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Smart Valve using IOT Technology

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ABSTRACT: One of the largest economic sectors in our nation, agriculture employs a large number of farmers and workers who are essential to the growth and expansion of our economy. India's groundwater levels are at a very low level. For roughly 58% of Indians, agriculture is their main source of income. The difficulties faced by Indian agriculture can be roughly divided into two categories: persistent issues and new problems arising from the country's current agricultural methods, system, changing climate, and economy. To share field status information, we make use of numerous wireless communication modules. To determine the actual condition of the fields, sensors are positioned in various fields. By doing this, we may run various motors without doing any physical labour and automatically irrigate the crop. Farmers may lessen their workload and use water more effectively thanks to this project. The concept is to apply digital technology for drip irrigation systems in order to reduce labour requirements and increase water use efficiency in the irrigation industry. The project was motivated by the research issue of the farmers' high workload to open the valves, close the valves, wait until the entire field was wet, and then turn off the engine.

KEYWORDS: IOT Technology, Smart irrigation, Automation of drip irrigation systems

I.INTRODUCTION

Irrigation systems are crucial parts of the agricultural infrastructure around the world. We employ a range of irrigation techniques in agriculture to get the greatest outcomes. Nowadays, there are many ways to apply technology in the agriculture sector. IoT technology is used in farm development. The two fundamental parts of smart irrigation are the sensing unit and the main station. From the detecting device, which might be on the lawn, the main stations might be placed a distance away. The data is transferred between these two blocks. In all irrigation methods, effective labour and water use is essential.

Wireless equipment requires extremely little upkeep and is quite effective. One extremely important aspect of irrigation is the efficient use of water. A vital component of agriculture is water. by observing the state of the land using six different types of sensors in the realm of agriculture. The equipment is known as the Electromechanical Integrated Intelligent Device, and it allows us to give water to the fields at the appropriate times. The idea behind it is automatic closed-loop control systems.

Drip irrigation has the advantage of saving water up to 70% more than flood irrigation. With the water that is saved, more area may be watered.Crop matures quickly, expands steadily, and is healthier.Returns on investment are larger and faster when maturity is early.It drips water into the earth at extremely low rates using a network of thin plastic pipes with emitters or drippers as outlets. Drip irrigation is often referred to as trickling irrigation. Through this project, we intend to automate the drip pipe valves using a mobile application. Because they can operate the motor and valves using a mobile application, farmers' heavy workload is decreased.

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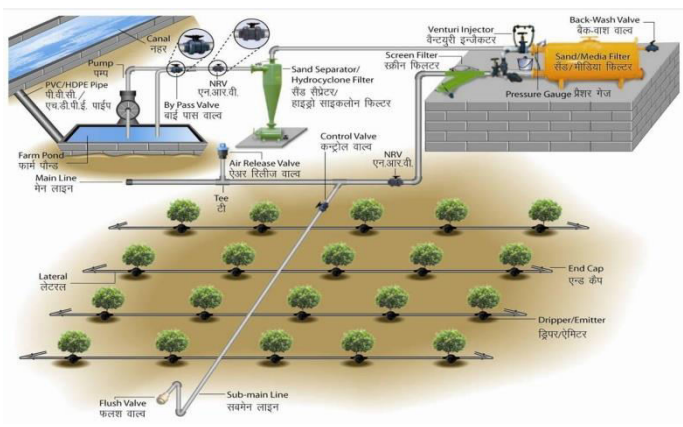
IMAGES OF DRIP IRRIGATION SYSTEM



II.LITERATURE REVIEW

In a paper titled **"IoT based Smart Irrigation and Control System"** released in 2018, **Dr. T. Vairam and R. Prasanth** discuss how IoT is crucial to the agriculture sector. Irrigation is a crucial procedure in agriculture. WSN technology could be used to create an effective irrigation system. Utilizing WSN technology has greatly enhanced the monitoring and control systems. It made it possible for many sensors to communicate effectively. In order to increase the network's lifespan, wireless sensor networks must effectively use the energy of their sensors. By monitoring soil moisture and automating irrigation based on the soil moisture threshold.

A review paper on an "**IoT-based smart irrigation system"** was submitted in January 2019 by **Anjali Dokhande, Chetna Bomble, Rakshanda Patil, Puja Khandekar, Nayan Dhone, and Prof. Chandrashekhar Gode**. In their system, various sensors, including pH, soil moisture, and DHT11, are connected to the input pins of the Arduino microcontroller. The sensors' sensed values are shown on the LCD. The relay circuit, which is coupled to the driver circuit, which aids in switching the voltage, will automatically turn the pump ON/OFF if the measured value exceeds the threshold values in the program. Through the Wi-Fi module, the farmer will be informed of the present state of the field, and the website will also be updated.

