (get). They show up in two puts on the Arduino UNO board. In the first place, at the computerized pins 0 and 1, to show the pins liable for sequential correspondence. Second, the TX and RX drove (13). The TX drove streaks with various speeds while sending the sequential information. The speed of blazing relies upon the baud rate utilized by the board. RX streaks during the accepting interaction.
- Digital I/O: The Arduino UNO board has 14 computerized I/O pins (15) (of which 6 give PWM (Pulse Width Modulation) yield. These pins can be designed to fill in as information computerized pins to peruse rationale esteems (0 or 1) or as advanced yield pins to drive various modules like LEDs, transfers, and so on. The pins marked "~" can be utilized to produce PWM.
- AREF: AREF represents Analog Reference. It is now and again, used to set another reference voltage (somewhere in the range of 0 and 5 Volts) as far as possible for the simple information pins working.

CHAPTER 2

HARDWARE AND SOFTWARE COMPONENTS

2.1 Hardware components

2.1.1. POWERSUPPLY:

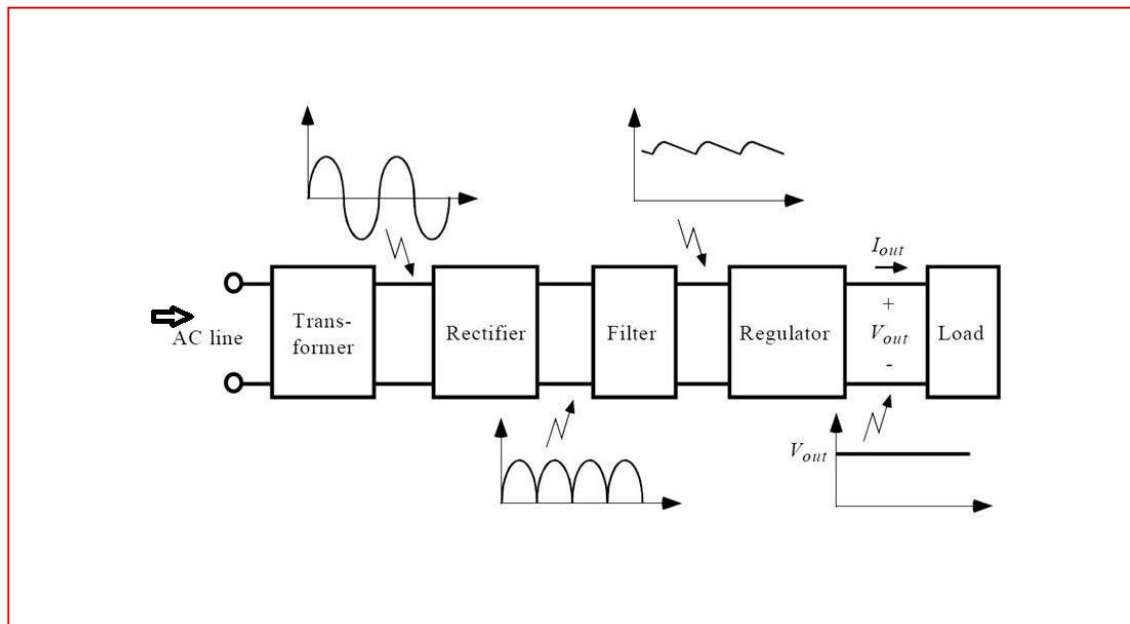


Fig.2.1.powersupply

2.1.1.1. Transformer:

Transformer is a static gadget used to change the voltage starting with one level over the non to the next level without change its recurrence. There are two sorts of transformers

1. Step-up transformer
2. Step-down transformer

Step-up transformer changes over low voltage level into high voltage level without change its recurrence.

Step-down transformer changes over high voltage level into low voltage level without change its recurrence.

In this task utilizing venture down transformer which changes 230V AC over to 12V AC [or] 230 V AC to 5V as demonstrated underneath.

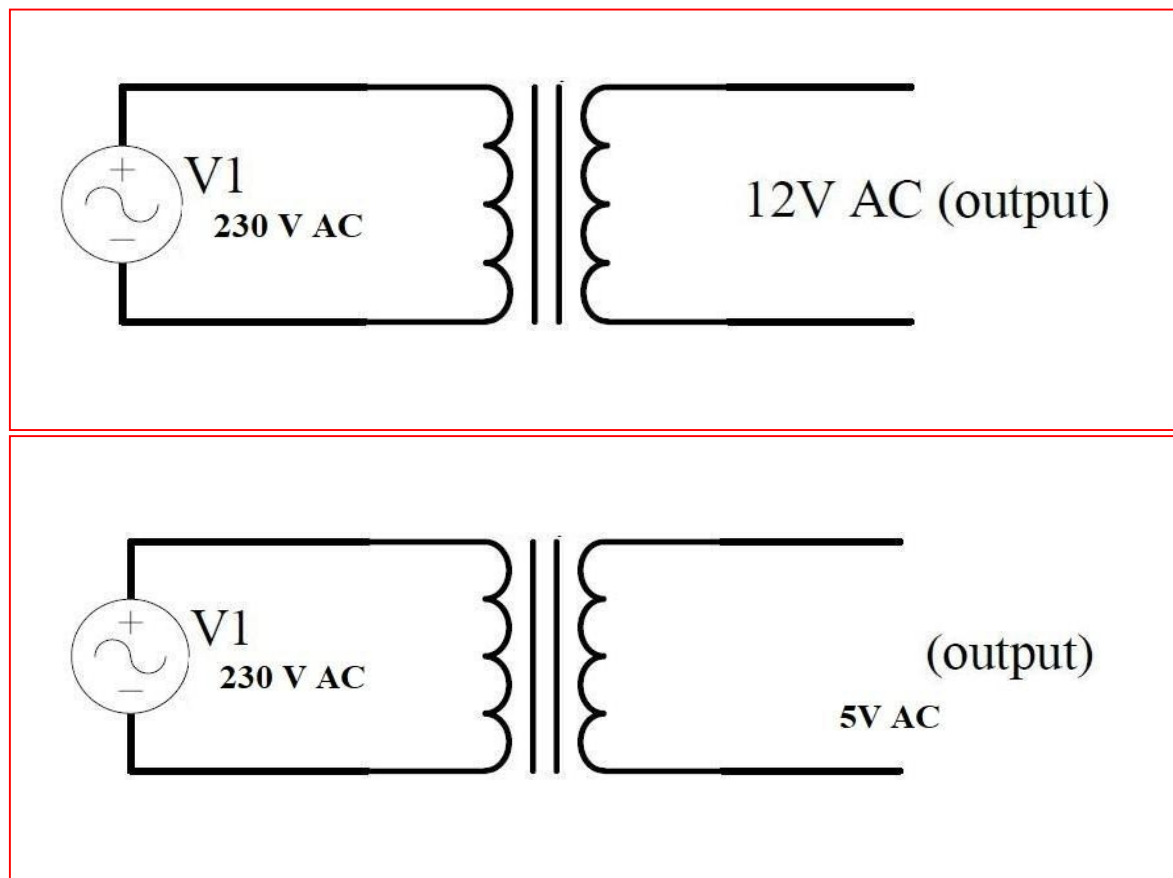


Fig.2.2.Transformers

2.1.1.2. Diodes:

Diodes permit power to stream just a single way. The bolt of the circuit image shows the course where in the current can stream. Diodes are the electrical form of a valve and early diodes were really called valves.

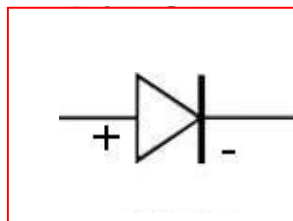


Fig.2.3.Diode Symbol

A **diode** is a device which only allows current to flow through it in one direction. In this heading, the diode is supposed to be 'forward-one-sided' and the lone impact on the sign is that there will be a voltage loss of around 0.7V. The other way, the diode is supposed to be 'converse one-sided' and no current will course through it.

2.1.1.3 Rectifier

The reason for a rectifier is to change over an AC waveform into a DC waveform (OR) Rectifier changes over AC current or voltages into DC current or voltage. There are two diverse amendment circuits, known as 'half-wave' and 'full-wave' rectifiers. Both use parts called diodes to change over AC into DC.

