

CAPSTONE REPORT
On
SMART GARDENING SYSTEM

Submitted in partial fulfillment of the requirement for the award of the
Degree of

BACHELOR OF TECHNOLOGY
IN
Electronics and Communication Engineering
By

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Qualitative Assessment of Proposed Topic by PAC		
Sr.No.	Parameter	Rating (out of 10)
1	Project Novelty: Potential of the project to create new knowledge	6.00
2	Project Feasibility: Project can be timely carried out in-house with low-cost and available resources in the University by the students.	5.40
3	Project Academic Inputs: Project topic is relevant and makes extensive use of academic inputs in UG program and serves as a culminating effort for core study area of the degree program.	5.50
4	Project Supervision: Project supervisor's is technically competent to guide students, resolve any issues, and impart necessary skills.	7.30
5	Social Applicability: Project work intends to solve a practical problem.	5.60
6	Future Scope: Project has potential to become basis of future research work, publication or patent.	5.40
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Final Topic Approved by PAC: DESIGN OF AN IOT BASED SMART GARDENING SYSTEM

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CERTIFICATE OF GUIDANCE

This is to certify that the declaration statement made by the group of students is correct to the best of our knowledge and belief. The capstone Project Proposal based on the technology/tool learnt is fit for the submission and partial fulfillment of the condition for the award of B. Tech in Electronics and Communication engineering from Lovely Professional University, Phagwara.

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DECLARATION

We hereby declare that the project work entitled “Smart Gardening System” is an authentic record of our own work carried out as requirements of Capstone Project for the award of degree of B.Tech in Electronics and Communication Engineering from Lovely Professional University, Phagwara, under the guidance Prof. Manoj Sindhwani, during January to April, 2020.

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ABSTRACT

The interminable need of everyone in this world is oxygen. Plants assume an essential job in keeping up the carbon dioxide and oxygen content noticeable all around. Number of plants are being decimated every single day for urbanization process. The quantity of plantings made is additionally decreased. Aside from these things more beyond words to absence of support. The fundamental point of this task is to keep up the idea of the plants by ceaselessly checking the boundaries prompting the expanded existence of the two plants and individuals. The programmed frameworks are wanted to a manual framework. A calculation has been worked out with edge estimations of soil dampness sensor to control the water amount in soil and furthermore a water level sensor has been actualized to gauge the water level in tank. NodeMCU is utilized to interface various sensors which gather the boundaries of soil. An LCD screen is likewise connected to the smaller scale controller to show dampness states of the dirt and water siphon. The water level sensor is utilized to distinguish the degree of tank with the goal that tank contains proficient water to move into crops. Human endeavors can be diminished utilizing this procedure and increment sparing of water by productively inundating the plants.

TABLE OF CONTENTS

CONTENTS	PAGE NO.
Certificate of Guidance	2
Acknowledgement	3
Declaration	4
Abstract	5
Table of contents	6
List of figures	7
Introduction	8
Literature Review	9
Problem statement	10
Wi-Fi Module	11
Voltage regulator	13
Motor	16
LCD	20
Soil Moisture Sensor	24
DHT 11	26
I2C	28
Servomotor	30
Circuit Diagram	33

Order of Execution	34
Programming Code	35

LIST OF FIGURES

Figure	Page no.
Figure 1.1 ESP8266	12
Figure 3.1 LM7805	13
Figure 3.2 Pinout of LM7805	14
Figure 3.3 Model of LM7805	15
Figure 5.1 Working of Motor	16
Figure 5.2 Types of Motors	19
Figure 6.1 Pin Diagram of LCD	21
Figure 6.2 Working of LCD	22
Figure 7.1 Model of soil moisture sensor	25
Figure 8.1 Pin Diagram of DHT11	27
Figure 9.1 Circuit Diagram of I2C	30
Figure 10.1 Pin Diagram of Servo Motor	31
Figure 10.2 Stimulation of Servo Motor	32
Figure 11.1 Cricuit Diagram of the System	34
Figure 12.1 Order of Execution	35

INTRODUCTION

Mechanization runs the world these days. It is a method of utilizing PCs or cell phones in checking and controlling the straightforward boundaries of everyday life. An amazing standard will be fed by the act of utilizing mechanization for basic things. Utilizing the idea of IOT we make sensors to speak with one another which are incredible in mechanization. The significant part of this model is that it spares cost and guarantees security. At the point when individuals attempt to make plantings and set up their own nursery, they were mindful in support at just in their individuals to consequently screen the boundaries and guarantees support of the nursery. It assumes a crucial job and fills in as a decent ally for plants. IOT gives answers for different issues and it permits things to be detected or controlled remotely in organize foundation.

This project is about smart gardening, in this project there are 2 parts, first is automatic sprinkling system which enables garden to sprinkle water automatically when requires and second is motor canopy for providing shelter for gardener. All of which will be totally IoT based which makes the system smart enough to be controlled from anywhere across.

LITERATURE REVIEW

This task is about brilliant planting, in this venture there are 2 sections, first is programmed sprinkling framework which empowers nursery to sprinkle water consequently when requires, and the second is engine shade for giving sanctuary to planter. The advantages of planting have been underscored to improve the personal satisfaction. Information created from sensors are detonating with late advancement of IoT. This change in outlook requires different industry handle that request moment activities to break down the emerging information consistently, alongside the constant representation investigation. As the current representation frameworks, in any case, perform perception subsequent to putting away information, the reaction time of the server can't ensure the ms-level handling that is near ongoing.

This paper proposes a design for smart irrigation system using ready-to-use, cost effective and energy efficient devices including NodeMCU, lcd, and relay boards. The design can be used in observing agriculture fields as well as in small gardens via website using any electronic device.

This research combines the concept of the Internet of Things and control system. The temporary results of this research are the application of lamp control.

PROBLEM STATEMENT

Many gardeners still use the traditional methods of gardening which results in low yielding of garden. The existing garden is less shelter and less comfortable. So, the Smart Garden System is creating to make the garden more shelter and comfortable. The other problem is the existing garden needs people to keep and control the operations. By using this smart garden system, it can ease the user and the owner to control the operation.

Locally established agribusiness and estate requires an everyday observing. In our bustling lives it is difficult to consistently set aside a few minutes for our manors to steady screen them. Results, they cease to exist. This is an undertaking that has distinguished this issue and attempted to structure a versatile arrangement so one never needs to stress over their plants. they can be occupied with their everyday tasks or appreciate extended vacations and their plants would be sound and new.

Required Components

ESP8266 Wi-Fi Module:

ESP8266 is a Wi-Fi enabled system on the chip

Volume created by Espressif

System. It is often used in the development of IoT (Internet of Things) embedded applications

4 2.4 GHz WiFi (802.11b / g / n, supports WPA / WPA2),

- General Purpose Input / Output (16 GPIO),
- Inter-Integrated Circuit (I²C) serial communication protocol,
- Analog-to-digital conversion (10-bit ADC)
- Serial Peripheral Interface (SPI) Serial Communication Protocol,

The IS (Inter-IC Sound) interfaces (sharing pins with the GPIO) with the MA DMA (Direct Memory Access),

ART UART (on special pins, can also enable transmit-only UART on GPIO2), and

- Pulse width modulation (PWM).

It uses a 32-bit RISC CPU (or overclocked up to 160 MHz) based on the Densilica Extensa L106, which runs at 80 MHz. It has 64 KB Boot ROM, 64 KB Instruction RAM and 96 KB Data RAM. External flash memory can be accessed via SPI.

The ESP8266 module is a low-cost standalone wireless transceiver that can be used for endpoint IoT upgrades.

To communicate with the ESP8266 module, the microcontroller must use the set of AT commands.

