Third International Conference on "Materials, Computing and Communication Technologies"
in association with International Journal of Scientific Research in Science,
Engineering and Technology
Print ISSN: 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)

Smart Irrigation Management System Using IoT

S. K. Kabilesh*, G. Nishanth, A. Mayavan, J. Kesavamoorthi, S. Suryakala
Department of Electronics and Communication Engineering, Jai Shriram Engineering College, Tiruppur, Tamil Nadu, India

ABSTRACT

The agricultural industry plays a vital role in the economic health of every nation due to the fact that it contributes to Gross Domestic Product and food production. Several issues are related to traditional methods of agriculture, such as waste of water during irrigation, dependency on non-renewable power sources, time, money, human resources, etc. A smart development of agriculture sector is essential for the growth of the country since every activity today is becoming more and smarter. IoT Technology is used in this paper to create the Smart Irrigation System through the monitoring of soil moisture and climate conditions thus, preventing water wastage and maximizing crop productivity. IOT technology is being used to inform farmers about the status of sprinklers and measure soil moisture. This value enables the system to use the right quantity of water without over or under irrigation. The sensors measure soil moisture levels. The water sprinklers are regularly turned ON/OFF through a webpage using a GSM-GPRS SIM900A modem that updates the information from the sensors on a regular basis

Keywords: IOT, Agriculture, Bylnk, Water management

I. INTRODUCTION

Agricultural growth is India's main focus. A country with consistent agriculture growth can become an economic powerhouse. A country like India has very favorable climatic conditions to grow various agriculture crops. The two most important resources in India are land and water. A deficiency of water resources has heavily influenced the yield of agricultural crops. So, water scarcity has a consequently immense impact on food production. In the absence of water, farmers are unable to cultivate crops, which results in a decline in food production to ensure there is enough to feed every human on this planet. [1] The use of irrigation systems hasn't been done in an efficient way, reducing water utilization in an efficient manner. It is a method of conveying water to crops to maximize yields. As a result, this study proposes using a distributed network of sensor nodes and dispersed pumping units to give water to the sensor units' precise locations. We present an automated irrigation system using a low-cost moisture sensor. An automated irrigation unit with a low-cost moisture sensor and a distributed network of sensor nodes covering specific areas is proposed in this research. A distributed number of pumping units were used to accomplish this. [2] This system consists of a distributed

wireless sensor network (WSN) that includes soil moisture and temperature sensors. This automated water irrigation uses a wireless sensor network and a GPRS module with the purpose of maximizing the use of water for agriculture crops. Farmers will be able to control irrigation remotely by monitoring moisture levels in the field and enabling sprinklers to be turned on automatically at a certain level when necessary. The Internet of things will make this possible. [3,8,9]

II. LITERATURE SURVEY

Based on GSM-SMS, A Remote Measurement and Control System for Greenhouse Is Developed the proposed system employed a GSM-SMS [11] system to measure and control greenhouses, while using a PC-based database system connected to a mobile base station in actual operation, the central station sends and receive messages via GSM module[10]. The parameters, such as air temperature, humidity, that must be measured by every base station are chosen by the central station and have a criterion value set by it. [4,7] A notification will be sent to the user if any unauthorized entry has happened or the door has been opened. The user can then take the appropriate action. The ESP8266 will be used to connect over the internet, as well as with an microcontroller, a magnetic Reed sensor, and a buzzer to sound an alarm. The key advantages of an irrigation system based on soil moisture are ease of installation, low cost, and low maintenance. Parameswaran et al. discussed a soil moisture-based irrigation system. [5,6]

III. MATERIALS AND METHODOLOGY

This system is configured by various essential components listed below.

- NodeMcu ESP8266
- Soil Moisture Sensor
- Relay board
- Water pump

Some of the software requirements are Blynk application, Arduino application, Java programming for NodeMcu.

1. NodeMcu

NodeMCU is a platform based on the ESP8266 that can connect objects and transfer data using the Wi-Fi protocol. In addition, it provides the most important aspects of microcontrollers, such as GPIO, PWM, ADC and others. It can solve many of the project's needs alone. A wireless Wi-Fi transceiver, operating in the unlicensed 2400-2484 MHz frequency range of IEEE 802.11 b/g/n, is integrated into the module, as well as a TCP/IP stack and Wi-Fi___33 security, including WAP3.