- **The Half-wave Rectifier**

The half-wave rectifier is the simplest type of rectifier since it only uses one diode, as shown in Fig.

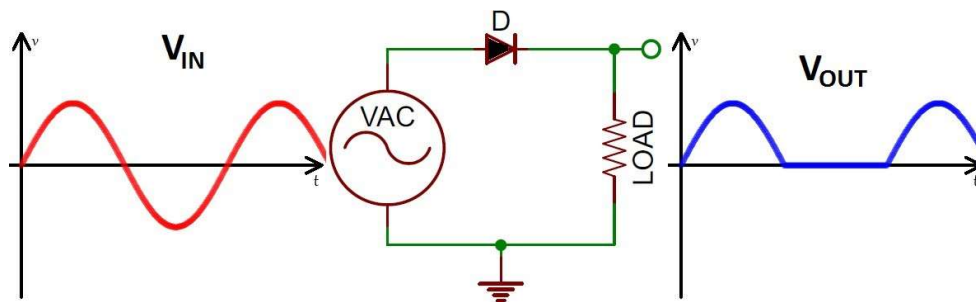


Fig.2.4 HalfWave Rectifier

Fig 2 shows the AC input waveform to this circuit and the subsequent yield. As should be obvious, when the AC input is positive, the diode is forward-biased and lets the current through. At the point when the AC input is negative, the diode is reverse-biased and the diode doesn't let any current through, which means the yield is 0V. Since there is a 0.7V voltage drop across the diode, the peak output voltage will be 0.7 V not as much as V_s .

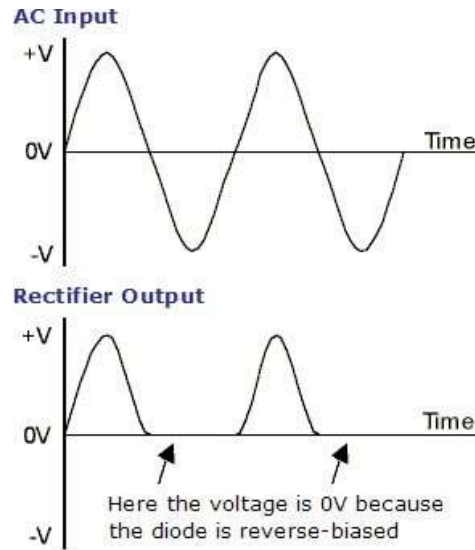


Fig.2.5 Half-Wave Rectification

While the yield of the half-wave rectifier is DC (it is all sure), it would not be reasonable as a force supply for a circuit. Right off the bat, the yield voltage consistently shifts among $0V$ and $V_s - 0.7V$, and also, for a fraction of the time there is no yield by any stretch of the imagination.

- **The Full-wave Bridge Rectifier**

The circuit in Fig 2.4 tends to the second of these issues since at no time is the yield voltage $0V$. This time four diodes are orchestrated with the goal that both the positive and negative pieces of the AC waveform are changed over to DC. The subsequent waveform is appeared in Fig 2.5.

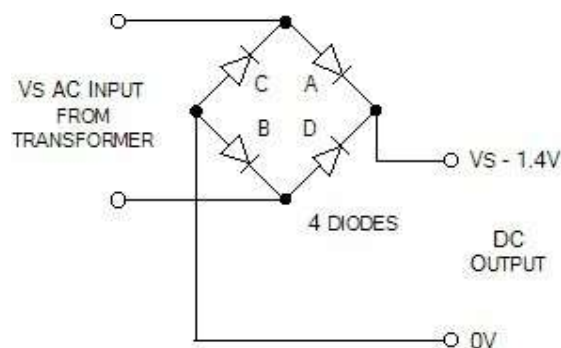


Fig.2.6 Full-Wave Rectifier

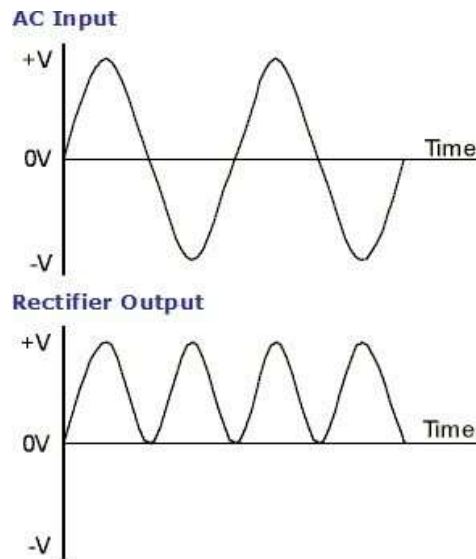


Fig.2.7.Full-WaveRectification

At the point when the AC input is positive, diodes A and B are forward-biased, while diodes C and D are reverse-biased. At the point when the AC input is negative, the inverse is valid - diodes C and D are forward-biased, while diodes A and B are reverse-biased. While the full-wave rectifier is an enhancement for the half-wave rectifier, its yield actually isn't reasonable as a power supply for most circuits since the output voltage actually shifts among 0V and $V_s - 1.4V$. Thus, in the event that you output 12V AC in 10.6V DC out.

2.1.1.4. Capacitor Filter

The capacitor-input channel, likewise called "Pi" channel because of its shape that resembles the Greek letter pi, is a sort of electronic channel. Channel circuits are utilized to eliminate undesirable or undesired frequencies from a signal. A run of the milli-capacitor input channel comprises of a channel capacitor C1, associated across the rectifier output. The capacitor C1 offers low reactance to the AC part of the rectifier output while it offers limitless reactance to the DC segment. Accordingly the AC parts will ground. Around then DC segments are feed to Regulator.

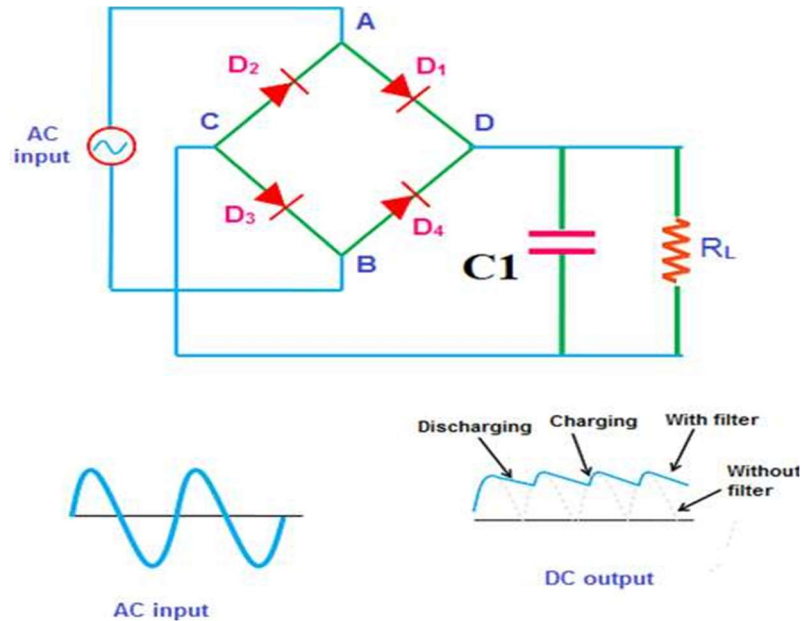


Fig.2.8.Centered Tapped Full-Wave Rectifier with a Capacitor Filter

2.1.1.5. Voltage Regulator:

A voltage controller is an electrical regulator intended to naturally keep a consistent voltage level. It might utilize an electromechanical instrument, or uninvolved or dynamic electronic parts. Contingent upon the plan, it could be utilized to direct at least one AC or DC voltages. There are two sorts of controller and they are Positive Voltage Series (78xx) and Negative Voltage Series (79xx).

- 78xx:'78' demonstrate the positive arrangement and 'xx' shows the voltage rating. Assume 7805 produces the greatest 5V. '05' indicates the controller yield is 5V.
- 79xx:'78' demonstrate the negative arrangement and 'xx' shows the voltage rating. Assume 7905 produces the most extreme - 5V. '05' indicates the controller yield is - 5V. These controllers comprises the three pins there are

Pin1:It is utilized for input pin.

