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Automatic Garden Monitoring and Controlling

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ABSTRACT: In the present era, water scarcity occurs due to the increase in population. So to avoid this problem we have to promote the agriculture sector. But water wastage is more in this sector in the form of water logging while watering the agricultural fields through irrigation. Therefore an automatic garden monitoring system has to be designed for the proper water supply in the fields. This paper deals with an automatic garden monitoring system which automatically senses the moisture content of the soil and decide whether watering is needed or not and how much water is needed for soil. This system uses Arduino UNO microcontroller. It is programmed to sense the moisture content of the soil. When the moisture content is less than the limit which is predefined, it will start supplying the desired amount of water till it reaches the limit. So when the soil is dry the pump will automatically water the fields and when the soil is wet the pump will automatically switch off, there by eradicate the need of manpower and conserve the time.

KEYWORDS: Arduino Uno, soil moisture sensor, temperature and humidity, water motor

I. INTRODUCTION

In a country like India, the agriculture plays the important role in the economy and development of the country. The farmers have been using irrigation technique in India through the manual control in which the farmers irrigate the land at the regular intervals. This process sometimes consumes more water or sometimes the water reaches late due to which the crops get dried.

The main aim of this project was to provide water to the plants or gardening automatically using microcontroller (Arduino Uno). We can automatically water the plants when we are going on vacation or we don't need to bother our neighbour. They do not sense the soil moisture and the ambient temperature and if the soil actually needs watering or not. To overcome this we are using sensor to monitor and control the garden automatically. This method will reduce huge water loss and it became a popular method by reducing the labour cost and increasing the yields.

The system is composed of three main components: monitoring node, display node, and the cloud. The monitoring nodes are installed in the several places in the field to monitor both soil and the environment. The monitoring nodes are Moisture sensor, DHT11 sensor and LDR sensor. When the components are activated, all the components will read and gives the output signal to the controller. Then the controller will access information and when the motors are turned On/Off it will be displayed on the LCD display. These nodes are connected and send data to the central node using ZigBee network.

From a study of the existing system, if it observed that it has various limitations. These limitations can be overcome using the proposed system.

II. PROPOSED SYSTEM

In this section, there is a description of the overall proposed system which is going to overcome all the limitations of the existing system. The proposed system is composed of five main components which are connected to Arduinouno:Soilmoisture,DHT11,DC Motor for watering ,LDR sensor, Power Supply .Moisture sensor used to check the moisture level of the field,DHT11 sense the temperature and humidity of the environment and LDR used to sense

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the presence and absence of light. Here this components are taken as a input devices to the Arduino and send the data to the system(Arduino Uno).The system display the received data in the dashboard with the help of adafruit.io.In this way the system will be updated according to the change by the input devices automatically.