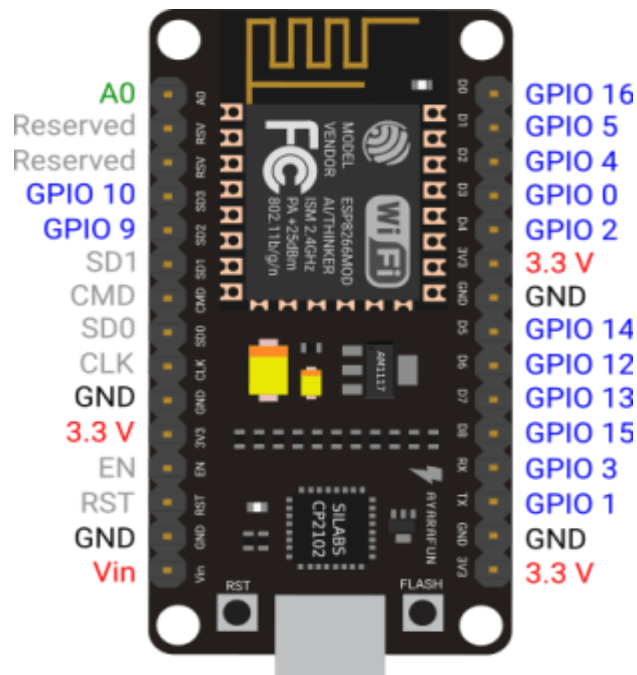
The microcontroller communicates with the ESP8266-01 module using UART with a specified baud rate.

There are many third-party manufacturers that make different modules based on this chip.

P ESP-01 comes with 8 pins (2 GPIO pins) - PCB trace antenna.

- ESP-02 comes with 8 pins, (3 GPIO pins) - U-FL antenna connection.

- ESP-03 comes with 14 pins, (7 GPIO pins) - porcelain antenna.
- ESP-04 comes with 14 pins, (7 GPIO pins) - no ant.



3 V3: 3.3 V Power Pin.

GND: - Ground pin.

RST: - Active Low Reset Pin.

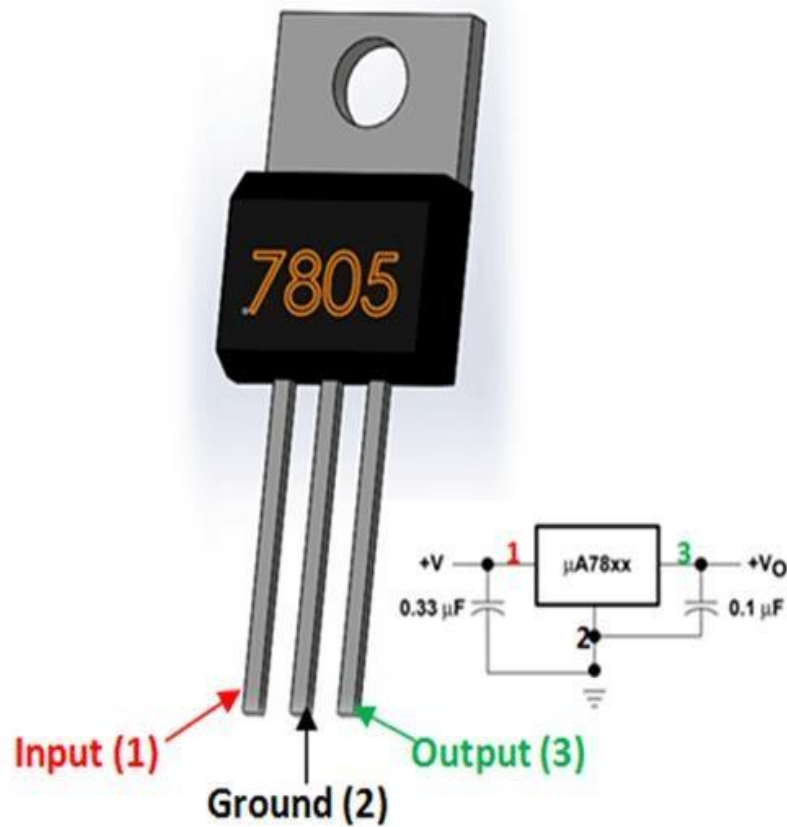
EN: - Active high operating pin.

TX: - UART's Serial Transmit Pin.

RX: - Get the pin of Serial UART.

GPIO0 & GPIO2-General Purpose I / O Pins. The value of these pins determines which mode (starting or normal) to start. It also determines whether TX / RX pins are used for volume programming or for serial I / O purposes.

Voltage Regulator IC 7805:

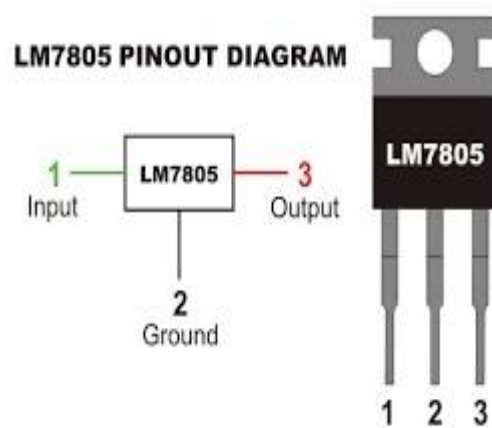


Introduction:

- The voltage regulator ic is used to control the voltage required at every node .
- The voltage regulator is versatile in nature.
- It provides constant output voltage for the equivalent input voltage.
- The 05 in 7805 ic mean it provides 5v of output voltage.
- The output current can reach up to 1.5 amp.

Pin configuration:

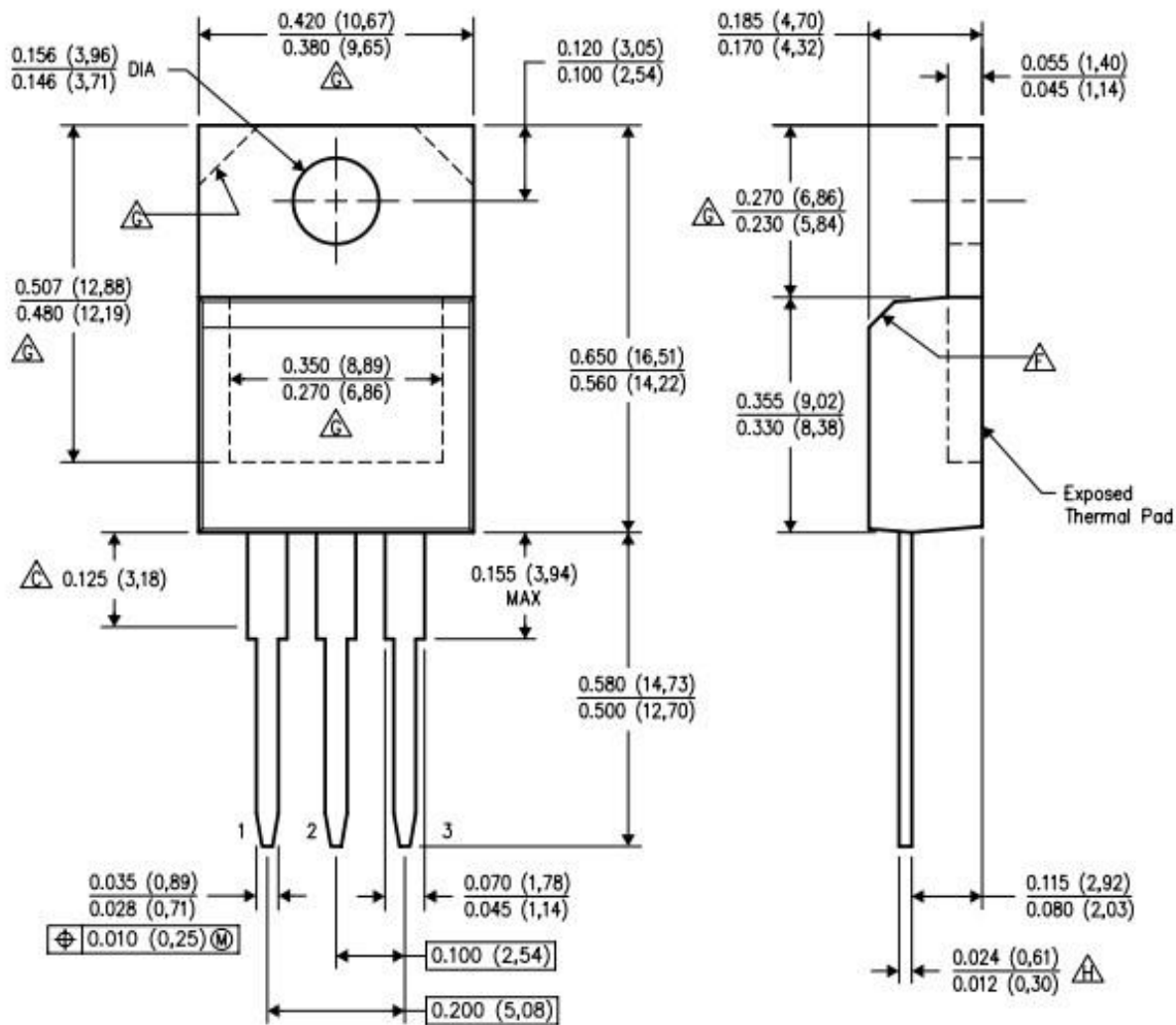
Pin no	Pin name	Descreption
1	Input	Varying voltage
2	Gnd	Ground connection
2	Output	Constant output voltage