Pin2: This is ground pin for regulator

Pin3: It is used for output pin. Through this pin get the output.

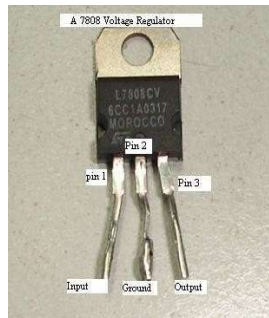


Fig.2.9.Regulator

2.1.2. GSM

2.1.2.1. DEFINITION OF GSM

GSM (Global System for Mobile communications) is an open, advanced cell innovation utilized for sending versatile voice and information administrations. GSM is a computerized cellphone framework that is broadly utilized in Europe and different pieces of the world. GSM utilizes a variety of Time Division Multiple Access (TDMA) and is the most generally utilized of the three advanced remote phone advances (TDMA, GSM, and CDMA). GSM digitizes and packs information, at that point sends it down a channel with two different surges of client information, each time permitting space. It works at either the 900 MHz or 1,800 MHz recurrence band. It upholds voice calls and information move paces of upto 9.6kbit/s, along with the transmission of SMS (Short Message Service).

2.1.2.2. GSM FREQUENCIES

GSM networks operate in a number of different frequency ranges (separated into GSM frequency ranges for 2G and UMTS frequency bands for 3G). Most 2G GSM networks operate in the 900MHz or 1800MHz bands. Some countries in the America (including Canada and the United States) use the 850 MHz and 1900 MHz bands because the 900 and 1800 MHz frequency bands were already allocated. Most 3G GSM networks in Europe operate in the 2100MHz frequency band. There are 400 and 450MHz frequency recurrence groups are allotted in certain nations where these frequencies were recently utilized for original frameworks.

GSM-900 utilizes 890–915 MHz to send data from the portable station to the base

station (uplink) and 935–960 MHz for the other heading (downlink), giving 124 RF channels (channel numbers 1 to 124) divided at 200kHz. Duplex dispersing of 45MHz is utilized. In certain nations the GSM-900band has been reached out to cover a bigger recurrence range. This 'broadened GSM', E-GSM, utilizes 880–915 MHz (uplink) and 925–960MHz (downlink), adding 50 channels (channel numbers 975 to 1023 and 0) to the first GSM-900 band.

Time division multiplexing is utilized to permit eight full-rate or sixteen half-rate discourse channels per radio recurrence channel. There are eight radio time slots (giving eight burst periods) gathered into what is known as a TDMA outline. Half rate diverts utilize substitute edges in the equivalent timeslot. The channel information rate for each of the 8 channels is 270.833Kbit/s, and the edge length is 4.615ms.

The transmission power in the handset is restricted to a limit of 2 watts in GSM850/900 and 1 watt in GSM1800/1900. GSM works in the 900MHz and 1.8GHz groups in Europe and the 1.9GHz and 850MHz groups in the US. The 850MHz band is additionally utilized for GSM and 3G in Australia, Canada and numerous South American nations. By having fit range across the greater part of the globe, GSM's worldwide meandering capacity permits clients to get to similar administrations when voyaging abroad as at home. This gives shoppers consistent and same number availability in excess of 218 countries. Terrestrial GSM networks currently cover over 80% of the total populace. GSM satellite meandering has likewise stretched out help admittance to territories where earth bound inclusion isn't accessible.

1. It can undoubtedly adjust to transmission of information just as voice correspondence.
2. It has a capacity to convey 64kbps to 120Mbps of information rates. This permits the administrator to do administrations like fax, voice band information and SMS just as transmission capacity serious application, for example, interactive media and video conferencing.
3. Since TDMA innovation isolates clients as per time, it guarantees that there will be no obstruction from concurrent transmissions.
4. It furnishes clients with an all-encompassing battery life, since it communicates just part of the time during discussions. Since the cell size develops more modest, it demonstrates to save base station gear, space and upkeep.

TDMA is the savviest innovation to change a simple frame work over to advanced.

2.1.2.3. THE CONCEPT OF CELLULAR NETWORK

Mobile telephone networks are based on the concept of **cells**, circular zones that overlap to coverage or graphical area.

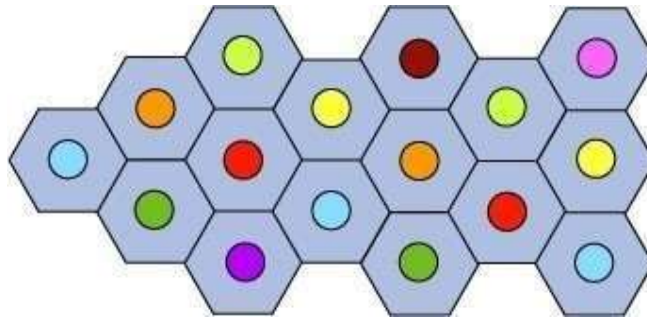


Fig.2.11.Cells

2.1.3. ARCHITECTURE OF THE GSM NETWORK

In a GSM organization, the client terminal is known as a portable station. A versatile station is comprised of a SIM (Subscriber Identity Module) card permitting the client to be particularly recognized and a portable terminal. The terminals (gadgets) are distinguished by an exceptional 15-digit ID number called IMEI (International Mobile Equipment Identity). Each SIM card likewise has an interesting (and mystery) distinguishing proof number called IMSI (International Mobile Subscriber Identity). This code can be secured utilizing a 4-digitkey called a PIN code.

The SIM card subsequently permits every client to be recognized autonomously of the terminal used during correspondence with a base station. Trades occur through a radio connection (air interface) between a portable station and a base station.

Every one of the base stations of a cell network are associated with a base station regulator (BSC) which is liable for overseeing dissemination of the assets. The framework comprising of the base station regulator and its associated base stations is known as the Base Station Subsystem (BSS).

At long last, the base station regulators are themselves truly associated with the Mobile Switching Center (MSC), oversight by the phone network administrator, which interfaces them to the public phone organization and the Internet. The MSC has a place with a Network Station Subsystem (NSS), which is liable for overseeing client characters, their area and foundation of interchanges with different supporters. The MSC is for the most part associated with data sets that give extra capacities:

1. The Home Location Register (HLR) is a data set containing data (geographic position, regulatory data and so forth) of the endusers enrolled in the space of the switch (MSC).
2. The Visitor Location Register (VLR) is a data set containing data of clients other than the nearby endusers. The VLR recovers the information of another client from the HLR of the client's supporter zone. The information is kept up as long as the client is in the zone and is erased when the client leaves or after an extensive stretch of inertia (terminal off).
3. The Equipment Identify Register (EIR) is a dataset posting the portable terminals.
4. The Authentication Center (AUC) is answerable for confirming client personalities.
5. The cell network framed in this manner is intended to help portability by means of the executives of handovers (developments starting with one cell then on to the next).
6. At last, GSM networks support the idea of wandering i.e., development starting with one administrator network then onto the next.

2.1.3.1. GSM Modem:

A GSM modem is a remote modem that works with a GSM remote organization. A remote modem carries on like a dial-up modem. The fundamental contrast between them is that a dial-up modem sends and gets information through a fixed phone line while remote modems ends and gets information through radio waves. Wired dial-up modems, such as ATD (Dial), ATA (Answer), ATH (Hook control) and ATO (Return to online data state) are also supported by GSM modems and mobile phones.

For example, D is the actual AT command name in ATD and +CMGS is the actual AT command name in AT+CMGS. Some of the tasks that can be done using AT commands with a GSM modem or mobile phone are listed below:

- Get basic information about the mobile phone or GSM modem. For example, name of manufacturer (AT+CGMI), model number (AT+CGMM), IMEI number (International Mobile Equipment Identity) (AT+CGSN) and software version (AT+CGMR).
- Get basic information about the subscriber. For example, MSISDN (AT+CNUM) and IMSI number (International Mobile Subscriber Identity) (AT+CIMI).

