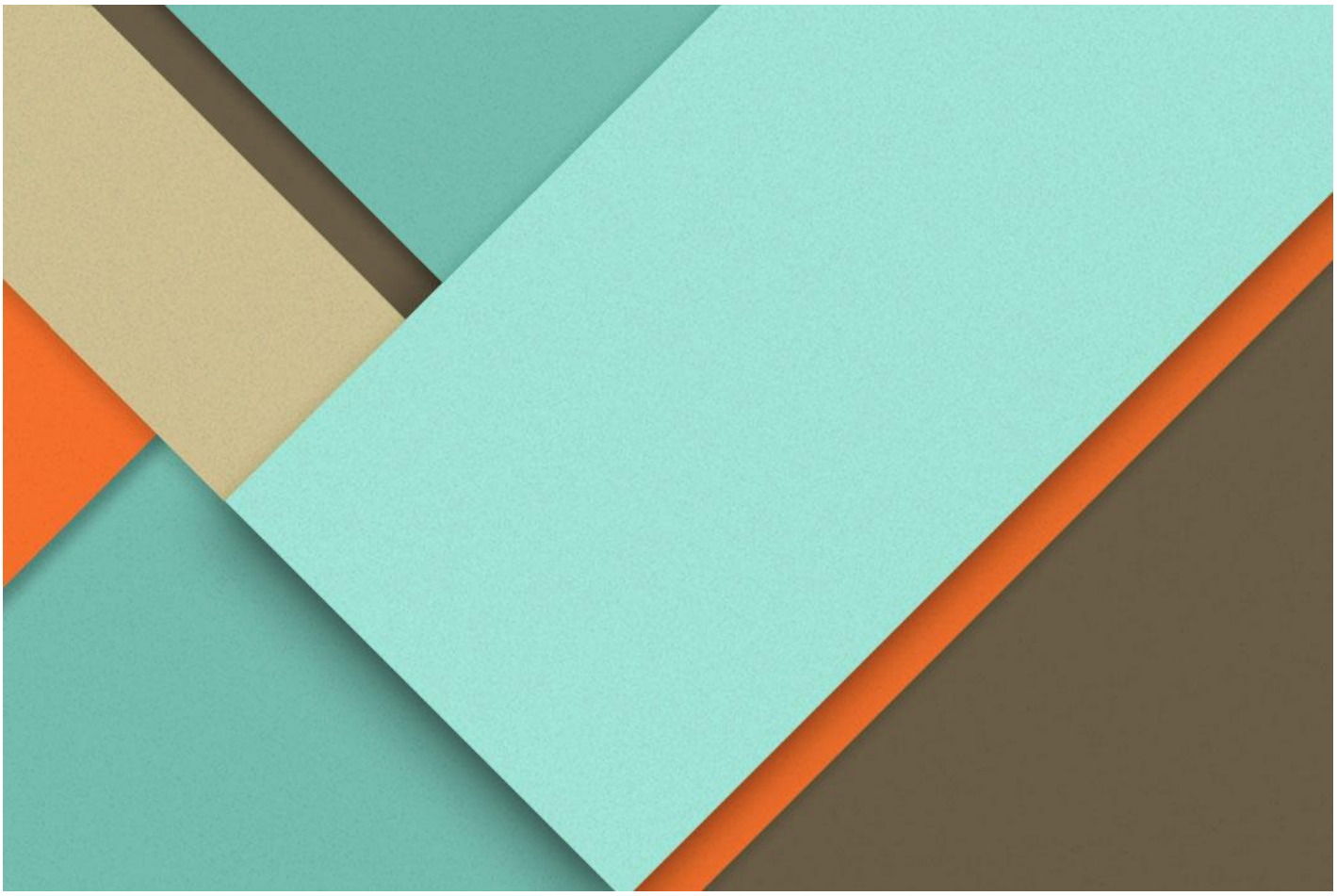

IOT BASED SMART GARDEN

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Group - 4

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IOT BASED SMART GARDEN

ABSTRACT:

The Basic need of every living being in this world is oxygen. Here plants play a vital role in maintaining the oxygen level in the atmosphere. But due to urbanization, we are losing our forests and trees which are responsible for air pollution. In big cities, people facing problems in their homegrown gardens regarding the maintenance and availability of proper gardeners.