Features of LM7805:

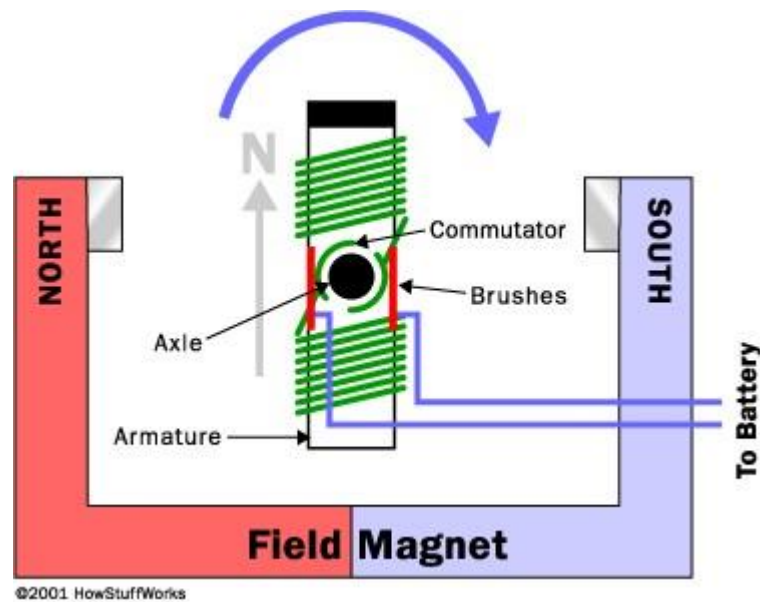
- 5v of output voltage(positive).
- Minimum input voltage is 7V.
- Maximum output voltage is 25V.
- Operating current is 5mA.
- The maximum temperature at the junction is 125V.

Model of voltage regulator:



MOTOR:

An electric motor can be defined as; it is one kind of machine used to convert the energy from electrical and mechanical. Most of the motors work through the communication among the electrical current and magnetic field of the motor's winding for generating force in the form of shaft rotation. These motors can be triggered by a DC source or AC source. A generator is mechanically the same to an electric motor, however, works in the opposite direction by changing mechanical energy to electrical energy.



Electric Motor Construction: The electric motor construction can be done using the rotor, bearings, stator, air gap, windings, commutator.

ROTOR:

The rotor in an electric engine is the moving part, and the principle capacity of this is to turn the pole for creating the mechanical force. For the most part, the rotor incorporates conductors which are laid to convey flows and speak with the attractive field in the stator.

BEARINGS:

The bearings in the engine essentially give the help to the rotor to enact its pivot. The pole of the engine extends with the assistance of the direction to the heap of the engine. As the heap powers are utilized outside of the bearing, at that point the heap is known as overhung.

STATOR:

The stator in the engine is the latent piece of the electromagnetic circuit. It incorporates changeless magnets or windings. The stator can be worked with various meager metal sheets which are known as covers. These are essentially utilized for decreasing vitality misfortunes.

AIR GAP:

The air hole is the space among the stator and the rotor. The impact of the air hole predominantly relies upon the hole. It is the significant hotspot for the low force factor of the engine. When the air hole increments between the stator and rotor at that point polarizing current additionally increments. Due to this explanation, the air hole ought to be less.

WINDINGS:

Windings in the engines are wires that are laid within the curls, by and large secured around an adaptable iron attractive center in order to make attractive shafts while stimulated with the current. For engine windings, copper is the most as often as possible utilized material. Copper is the most well-known material for windings and aluminum is additionally utilized in spite of the fact that that ought to be strong to convey a comparable electrical burden safely.

COMMUTATOR:

The commutator is a half ring in the engine which is created with copper. The fundamental capacity of this is to interface the brushes toward the curl. The commutator rings are utilized to guarantee the progression of current bearing inside the loop turns around every half time in this manner the one surface of the curl is regularly pushed upwards, and the other surface of the loop is pushed downwards.

PRINCIPLE:

It depends on the rule that when a current-conveying conductor is put in an attractive field, it encounters a mechanical power whose heading is given by Fleming's Left-hand rule and whose extent is given by

$$\text{Force, } \mathbf{F} = \mathbf{B I l} \text{ newton}$$

Where B is the magnetic field in weber/m².

I is the current in amperes and

l is the length of the coil in meter.

The force, current and the magnetic field are all in different directions.

On the off chance that an Electric flow courses through two copper wires that are between the posts of a magnet, an upward power will move one wire up and a descending power will move the other wire down.

The circle can be made to turn by fixing a half hover of copper which is known as commutator, to each finish of the circle. Current is passed into and unaware of present circumstances by brushes that press onto the strips. The brushes don't go around so the wire doesn't get bent. This plan additionally ensures that the current consistently goes down on the privilege and back on the left with the goal that the revolution proceeds. This is the manner by which a straightforward Electric engine is made.