- Get the current status of the mobile phone or GSM/GPRS modem. For example, mobile phone activity status (AT+CPAS), mobile network registration status (AT+CREG), radio signal strength (AT+CSQ), battery charge level and battery charging status(AT+CBC).
- Establish a data connection or voice connection to a remote modem (ATD, ATA, etc).
- End and receive fax(ATD,ATA,AT+F*).
- Send (AT+CMGS,AT+CMSS), read(AT+CMGR,AT+CMGL), write(AT+CMGW) or Delete (AT+CMGD) SMS messages and obtain notifications of newly received SMS messages (AT+CNMI).
- Read (AT+CPBR), write(AT+CPBW) or search(AT+CPBF) phone book entries.
- Perform security-related tasks, such as opening or closing facility locks (AT+CLCK), checking whether a facility is locked (AT+CLCK) and changing passwords (AT+CPWD).

2.1.3.2. BASIC CONCEPTS OF SMS TECHNOLOGY

1. Validity Period of an SMS Message an SMS message is stored temporarily in the SMS center if the recipient mobile phone is offline. It is possible to specify the period after which the SMS message will be erased from the SMS community with the goal that the SMS message won't be sent to the beneficiary cell phone when it gets on the web. This period is known as the legitimacy period.

2. Message Status Reports

Sometimes the client might need to know whether a SMS message has arrived at the beneficiary cell phone effectively. To get this data, need to set a banner in the SMS Message to tell the SMS community that a status report is needed about the conveyance of this SMS message. The status report is shipped off the client portable as a SMS message.

3. Message Submission Reports

After leaving the cellphone, a SMS message goes to the SMS place. At the point when it arrives at the SMS place, the SMS community will send back a message accommodation report to the cell phone to illuminate whether there are any mistakes or disappointments (for example mistaken SMS message design, occupied SMS

place, and soon) On the off chance that there is no blunder or disappointment, the SMS place sends back a positive accommodation report to the cell phone. Else it sends back a negative accommodation report to the cell phone.

4.Message Delivery Reports

Subsequent to getting a SMS message, the beneficiary cell phone will send back a message convey an port to the SMS place to advise whether there are any blunders or disappointments (model causes: unsupported SMS message design, insufficient extra room, and so on).

2.1.4. 16*2 Alphanumeric LCD Description

Fluid gem show is vital gadget in embedded framework. It offers high adaptability to client as he can show the necessary information on it. A fluid gem show (LCD) is a flimsy, level electronic visual presentation that utilizes the light balancing properties of fluid gems (LCs). LCs don't emanate light straightforwardly.

2.1.4.1. Block Diagram

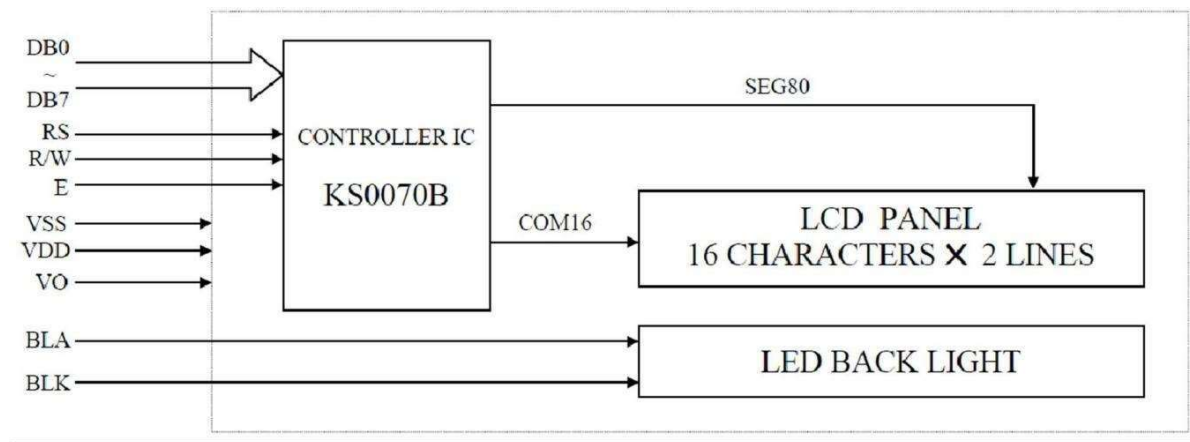


Fig2.13:connecting the LCD with controller IC Display Data RAM

Display data RAM (DDRAM) stores display data represented in 8-bit character codes. Its extended capacity is 80 X 8 bits, or 80 characters. The area in display data RAM (DDRAM) that is not used for display can be used as general data RAM. So DDRAM is actually displayed on the LCD.

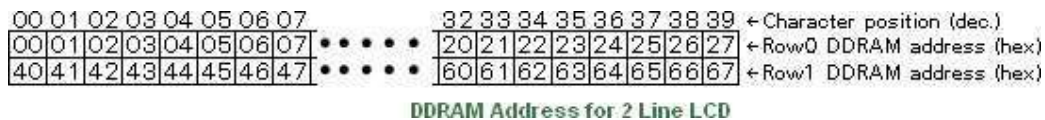


Fig:2.14.DDRM address of 2 line LCD

2.1.5. Character Generator ROM

Now you might be thinking that when you send an ASCII value to DDRAM, so the appropriate response is CGROM. The character generator ROM creates 5 x 8 speck or 5 x 10 spot character designs from 8-bit character codes. It can create 208 5 x 8 speck character designs and 32 5 x 10 dab character designs. Client characterized character designs are additionally accessible by veil modified ROM.

2.1.5.1. Occupied Flag:

Occupied Flag is a status marker banner for LCD. At the point when we send an order or information to the LCD for preparing, this banner is set (for example BF =1) and when the guidance is executed effectively this banner is cleared (BF=0). This is useful in creating and careful measure of deferral for the LCD processing.

2.1.5.2. Guidance Register(IR) and Data Register(DR) :

There are two 8-bit enrolls in HD44780 regulator Instruction and Data register. Guidance register relates to the register where you send orders to LCD for example LCD move order, LCD clear, LCD address and so on and Data register is utilized for putting away information which is to be shown on LCD.

2.1.5.3. 16x2AlphanumericLCDModule Features

Keen, with worked in Hitachi HD44780 viable LCD regulator and RAM giving straight forward interfacing

61x15.8mm seeing region

5 x7speck framework design for 2.96x5.56mm characters, in addition to cursor line Can show 224 unique images

2.1.5.4. Circuit Description

Above is the very basic schematic. The LCD board's Enable and Register Select is associated with the Control Port. The Control Port is an open gatherer/open channel yield.

While most Parallel Ports have in ward draw up resistors, there are a not many which don't. Consequently by consolidating the two 10K outer draw up resistors, the circuit is more convenient for a more extensive scope of PCs, some of which may have no inside pull up resistors.

2.1.6. DC Motors:

Electric engines are utilized to productively change over electrical energy into mechanical energy. Attraction is the premise of their standards of activity, material to cover, paint, punch, plate, make or structure steel, film, paper, tissue, aluminum, plastic and other crude materials.



Fig.2.15:indicationofmagneticfield

This is the Left Hand Rule for engines. The main finger focuses toward the attractive field (first-field), which goes from the North pole toward the South pole. The subsequent finger focuses toward the current in the wire (second - current). The thumb at that point focuses toward the path the wire is pushed or pushed while in the attractive field (thumb-force or push).

Along these lines, when a wire conveying current is opposite to an attractive field, a power is made on the wire making it move opposite to the field and bearing of current. The more noteworthy the current in the wire, or the more prominent the attractive field, the quicker the wire moves as a result of the more note worthy power made. In the event that the current in the wire is corresponding to the attractive field, there will be no power on the wire.

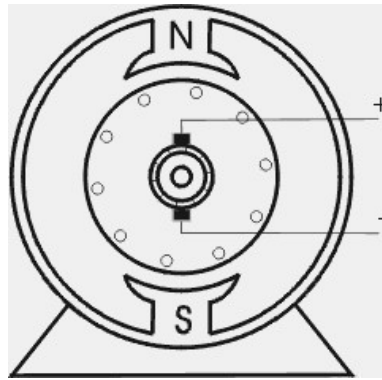


Fig.2.16:DCmotor

DC motors are fairly simple to understand. They are also simple to make and only require a battery or dc supply to make them run.

A simple motor has six parts, as shown in the diagram below:

- **Armature or rotor**
- **Commutator**
- **Brushes**
- **Axle**
- **Field magnet**
- **DC power supply**

An electric motor is all about magnets and magnetism: A motor uses **magnets** to create motion. The armature (or rotor) is an electromagnet, while the field magnet is a perpetual magnet (the field magnet could be an electromagnet also, yet in most little engines it isn't to save power).

