# Iot Based Garden Monitoring System



# IoT BASED GARDEN MONITORING SYSTEM

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**Abstract—**In an agricultural country like India a lot of people will work with green thumb in mind. Most of the people loves to grow plants at home, but due to their work schedule they very often take care of plants. The only solution to this problem is smart monitoring of the plant growth by modernizing the current traditional methods of gardening. Hence the proposed system targets at smart way of monitoring the plant growth using automation and IoT technologies. Internet of things (IoT) provides various applications for crop growth and monitoring the growth conditions. Main theme of this paper is to increase the plant growth condition by maintaining the suitable moisture level and temperature with the use of moisture sensor and temperature sensor. This paper works for the crop development at low quantity water consumption by providing an automatic watering system to the user. People often waste lot of time for watering the plants so an efficient management of water should be developed. The proposed system will work based on the information send by the sensors and so proper growth for the plant will be estimated. With the help of the moisture sensor and temperature sensor details like moisture content and the temperature will be obtained and so based on those reading automatic watering will be done. The major advantage of this system is to make a suitable environment for plant growth and also to minimize the water consumption.

Keywords— Green thumb, Smart monitoring, IoT, moisture sensor, temperature sensor.

## 1. INTRODUCTION

Plants are considered to be the major source of the survival and helps to purify the air filled with pollutants. Many feel responsible to plant a tree and some consider it as a hobby. planting a tree is not just burying a seed ball in the soil, it has many factors to be considered. Some plants need more care for an efficient growth. There are some plants which are grown only for showcase purposes and homemade agriculture. The required environment must be provided to the plant and should be watered time to time to make the photosynthesis happen. We also know that one kind of soil or nutrient is not sufficient to all the plants to grow better. Each plant has its characteristics to gain a high yield.

To overcome all these problems, we are going to set a monitoring machine. This can be defined as a system which not only monitors the growth but also gives alerts when there is a defect in the growth or proving a suitable environment. This type of system can be created with the help of Internet of Things (IOT).

IOT is basically defined as the phenomenon where the system or a device is functioned with the help of internet. Here the system works on IOT with the help of the following sensors as shown in Fig 1.

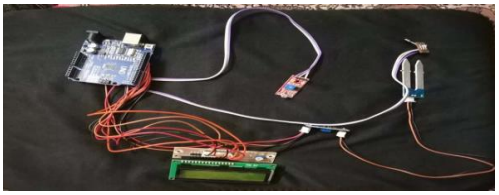

**Fig. 1: Working module**

## 2. LITERATURE REVIEW

i. R.Nageshwara Rao et.al, proposed a system which will helps for smart agriculture by using automatic and IoT technologies. The proposed system works on Raspberry pi based automation which improves the crop productivity. IoT provides various applications for crop growth and also helps in the decision support at the time of need. Main theme of this paper is to increase the crop productivity by consuming less amount of water. For watering the crops framers waste lot of time and also consume more than the required amount of water so to minimize the loss, this paper proposed a system which will efficiently manages the watering system with less complexity. This system works on the data which comes from the sensors used for gathering the information like moisture content, humidity and temperature of the soil. Major advantage of this system is to provide a smart agriculture and to implement an automatic watering system for farming which will helps to reduce the water consumption [1].

ii. Tanu Sahu and Ashok Verma proposed an automated watering system by considering water scarcity at some regions. Excess watering will also affect the crop in many ways. Due to this the soil fertility will get reduced, crop production will get reduced, so to minimize the crop loss this system was developed with an automatic sprinkler which will distributes water to all crops in an efficient manner without any wastage of water. This system works on the data gathered like the soil temperature, humidity and weather condition. This information will be gathered by using the temperature sensor and moisture sensor. Raspberry pi acts as a heart for this proposed system. Whenever there is a change in the moisture content or in the temperature the sensors will automatically sends the signals to the raspberry pi and it will alert the sprinklers and automatic watering will be done. This paper mainly projects the need of an automatic watering system for a proper irrigation and the development of an automated sprinkler by using raspberry pi[2].

iii. Shamma Ali, Hamda Saif, Hasa Rashed, Hend AlSharqi and Ammar Natsheh This paper proposed a system which will increase the efficient usage of watering and less consumption of energy. presenting the smart irrigation by using the energy for solar panel will reduce the energy consumption. Using the devices like Arduino, Raspberry pi, camera and other technologies the proposed system is developed. This paper mainly projects the efficient usage of energy obtained from solar panel and reducing the water wastage by using Arduino and Raspberry pi [3].

