



IJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 Issue: V Month of publication: May 2021

DOI: <https://doi.org/10.22214/ijraset.2021.34427>

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A Review on IOT based Smart Automation Irrigation System

Pooja Jadhav¹, Prof. Vipin Wani²

^{1,2}Dept. of Computer Science & Engineering, Sandip University, Nashik, India

Abstract: India is an agricultural country. 70% of people do this. The main requirement in the agriculture field is water and manpower. Nowadays the main problem lies in agriculture is water scarcity, manpower, funds, etc. To overcome these problems we have to develop an automation irrigation system using IoT. This technology is used for creating systems automated using DTH11 sensor, Humidity Sensor, Soil Moisture sensor, some hardware parts, and software. The PH sensor is also used to analyze soil nutrient content present in the soil in real-time and the PH sensor is used to determine the Ph value of the soil. Monitoring of these provides the proper fertility to the soil depending upon the soil nutrients. To provide quality crops based on temperature, humidity, soil moisture, and its nutrient level content and Ph. factor, it has also been maintained. The real-time result will be generated. The generated results PDF will be sent to the person through email or web SMS. The overall cost required should be low enough so that every person can afford it.

Keywords: IoT, DTH11 Sensor, PH Sensor, SMS.

I. INTRODUCTION

In India, most of the people's main source of earning is depends on agriculture. In the Indian farming system, the farmer chooses most of the methods manually such as water dripping, sprinkling, motor ON/OFF, etc. These all things affect productivity. To improve productivity there is a need to change the manual system to automation. The IoT will help to convert that manual system to automation. Also, it is available at a low cost so every person can afford it. This system will help to provide water to plants as per requirements. Automation Irrigation System used sensors to observed the temperature, humidity, and soil moisture around the crop area that gives the precise time to ON/OFF the motor. As the system is very useful it is required to protect from unauthorized users. The data will be stored on the cloud and the graphical representation of data will be displayed on the web portal. If an unauthorized user tries to access that data the message will be delivered to the user by email or web SMS.

As the data stored on the web portal, we can retrieve the data of the last few months for analysis purposes according to the analysis result, we can decide that at what temperature which type of plants will give better productivity. It's very helpful for farmers to improve productivity at minimum cost and no manpower will be required for this purpose.

The Raspberry pi will be used as a hardware part and sensors used to observe the temperature, soil moisture, humidity and ph factor also maintained. The sensor's value will be compared with a threshold value and the PH value to calculate, the water is required or not. If the water is required the SMS will be sent to the person and the motor gets ON automatically.

II. LITRATURE REVIEW

"A Study on Smart Irrigation Systems for Agriculture Using IoT" .Agriculture plays an imperative role in the country's development. In our country, more than 72% of people depend upon farming which is one-third of the population invests in farming. Thus, the challenges and issues concerning agriculture need to be focused on to hinder the country's development. The only recommended solution to this issue is modernizing agriculture using smart technologies. IoT can construct agricultural and farming processes more efficiently by tumbling human intervention through automation [1].

"IoT Sensors And Applications: A Survey" The Sensors have recently been considering a highly prospective feature of scientific research. Sensors help to monitor our state of health, air quality, home security and are widely used to monitor the production process on the industrial internet. Industries have been using various kinds of sensors but the invention of the Internet of Things has promotes the growth of sensors to a completely different level [2].

"Agriculture Monitoring" The main aim of this paper is to make use of evolving technology i.e. IoT and smart agriculture using Automation. The Major factor is to monitor the environment and to improve the yield to get efficient crops. The aspect of this paper includes soil moisture, monitoring temperature, and water level in agricultural field through sensors using Arduino UNO. The camera is interfaced with Arduino UNO to capture images. The alert message can be sent to the farmer to inform the status of the agricultural field using the GSM module [3].

“Automatic Irrigation System for Vegetable Crops using Internet of Things” The main problem lies in agriculture is water scarcity, manpower, capital, soil fertility, etc.

To overcome these problems, we have developed an automatic irrigation facility. The System minimizes human intervention on fields and provides a limited amount of water to each crop which minimum water scarcity. also, the system detects the pH value of the soil and provides necessary chemical compounds to each plant. It helps the growth of the plant widely. By adopting this methodology the person, who possesses fields in any remote geographic location can also be frequently monitored with the limited cost. Results show a significant improvement in the proposed work [4].

“An Overview of Internet of Things (IoT) and Data Analytics in Agriculture: Benefits and Challenges” As a result, the use of the Internet of Things (IoT) and data analytics (DA) to enhance the operational efficiency and productivity in agriculture sector. There is a paradigm shift from the use of wireless sensor networks (WSN) as a major driver of smart agriculture to the use of IoT and DA. The IoT integrates several existing technologies, such as radio frequency identification, WSN, cloud computing, middleware systems, and end-user applications. In this paper, there are several benefits and challenges of IoT have been identified. we provide future trends and opportunities which are categorized into technological innovations, application scenarios, business, and marketability[5].

“IoT based Smart Irrigation System” This paper proposes an automated irrigation system that monitors and maintains the desired soil moisture content via automatic watering. Microcontroller ATMEGA328P on the Arduino platform is used to implement the control unit.