Types of Electric motors:

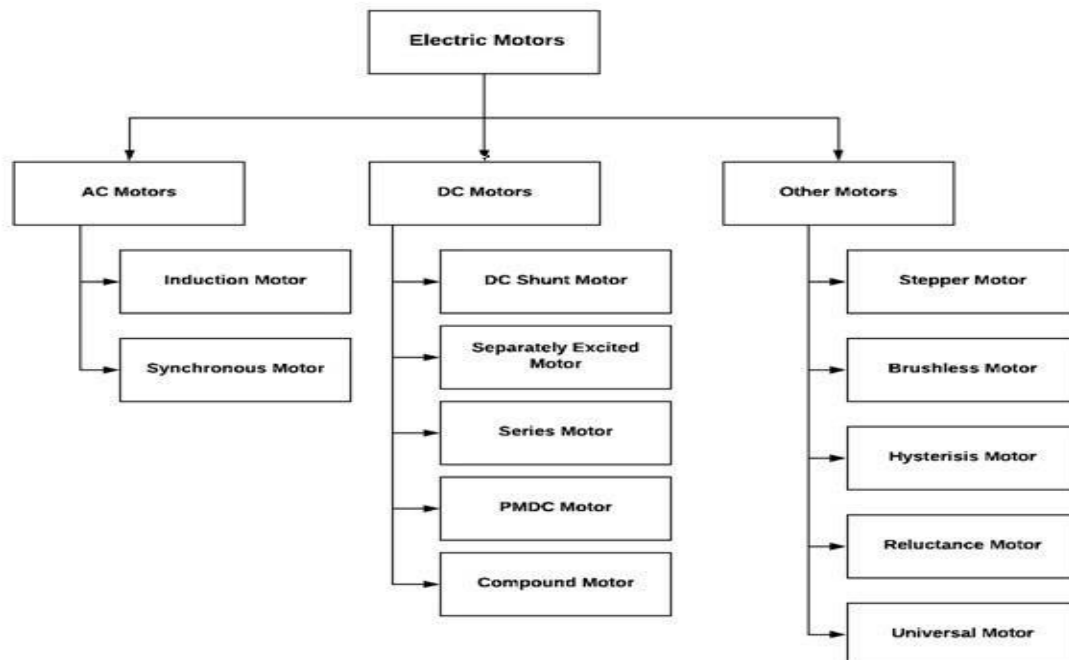
The arrangement of the electric engine should be possible dependent on various contemplations like the kind of intensity source, development, and application. Notwithstanding AC types and DC kinds of engines, there are some more sorts of engines accessible like brushed, brushless, 1-phase, 2-phase or 3-phase, air-cooled/fluid cooled. General electric engines that have normal measurements, just as attributes, give reasonable mechanical capacity to use in enterprises.

AC Motors:

The principle capacity of the AC engine is to change the current from substituting to mechanical with the assistance of electromagnetic enlistment. This engine works with rotating current and the primary pieces of this engine are the rotor and stator. The fixed part in the engine is stator though the pivoting part is rotor. This engine might be a solitary stage engine/three-stage engine. Single-stage engines are for the most part utilized in little force change though the three-stage engine is utilized in gigantic force transformation.

DC Motors:

DC engine is a sort of turning electrical machine, used to change over the vitality from DC to mechanical. A large portion of the engines relying upon the created powers from the attractive field. The inward instrument of these engines is either electronic or electromechanical to alter the progression of current course in the engine. This engine speed can be controlled utilizing either by modifying the strength of current or a variable gracefully voltage inside the field windings.



Liquid Crystal Display (LCD):

The LCD is characterized as the diode that utilizes little cells and the ionized gases for the creation of pictures. The LCD chips away at the regulating property of light. The light adjustment is the procedure of imparting and getting the sign through the light. The fluid precious stone expends a limited quantity of vitality since they are the reflector and the transmitter of light. It is typically utilized for seven segmental display.

Introduction:

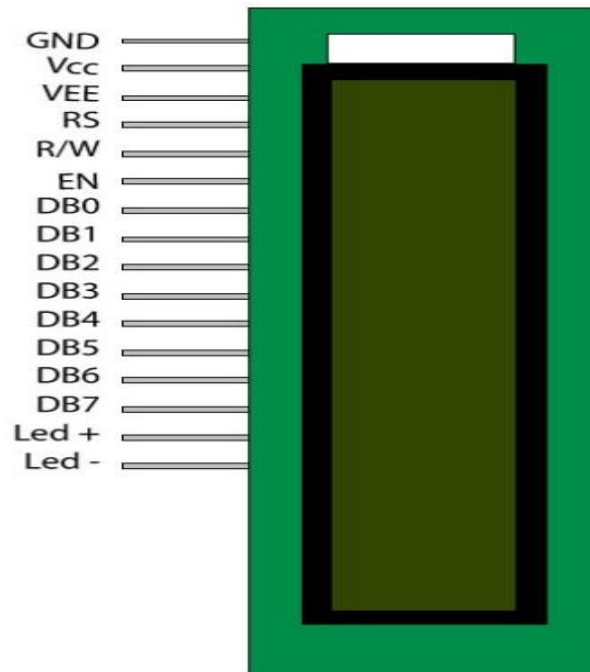
An LCD is either comprised of a functioning lattice show network or an inactive showcase framework. The greater part of the Smartphone's with LCD innovation utilizes dynamic network show, however a portion of the more seasoned shows despite everything utilize the inactive presentation lattice structures. A large portion of the electronic gadgets for the most part rely upon fluid gem show innovation for their showcase. The fluid has an extraordinary preferred position of having low force utilization than the LED or cathode beam tube.

Fluid precious stone presentation screen chips away at the guideline of blocking light opposed to transmitting light. LCDs require a backdrop illumination as they don't emanate light by them. We generally use gadgets which are comprised of LCD's presentations which are supplanting the utilization of cathode beam tube. Cathode beam tube attracts more force contrasted with LCDs and is additionally heavier and greater.

Features of 16×2 LCD module:

- Operating Voltage is 4.7V to 5.3V
- Current consumption is 1mA without backlight
- Alphanumeric LCD display module, meaning can display alphabets and numbers
- Consists of two rows and each row can print 16 characters.
- Each character is built by a 5×8-pixel box
- Can work on both 8-bit and 4-bit mode
- It can also display any custom generated characters
- Available in Green and Blue Backlight

Pin diagram:



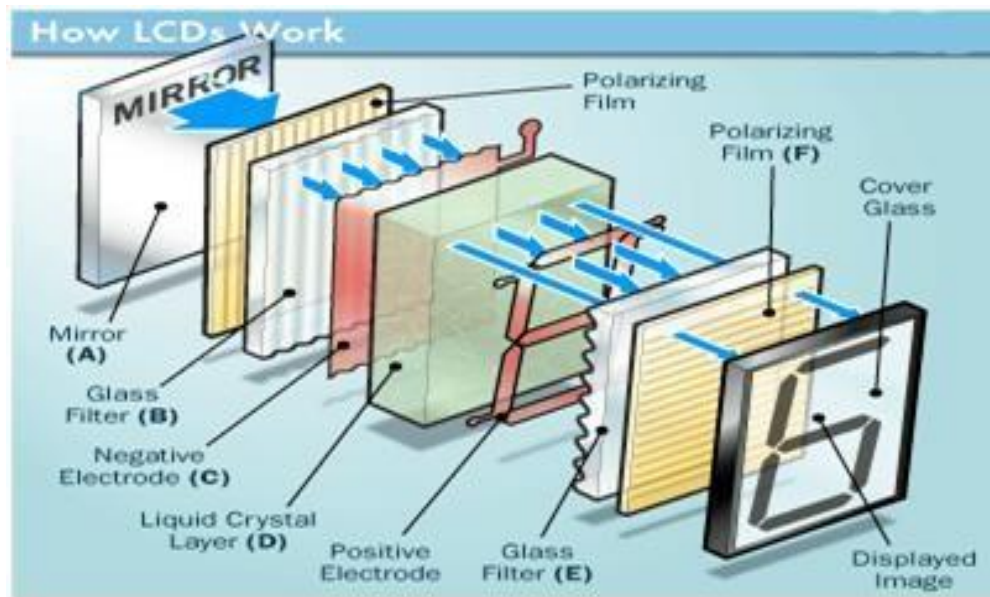
Construction of LCD:

Simple facts that should be considered while making an LCD:

1. The basic structure of the LCD should be controlled by changing the applied current.
2. We must use polarized light.
3. The liquid crystal should be able to control both of the operations to transmit or can also be able to change the polarized light.

