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SMART IRRIGATION ROBOT

Prof. (Mrs.) Anjali More 1, Darshan Gaikwad 2, Hritik Potawade 3, Kalpesh Dere 4, Siddharth Wandre 5

1 Assistant Prof. Dept. of Computer Engineering, SRTTC FOE, MH, India

2 Student, Dept. of Computer Engineering, SRTTC FOE, MH, India

3 Student, Dept. of Computer Engineering, SRTTC FOE, MH, India

4Student, Dept. of Computer Engineering, SRTTC FOE, MH, India

5 Student, Dept. of Computer Engineering, SRTTC FOE, MH, India

(Savitribai Phule Pune University)

Abstract –

Nowadays, an optimized irrigation system has become a need due to the lack of the world water resource. Unplanned use of water basically leads to wastage of water. So, conveyance of automation within the farming system is the most important need for the present & future era. The shortcomings of the manual agriculture system are often corrected by exploiting the automated method that results in higher production of crops. The system has a wireless network of soilmoisture, temperature and humidity sensors. This project is about smart irrigation system which is cost effective. As the technology is growing and changing so fast. DC motor based wireless vehicle is designed for irrigation purpose. The objectives of this paper were to control the water supply to each plant depending on values of temperature and soil moisture sensors. This proposed system is incredibly helpful in Farms, gardens, home etc.

KEYWORDS Agriculture, Internet of Things, Wireless Network, Automated system, Smart irrigation.

1. INTRODUCTION

In India, water resource is in severe shortage and agricultural water consumption accounts for about 80% of the total water consumption. Because of the outdated agriculture irrigation method, the coefficient of irrigation water for effective utilization is only 0.3-0.4 or so. One most important way to improve the utilization rate of irrigation water is to implement precise controlled information based on previous water crop demand data. To keep our agricultural land good, we need an irrigation system which is the method of watering our agricultural field. As there is an increase in scarcity of water, we tend to upgrade our technology and also many various techniques for proper use of water for crops. The soil is that the most vital medium for plant growth. However, many different parameters as well as soil moisture, PH of soil, temperature, and wetness varies from region to region. Testing of the soil provides valuable info about the soil which might be useful to optimize plant growth.

There are many unique types of techniques for irrigating farm fields for various types of crop fields. Channel system is a method of irrigation. But a smart irrigation system is a new technology to properly irrigating farm fields. Smart irrigation scheduling consistently has shown to be valuable in water use efficiency concerning manual irrigation based on direct soil water measurements. The implementation aims to demonstrate that smart irrigation can be used to prevent water wastage. This smart irrigation system that consists of a distributed wireless network of soil moisture and temperature sensor. The main purpose of this project is to save water and to increase the production of crops by monitoring plants. To maximize utilization of available water.

The conventional smart irrigation system is fully controlled and monitored by the farmer. This project presents a fully smart irrigation system that is controlled and monitored by using Arduino Uno and node MCU.

2. LITERATURE SURVEY

In [4], the authors have provided us with a review of the prevailing solar-powered smart irrigation system. The authors have introduced a way during which they did irrigation through solar power. The idea has been incontestable. They generated energy from PV panels for the irrigation system. Although, this method uses renewable energy however it had some drawbacks like its initial price which were too high and it used a great amount of space. They have given the design of their project and enforced selections through period knowledge. It also had some drawbacks like high maintenance prices and difficulty in installation.

Authors in [6, 7], introduced an improved IoT Based automated irrigation system. Many alternative works that have bestowed many styles for the development of sensible irrigation system however as our work is additionally inclined towards sensible irrigation therefore, we've got developed a automation that may be affected into the most space of the sector for irrigation and it'll capture the condition of crops through high element camera. In recent years, researchers have tried their best to ascertain a system that would be renewable and would simply irrigate the most quantity of space at a time however they need not achieved 100 accuracies.

In [8, 9], the authors have developed an algorithm which is successful that extracts the distribution of covered temperature. The main advantage of this technique is that it gives us an overview of Information and schedule of the irrigation process, using the algorithm of a cellular internet interface.

In [13 14], the authors have given an idea of low costing based on wirelessly controlled irrigation system. The basic purpose of implementing this technique was to save the maximum amount of water. The main drawback of this technique is that its maintenance cost is too high.

3. PROPOSED WORK:

In this model different components are attached for specific functions. To monitor plants soil moisture, we have attached soil moisture sensor to node MCU as well as we attached temperature and humidity sensor for monitoring surrounding of plant. These data can be access by mobile application. In other part we have robot which is running on 12v battery. In these robots we attached 4 300rpm BO motors, and they are controlled by motor shield. We are using water as well for watering plants. And these robots can be controlled by android application.