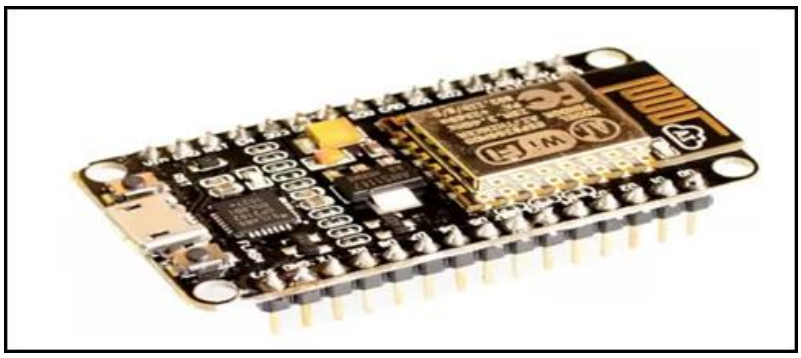

Fig 1. NodeMCU

2. Soil Moisture Sensor

The soil moisture sensor measures or estimates the amount of water in the soil. These sensors are portable or stationary. A stationary soil moisture sensor is placed at predetermined depths and locations in the field, whereas a portable probe measures soil moisture at various locations. In order to measure electrical resistance through the sensor, electrodes are charged. When water is used by plants or when soil moisture decreases, water is withdrawn from the sensor, which increases resistance. Conversely, as soil moisture increases, resistance decreases.

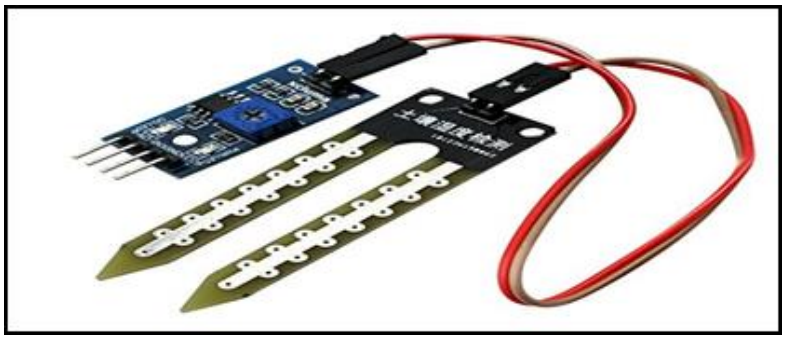

Fig 2. Soil Moisture Sensor

3. Water pump

Water pumps are widely used in households for use in cooking, cleaning, bathing, heating, watering flowers, and other purposes. Water pumps are widely used in households for use in cooking, cleaning, bathing, heating, watering flowers, and other purposes. Pumps should be operated at, or close to, the best efficiency point (BEP), which is about 85 percent of the shutoff head.

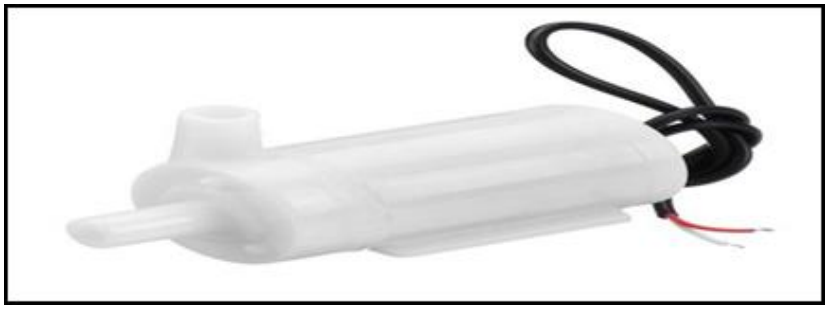

Fig 3. Water pump

4. Relay board

Designed as a relay interface board, it can be controlled directly by various microcontrollers such as Arduino, AVR, PIC, ARM, etc. The module uses a low level trigger signal (3.3-5VDC) to control the relay. Triggering the relay operates the normally open or normally closed contacts. It is frequently used in automatic control circuit. To put it simply, it is an automatic switch to controlling a high-current circuit with a low-current signal.

Fig 4. Relay Board

IV. PROPOSED SYSTEM

The data is first collected from various sensors, such as soil moisture and water levels. The sensors are connected to the NodeMcu Board via a breadboard. The Blynk application receives the data from the board. The programming language utilised executes instructions that extract and reflect data. Data will be sent to the blynk application every second. The user may see the soil's precise moisture level. He can turn on/off the motor from anywhere if he wants.