As referenced over that we have to take two energized glass pieces channel really taking shape of the fluid gem. The glass which doesn't have a spellbound film on the outside of it must be scoured with an uncommon polymer that will make minuscule depressions on the outside of the energized glass channel. The scores must be a similar way as the energized film. Presently we need to include a covering of pneumatic fluid stage gem on one of the polarizing channels of the captivated glass. The minuscule channel makes the primary layer atom line up with channel direction. At the point when the correct edge shows up at the primary layer piece, we should include a second bit of glass with the enraptured film. The principal channel will be normally enraptured as the light strikes it at

the beginning stage.



Hence the light goes through each layer and guided on the following with the assistance of a particle. The atom will in general change its plane of vibration of the light to coordinate its point. At point when the light arrives at the most distant finish of the fluid precious stone substance, it vibrates at a similar edge as that of the last layer of the particle vibrates. The light is permitted to go into the gadget just if the second layer of the enraptured glass matches with the last layer of the particle.

Working of LCD:

The guideline behind the LCD's is that when an electrical flow is applied to the fluid precious stone particle, the atom will in general untwist. This causes the point of light which is going through the atom of the captivated glass and furthermore cause an adjustment in the edge of the top polarizing channel. Thus, somewhat light is permitted to pass the captivated glass through a specific region of the LCD. In this manner that specific zone will become dim contrasted with others. The LCD chips away at the guideline of blocking light. While building the LCD's, a reflected mirror is organized at the back. An anode plane is made of indium-tin-oxide which is kept on top and a spellbound glass with a polarizing film is additionally included the base of the gadget. The total district of the

LCD must be encased by a typical anode or more it ought to be the fluid gem matter.

Next comes the second bit of glass with a terminal as the square shape on the base and, on top, another polarizing film. It must be viewed as that both the pieces are kept at the correct points.

When there is no current, the light goes through the front of the LCD it will be reflected by the mirror and bobbed back. As the anode is associated with a battery the current from it will cause the fluid gems between the normal plane terminal and the cathode moulded like a square shape to untwist. In this way the light is obstructed from going through. That specific rectangular zone seems clear.

Advantages of LCD:

- LCD's expends less measure of intensity contrasted with CRT and LED
- LCD's are comprised of some microwatts for show in contrast with some factory watts for LED's
- LCDs are of minimal effort
- Gives great differentiation
- LCD's are more slender and lighter when contrasted with cathode-beam cylinder and LED

Applications of Liquid Crystal Display:

- LCD innovation has significant applications in the field of science and designing also on electronic gadgets.
- Fluid precious stone thermometer
- Optical imaging
- The LCD presentation innovation is additionally relevant in the representation of the radio recurrence waves in the waveguide
- Utilized in the clinical applications

Soil Moisture Sensor:

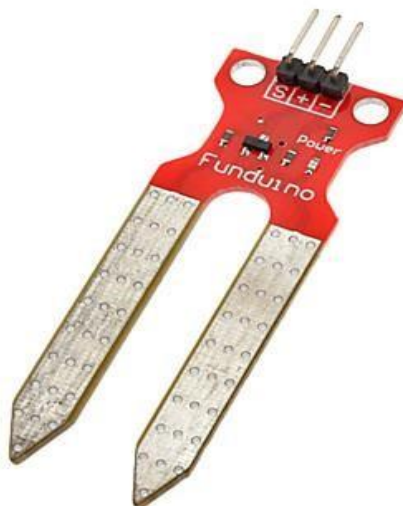
The dampness of the dirt assumes a basic job in the water system field just as in gardens for plants. As supplements in the dirt give the food to the plants for their development.

Providing water to the plants is likewise basic to change the temperature of the plants. The temperature of the plant can be changed with water utilizing the strategy like transpiration. What's more, plant root frameworks are likewise grown better when ascending inside wet soil.

Extraordinary soil dampness levels can manual for anaerobic circumstances that can empower the plant's development just as soil pathogens. This article examines a diagram of the dirt dampness sensor, working and it's applications.

The dirt dampness sensor is one sort of sensor used to measure the volumetric substance of water inside the dirt. As the straight gravimetric element of soil dampness needs wiping out, drying, just as test weighting. These sensors measure the volumetric water content not legitimately with the assistance of some different standards of soil like dielectric steady, electrical opposition, in any case communication with neutrons, and substitution of the dampness content.

The connection among the determined property just as dampness of soil ought to be balanced and may change dependent on environmental variables like temperature, sort of soil, in any case electric conductivity. The microwave emanation which is reflected can be impacted by the dampness of soil just as for the most part utilized in agribusiness and remote detecting inside hydrology.



These sensors typically used to check volumetric water content, and another gathering of sensors ascertains another property of dampness inside soils named water potential. For the most part, these sensors are named as soil water potential sensors which incorporate gypsum squares and tensiometer.

Soil Moisture Sensor Pin Configuration

- VCC-Power Supply
- VSS-Ground
- SIG-Analog Output

Working Principle

This sensor essentially uses capacitance to measure the water substance of the dirt (dielectric permittivity). The working of this sensor should be possible by embeddings this sensor into the earth and the status of the water content in the dirt can be accounted for as a percent.

This sensor makes it flawless to execute tests inside science courses like natural science, rural science, science, soil science, plant science, and agriculture.

Requirements:

- The necessary voltage for working is 5V
- The necessary current for working is <20mA
- Kind of interface is simple
- The necessary working temperature of this sensor is 10°C~30°C

Soil Moisture Sensor Applications:

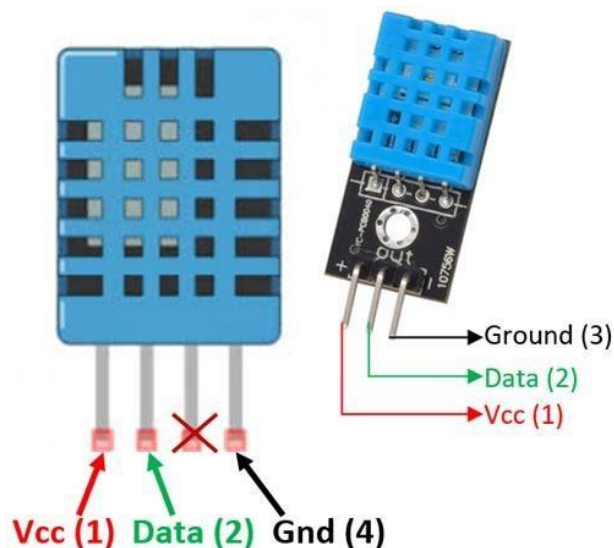
- Farming
- Scene water system
- Examination
- Landscape Irrigation
- Gardening
- Weather Station Networks

DHT11 Sensor:

Mugginess is the proportion of water fume present noticeable all around. The degree of dampness in air influences different physical, synthetic and natural procedures. In mechanical applications, moistness can influence the business cost of the items, wellbeing and security of the workers. In this way, in semiconductor businesses and control framework enterprises estimation of stickiness is significant. Dampness estimation decides the measure of dampness present in the gas that can be a blend of water fume, nitrogen, argon or unadulterated gas and so on... Humidity sensors are of two sorts dependent on their estimation units. They are a relative mugginess sensor and Absolute moistness sensor. DHT11 is a computerized temperature and dampness sensor.

DHT11 is a minimal effort computerized sensor for detecting temperature and dampness. This sensor can be effectively interfaced with any smaller scale controller, for example, Arduino, Raspberry Pi and so on... to gauge mugginess and temperature momentarily.

DHT11 mugginess and temperature sensor is accessible as a sensor and as a module. The contrast between this sensor and module is the draw up resistor and a force on LED. DHT11 is a relative moistness sensor. To gauge the encompassing air this sensor utilizes a thermistor and a capacitive



moistness sensor.

