Garden Monitoring and Maintenance Using IOT

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ABSTRACT: The automation of gardening and monitoring of the plants by utilizing in the Raspberry Pi platform by using IOT (Internet of things). The main intention of this automation is to provide more comfort for the people by reduction of the manual work and this is done without the user interaction for improving the overall performance of any system. The important parameters for the productivity and quality of growth of the plant are soil moisture, humidity, and temperature. All the sensors like soil moisture, temperature, humidity, are used here in this interface with the Raspberry Pi controller. This information regarding the garden can be directly controlled and monitored by the garden owner using IoT through their smart phone using telegram android mobile application.

KEYWORDS: Soil Moisture Sensor, Temperature, Humidity Sensor, Relay Motor, Telegram.

I.   INTRODUCTION

Internet of Things (IOT) is all about collecting information from the world with the help of network devices which are connected and capable of collecting the information, and the information which are collected by the sensors are then shared on cloud Network devices includes sensors and other physical devices.

Internet of things alludes to a system which comprises physical gadgets, vehicles, structures and different things which are implanted with hardware, programming, sensors and so on... Web of things empowers these gadgets to associate with one another and trade information. Internet of things is one area which is blossoming nowadays which are making our lives simple, we use web of things in different areas, for example, Home robotization, wearable's, Smart framework, horticulture, shrewd retail, social insurance and so on...

Modernization the earth like pruning trees for developing tall structures and this outcome in natural lopsidedness and climatic changes. For relieving the impact, cultivating like planting trees and bushes will turn out to be increasingly more significant than an interest. Greenhouse needs in learning about the necessity of plant that the supplement and the measure of water to be showered to improve the development of the plant. Moreover, the upkeep of the greenhouse is tedious and it is additionally a repetitive procedure. In normal, the plant specialist will need learning about the prerequisites of plant like having appropriate supplement and measure of legitimate water to be showered for the improvement of its development. With respect to this, it is fundamental for structure a self-ruling cultivating for the plants.

The main goal of the project is to provide a smart control of the garden, by irrigating the garden based on data collected by the sensors. The definition provides an overview about the system requirement and specification.

Aim of the project is to develop a smart garden system environment able to auto monitoring the humidity and water amount in the garden and provide needs to environment.

The system vision is to connect a growing bed via sensors to a raspberry pi board such that we can measure moisture and temperature and stores that data. This will enable to determine the minimal feasible amount of watering. This application has many feature which benefits both the user and garden. This system focuses to make the user maintain the garden.

II. LITERATURE SURVEY

[1] [2] Plant monitoring and smart gardening in Raspberry pi platform using IOT. Automation reduces manual work and improves performance. Temperature, humidity, sunlight, soil moisture and pH are the important parameters for quality and productivity of plant growth. Raspberry pi is used for interfacing with all the sensors used with in this project. Smart phone of an owner can be used to directly monitor and control the garden activities. This provides convenience and comfort to the user by sensing and controlling the parameter of garden without their physical presence.

[3] [11] Slowly allowing the water to the root of the plant on to the soil surface or directly on to the root zone, though solenoid valve is called as "Abstract irrigation" system. These are suitable for smart homes has it too expensive because ready to use, energy efficient. There is a new introduction of a new device called Raspberry Pi which helps us with multi sensors as soil moisture sensor, ultrasonic sensor and light sensor. This system is introduced to reduce cost, minimize the waste water and reduce physical human interface. The system will help us to measure moisture of soil.

[5] [6] Cutting tress for constructing tall buildings results in climatic changes and ecological imbalance. We have to plant the tress to overcome from this effect. Planting trees becomes more and more important than just a hobby. Garden lacks in knowledge about the requirement of plant that the nutrient and the amount of water to be sprayed to enhance the growth of the plant. Now it is necessary to build an autonomous gardening vehicle.

This Vehicle automatically identifies and classifies the plant types using algorithms. In this paper they used the algorithms such as (SIFT)Scale Invariant Feature Transform, (SURF), Speeded-Up Robust Features, (ORB) Oriented FAST and Rotated BRIEF. These algorithms also measure the gardening parameters such as heat level, humidity, temperature, wind speed, and soil moisture. The data collected from the sensors are used to maintain the garden more effectively and effectively.

[7] [10] The technique of using computer or smart phone in controlling and monitoring is called as home automation with the help of phones. There are all possibilities of stay connected with the home system. It's not about remotely controlling and monitoring the lights, fan, gas leakage, motion detection and watering the garden from smartphone anywhere. As people lose their interest in gardening because they need to take care of plant, give them right nutrition, then the smart phones play a vital role, they can control those plants from mile away sitting in office. Therefore, an automated and qualified system to take care of plants can be vital tool.

[8] [9] India is one of the largest fresh water user in world. There is huge amount of water is utilized in agriculture field rather than domestic and industrial sector ground water contribute around 65%. Water is the most important source in the current generation most of them are used in agriculture. Soil moisture sensor and temperature sensor are placed in the root zone of the plant the system can distributed this information through the wireless network.