In **November 2021**, **Priyanka Phapale, Nisha Pedsangi, and Poorvi Pimpalkar** presented a review paper on a "**Smart Irrigation System"**. Their prototype consists of both software and hardware elements. With respect to soil type and crop type, a predetermined range of soil temperature and moisture is set. The LM393 comparator module and REES52 soil moisture sensor are inserted into the soil for examination. The watering system will be turned on or off appropriately if the moisture of the so deviates from the predetermined range. The microcontroller will turn off the motor pump in the event of heavy rain.

Review article on **"Smart Irrigation System"** was submitted by **Shivani Bitla, Sai Santhan, Shreya Bhagat, Abhishek Pandey,** and **Vijay Nath** in April 2020. This essay explores the significance of smart irrigation, its practical uses, and the various approaches that may be used to create smart irrigation systems that are both cost-effective and generate the best possible growth. The minimal labour force and enhanced cost-effectiveness have become increasingly important in the modern workplace. For humans to survive and rule, agriculture is a field that needs to grow. Climate and irrigation are two important factors that influence agriculture.

This paper, **"Sensor based Crop Protection System with IOT Monitoring"**, was published by **D. Kalra, Praveen Kumar, K. Singh,** and **Apurva Soni** in December 2020. Accordingly, automatic irrigation offers a framework for a water system that advances the amount of water that is readily available in the water supply, providing an efficient and potent mechanism for irrigation needs. When the moisture sensor detects the level of water in the reservoir, the

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irrigation system will automatically start or stop the water syphons on the agricultural site depending on the moisture content.

T. Balasooriya, Pranav Mantri, and Piyumika S Suriyampola stated in a December 2020 paper titled **"IoT-Based Smart Watering System Towards Improving the Efficiency of Agricultural Irrigation"** that a significant amount of water is currently wasted in agriculture due to ineffective irrigation techniques. In addition to conserving water, it is possible to grow healthier plants by keeping an eye on the pH level of irrigation water and the soil moisture of crops. Although a number of intelligent watering systems have been suggested, none of them currently take soil moisture and pH into account. This study suggests an IoT-Based Smart Watering System (IBSWS) to address these issues by using pH and soil moisture sensors to collect and interpret real-time data.

In a paper titled **"Smart drip irrigation system using raspberry pi and Arduino",** published in 2015, **N. Agrawal and Smita Singhal** suggest a design for a home automation system using readily available, affordable, and energy-efficient components like raspberry pi, arduino microcontrollers, xbee modules, and relay boards. The implementation of the system is made overall more affordable, scalable, and reliable using these components. Python is the programming language used by the Raspberry Pi to process user commands. Using the Zigbee protocol, Arduino microcontrollers are utilized to receive the on/off commands from the Raspberry Pi. The backbone of communication between the Raspberry Pi and end devices is the star zigbee topology.

In a paper titled **"A low-cost smart irrigation control system",Chandan Kumar Sahu and Pramitee Behera** (2015) focused on a smart irrigation system that is cost-effective and used in farm fields by middle class farmers. In the 21st century, where we currently reside, automation has a significant impact on human existence. Automation enables automatic control of appliances. It not only makes you more comfortable, but it also saves time and energy. The automation and control equipment used in today's businesses is expensive and inappropriate for usage in farm fields.>>

In a paper titled **"AUTOMATION OF IRRIGATION SYSTEM USING IoT"** published in 2018, **Pavankumar Naik and Arun A. Kumbi** noted that India is primarily an agricultural nation. For most Indian households, agriculture is the most important line of work. It is essential to the growth of an agricultural nation. Therefore, we have presented a project termed "automated watering system utilising IoT" in this regard to save time and water. In the suggested system, we use a variety of sensors, such as temperature, humidity, and soil moisture sensors, which sense the many aspects of the soil and automatically irrigate the area depending on the soil moisture value. The user's Android application will display these sensed metrics and the motor status.

III.REVIEW FINDINGS

We examined a variety of irrigation system automation strategies. Although there are numerous automatic control valves and taps, no one has yet used them in agricultural fields. Numerous reviews and papers have been written, however they haven't been applied to the fields. Contrarily, our technology is simple to implement in agricultural fields, and farmers can quickly operate the engine and valves from any location with no additional work. The project's features are compiled into an android application. In this project, esp32 is also being used, and Google Firebase is being used for login user authentication. Thing Speak is also being used for storing the values of soil moisture sensors and motor on and off indicator.