At the point when these parts together, here is a finished electric engine.

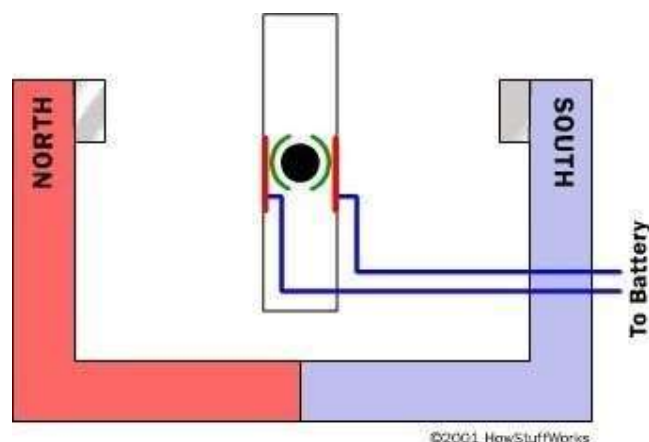


Fig.2.17DCmotorwitharmaturewinding

In the above Fig, the armature winding has been left out with the goal that it is simpler to see the commutator in real life. The critical thing to see is that as the armature goes through the even position, the posts of the electromagnet flip. In light of the flip, the north pole of the electromagnet is consistently over the pivot so it can repulse the field magnet's north pole and draw in the field magnet's south pole.

2.1.6. RELAYS:

A transfer is an electrically controllable switch generally utilized in modern controls, cars and apparatuses.

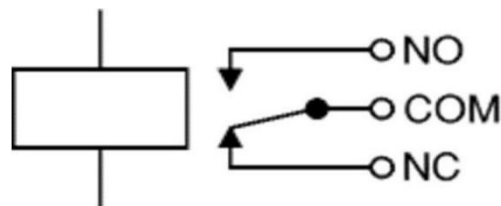


Fig.4.18:Circuit symbol of a relay

2.1.6.1Operation:

When current moves through the curl, an attractive field are made around the loop i.e.,the loop is stimulated. This makes the armature be pulled into the curl.

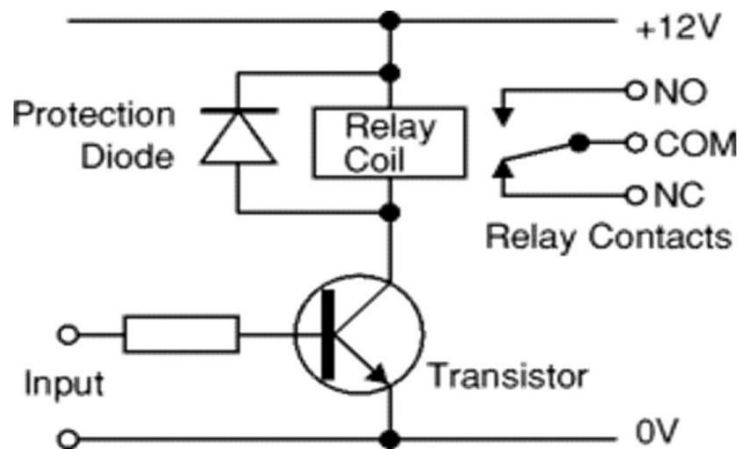


Fig.4.19:Relay Operation and use of protection diodes

Transistors Semiconductors and ICs should be shielded from the concise high voltage 'spike' created when the hand-off loop is turned off.

In picking a transfer, the accompanying qualities should be thought of:

1. The contacts can be regularly open (NO) or ordinarily shut (NC). In the NC type, the contacts are shut when the loop isn't stimulated. In the NO sort, the contacts are shut when the loop is stimulated.
2. There can be at least one contact. i.e., various sorts like SPST (single shaft single toss), SPDT (single post twofold toss) and DPDT (twofold shaft twofold toss) hand-off.
3. The voltage and current needed to stimulate the loop. The voltage can fluctuate from a couple of volts to 50 volts, while the current can be from a couple milliamps to 20 milliamps. The hand-off has a base voltage, beneath which the loop won't be empowered. This base voltage is known as the "pull-in" voltage.
4. The least DC/AC voltage and current that can be taken care of by the contacts. This is in the range of a few volts to hundreds of volts, while the current can be from a few amps to 40A or more, depending on the relay.

2.1.6.2 DRIVING ARELAY:

An SPDT transfer comprises of five pins, two for the attractive curl, one as the basic terminal and the last pins as regularly associated pin and typically shut pin. At the point when the current moves through this loop, the curl gets invigorated.

2.1.7. SENSOR:

A sensor (likewise called finders) is a gadget that actions a quantifiable trait and converts it into a sign which can be perused by a spectator or by an instrument.

2.1.7.1. TEMPERATURE SENSOR:

Temperature Sensor which changes over temperature esteem into electrical signs. The utilized IC called LM 35 as a temperature sensor.

2.1.7.1.1. Features:

- Calibrated directly in ° Celsius (Centigrade)
- Linear +10.0mV/°C scale factor
- 0.5°C accuracy guaranteed (at +25°C)
- Rated for full -55°C to +150°C range
- Suitable for remote applications

- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Less than 60μA current drain
- Low self-heating, 0.08°C in still air
- Nonlinearity only $\pm 1/4^\circ\text{C}$ typical
- Low impedance output, 0.1W for 1mA load

2.1.7.1.2 TEMPERATURE SENSING CIRCUIT

The techniques for temperature estimation might be partitioned into two primary classes to the extent that the trading of warmth between the testing body and the hot framework happens by contactor by radiation across a space.

VCC_CIRCLE

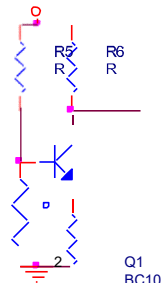


Fig.4.20: Temperature Sensing Circuit

2.1.8.1PHsensor:

2.1.8.1.1 DefiningpH

- PH is the numeric portrayal of gram-comparable per liter of hydrogen particle focus in any arrangement. It shifts between 0 to 14. It is the logarithmic estimation of moles of hydrogen particles per liter of arrangement.
- To screen pH of downpours owe can identify the contaminations in air, if the down pour water becomes more acidic.
- To monitor pH of many other daily used products like milk, shampoo etc.

Three Ways to measure pH of a solution

- Using indicator strip which when placed in a solution, changes its color accordingly. The strip is then taken out and its color is matched with a color on the color chart to decide the corresponding pH value.
- Using a pH indicator fluid where the unknown solution is added to the fluid and the changed color of the fluid is matched with a already available color on the color wheel to decide the pH value.
- Using a pH sensor where a probe can be simply inserted inside the solution and pH reading can be done.

A laser varies from different wellsprings of light in that it discharges light which is cognizant. Spatial lucidness permits a laser to be engaged to a difficult situation, empowering applications, for example, laser cutting and lithography. Spatial rationality likewise permits a laser pillar to remain limited over significant stretches (collimation), empowering applications like laser pointers and lidar. Lasers can likewise have high worldly rationality, which permits them to emanate light with an exceptionally restricted range, i.e., they can radiate a solitary shade of light. On the other hand, worldly soundness can be utilized to deliver beat so flight with a wide range yet

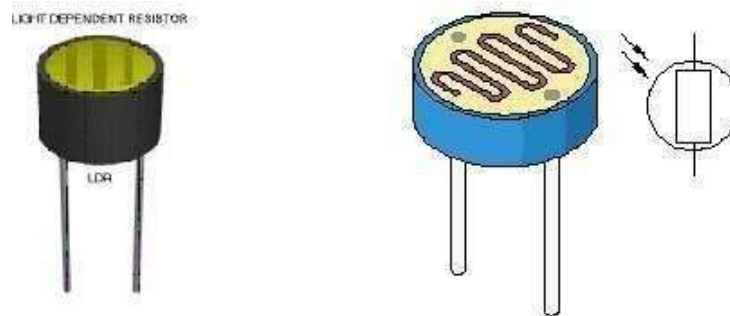


Fig.2.21:Lightdependentresister

The output of the LDR is given to ADC which converts the analog intensity value into corresponding digital data and presents this data as the input to the microcontroller

