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Smart Sprinklers Approach for Irrigation Using IOT

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ABSTRACT:This idea proposes intelligent and smart sprinklers which can be used for controlling the watering or irrigation of flowering plants. It controls the irrigation of plants automatically where the need of human interaction can be reduced. This mainly focused on wastage of water. It also aids time saving, cost effectiveness, environmental protection, and low maintenance and operating cost and efficient irrigation service. Arduino open source is used in the design the prototype model in making the system compact and sustainable. The system has sensor which measures the moisture of the soil and switches relay which controls solenoid valve according to the requirement.

KEYWORDS: Smart sprinkler, anduino, irrigation, water, soil.

I. INTRODUCTION

Agriculture is the backbone of all developed countries. It uses 85% of available freshwater resources worldwide, this percentage continues to be dominant in water consumption because of population growth and increased food demand. Due to this, efficient water management is the major concern in many cropping system in arid and semi-arid areas. An automated irrigation system is needed to optimize water use for agricultural crops. The need of automated irrigation system is to overcome over irrigation and under irrigation. Over irrigation occurs because of poor distribution or management of water. Under irrigation leads to increased soil salinity with consequent buildup of toxic salts on the soil surface in areas with high evaporation.

To overcome these problems and to reduce the manpower, smart irrigation system has been used. Improving irrigation efficiency can contribute greatly to reducing production costs, making the industry more competitive and sustainable. Through proper irrigation, average crop yields can be maintained (or increased) while minimizing environmental impacts caused by excess applied water and subsequent agrichemical leaching. Recent technological advances have made soil water sensors. Available for efficient and automatic operation of irrigation systems. Automatic soil water sensor-based irrigation seeks to maintain a desired soil water range in the root zone that is optimal for the plant's growth.

II. LITERATURE REVIEW

One of the things that can help IoT with daily activities is the agriculture section. Currently, the flawless integration with wireless sensors and IoT in smart agriculture can raise agriculture to a previously unthinkable [1]. The sales of agricultural products have always been challenging, so real-time monitoring in the processing, production, and circulation [2]. Supporting farmers with decision tools and automation technology is a purpose of application in agriculture. Integrate products, knowledge, and services for better quality, productivity, and profit expected to increase from 30 million in 2015 to 75 million in 2020 [3].

Smart Garden System is a breakthrough that is currently popular. At home, there are presently gardens in front and back yards. With uncertain climate change, a beautiful garden is needed and can provide coolness to the house. However, daily activities leave many people without enough time to water their plants. Plants that are not treated will wither and do not provide benefits. Smart solutions are needed for better crop maintenance for more efficient water resources, even in adverse weather conditions.



Besides, different plant species require different amounts of water, intelligent systems necessary for efficient water utilization and dynamic plant growth [4]. Because it becomes crucial to combine developing technology with plantations and carry out smart farms [5], the Smart Garden System appears. Features allow us to use various IoT applications such as integrating sensors/actuators, digital transmissions, low power consumption, scalability, and WSN security [6]. This system is a process in which automation water the garden through a humidity sensor in the ground or air.

This system will facilitate with the help of the internet. The humidity sensor is connected to the watering plant and smartphone so we can monitor soil moisture. If the air or soil does not have enough water or humidity, the system will turn on the watering machine. Soil moisture, rainfall, evaporation are essential parameters for designing Smart Garden Systems [7], [8]. Some of the Smart Garden System's main features are real-time feedback from garden sensors, park monitoring, application-controlled water systems, and automatic watering systems. Mobile devices have robust computing, sensing, and connectivity resources. Tools such as smartphones and tablets can run applications for various purposes [9]. In this particular case, we would like to apply the Smart Garden System on mobile devices.

III. EXISTING SYSTEM

A smart micro controller lies at the heart of the automated irrigation infrastructure. Soil moisture sensors and temperature sensors, which are placed on the fields, send real-time data to the micro controller. Generally a moisture range is pacified and whenever the actual values are out of this range the micro controller also has serve motors to make sure that the pipes are actually watering the fields uniformly so that no areas get clogged or is left too dry. The entire system can be managed by the end-user through a dedicated mobile application. Smart irrigation makes it possible for growers to monitor and irrigate their fields remotely, without any hassle. And the problems of the existing system is in our country many places are filled with farms and gardens, the flow of water is wasting at those places. To reduce the water consumption during filling of water to the farms gardens.