IV.METHODOLOGY OF PROPOSED SURVEY

The valves on the drip tubes of the drip irrigation system will be activated automatically by pressing a single button in this project. This drip irrigation system automation is known as Smart valve employing IOT technology, and the user can easily control all of the valves and the motor using a mobile application. Users will find it easy to interact with and use this project's UI because it is an android application. Depending on their demands, users can select various application components. The users will be shown a login page as home page from which users can also redirect themselves to register page if at all they haven't registered yet by clicking on the signup button in the login page. While logging in the Google firebase is used as an authentication member so that it checks the database and gets you logged in.

After logging in, When the farmers clicks on the "Motor-On" button then the soil moisture sensors present at the end of every sub-driplines will collect the readings and store them in the database named thing-speak and these

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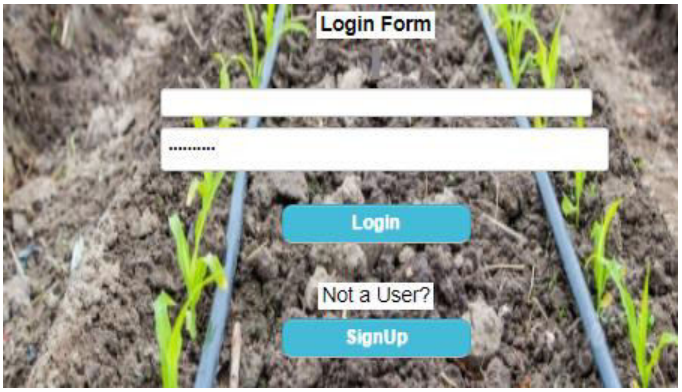
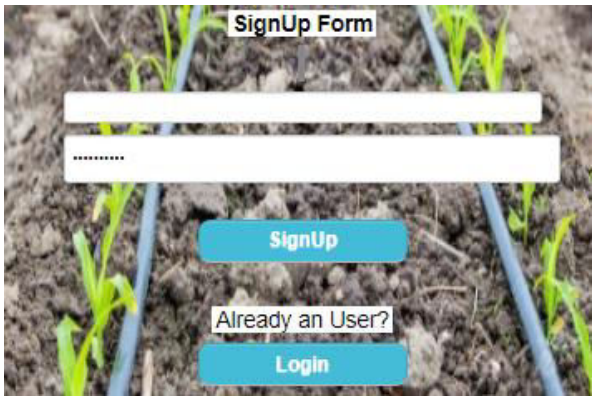
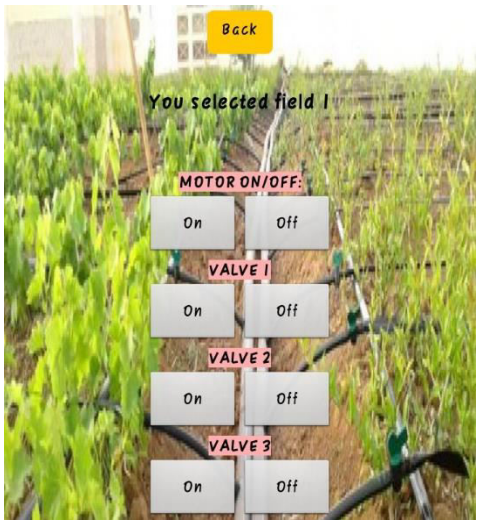
values are sent to esp32 on their specific conditions and make the valves on and off based on the values of their respective soil moisture sensor values. If the condition is set to percentage 80 then when the soil moisture sensor reads the percentage as above 80%. The thingspeak automatically sends signals to the esp32 and esp32 sends signals to motor saying its enough to get wet, now its time to off. And it turns the valves into off position. Similarly, when all of the remaining valves are closed, the motor turns off, and the last valve is closed.







V.COMPARISON WITH EXISTING SYSTEMS

By using a variety of smart automation irrigation criteria, it is possible to handle a wide range of issues in the agricultural industry using a variety of components and approaches. We can clearly understand the application of smart irrigation by comparing the scope of that method to other techniques and by using various sensors and techniques.

These days, agriculture is being automated to lighten farmers' workloads. The agricultural industry is expanding yearly. In order to reduce water waste, drip irrigation systems were first introduced, and now that artificial intelligence has advanced, these systems are being automated. Each system is significantly different from other ones in its own ways and techniques.

VI.CONCLUSION

In India, a large number of people depend on agriculture, and this dependence is growing. The farmer can be viewed as India's economic foundation. Everyone in the world has a fundamental desire for food. There are numerous new technologies being developed nowadays, and by utilising them, we can produce agriculture very effectively. Additionally, the population has grown recently, necessitating increased production We can solve the issue by using automation technology. We can keep an eye on the condition of the agricultural fields by utilizing the soil moisture sensors.

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