2.1.9.1. Water Level Indicator Description

This is the circuit diagram of a simple corrosion free water level indicator for home and industries. In fact the level of any conductive noncorrosive liquids can be measured using this circuit

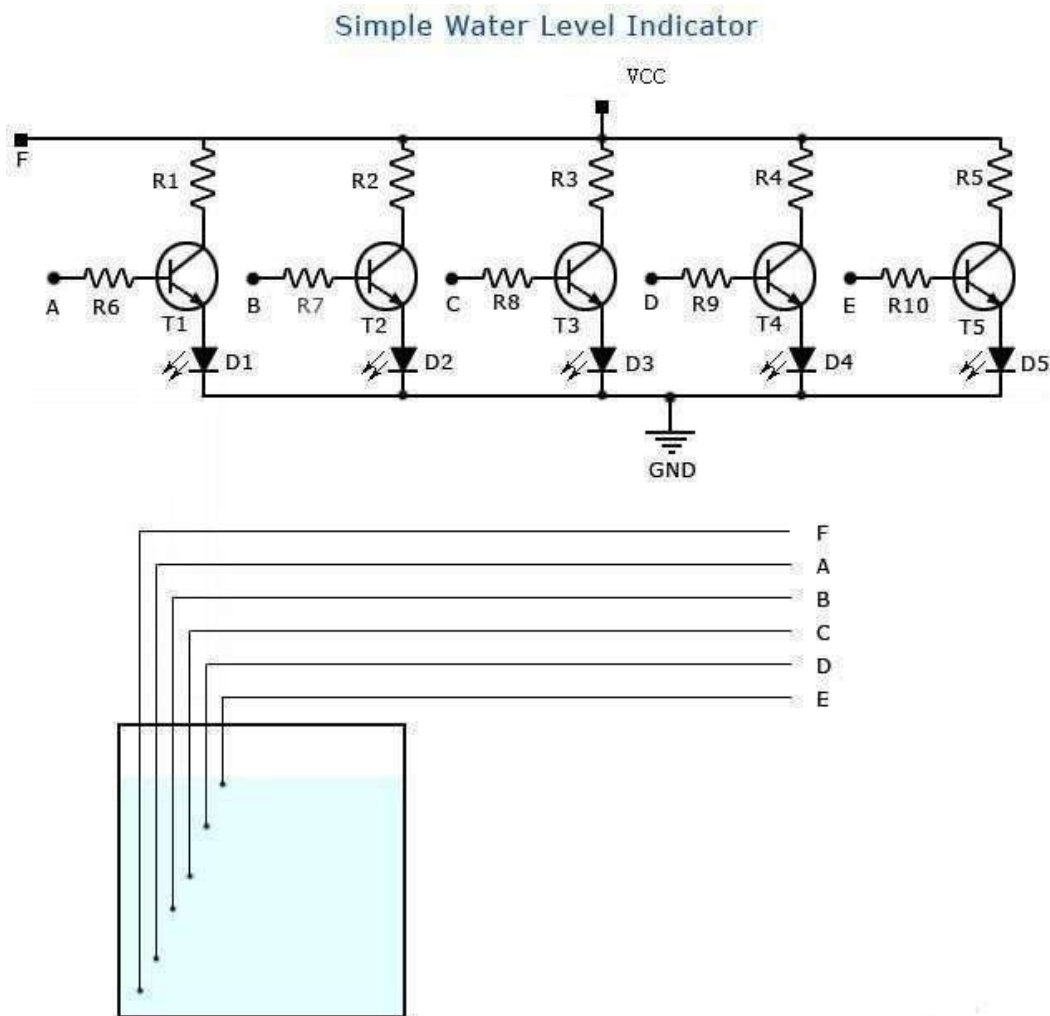
One anode test is (F) with 6V AC is set at the lower part of tank. Next tests are set bit by bit over the base test. At the point when water is rising the base of every semiconductor gets electrical association with 6V AC through water and the

comparing probe, Which thus makes the semiconductors direct to gleam LED and demonstrate the degree of water.

2.1.9.1. Components

T1–T5BC548 or 2N2222 Transistors R1-R52.2K 1/4 W Resistors

R6-R10 22K1/4W Resistors



D1–D5LED's(coloryourchoice)

Fig 2.23.Circuit Diagram and Sensor Arrangement. Fig.2 .24:Water Level Indicator

2.2 SOFTWARES

Arduino is a model stage (open-source) in view of a simple to-utilize equipment and programming. It comprises of a circuit board, which can be customized and an instant

programming called Arduino IDE (Integrated Development Environment), which is utilized to compose and transfer the PC code to the actual board.

• 2.2.1 Introduction to Arduino

IDE The key features are:

- Arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.
- Unlike most previous programmable circuit boards, Arduino does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board. Simply a USB cable can be used.
- Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program.
- Finally, Arduino provides a standard form factor that breaks the functions of the micro- controller into a more accessible package.
- After learning about the main parts of the Arduino UNO board, will be ready to upload our program on the Arduino board.

2.2.1.1 Arduino data types:

Data types in C allude to a broad framework utilized for pronouncing factors or elements of various kinds. The sort of a variable decides how much space it involves in the capacity. The following gives all the information types that you will use during Arduino programming.

•Void:

The void catch phrase is utilized uniquely in work announcements. It demonstrates that the capacity is relied upon to return no data to the capacity from which it was called.

Model:

```
Void Loop( )
```

```
{
```

```
/rest of the code
```

```
}
```

- **Boolean:**

A Boolean holds one of two qualities, valid or bogus. Each Boolean variable possesses one byte of memory.

- **Char:**

An information type that takes up one byte of memory that stores a character esteem. Character literals are written in single statements like this: 'A' and for numerous characters, strings utilize two fold statements: "ABC".

- **Unsigned char:**

Unsigned char is an unsigned data type that occupies one byte of memory. The unsigned char data type encodes numbers from 0 to 255.

Unsigned Char chr_y=121;// declaration of variable with type Unsigned char and initialize it with character y

- **Byte:**

A chomp stores a 8-bit unsigned number, from 0 to 255.

- **int:**

Numbers are the essential information type for number stock piling. Int stores a 16-bit (2-byte) esteem. This yields a scope of - 32,768 to 32,767 (least estimation of - 2^{15} and a most extreme estimation of $(2^{15}) - 1$).

- **Unsigned int:**

Unsigned ints (unsigned numbers) are equivalent to int in the way that they store a 2 byte esteem. Rather than putting away negative numbers, in any case, they just store positive qualities, yielding a valuable scope of 0 to 65,535 ($2^{16} - 1$). The Due stores a 4byte (32-bit) esteem, going from 0 to 4, 294, 967 ,295 ($2^{32} - 1$).

- **Word:**

On the Uno and other ATMEGA based sheets, a word stores a 16-cycle unsigned number. On the Due and Zero, it stores a 32-digit unsigned number.

- **Long:**

Long factors are expanded size factors for number stock piling, and store 32 pieces (4bytes), from 2,147,483,648 to 2,147,483,647.

- **Short:**

A short is a 16-bit data-type. On all Arduinos (ATMega and ARM based), a short stores a 16-bit (2-byte) value. This yields a range of -32,768 to 32,767 (minimum value of -2^{15} and a maximum value of $(2^{15}) - 1$).

- **Float:**

Information type for gliding point number is a number that has a decimal point. Skimming point numbers are regularly used to estimate the simple and nonstop qualities since they have more note worthy goal than whole numbers.

Coasting point numbers can be pretty much as extensive as $3.4028235E+38$ and a slow as $3.4028235E+38$. They are put away as 32 pieces (4bytes) of data.

- **Double:**

On the Uno and other ATMEGA based sheets, Double exactness gliding point number involves four bytes. That is, the two fold execution is actually equivalent to the buoy, with no increase in accuracy. On the Arduino Due, pairs have 8-byte (64 cycle) accuracy.

In this segment, we will learn in simple advances, how to set up the Arduino IDE on our PC and set up the board to get the program by means of USB link.