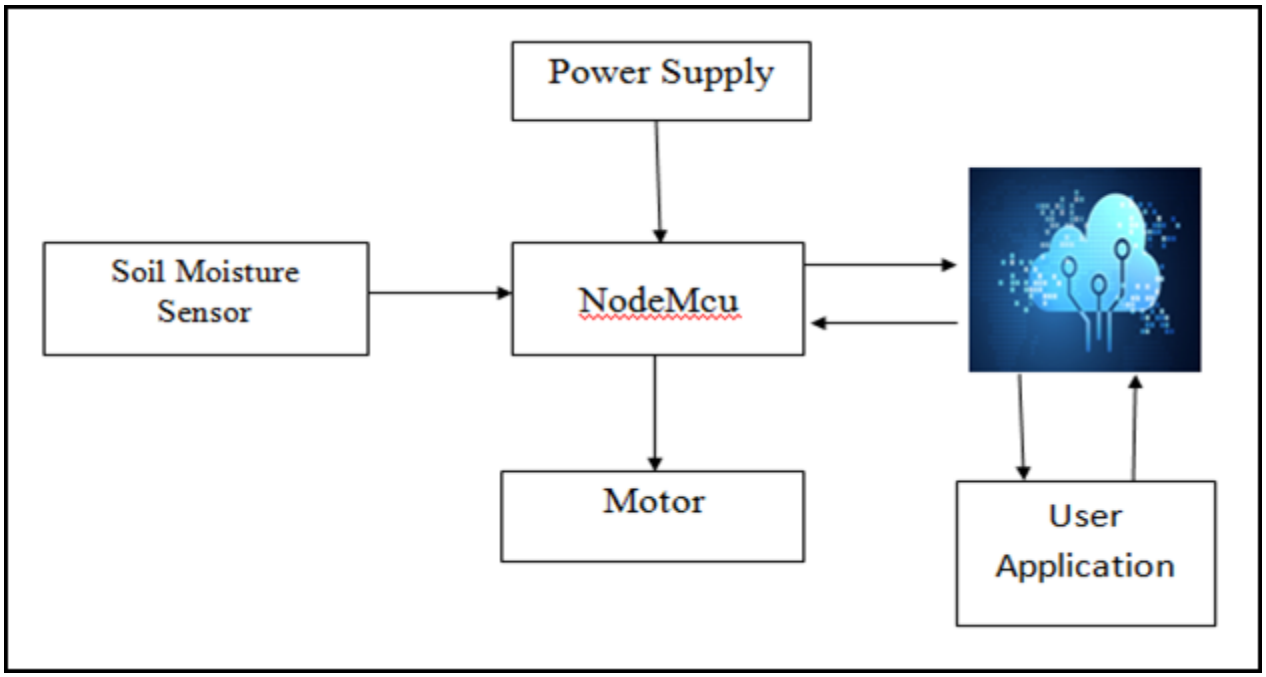

Fig 5. Proposed Methodology

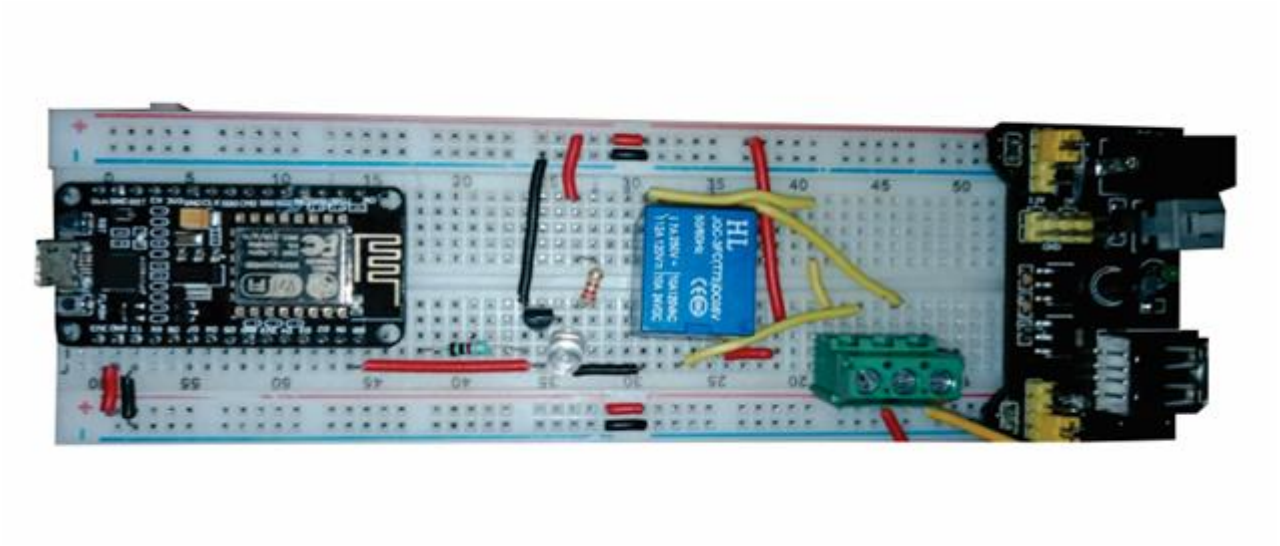

Fig. 6. Hardware Connection

V. RESULT AND DISCUSSION

Here, the analog output of soil moisture sensor is processed using ADC. The moisture content in terms of on the serial monitor. The output of the soil moisture sensor changes in the range of ADC value from 0 to 1023. This can be represented as moisture value in terms of percentage using formula given below. ADC is used to process the analogue output of the soil moisture sensor. On the serial monitor, the moisture content is represented as a percentage. The output of the soil moisture sensor varies across the ADC value range of 0 to 1023. This can be expressed as a moisture value in percentages using the formula below. Data is continuously transmitted to the bylnk application whenever the water level fall from desired water level then the mobile application sent the alert message to the user. Based on the water level action should be taken.

Fig 7. Bylink app indication of Moisture level

VI. CONCLUSION

As a result, this initiative will be very valuable for all those people who own farms and want to contribute to the country's agriculture but are limited by staff and time due to their everyday responsibilities. This initiative also enables for the monitoring of employees and crops in order to prevent losses. Anyone with a Smartphone can use it, and once set up, it doesn't require any upkeep.

VII. REFERENCES

[1]. Anitha, A., Sampath, N. and Jerlin, M.A., 2020, February. Smart irrigation system using Internet of Things. In 2020 International Conference on Emerging Trends in Information Technology and Engineering (ic-ETITE) (pp. 1-7). IEEE.

[2]. AdityaRajgor, P., Nikam, D., Mishra, D. and Sanket, B., 2021. A Study on Smart Irrigation System Using IoT for Surveillance of Crop-Field. NEW ARCH-INTERNATIONAL JOURNAL OF CONTEMPORARY ARCHITECTURE, 8(2), pp.2332-2335.