4. PROPOSED SYSTEM ARCHITECTURE

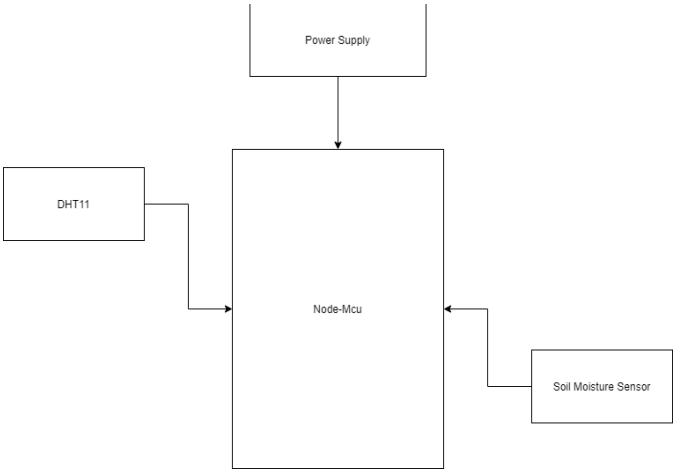

Fig:01

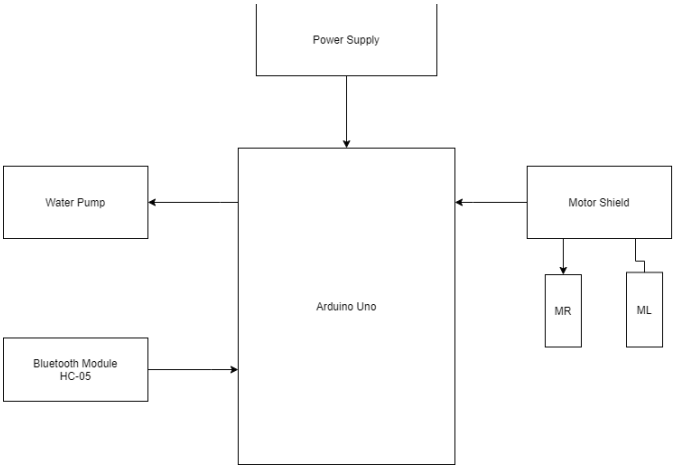

Fig:02

5. PROPOSED WORK SCOPE

The scope of this project is to save water and reduce Human man intervention in the agriculture field. Continuously monitoring the status of sensors and provide the signal for taking a necessary action. To get the output of a waterer sensor & provide water to crop accordingly for getting better crop and plant growth. IoT is helping the farmers by monitoring growth stages of the crop, diseases, an estimation of the yield by giving otherwise restricted low-power, low-cost devices access to higher processing capabilities via wireless technologies.

Smart irrigation helps a minimalism wastage of water. It allows reinvesting in new and improved technologies which ensures sustainable able and responsible irrigation over time. It also allows controlling the amount of water delivered to the plants when it is required.

6. SYSTEM REQUIREMENTS

6.1. HARDWARE REQUIREMENTS

Node-MCU: -

Node-MCU is an open-source IoT platform. Node-MCU includes firmware that runs on the ESP8266 Wi-Fi SoC from Express if Systems which is predicated on the ESP-12 module. We use the c program for getting data from the sensor and send it to the server as well as to use to controlling robot movement.

DHT11: -

The DHT11 is basic, low-cost, digital temperature as well as humidity sensor. It uses a capacitive humidity sensor as well as a thermistor to measure the surrounding air and gives a digital signal on the data pin. It's fairly simple to use, but also requires careful timing to grab data.

Soil-Moisture: -

It's an important variable in controlling the exchange between water and heat energy between the land surface and the atmosphere through evaporation and plant transpiration. Soil moisture data has many uses like reservoir management, early warning of droughts, irrigation scheduling, and crop yield forecasting.

Motor Shield: -

The Motor Shield is a driver module for motors which allows you to make use of Arduino to control the working speed and direction of the motor. As it is Based on the Dual Full-Bridge Drive Chip L298, it is also able to drive two DC motors or a step motor.

Arduino Uno: -

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P which has a total of 14 digital input/output pins out of which 6 pins can be used as PWM outputs, 6 pins

as analog inputs, also it has a 16 MHz quartz crystal and many other like a USB connection, a power jack, an ICSP header and a reset button.

Bluetooth Module HC-05: -

HC-05 Bluetooth Module is a Wireless Communication device based on the Bluetooth Protocol. Following module is based on BC417 Single Chip Bluetooth IC.

6.2. SOFTWARE REQUIREMENTS

Arduino IDE: -

The Arduino Integrated Development Environment (IDE) is a cross-platform application. It is basically used to write programs in C & C++ and upload programs to Arduino compatible boards, along with the help of third-party cores, and other vendor development boards.