DHT11 sensor has four pins-VCC, GND, Data Pin and a not associated pin. A draw up resistor of 5k to 10k ohms is given to correspondence among sensor and smaller scale controller.

Working Principle of DHT11 Sensor:

DHT11 sensor comprises of a capacitive moistness detecting component and a thermistor for detecting temperature. The dampness detecting capacitor has two cathodes with a dampness holding substrate as a dielectric between them. Change in the capacitance esteem happens with the adjustment in dampness levels. The IC measure, process this changed opposition esteems and change them into computerized structure.

For estimating temperature this sensor utilizes a Negative Temperature coefficient thermistor, which causes an abatement in its opposition esteem with increment in temperature. To get bigger opposition esteem in any event, for the littlest change in temperature, this sensor is typically comprised of semiconductor earthenware production or polymers.

The temperature scope of DHT11 is from 0 to 50 degree Celsius with a 2-degree exactness. Moistness scope of this sensor is from 20 to 80% with 5% exactness. The testing pace of this sensor is 1Hz. for example, it gives one perusing for consistently. DHT11 is little in size with working voltage from 3 to 5 volts. The greatest current utilized while estimating is 2.5mA.

Applications:

This sensor is utilized in different applications, for example, estimating mugginess and temperature esteems in warming, ventilation and cooling frameworks. Climate stations likewise utilize these sensors to anticipate climate conditions. The moistness sensor is utilized as a preventive measure in homes where individuals are influenced by mugginess. Workplaces, vehicles, historical centers, nurseries and businesses utilize this sensor for estimating mugginess esteems and as a security measure.

It's reduced size and inspecting rate made this sensor well known among specialists. A portion of the sensors which can be utilized as an option to DHT11 sensor are DHT22, AM2302, SHT71.

I2C:

The Inter-Integrated Circuit (I2C) Protocol is a convention planned to permit different "slave" advanced incorporated circuits ("chips") to speak with at least one "master" chips. Like the Serial Peripheral Interface (SPI), it is just proposed for short separation correspondences inside a solitary gadget. Like Asynchronous Serial Interfaces, (for example, RS-232 or UARTs), it just requires two sign wires to trade data.

Features of I2C:

- 2-wire Bi-directional
- Half-duplex
- Multi-Master
- Multi-Slave
- Single ended
- Serial computer bus
- Open drain
- Number of Devices-7 bit-128 devices.

Speed of I2C:

- Standard mode-100kbps
- Fast mode-400kbps
- Fast mode plus-1Mbps
- High Speed mode- 3.4Mbps

Highlights:

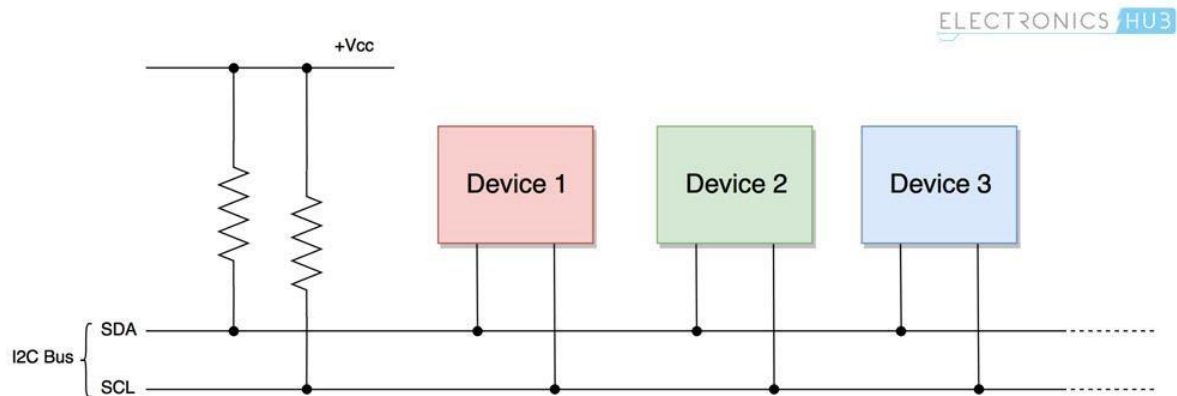
- Just two normal transport lines (wires) are required to control any gadget/IC on the I2C organize
- No need of earlier concurrence on information move rate like in UART correspondence. So, the information move speed can be balanced at whatever point required
- Straightforward instrument for approval of information moved
- Utilizations 7-piece tending to framework to focus on a particular gadget/IC on the I2C

transport

- I2C systems are anything but difficult to scale. New gadgets can essentially be associated with the two basic I2C transport lines

The physical I2C Bus:

I2C Bus (Interface wires) comprises of only two wires and are named as Serial Clock Line (SCL) and Serial Data Line (SDA). The information to be moved is sent through the SDA wire and is synchronized with the clock signal from SCL. All the gadgets/ICs on the I2C arrange are associated with the equivalent SCL and SDA lines



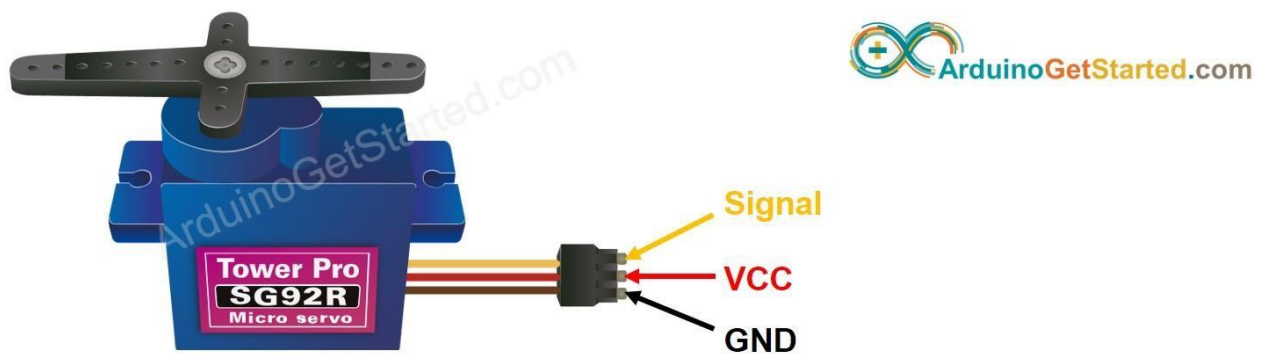
Both the I2C transport lines (SDA, SCL) are worked as open channel drivers. It implies that any gadget/IC on the I2C system can drive SDA and SCL low, yet they can't drive them high. Thus, a draw up resistor is utilized for each transport line, to keep them high (at positive voltage) as a matter of course.

The explanation behind utilizing an open-channel framework is that there will be no odds of shorting, which may happen when one gadget attempts to pull the line high and some other gadget attempts to pull the line low.

Servo motor:

A servo motor is an electrical device which can push or rotate an object with great precision. If you want to rotate an object at some specific angles or distance, then you use servo motor. It is just made up of a simple motor which runs through a servo mechanism. If the motor is DC powered, then it is called a DC servo motor, and if it is AC powered, then it is called an AC servo motor. We can get a very high torque servo motor in a small and light weight package. Due to these features, they are being used in many applications like toy car, RC helicopters and planes, Robotics, Machine etc.

Pin diagram:



A servo motor consists of three wires- a black wire connected to the ground, a white/yellow wire connected to the control unit, and a red wire connected to the power supply.

The function of the servo motor is to receive a control signal that represents a desired output position of the servo shaft and apply power to its DC motor until its shaft turns to that position.