5.2. **Step wise approach for software instalation**

Step1:

First Arduino board and a USB link. On the off chance that you use Arduino UNO, Arduino Due milanove, Nano, Arduino Mega2560, or Diecimila, you will require a standard USB link the sort would associate with a USB printer as demonstrated in the accompanying picture.

2:Download Arduino IDE Software.

.

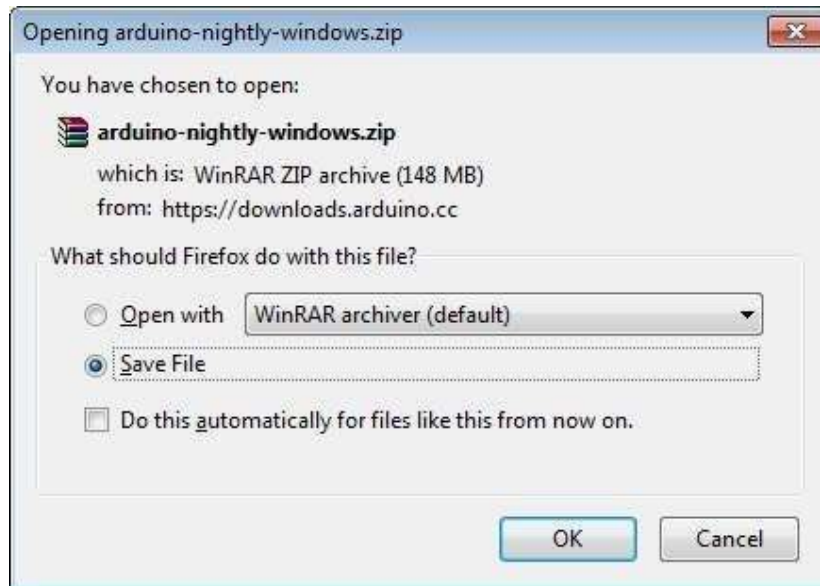


Fig.2.21: Opening arduino

Step3: Power up board.

The Arduino Uno, Mega, Due milanove and Arduino Nano naturally draw power from either, the USB association with the PC or an outer force supply. On the off chance that are utilizing an Arduino Diecimila, need to ensure that the board is arranged to draw power from the USB association. The force source is chosen with a jumper, a little piece of plastic that fits onto two of the three pins between the USB and force jacks. Watch that it is on the two pins nearest to the USB port. Associate the Arduino board to your PC utilizing the USB link. The green force LED (named PWR) should gleam.

Step4: Launch Arduino IDE.

After Arduino IDE programming is downloaded, need to unfasten the envelope. Inside the envelope, discover the application symbol with a boundlessness name (application.exe). Double tap the symbol to begin the IDE.

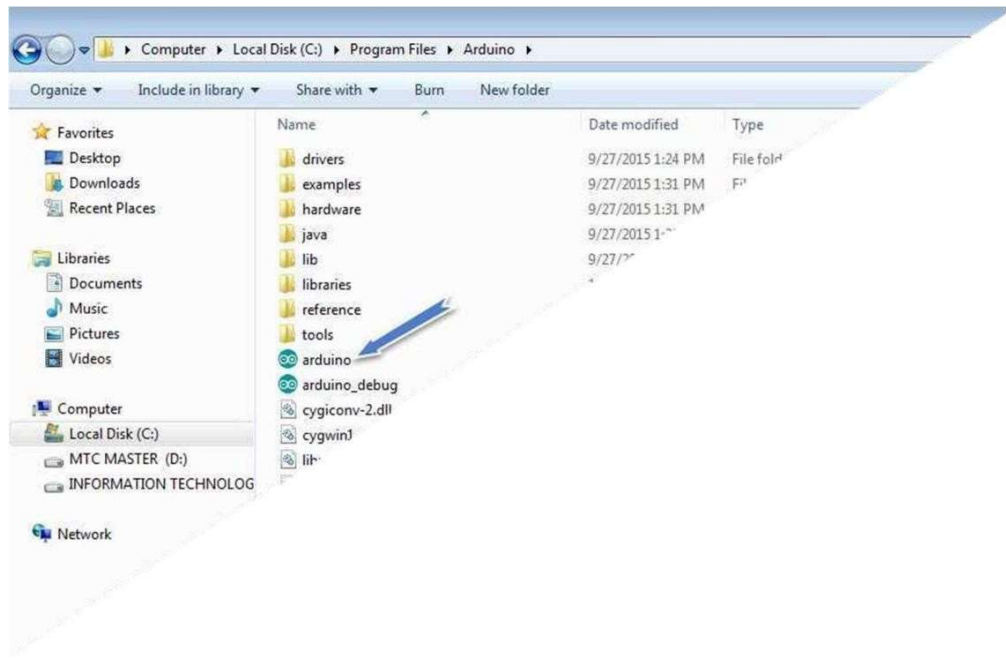


Fig.2.22: Launching Arduino IDE

Step5: Open the first project.

Once the software starts, have two options:

- Create a new project.
- Open an existing project example.

To create a new project, select File-->New. To open

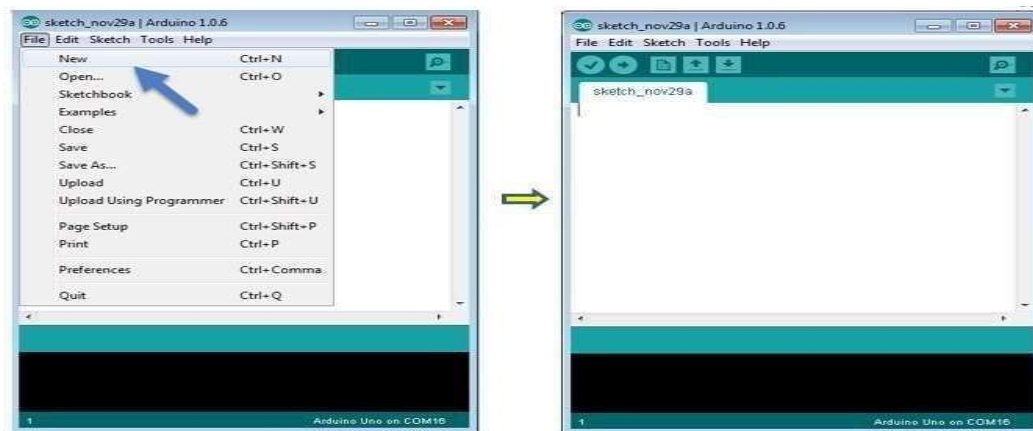


Fig.2.23: Opening blank new project

To open an existing project example, select File->Example->Basics->Blink.

Step6: Select Arduino board.

To avoid any error while uploading your program to the board, you must select the correct Arduino board name, which matches with the board connected to computer.

Go to Tools-> Board and select board

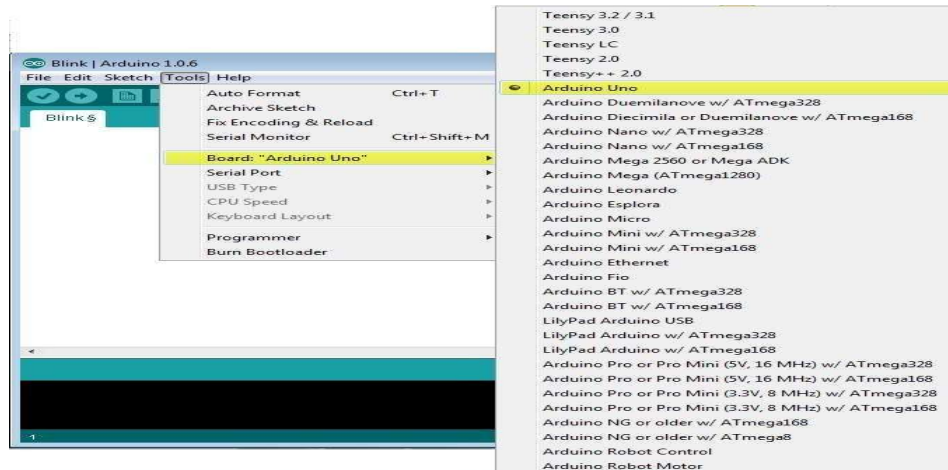


Fig.2.24:Selecting arduino board

Here, selected Arduino Uno board according to tutorial, but must select the name matching the board that are using

Step7: Select serial port.