As we know horticulture requires proper monitoring. In today's busy life, we cannot properly monitor our garden. Therefore, we have come up with a solution, which is a smart garden. It will monitor our garden 24 x 7. It can measure environmental factors and adopt effective methods for plant care

The main aim of this project is to maintain the nature of the plants by continuously monitoring the parameters leading to the increased life of both plants and human beings. Automatic systems are preferred to manual systems. Android software is used to create mobile applications which are used to monitor the parameters of the garden and automate the watering process. NodeMCU is used to connect different sensors which collect the parameters of soil and transmit the information to the firebase through inbuilt Wi-Fi.

INTRODUCTION:

Automation rules the world nowadays. It is a technique of using computers or mobile phones in monitoring and controlling the simple parameters of day to day life. The standard of our life will be nourished by the practice of using automation for simple things. Using the concept of IOT we make sensors to communicate with each other which are powerful in automation. The important aspect of this prototype is that it saves cost and ensures safety. When people try to make plantings and set up their own garden, they are cautious in maintenance at only their beginning stages. As days go on due to lack of maintenance the plants get destroyed. This prototype will help people to automatically monitor the parameters and ensure maintenance of the garden. It plays a vital role and serves as a good companion for plants. IOT provides solutions for various problems and it allows things to be sensed or controlled remotely in network infrastructure.

The proposed system integrates all sensors and components for real-time statistics. Communication is done with wireless sensor networks. Mobile computing is an efficient technology to support the internet of things for developing real-life systems. Already, there are mobile applications that help farmers in their crop maintenance. Similar IoT based systems are designed for garden maintenance that are costly and often used one task, only temperature reading or water pouring mechanism. Our country is based upon the agriculture sector, and it needs to achieve higher benefits from agriculture like India.

Traditional gardening methods:

What is IOT: Smart garden???

- ➔ We have proposed a system that analyzes the environmental parameters of the garden to automate the watering process of plants. A mobile application is developed to check the status of the garden for watering. This system senses the temperature and moisture with temperature and moisture sensors for big gardens. Soil and other supporting sensors are integrated over ESP-32 that gathers the values of soil and transfers the information to the firebase by using a built-in WIFI facility.
- ➔ In this system, we have used a temperature sensor, humidity sensor, and pump controller to develop the prototype. The system senses the moisture and humidity level of plants and provides water accordingly

Why do we need a smart garden???

Plants in our garden require proper monitoring. In today's busy life, we cannot properly monitor our garden. Therefore, we have come up with a solution, which is the smart garden. It will monitor our garden 24 x 7 through various sensors. It can measure environmental factors such as soil moisture, sunlight, heavy rainfall and it will also protect our garden from small animals such as and adopt effective methods for plant care.

Implementation of the proposed smart garden monitoring system:-

The proposed system incorporates the physical configuration of its electrical components with communication approaches that cover the methods and types of data transfer between the device and application. The implementation is mainly consisting of two parts:

- Device
- Mobile Application

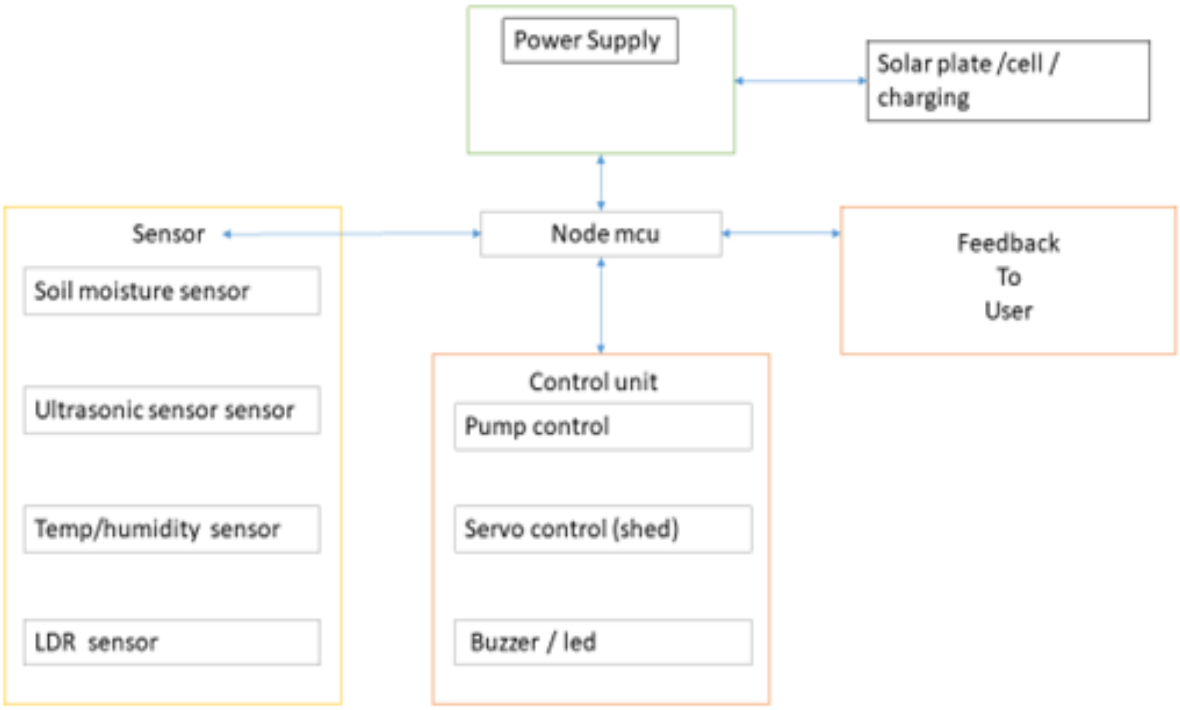
The device will be using sensors that are programmed with a microcontroller and linked with a mobile application to transfer the data that is collected from the device. The development of this prototype consists of both hardware and software along with a communication medium. The emphasis is more on the hardware side as manufacturing of devices from components which are vital for projects purpose. The proposed design is a portable and area independent automated system that, as stated in previous sections, collects information about garden health with sensors.

In the Central point is the NodeMCU controller to which sensors of temperature, humidity, and moisture are connected with the power supply, charging unit, and display. A small TFT LCD screen is used here to build the display over the device. The system is composed of three units: Sensors, power, and display. The unit for sensors consists of temperature, humidity, and moisture sensors.

Initially, the user begins by starting the device, and the underlying areas are tested by a constructed device. The device analyzes the garden area and tries to fetch the defined real-time parameter values by using integrated sensors. If the values are successfully fetched, then the device determines the network access. Otherwise, the device is restarted and

debug procedure activated, which finds and handles the error. If the device found a network connection, then the retrieved results are delivered via mobile application. If there is any problem while connecting with the network, then the retrieved results are shown by the TFT screen integrated on NodeMCU.

Block diagram:



Hardware development:

The hardware for the system consists of the following components which are tested using ESP-32 (programming) and integrated over a breadboard with jumper wires to connect with a DC unit.

- ➔ NodeMCU: A microcontroller with inbuilt networking features.
- ➔ Temperature Sensor: Used to measure the soil of the plants.
- ➔ Temperature+Humidity Sensor: Used for measuring the temperature and humidity of the plants.
- ➔ Soil Moisture Sensor: To detect moisture level present in the soil.
- ➔ TFT LCD (1”4 inches): Display output from sensors. 6. Minor Components: Includes 1kW resistor, charging unit, TFT LCD screen, etc.

NodeMCU:

ESP32 is a series of the low-cost, low-power systems on a chip microcontroller with integrated Wi-Fi and dual-mode Bluetooth. The ESP32 series employs a Tensilica Xtensa LX6 microprocessor in both dual-core and single-core variations and includes built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power management modules. ESP32 is created and developed by Espressif Systems, a Shanghai-based Chinese company, and is manufactured by TSMC using their 40 nm process. It is a successor to the ESP8266 microcontroller.

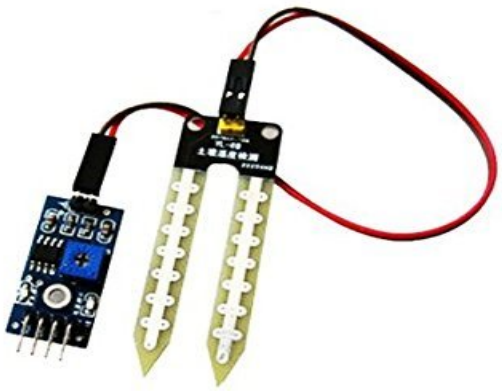
Sensors:

➔ The devices which convert electrical signals into digital signals are known as sensors.