The setup uses soil moisture sensors which measure the exact moisture level in the soil. This value enables the system to use an appropriate quantity of water which avoids over/under irrigation. The IoT is used to keep the farmers updated about the status of sprinklers. Information from the sensors is regularly updated on a webpage using a GSM-GPRS SIM900A modem through which a farmer can check whether the water sprinklers are ON/OFF at any given time. Also, the sensor readings are transmitted to a Thing speak channel to generate graphs for analysis [6].

“SMART IRRIGATION SYSTEM AND PLANT DISEASE DETECTION” includes 1. A module placed in a farm that contains various sensors and devices for data conversion and transfer such that farm details and environmental factors are monitored and controlled correctly 2. Image processing for disease detection of visually seen symptoms of the plant. The proposed system will thus improve productivity and benefit the irrigation sector [7].

“REVIEW PAPER ON IOT BASED TECHNOLOGY” The main objective of the proposed system is to provide a technology-oriented and low-cost system to make an advanced industry for those who away from their industry and want to control devices [8].

“IoT based Smart Agriculture” this project aims at making agriculture smart using automation and IoT technologies. This project includes smart GPS-based remote-controlled robots to perform tasks like spraying, weeding, moisture sensing, bird and animal scaring, keeping vigilance, etc.

Second, it includes smart irrigation with smart control and intelligent decision-making based on accurate real-time field data. Third, smart warehouse management which includes humidity maintenance, temperature maintenance, and theft detection in the warehouse. Controlling of all these operations will be through any remote smart device or computer connected to the Internet and the operations will be performed by interfacing sensors, Wi-Fi or ZigBee modules, camera and actuators with micro-controller and raspberry pi.[9]

“Real-Time Automation and Monitoring System for Modernized Agriculture” the data transfer is mainly controlled by a suitable wired communication system, now can be replaced with the hybrid system(wired and wireless) to extract the benefits and to automate the system performance and throughput. ZigBee protocols based on IEEE 802.15.4 – 2003 for the wireless systems are used. Online interaction can be made with the farmers to give them the knowledge about this technique and implement it effectively in their farms to extract more yield with advanced technology [10].

III. PROPOSED SYSTEM

In the Proposed system latest IoT technology is used, which helps in collecting information about soil moisture, temperature, humidity, pH nutrients value, of the field. Sensors like DTH11, soil moisture, pH nutrients are used for the detection of the plant conditions and Raspberry pi is used to control and automate the farm process. It generates real-time results. GSM Module is used for sending and receiving the updated message through a web portal to the farmers with the ongoing conditions of the agricultural land using IoT at any time.

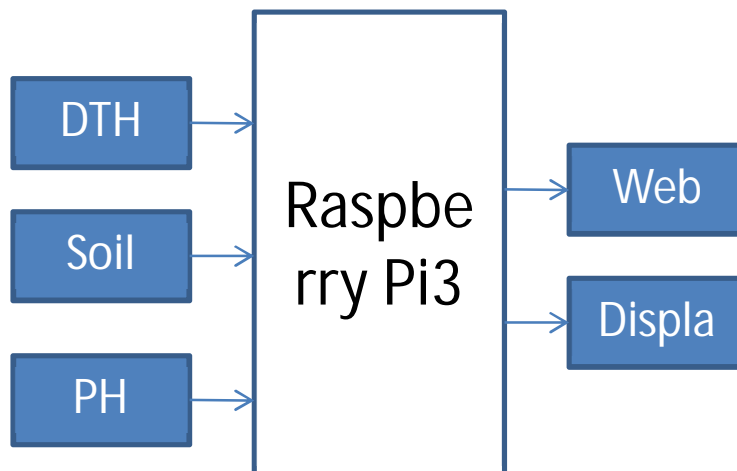


Fig. 1 Block Diagram of Proposed System

- 1) *DTH11 Sensor*: This sensor is used to identify the Temperature and Humidity of the soil. It helps farmers to reply quickly according to the soil conditions. It consists of 3 pins. One of them is an output pin and two pins are used to discover the analog readings of Temperature and Humidity.
- 2) *Soil Moisture Sensor*: This sensor is used to detect the moisture content in the soil for the better yielding of crops. If the soil has less water content then it automatically indicates that there is less water contamination. It has four pins. one of them is an analog pin (A0) and the second is a Digital pin (D0)[3].
- 3) *PH Sensor*: This sensor is used to measure the ph value and nutrients of the soil. The PH value between 0 to7 is acidic solutions with a large combination of hydrogen ions whereas solutions having pH values between 8 to14 have basic solutions with small hydrogen concentrations. The pH value of 7 is neutral solutions. Based on the values of PH, its plant's growth will depend.
- 4) *Raspberry Pi3*: The Raspberry pi is used to receive the sensors data and generate the real-time result and send an instantaneous email or SMS of the obtain data to the user.

IV.EXPECTED RESULT

The sensors like temperature, humidity, soil moisture, and ph sensor are used. If temperature and soil moisture are true according to condition then IC will operate the Raspberry Pi. If water is required for plants the SMS will deliver to the farmer. All data will be display in graphical format on the web portal. The pdf file of that data will be sent to the user through email or web SMS. We can download the last few months of data also for analysis purposes.

V. CONCLUSION

IoT-based smart automation irrigation system using a web portal is very useful in the agriculture field. It required low cost so every person can afford it. Using this system the productivity in the agriculture field get increased. Also, it doesn't require manpower. Using sensors the temperature, soil moisture, and soil nutrients will observe and according to that water will be provided to plants. Data security is also provided so unauthorized users can't access the data. This system is very useful to improve productivity in the agriculture sector.

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