iv. Pareena Jariyayothin et.al, proposed a system based on IoT which is used for smart monitor and control over homegrown plants. Arduino UNO acts as the heart of the overall system and microcontroller is used for data transfer which is obtained by the sensors. A mobile application is also made available where the end user can add any plant growth conditions. Major advantage of this system is to smart monitor and to implement control watering for plant growth[4].

v. Kahin Akram Hassan et.al, proposed an article which shows the importance of indoor monitoring and controlled climatic surrounding for an active plant growth. Internet of things an Azure are used for this controlled indoor monitoring[5].

vi. Shrinidhi Rajagopal et.al, proposed an article which shows the importance of automatic watering of plants at regular interval of time. This system is based on Internet of things and describes the object-oriented designs[6].

vii. Preecha Tangworakitthaworn et.al, proposed a game-based system for plant growth. This paper emphasis on the need of proper plant growth by developing a game-based system. IoT technology is used for developing the proposed system[7].

viii. Vimal P V et.al, proposed a system which is used to maintain the proper environment conditions like temperature, pH value, moisture level by using the respective sensors. Arduino

acts as the heart of the entire system. LDR is also used for detecting the light presence and DHT11 is used for finding the pH value. Data from the sensors will send to the Arduino and then it is sent to the mobile phone through offline and online. SMS can also be received through GSM. Cooling fan, automatic water pump is used to maintain the suitable environment. Major advantages of this proposed system is to maintain proper environmental conditions for a healthy plant growth[8].

ix. Aishwarya K S et.al, proposed a system which helps the plant growth and hydroponics (fish growth at same time. This system shows the importance of nutrients essential for fish waste. IoT based model is developed and Arduino acts as the heart of the entire system. Major advantage of this is to control the cost of plant growth and increase the food quality[9].

## 3. PROPOSED SYSTEM

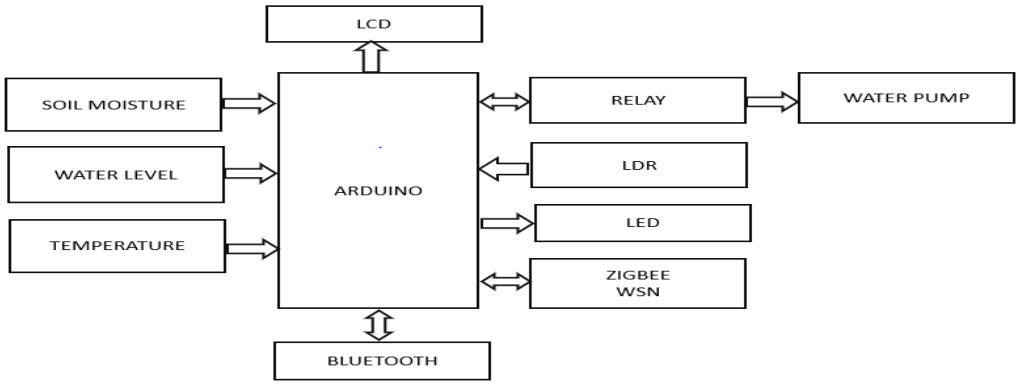


**Fig.2: Proposed System**

In the proposed system we have different type of sensors such as soil moisture sensor to maintain the moisture level, temperature sensor to detect the temperature, Light Dependent Resistor (LDR) for light detection. This system also consists of the relay which is used for watering purpose and Arduino will acts as the heart of the system. Block diagram of the proposed system is shown in Fig.2.

## 4. METHODOLOGY OF THE PROPOSED SYSTEM

In the proposed system Arduino Uno is considered to be the heart of the entire system. The Arduino Uno consists of several input and output ports through which several components are connected together and then functionalized which is shown in Fig 2. It also consists of inbuilt storage device which is of 256KB where the executable code is uploaded.

**Fig. 3: Arduino**

Arduino function will be based upon the code which is uploaded into the memory. This code is done with the help of Arduino 1.6.13, it is coded in such a way that all the sensors has to be defined.

Soil moisture sensor, temperature sensor, LDR are connected to the Arduino and its respective information is gathered. The soil moisture sensor will detect the moisture content, if the moisture content is less than the required moisture level through the relay the signal will be sent and the water pumped will be on, after a few seconds the water pump will be turned off. This module will helps to increase the efficient usage of water.