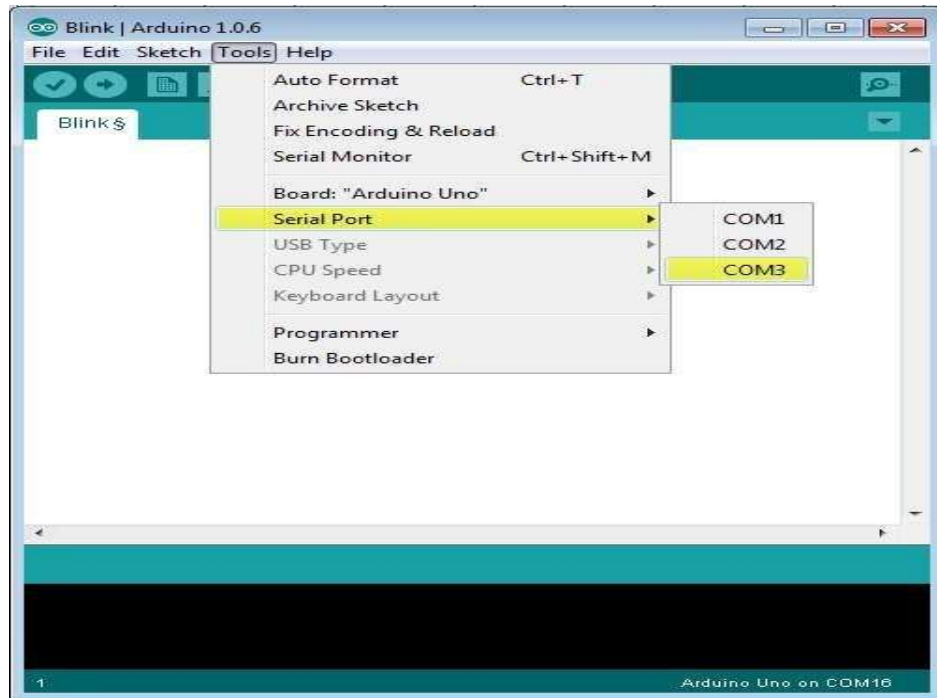


Fig.2.25:Selecting serial port

Step 8: Upload the program to your board. Prior to clarifying how to transfer our program to the board, should exhibit the capacity of every image showing up in the Arduino IDE toolbar.

Arduino programming structure

In this part, we will concentrate top to bottom, the Arduino program construction and learn all the more new phrasings utilized in the Arduino world. The Arduino programming is open-source. The source code for the Java climate is delivered under the GPL and the C/C++ microcontroller libraries are under the LGPL.

Sketch: The first new terminology is the Arduino program called “**sketch**”.

Structure

Arduino projects can be separated in three primary parts: Structure, Values (factors and constants), and Functions. In this instructional exercise, the Arduino programming program, bit by bit, and can compose the program with no language structure or assemblage mistake.

Allow to begin with the Structure. Programming structure comprise of two fundamental capacities:

- Setup()work
- Loop()work

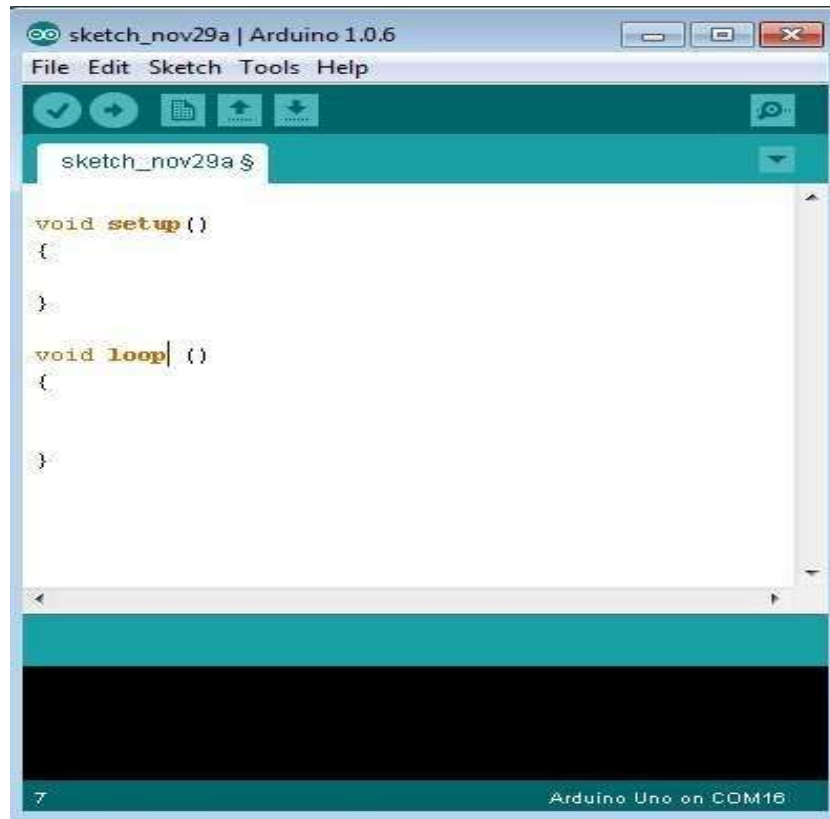


Fig. 2.26: Programming structure

Voidsetup()

```
{  
}
```

PURPOSE:

INPUT OUTPUT RETURN

VoidLoop()

```
{  
}
```

CHAPTER 3

RESULTS

3.1.RESULTS



Fig.3.1:Temperature monitoring using temperature sensor

Whenever the temperature of environmental factors builds then the temperature sensor detects the temperature, at that point an alarm message ships off the client in regard to this and alongside this the DC fan begins to turn as to cool the temperature.



Fig.3.2:Water level indicator

In our undertaking, the water level checking is finished utilizing this, this incorporates the siphoning of water through the interface of Arduino uno. At whatever point, the water level is low then the DC engine turns over siphoning the water alongside an alarm messages hipped off the client through the GSM.



Fig.3.3:pHvalueabove7

Theourundertaking,thewaterlevelcheckingisfinishedutilizingthis,thisincorporatesthe siphoning of water through the interface of Arduino uno. At whatever point, the water level is low then the DC engine turns over siphoning the water alongside an alarm messages hipped off the client through the GSM.



Fig.3.4:Securityforthepondusingourproject

As our fundamental aphorism to give security for our lakes, we utilized laser and LDR for giving the security. At whatever point any item goes through the laser, at that point the LDR recognizes something has passed and afterward passes a message caution to the client.

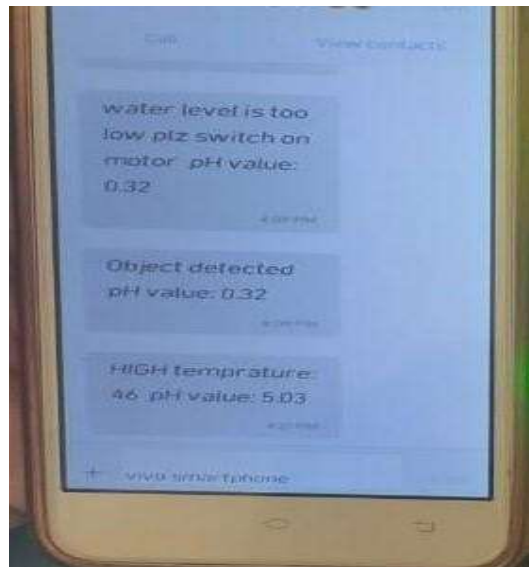


Fig.3.5:Messagealertsentaboutthestatusofourpond.

This is the message alerts to the user sent through the GSM. As we discussed after every module happening there sends an alert message to the use as follows.

CHAPTER 4 CONCLUSION AND FUTURE SCOPE

4.1. CONCLUSION

Thus, Security for pisciculture alongside water and temperature observing task has been executed utilizing Arduino uno.

4.2. FUTURE SCOPE

- This project makes the pisciculture simpler to develop. As many-a-ranchers deal with issues to develop it.
- We could also measure the oxygen content in the farm instead measuring pH.
- On further we can also use IOT.
- We can likewise expand the quantity of boundaries and sensors to make this venture safe.

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