Working of Servomotors:

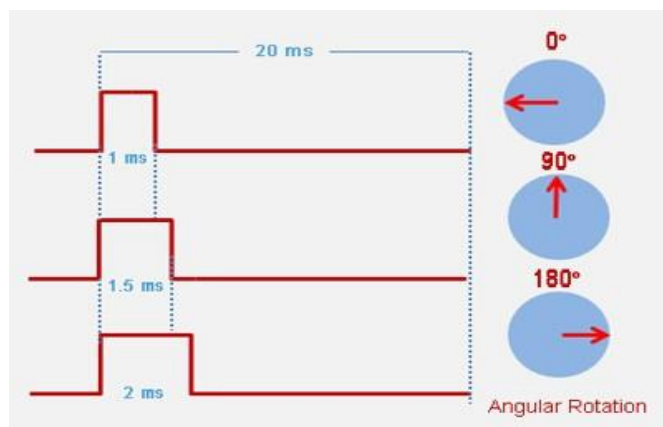
Servo motor control position and speed exactly. Presently a potentiometer can detect the mechanical situation of the pole. Thus, it couples with the engine shaft through riggings. The flow position of the pole is changed over into electrical sign by potentiometer and is contrasted and the order input signal. In present day servo engines, electronic encoders or sensors sense the situation of the pole.

We provide order contribution as per the situation of shaft. On the off chance that the criticism signal contrasts from the given information, a blunder signal alarms the client. We intensify this blunder flag and apply as the contribution to the engine, thus the engine turns. What's more, when the pole spans to the require position, mistake signal become zero, and thus the engine stays halt holding the position.

The order input is in type of electrical pulses. As the real contribution to the engine is the distinction between input signal (current position) and required sign, subsequently speed of the engine is relative to the contrast between the current position and required position. The measure of intensity require by the engine is corresponding to the separation it needs to travel.

Controlling Servo Motor:

Servo engine is constrained by PWM (Pulse with Modulation) which is given by the control wires. There is a base pulse, a most extreme pulses and a redundancy rate. Servo engine can divert 90 degree from either course structure its unbiased position. The servo engine hopes to see a pulse each 20 milliseconds (ms) and the length of the beat will decide how far the engine turns.



For instance, a 1.5ms heartbeat will make the engine go to the 90° position, for example, if beat is shorter than 1.5ms shaft moves to 0° and in the event that it is longer than 1.5ms than it will turn the servo to 180°.

All servo motors work directly with your +5V supply rails but we have to be careful on the amount of current the motor would consume, if you are planning to use more than two servo motors a proper servo shield should be designed.

Advantages:

- If a heavy load is placed on the motor, the driver will increase the current to the motor coil as it attempts to rotate the motor. There is no out-of-step condition.
- High-speed operation is possible.

Disadvantages:

- Since the servomotor tries to rotate according to the command pulses but lags, it is not suitable for precision control of rotation.
- Higher cost.
- When stopped, the motor's rotor continues to move back and forth one pulse, so that it is not suitable if you need to prevent vibration

Applications:

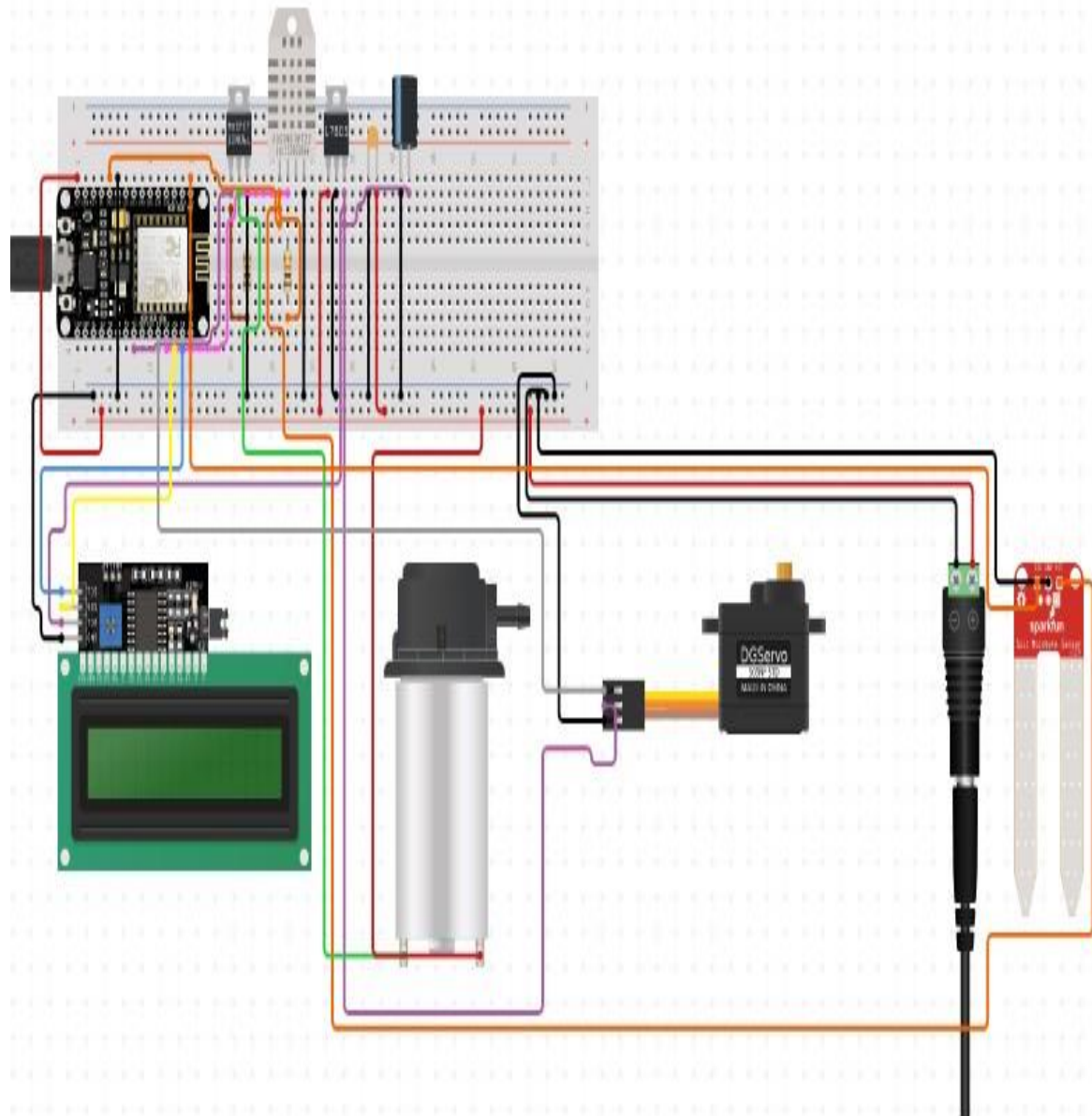
Robotics: At every joint of the robot, we connect a servomotor. Thus, giving the robot arm its precise angle.

Conveyor belts: servo motors move, stop, and start conveyor belts carrying product along to various stages, for example, in product packaging/ bottling, and labelling.