The heart of the system is called Raspberry Pi and webcam interfered with raspberry pi via Wi-Fi module. Python programming used for the automation purpose this system is network of wireless sensor and a wired based station which can be used to provide the sensor data to automate the irrigation system.

The webcam application on mobile phone, can easily make online monitoring the actual situation of the field and sensor such as soil moisture and temperature are used to provide the information changes in the field. It is more advantageous than the traditional agriculture technique

III. PROPOSED SYSTEM

The main purpose of automation is to provide comfort to the people by reducing the manual work and to improve the overall performance of any system without the user interaction. The important parameters for the quality and productivity of plant growth are soil and air temperature, humidity, sunlight, soil moisture. Information to the user

about the plant health and growth may be provided to the user by continuously monitoring and recording these garden parameters. It provides a better understanding of how each parameter affects the growth of plants. All the sensors (Temperature, moisture, humidity) used in this project interface with the Raspberry Pi controller. And this information about the garden can be directly monitored and controlled by the owner of the garden through his or her smart phone using IoT.
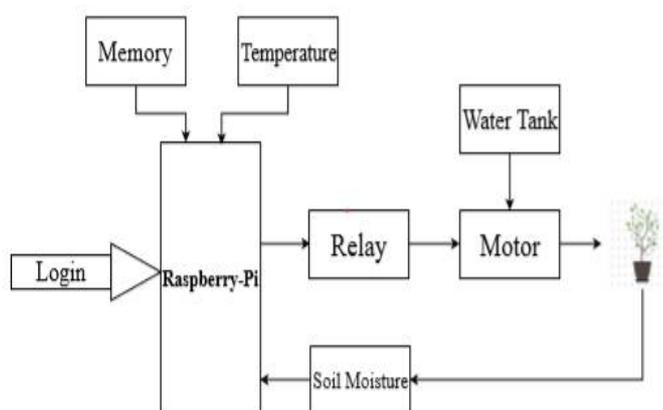

Fig 1: Proposed System

All the parameters of the garden like temperature, humidity, moisture, light intensity are controlled with the help of sensors like humidity sensor, moisture sensor, temperature sensor is interfaced with the Raspberry Pi board. The Raspberry Pi is a series of small single board ,it is a very cheap computer that runs Linux, but it also provides a set of GPIO (general purpose input/output) pins that allow you to control electronic components for physical computing and explore the Internet of Things (IoT).Soil moisture sensor measures the volumetric water current in the soil. Soil moisture sensor measures the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant. This sensor is used to detect the temperature of the soil. The temperature sensor monitors the environment condition in the agricultural field every day. This sensor operates when the applied voltage increases. The different types of humidity sensors are thermal, capacitive and resistive. This sensor is used to determine the water level in the water tank. An electric motor is an electrical machine that converts electric energy into mechanical energy. IoT technology is making motor smarter. Motor are connected to the raspberry pi board which pumps the water whenever admin gives the instruction. In this project the motor will be connected to relay model in which is connected to Raspberry pi board, in which the user can control the operations of the motor according to the situation.

IV. HARDWARE REQUIREMENT

A. RASPBERRY PI3

 Raspberry pi is a very good platform because in every problem will be well documented. It is a small card size cheapest computer. It is basically a microcontroller which uses RASBIAN operating system and Python programming language. It is a circuit board and it is referred as a motherboard.

Fig 2: Raspberry pi 3

B. Soil Moisture Sensor

This sensor is used to measure the moisture content of the soil. This sensor reminds the user to water their plants and also monitors the water content in the soil. There are many different types of soil moisture sensor. They are Frequency domain sensor, by measuring soil's dielectric constant, this frequency domain sensor measures the water content in the soil.
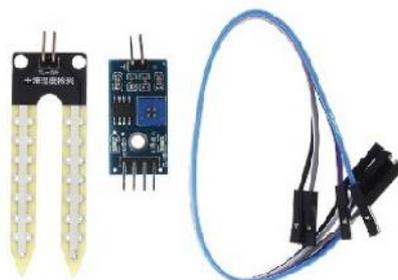

Fig 3: Soil moisture sensor

C. Humidity and Temperature sensor

The temperature sensor screens the earth condition in the horticultural field each day. This sensor works when the connected voltage increments. The various kinds of mugginess sensors are thermal, capacitive and resistive. By the utilization of simple to advanced convertor these sensors give results in simple structure which are changed over to computerized esteem. In our task we are utilizing DHT11 sensor.

Fig 4: Temperature and humidity sensor

D. Relay Module

A relay is an electrically worked switch. Many relay utilize an electromagnet to precisely work a switch, yet other working standards are additionally utilized, for example, strong state transfers. Relay are utilized where it is important to control a circuit by a different low-control signal, or where a few circuits must be constrained by one sign.

