SMART IRRIGATION SYSTEM USING API TECHNOLOGY

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Abstract - *This paper aims to deliver a smart and cost-effective irrigation system. The main objective of this paper is to integrate a real-time monitoring system, remote controlling, and cloud computation of acquired data. The system operates on some designated parameter ratings. Depending on the parameter values, the system executes actions such as switching the motor on and off automatically as well as manually also. Adding to that, this paper also offers a user-friendly experience with the help of a mobile application that enables the users to operate the system. Along with that, it contains a manual guide on pesticides. This will also help the user to Figure out if their surroundings are suitable enough for their desired agricultural system. Also, check the water and pesticide levels and get the message to the user.*

***Key Words*: *Internet of things, smart irrigation, real-time monitoring, remote controlling*.**

1. INTRODUCTION

In the modern age, the Internet of Things (IoT) plays a vital role to automate conventional systems. It has been taken up as a solution to many common engineering problems which has led to being fruitful. To build up an automated system IoT concept needs to be integrated with various types of sensors data which will then process data according to the user's requirement.

The agriculture aspect is a huge deal because of the overly exaggerated population. In the quest of feeding the whole nation, agriculture plays a vital role. So, an effective and more widespread way of agriculture is to be much preferred over any other sort of system. Agriculture is always done in the conventional way which promotes manual labor and working in the field day and night. Smart agricultural systems are not as widespread as they should be. The reasons could be many. To list a few- people are not enlightened enough to operate a smart farming system, the financial aspect of the costing of the paper. But to preserve and allocate crops for the large portion of the people in this country, an efficient way of farming should be the first option to avail too. Making the farmers vent towards automated systems more than applying manual labor, not just for the sake of their health but to also increase productivity and thus the growth of the economy. Automation in agriculture not only will contribute to the efficiency of agriculture but also reduce the tendency of manual labor for farmers. This paper proposes the modern aspect of farming but also in a cost-effective way. An IoT-based smart irrigation system can be quite helpful to farmland users in terms of its cost-effectiveness and the not-so-sophisticated modeling of the system. This paper operates by accumulating a few basic and essential data regarding agriculture and then comparing them with the pre-set threshold datasets it takes decisions and executes preferred actions. It also offers a user-friendly interface for the developed mobile application for the sake of the aspect of easy-to-use resolution for the user. Moreover, a website developed has also been linked up with the application interface. The website contains data about the threshold values of different agriculture systems for different crops. Also, there is some visual representation of many environmental as well as technical parameters on the website. This will give the user an out-and-out idea if they can switch their preferred agriculture system.

1.1 Module we used

1) **NodeMCU CH340**

   NodeMCU is an open-source networking platform. It uses Lua scripting language programming. Allows developers to deal with the underlying hardware in a manner similar to Arduino, so that software developers .can easily operate hardware devices

2) **Lolin baseboard**

This baseboard is designed to ease the prototyping using the NodeMCU V3 board (Lolin). It extends the GPIO of NodeMCU to header pins, which also includes the Vin, VUSB, 5V, 3.3V, and GND. You can

further use these pins for prototyping, with the male to female jumper wires.

With the onboard voltage regulator, you can now power the NodeMCU and the whole system with a DC jack, with voltage ranging from 6V to 24VDC. The board also comes with a power indicator

3) **1-Channel Relay board 12v**

This is a small and easy to use 1 channel relay board that operates on 12V. Use it to control one 240V power appliance directly from Arduino, Raspberry Pi, and other microcontrollers or low voltage circuits. Perfect for switching 240V appliances lights, fans, etc, and even high power motors at lower voltages. Power input and relay control signals are brought to header pins on the board. Hence, the board can be easily interfaced with our development boards using our female-to-female jumper wires.

4) **Soil Moisture sensor**

This is an easy-to-use digital soil moisture sensor. Just insert the sensor into the soil and it can measure moisture or water level content in it. It gives a digital output of 5V when the moisture level is high and 0V when the moisture level is low in the soil.

5) **water pump** Micro DC 3-6V Micro Submersible Pump Mini water pump For Fountain Garden Mini

water circulation System DIY project.

This is a low-cost, small-size Submersible Pump Motor that can be operated from a 3 ~ 6V power supply. It can take up to 120 liters per hour with a very low current consumption of 220mA. Just connect the tube pipe to the motor outlet, submerge it in water, and power it. Make sure that the water level is always higher than the motor. A dry run may damage the motor due to heating and it will also produce noise

1.2 IOT Section

This section comprises an app that displays the current temperature, humidity, and moisture level. Also, turn on/off the status of the motor and pesticide. If we want to stop the flow of water for some days for that we stop the flow, and for starting that flow we used to start the flow button. On top of the screen of the app, the showing the current status of flow i.e. Running or Stopped.

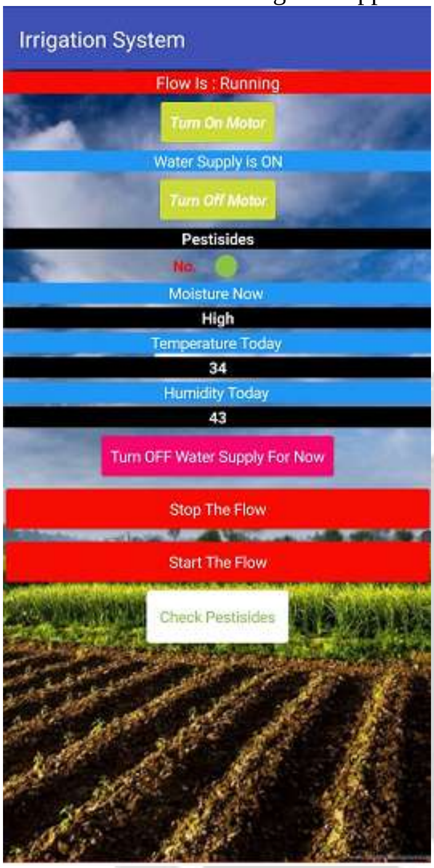

Figure 3: Webpage showing sprinkler and soil moisture status

2. PROPOSED SYSTEM

The system is a combination of hardware and software components.

3. CONCLUSIONS

A smart irrigation system was the desired outcome of this paper. The results and the visual outcomes indicate the fulfillment of the initial project goal. A mobile application offering a user-friendly experience contributes to the lessened sophistication of the system. Moreover, the developed website providing rich content for the farmer plays a huge role in enlightening the user too. The prototype in question possesses adequate room for improvement nonetheless but the sustainability period can be predicted from three to five years.

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