Temperature sensor is used to detect the temperature. Water level sensor is used to get the water level. LDR sensor will be used to detect the light presence and LED light is used to increase the light presence if needed. This helps in the photosynthesis. During the night times LDR will automatically helps to switch on the light which helps to observe our plant even at night times.

With a proper GUI an android app is developed so all the plant growth details obtained from the plant will be made visible to the end user.

*A. Soil moisture sensor*

Soil moisture sensor consists of two probes which can be inserted into the soil which is shown in Fig 3. Soil moisture sensor mainly used to detect the soil moisture content present in the soil. When current is passed through these probes, if the soil has less moisture then the electricity won't pass through out the soil which comes from the probes. But if there is some moisture content in the soil then the electricity from the probes passes through out the soil and this can be detected by the probes and sends the data to the LCD[10].

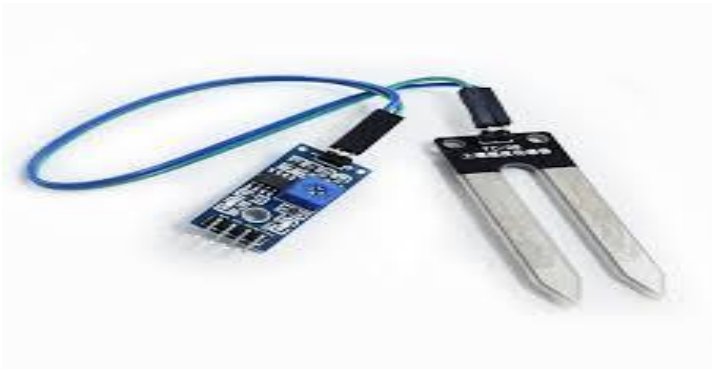

**Fig. 4: Soil Moisture Sensor**

*B. Temperature sensor (LM35)*

The LM35 sensor arrangement are exactness incorporated circuit temperature sensors as appeared in Fig 4, whose yield voltage is directly corresponding to the Celsius (Centigrade) temperature [11].

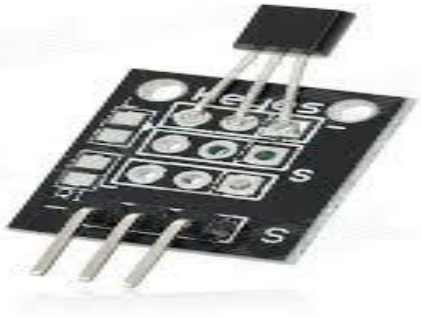

**Fig. 5: Temperature Sensor(Lm35)**

*C. Relay*

DC signals which comes from the battery will be converted into AC by the use of the Relay which is shown in Fig 5. As these motors works on AC current a controlled system like relay are used. Relays are used in electronic circuits such as high-power amplifiers, telephone exchanges etc. In this project relays are used to switch on the LED and water pump whenever there is less light presence and soil moisture near the plant.

**Fig. 6: Relay**

Based on the instructions given to the Arduino, working of the entire system will takes place. Working starts with the sensors detecting the surrounding environment by the instruction given by the Arduino. Data collected by the sensors will be displayed on the LCD. End user can login into the website by using their user id. If the moisture level is less than the required then the water pump will be automatically switched on by using the relay and if the light presence is less than LED will be turned on. Sensors will monitor the data repeatedly for a proper plant growth.

## 5. CONCLUSION

As defined earlier the system is made considering the Arduino Uno as the heart of the system and then the sensors were connected accordingly as per the functional requirement. Its main objective is to monitor a plant by providing the suitable environment with the help of sensors such as moisture sensor to check the moisture of the soil and temperature sensor to check the temperature around the plant and then the light sensor to check the availability of the light which plays the major role in the process of photosynthesis. If the moisture content is less than the required then automatic watering will be done with the help of the relay. The values are then read by the internal code present in the Arduino and then the alerts will be sent to the app present in the mobile or the website. These alerts

help the person to provide the required materials to create suitable environment for the growth of the plant.

This system not only gives the alerts of the plant but also study the properties of the soil and then states whether the existing soil is suitable or not for the plant that has been planted in the jar. This kind of alerts can be given with the help of a predefined data. This predefined data consists of the data such as which kind of plant is best suited for what kind of plant. The main goal of this project is to maintain suitable environment for plant growth.

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