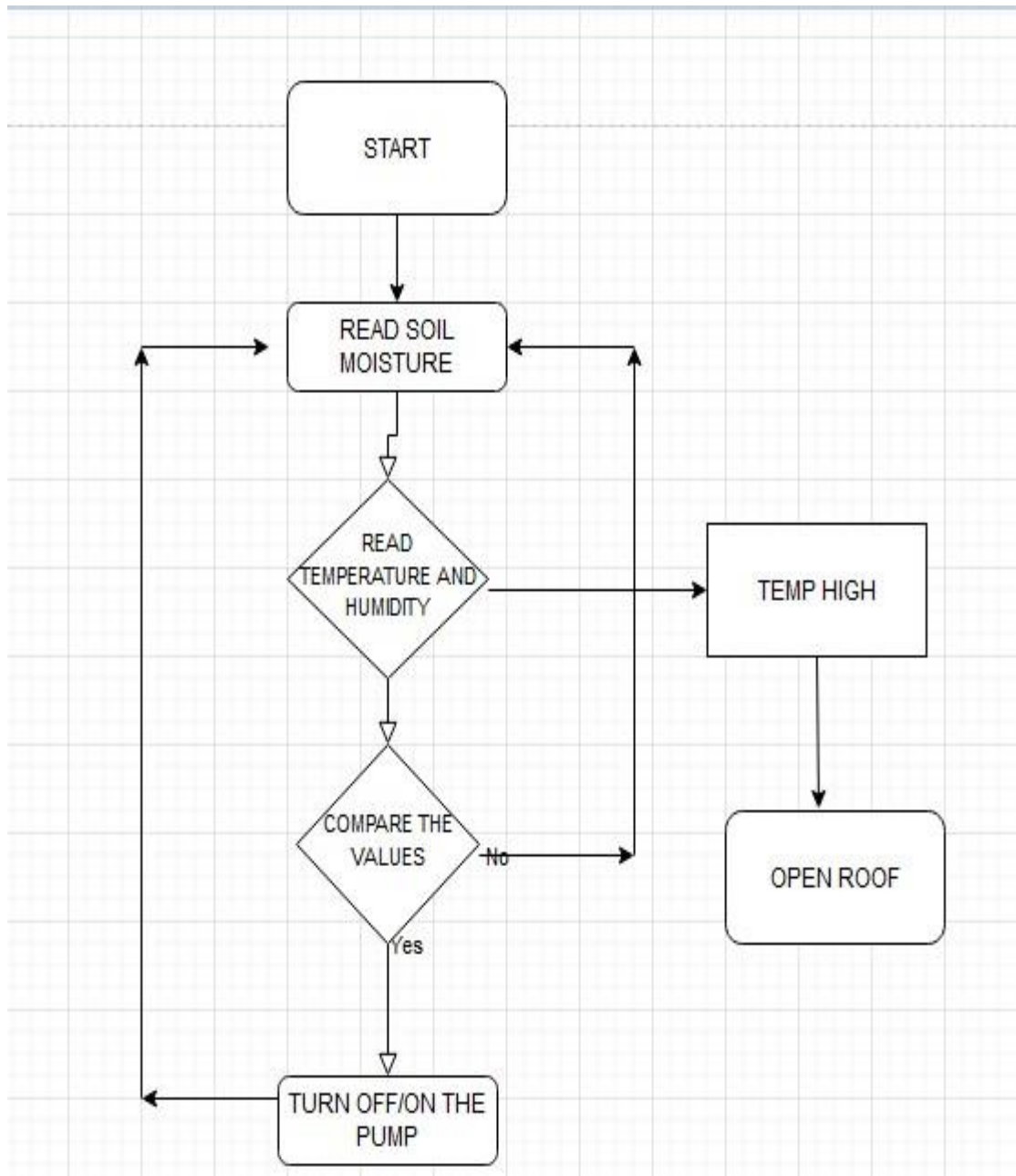
Camera auto focus: A highly precise servo motor build into the camera corrects a camera lens to sharpen out of focus images.

Solar tracking system: Servo motors adjust the angle of solar panels throughout the day and hence each panel continues to face the sun which results in harnessing maximum energy from sunup to sundown.

CIRCUIT DIAGRAM:



ORDER OF EXECUTION:



Programming:

```
#include<servo.h>

#include<DHT.h>

#include <LiquidCrystal_I2C.h>

#define DHTTYPE DHT11

#define DHTPIN  A0

Servo myservo;

LiquidCrystal_I2C lcd = LiquidCrystal_I2C(0x27, 16, 2);

DHT dht (DHTPIN,DHTTYPE,11);


float humidity, temp_f;

long writingTimer = 17;

long startTime = 0;

long waitTime = 0;


void setup() {

    // put your setup code here, to run once:

    {

        Serial.begin(9600);

        ESP8266.begin(9600);

        dht.begin();

        lcd.init();
```

```
lcd.backlight();

int moisture= digitalRead(A0);

startTime = millis();

ESP8266.println("AT+RST");

delay(2000);

Serial.println("Connecting to Wifi");

while(check_connection==0)

{

    Serial.print(".");

    ESP8266.print("AT+CWJAP=\"TP-

LINK_FDBA\", \"jaishrikrishna~12\"\\r\\n"); ESP8266.setTimeout(5000);

    if(ESP8266.find("WIFI CONNECTED\\r\\n")==1)

    {

        Serial.println("WIFI CONNECTED");

        break;

    }

    times_check++;

    if(times_check>3)

    {

        times_check=0;

        Serial.println("Trying to Reconnect..");
```

```

    }

    }

}

}

void loop() {

    // put your main code here, to run repeatedly:

    {

        waitTime = millis()-startTime;

        if (waitTime > (writingTimer*1000))

        {

            readSensors();

            writeThingSpeak();

            startTime = millis();

            if (temp_f>45;moisture>100);{

                lcd.print("level

            high");  delay(1000);

            myservo.write(180);

            digitalWrite(pump,HIGH) ;

        }

        else{

```

```
        digitalWrite(pump,LOW);  
        lcd.print("level ok");  
  
        delay(1000);  
  
    }  
  
}  
  
}
```

```
void readSensors(void)  
{  
  
    temp_f= dht.readTemperature();  
  
    humidity = dht.readHumidity();  
  
}
```

```
void writeThingSpeak(void)  
{  
  
    startThingSpeakCmd();  
  
    // preparacao da string GET  
  
    String getStr = "GET /update?api_key=";
```

```
    getStr += myAPIkey;

    getStr += "&field1=";

    getStr +=

    String(temp_f);

    getStr += "&field2=";

    getStr += String(humidity);

    getStr += "\r\n\r\n";

    GetThingspeakcmd(getStr);

}
```

```
void startThingSpeakCmd(void)

{  ESP8266.flush();  String cmd =

  "AT+CIPSTART=\"TCP\", \"";

  cmd += "184.106.153.149"; // api.thingspeak.com IP

  address  cmd += "\",80";  ESP8266.println(cmd);

  Serial.print("Start Commands: ");

  Serial.println(cmd);


  if(ESP8266.find("Error"))

  {

    Serial.println("AT+CIPSTART error");

    return;

  }

}
```



```
}
```

```
}
```

```
String GetThingspeakcmd(String getStr)
```

```
{
```

```
String cmd = "AT+CIPSEND=";
```

```
cmd +=
```

```
String(getStr.length());
```

```
ESP8266.println(cmd);
```

```
Serial.println(cmd);
```

```
if(ESP8266.find(">"))
```

```
{
```

```
ESP8266.print(getStr);
```

```
Serial.println(getStr);
```

```
delay(500);
```

```
String messageBody = "";
```

```
while (ESP8266.available())
```

```
{
```

```
String line = ESP8266.readStringUntil('\n');
```

```
if (line.length() == 1)
```

```
{  
  
    messageBody = ESP8266.readStringUntil('\n');  
  
}  
  
}  
  
Serial.print("MessageBody received:  
");  Serial.println(messageBody);  
  
return messageBody;  
  
}  
  
else  
  
{  
  
    ESP8266.println("AT+CIPCLOSE");  
  
    Serial.println("AT+CIPCLOSE");  
  
}  
  
}  
  
}
```

Conclusion:

Our conclusion about the project is that people have no time to know the plants growth, which is necessary for plants. If there are no plants on the earth, we face many problems like carbon dioxide level in air will be increased, we can't get fruits and vegetables. Now a days there is scarcity of water so the saving of water plays an important role which is controlled by sensing moisture content in the soil.

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