[3]. Pimpalkar, P., Pedsangi, N. and Phapale, P., Smart Irrigation System.

[4]. Rawal, S., 2017. IOT based smart irrigation system. International Journal of Computer Applications, 159(8), pp.7-11.

[5]. Sangeetha, B.P., Kumar, N., Ambalgi, A.P., Haleem, S.L.A., Thilagam, K. and Vijayakumar, P., 2022. IOT based smart irrigation management system for environmental sustainability in India. Sustainable Energy Technologies and Assessments, 52, p.101973.

[6]. Kabilesh, S.K., Sivashree, K.C., Sumathiiswarya, S., Narmathadevi, G. and Panjavarnam, R., 2021. Self-Regulated Anaesthesia Feeder for Surgical Patients. Research and Applications: Embedded System, 4(3).

[7]. Menaga, S., Paruvathavardhini, J., Kalaivani, P. and Haribabu, S., 2019. Air quality monitoring system using vehicles based on the IoT. International Research Journal of Engineering and Technology (IRJET), 6(03).

[8]. Menaga, S., Paruvathavardhini, J., Pragaspathy, S., Dhanapal, R. and Immanuel, D.J., 2021. An efficient biometric based authenticated geographic opportunistic routing for IoT applications using secure wireless sensor network. Materials Today: Proceedings.

[9]. Shivakumar, D., Gayathri, P., Muthukumar, M. and Menaga, S., 2020. Measurement of Temperature and Humidity Using DHT11 Sensor. Journal of Advancement in Communication System, 2(3).

[10]. Anas, R.M., Nandhini, P. and Deepika, N.M., 2018. Design and implementation of smart basket cart using near field communication. Indian Journal of Emerging Electronics in Computer Communications-IJEECC, 5(1), pp.778-785.

[11]. Manikandan, T., Kalaiyarasi, G., Priyadharshini, P.K. and Priyanga, R., 2015. Conductor less bus ticketing system using RFID and accident information through GPS and GSM. IJISET-International Journal of Innovative Science, Engineering & Technology, 2(9), p.885.