➔ The different types of sensors that we are using in this system are listed below.

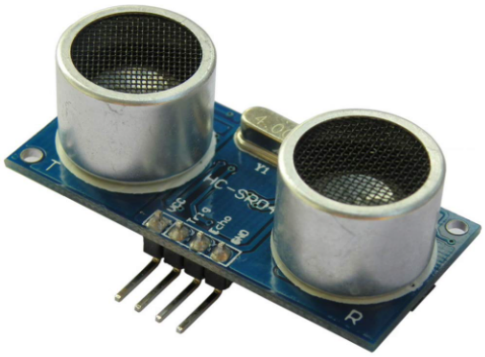
❑ Soil moisture sensor:

Used to measure the moisture content of the soil.



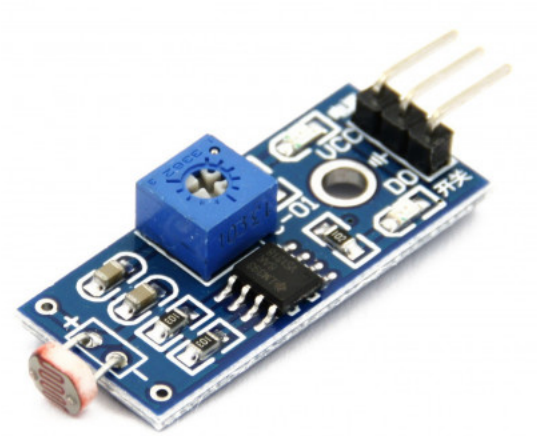
❑ Ultrasonic sensor (HCSR04) :

Ultrasonic sensor – used to detect the invaders in the garden.



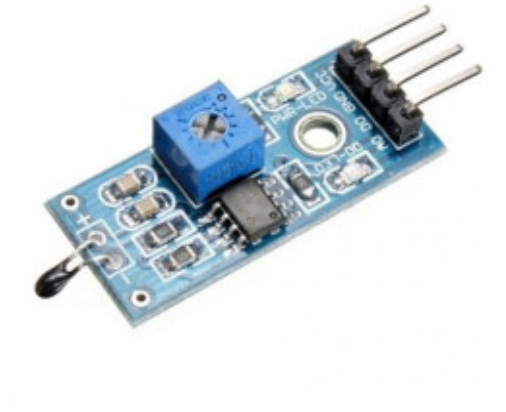
❑ LDR -

Light-dependent resistors (LDR), are light sensitive devices most often used to indicate the presence or absence of light, or to measure the light intensity.



4PIN NTC Thermistor Temperature Sensor Module

It is very sensitive to ambient temperature. It is generally used to detect the temperature of the surrounding environment. Through potentiometer adjustment, it is possible to change the temperature detection threshold.



OUTCOMES:

- ➔ Great Potential in Saving Energy and Money
- ➔ Extreme Convenience
- ➔ Another great benefit you can get from installing a home automation system is convenience
- ➔ It Can Help Save Precious Time
- ➔ Full Control When Your Out of Town
- ➔ Increases Promotes Peace of Mind
- ➔ Gardening in the Rain
- ➔ Protecting your garden soil is the primary reason to delay planting vegetables until the rain ends and the soil has had a chance to dry
- ➔ Irrigation problems

Conclusion:

The implementation of Smart Garden system using the Internet of Things has been verified to satisfactorily work by connecting different parameters of the soil to the cloud and was successfully controlled remotely through a mobile application. The system designed not only monitors the sensor data, like moisture, humidity, temperature and ultrasonic but also actuates other parameters according to the requirement, for example, if the water level in tank is reduced to a minimum value then the motor switch is turned on automatically to the water level of the tank reaches the maximum value. The initial cost and the installation of this system are cheap and hence it can be implemented anywhere. With the development of sensor technology, the system can be elevated to the next level which helps the users to utilize their investment in an economic manner. If soil nutrient sensors can be installed, then the system can be modified to supply fertilizers to the garden precisely. This system saves manpower and efficiently utilizes the water resources available ultimately leading to more profit. The feedback provided by the system will improve the implementation of the gardening process.