IV. PROPOSED SYSTEM

The smart irrigation system is based on soil sensor and operated based on the moisture content of the soil. In this system soil moisture sensor is connected to the input pins of Arduino microcontroller. The sensed values from the sensors are displayed in Smartphone. If the sensed value goes beyond the threshold values set in the program, the pump will be automatically switched ON/OFF by the motor driver. The farmer will be intimated about the current field condition through Smartphone Application and also updated in the web page. By using this system, the farmer can access the details about the condition of the field anywhere at any time The advantages of the proposed system is, increase in productivity Reduced water consumption Safe Man power reduced Reduce soil erosion and nutrient leaching require smaller water sources.

Architectural Design:

The architecture of a system describes its major components, their relationships (structures), and how they interact with each other. Software architecture and design includes several contributory factors such as Business strategy, quality attributes, human dynamics, design, and IT environment. We can segregate Software Architecture and Design into two distinct phases: Software Architecture and Software Design. In Architecture, nonfunctional decisions are cast and separated by the functional requirements. In Design, functional requirements are accomplished

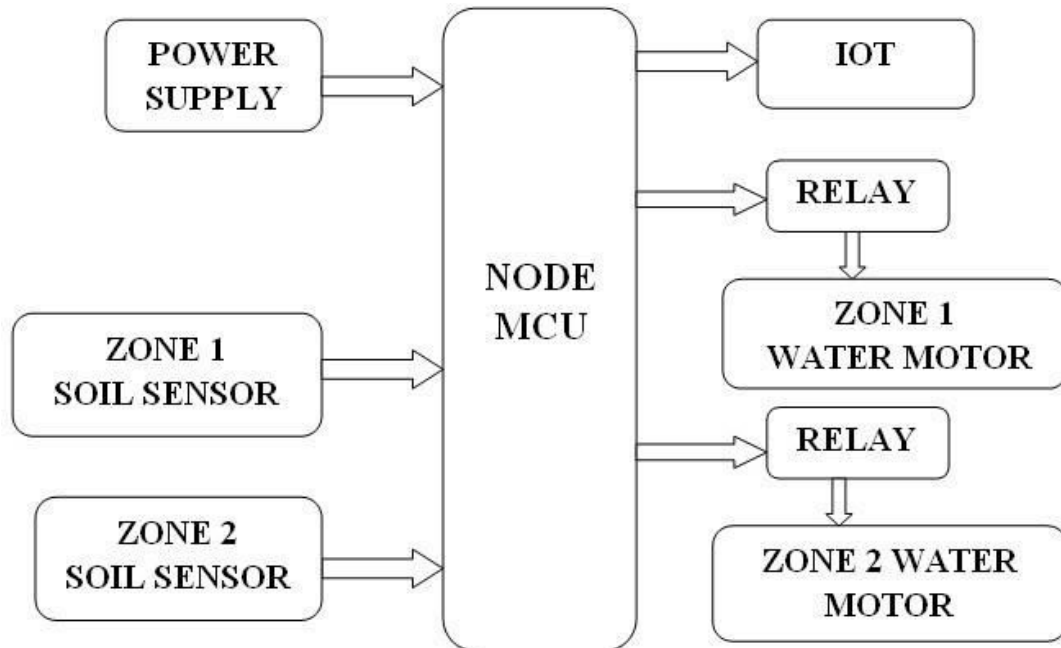


Fig: Propose system Architecture

Algorithms

- 1: All the sensors i.e. moisture sensor, humidity sensor, temperature sensor, is connected to the microcontroller
- 2: 5volts of power is supplied to the micro controller.
- 3: From that microcontroller a relay gets the information about the percent of the moisture in the soil.
- 4: If the moisture percent is low then the motor gets automatically ON and the notification is sent to the user device.
- 5: Block diagram of arduino based smart irrigation system which consists of three sensors which are connected to controller and sensed values from these sensors are sending to the mobile application.

Sample Code:

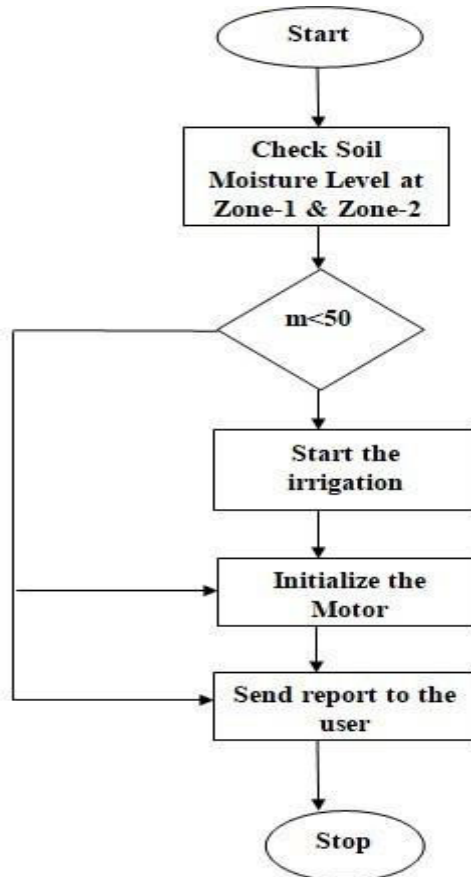
```

###Arduino
#define BLYNK_PRINT Serial #include <ESP8266WiFi.h> #include <BlynkSimpleEsp8266.h>
#include <SimpleTimer.h> //including the library of SimpleTimer
#define sen 16 //sensor1 #define gassen 5//sensor2 #define ledPin 4//water 1 #define ledPin1 0//water 2
int senval; SimpleTimer timer;
charauth[] = "9JbkOKehQfBdneuOxH_BY8q45WGRj_Ub"; //You will get this Auth Token in Gmail if you
signinBlynk app with your Gmail ID
charssid[] = "PROJECT"; //Enter your WIFI Name
char pass[] = "PROJECT123"; //Enter your WIFI Password // Set password to "" for open networks.
void setup()
{
  Serial.begin(9600); // Debug console Blynk.begin(auth, ssid, pass); Serial.begin(9600); pinMode(ledPin, OUTPUT);
  pinMode(ledPin1, OUTPUT); Blynk.virtualWrite(V0, "hello"); delay(1000);
}
void sendUptime()
{
}
void loop()
{
  senval=digitalRead(sen);
  Blynk.run();
  if(digitalRead(D5)==1)
  {
    digitalWrite(ledPin, HIGH); Serial.print("ZONE1 NO WATER"); Blynk.virtualWrite(V0,"ZONE1 NO WATER");
    delay(20000);
  }
}
    
```



```
}  
if(digitalRead(D5)==0)  
{  
digitalWrite(ledPin, LOW); Serial.print("ZONE1 WATER FULL");  
Blynk.virtualWrite(V0,"ZONE1 WATER FULL");  
}  
if(digitalRead(D1)==1)  
{  
digitalWrite(ledPin1, HIGH); Serial.print("ZONE2 NO WATER"); Blynk.virtualWrite(V1,"ZONE2 NO WATER");  
delay(20000);  
}  
if(digitalRead(D1)==0)  
{  
digitalWrite(ledPin1, LOW); Serial.print("ZONE2 WATER FULL");  
Blynk.virtualWrite(V1,"ZONE2 WATER FULL");  
}  
timer.run();  
}
```

Implementation:



Implementation Step

- 1: All the sensors i.e. moisture sensor, humidity sensor, temperature sensor, is connected to the microcontroller
- 2: 5volts of power is supplied to the micro controller.
- 3: From that microcontroller a relay gets the information about the percent of the moisture in the soil.
- 4: If the moisture percent is low then the motor gets automatically ON and the notification is sent to the user device.



5: Block diagram of arduino based smart irrigation system which consist of three sensors which are connected to controller and sensed values from these sensors are send to the mobile application

Implementation Procedure:

Many solutions require changes to be made to business processes as well. These changes should be made at the same time that the actual solution is deployed. Monitoring the solution usually the project team will spend some period of time monitoring the implemented solution. If there are problems that come up immediately after implementation, the project team should address and fix those problems.

V. CONCLUSION

Irrigation process is the more significant requirement for human's civilization and it is treated as backbone of our country. In the current circumstances saving of water is of high concerned. This work attempts to save the natural resources by continuously monitoring the status of the soil, controlling of water flow and thereby reduce the wastage. The farmers can be greatly benefitted by this system which would reduce the labor charges and increase the efficiency in farming. By modernizing the farming techniques we get high yields and increase the living standards of farmers. It will be very useful in arid and semi-arid areas.

Based on tests conducted and application of the prototype in various areas, we conclude that this system can be implemented in our country with some more research and development. It will prove to be beneficial to the farmers.

VI. FURTHER ENHANCEMENTS

The prototype can be connected with additional sensors like pH sensor, Temperature sensor and Humidity sensor along with moisture sensor which would help in irrigating the land depending on various conditions and requirements. The prototype could be connected to weather forecasting device to consider rainfall and weather changes and irrigate accordingly. The system can also be connected to the data cloud to gather the field information. The Smart irrigation system can be mass produced at lower cost to help small scale farmers in irrigation. It can also be developed further so that it can be utilized for all types of crops and soil conditions

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