III. HARDWARE SYSTEM

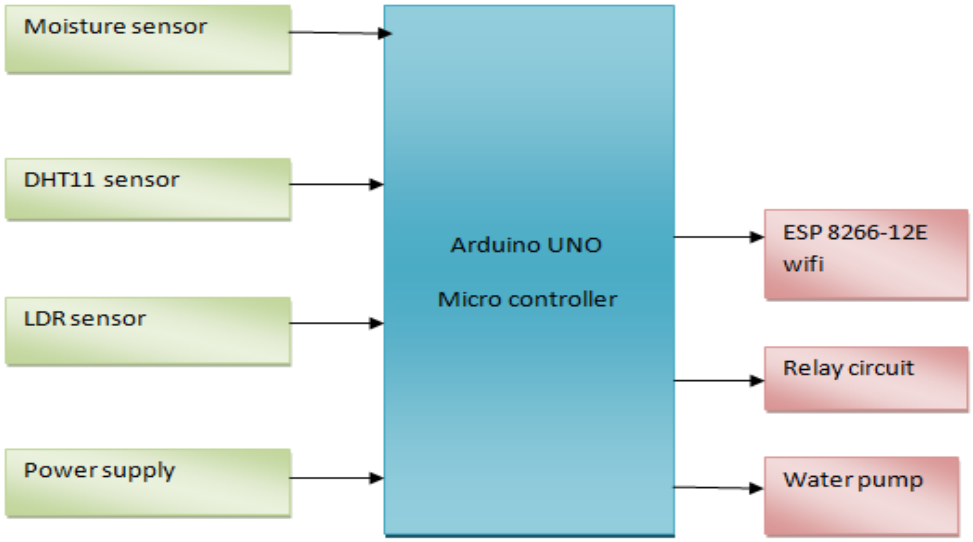

Fig.1.High level architecture of automatic garden monitoring system

IV. METHODOLOGY

- **Micro controller**: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.
- **Arduino**: It is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs. Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments.

- **Soil Moisture:** In Soil Moisture sensor there are two copper leads which are immersed under the ground to test the soil level. If the soil level ranges between 6-7 then it says to be normal condition for the growth and cultivation of plants.

    - **STEP**1: Dry condition- The probes are placed in the soil under dry conditions and are inserted up to a fair depth of the soil. As there is no conduction path between the two copper leads the sensor circuit

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remains open. The voltage output of the emitter in this case ranges from 0 to 0.5V.

- **STEP2**: Optimum condition- When water is added to the soil, it percolates through the successive layers of it and spreads across the layers of soil due to capillary force. This water increases the moisture content of the soil. This leads to an increase in its conductivity which forms a conductive path between the two sensor probes leading to a close path for the current flowing from the supply to the transistor through the sensor probes. The voltage output of the circuit taken at the emitter of the transistor in the optimum case ranges from 1.9 to 3.4V approximately.

- **STEP**3: Excess water condition- With the increase in water content beyond the optimum level, the conductivity of the soil increases drastically and a steady conduction path is established between the two sensor leads and the voltage output from the sensor increases no further beyond a certain limit. The maximum possible value for it is not more than 4.2V.

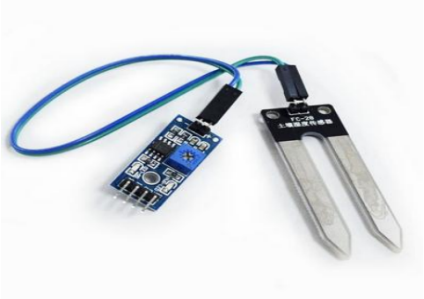

Fig.2 Soil moisture sensor

- **Temperature and Humidity (DHT11):** Digital temperature and humidity sensor is a composite Sensor contains a calibrated digital signal output of the temperature and humidity. Application of a dedicated digital modules collection technology and the temperature and humidity sensing technology, to ensure that the product has high reliability and excellent long - term stability. The sensor includes a resistive sense of wet components and an NTC temperature measurement devices, and connected with a high-performance 8-bit microcontroller. Dehumidifier, testing and inspection equipment, consumer goods, automotive, automatic control, data loggers, weather stations, home appliances, humidity regulator, medical and other humidity measurement and control.

Fig.3 DHT11 sensor

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- **LDR (**Light Dependent Resistor**)**: LDRs are made from semiconductor materials to enable them to have their light-sensitive properties. There are many types but one material is popular and it is cadmium sulphide (CdS). These LDRs or PHOTO RESISTORS works on the principle of "Photo Conductivity". Now what this principle says is whenever light falls on the surface of the LDR (in this case) the conductance of the element increases or in other words, the resistance of the LDR falls when the light falls on the surface of the LDR. This property of the decrease in resistance for the LDR is achieved because it is a property of semiconductor material used on the surface.

Fig.4 LDR sensor

V. CONCLUSION

This paper "AUTOMATIC GARDEN MONITORING AND CONTROLLING", describes about the various aspects of garden monitoring using IOT. Farming activities, even in urban zones are on an ascent as of late, in remarkable structures. Innovative advance makes the agrarian area develop high, which here is made by the IoT. The IoT will be playing a great role in changing the day to day life experience. The proposed project could be beneficial as it will help in advancing the assets in the nursery. And right now we are using limited number of parameters in our project but with the further advancement more number of parameters could be added for boosting the production. In future by building up a versatile application for IoT framework makes more adaptable to the people groups.

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