Blynk Android Application: -

Basically, Blynk is a Platform that is used to control Arduino, Raspberry Pi and the likes over the Internet with IOS and Android app. In this Application, you can also build a graphic interface for your project.

MIT app inventor: -

Basically, MIT App Inventor which is an intuitive, visual programming environment. MIT App Inventor allows everyone to build a fully functional application. The ones who are new to MIT App Inventor can create or build their very first and a simple application and run it in short time.

7. METHODOLOGY:

The sensor such as DHT11 Temperature, Humidity and Soil moisture sensor is used and the data acquired from sensors is transmitted to the web server using wireless transmission. The data processing is the task of checking various sensors data received from the field.

We make robot which can operate remotely the tank and water motor attach on robot so we can supply water to plants.

8. Mathematical Model:

Selected problem statement

S1= {s, g, Y, F, Z}
s=Initial state: User interaction with app
g=Get data: App get data from server.
Y=For user: Checking the warning of low moisture level.
F= Use application to reach plant and watering plant.
E=End state: Moisture level back to normal

9. RESULTS:

Fig:03 **Displays the Plants Data**

All the acquired data is shown through wireless network in the mobile. In above diagram, Fig 03 we have received the data of soil moisture, Temperature, Humidity.

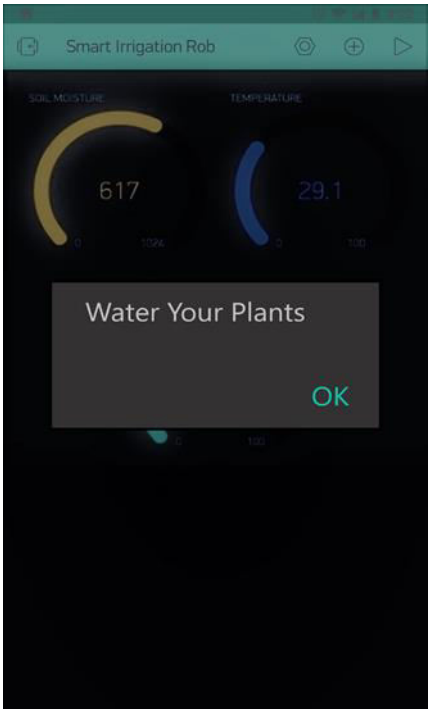

Fig:04 ALERT NOTIFICATION

In above fig 04, it displays that the user should water the Plants. If the soil moisture is less then it notifies us with a message "Water Your Plants" as shown in fig04.

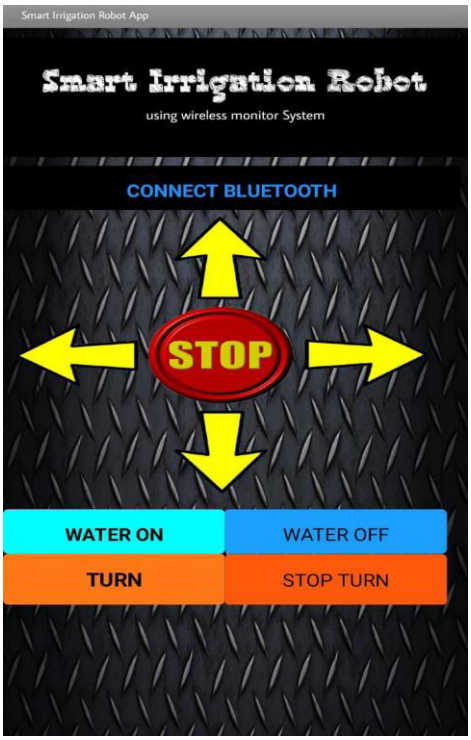

Fig:05 **HOMEPAGE**

The above fig 05, is the homepage of the application. Its displays us the all the activities that will be performed.

As it is connected via Bluetooth it shows the option to connected to Bluetooth also when to water plants or stop watering the plants.

10. FUTURE ENHANCEMENT

We can use cloud-based services to control and monitor Plant's soil moisture as well as robot. For that we can attach camera to the robot to see visual of actual field. Also, we can use solar panels to power robot so no need to charge battery every time. Attach GSM module to monitoring system can give us low moisture level warning when we are not connected to internet or we are offline. If our robot is running on same path everyday so we can set its path then robot will water plants on just one click no need to control.

11. CONCLUSIONS

By using the proposed automated irrigation system, Wastage of water can be saved. It also improvises the irrigation cycle and renders it a successful one & a very helpful one. Furthermore, with this method, water delivery to fields is achieved more efficiently. The designed controlled robot is controlled wireless through different commands and the collected information of the field is displayed remotely on the mobile application. Thus, this method has greater priority over all other methods of irrigation because of its consistency and usability. The maintenance cost of our project is low and, in the future, it could be deployed on a commercial basis because of cost- effectiveness.

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