Fig 5: Relay Module

V. SOFTWARE REQUIREMENT

A. TELEGRAM

Telegram is a cloud-based instant messaging and voice over IP service. Telegram client apps are available for Android, iOS, Windows Phone, Windows NT, macOS and Linux. Users can send messages and exchange photos, videos, stickers, audio and files of any type.

Messages and media in Telegram are encrypted when stored on its servers, and the client-server communication is also encrypted. The service provides end-to-end encryption for voice calls, and optional end-to-end encrypted "secret" chats between two online users, yet not for groups or channels.

Bots

In June 2015, Telegram launched a platform for third-party developers to create bots. Bots are Telegram accounts operated by programs. They can respond to messages or mentions, can be invited into groups and can be integrated into other programs.

when the bot controller changes the access settings silently at a later point in time. Telegram pointed out that it considered implementing a feature that would announce such a status change within the relevant group. Also there are inline bots, which can be used from any chat screen. In order to activate an inline bot, user needs to type in the message field a bot's username and query. The bot then will offer its content. User can choose from that content and send it within a chat.
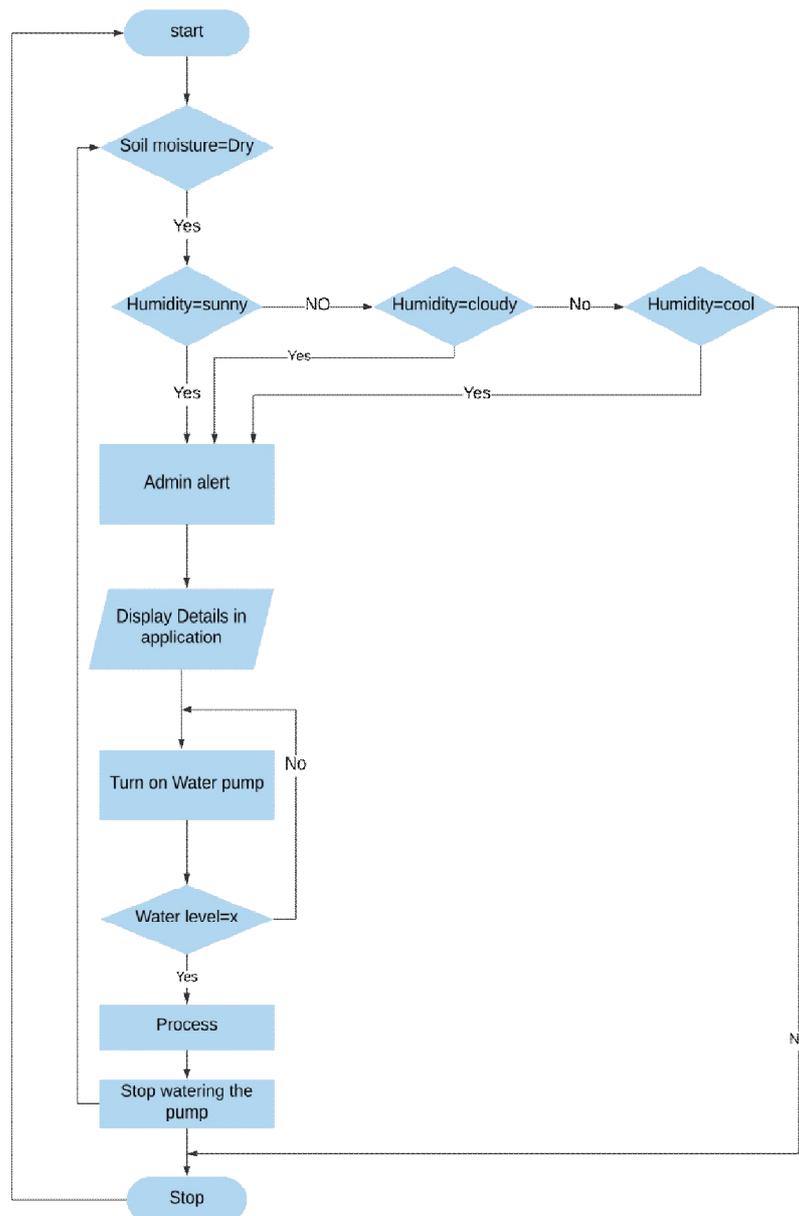

Fig 6: Telegram

VI. PROPOSED SYSTEM FLOW CHART

VII. CONCLUSION

Smart Home Garden Irrigation System has been successfully developed with Raspberry Pi by connecting it with soil moisture sensor, Humidity and Temperature sensor and a single relay module. All sensors have provided good measurement of parameters when carrying out the experimental cases. Raspberry Pi controls on and off of the relay. The system is feasible and cost effective for optimizing water resources in any small scale agricultural sectors. By

implementing Android interface apps in mobile, a user can manage to control the irrigation system remotely. Additionally, email is also sent to the user to give information about the system. Therefore, the irrigation system, It saves time and also water consumption.

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