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IoT Based Smart Irrigation System

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Abstract – Because of the world is trending into new technologies and implementations it's a necessary goal to trend up with agriculture also. IOT plays a really important role in smart agriculture. IOT sensors are capable of providing information about the agriculture sector. We have proposed an IOT based smart agriculture system using automation. In what follows, we'll put the spotlight on some interesting facts about smart irrigation: This smart agriculture using IOT system is powered by PICK18F4520 microcontroller, it consists of Moisture sensor, PIR sensor, ESP8266 module. It helps farmers to avoid water wastage and improve the standard of crop growth in their fields by a) irrigating at the right times, b) minimizing runoffs as well as other wastages, and c) accurately determine the soil moisture levels, thereby, finding the other irrigation requirements at anywhere and this all is displayed on the LCD display module. Also, we come up with the system which detect unwanted movement of species across the farm with the help of PIR sensor. To take precautionary measures from such harmful species in the farm filed, we developed a device which recognizes the movement of the species along with the body temperature and alerts the user by creating an alarm.

Keywords-Agriculture, Sensor, Irrigation, Internet of Things, IOT, Water Tank.

I. INTRODUCTION

In India, agriculture plays a crucial role within the development of food production. In our country, agriculture depends on the monsoons which aren't sufficient source of water therefore the irrigation is used within the agriculture field. The Internet of Things (IoT) could also be a milestone within the evolution of technology. IoT plays an important role in many fields, one of that's Agriculture by which it can feed billions of people on earth in the future. rather than using traditional methods of irrigation, switching irrigation to smart irrigation. Automated irrigation also reduces resource consumption, like time and electricity. Problems in Traditional System within the case of traditional irrigation system irrigation is completed manually by farmers. Since the water is irrigated directly within the land, plants undergo high stress from variation in soil moisture. The smart irrigation system will assist you have better control of your landscape and irrigation needs also as peace of mind that the smart system can make decisions independently if you're away. It helps farmers to avoid water wastage and improve the quality of crop growth in their fields by a) irrigating at the proper times, b) minimizing runoffs and other wastage. Also, we come up with the system which detect unwanted movement of species across the farm with the assistance of PIR sensor.

II. PROPOSED SYSTEM

An IoT based Smart Irrigation system is for an efficient agricultural management system which enables farmers to deal with the challenges they face. There are many applications in IoT, which addresses the most problems like soil moisture detection, conservation management, crop growth monitoring, etc., this project enables better and smarter irrigation through Moisture and PIR sensors networked to speak with the user. For farmers and growers, the web of Things has provided extremely productive ways to cultivate soil with the utilization of cheap, easy-to-install sensors and an abundance of insightful data they provide.

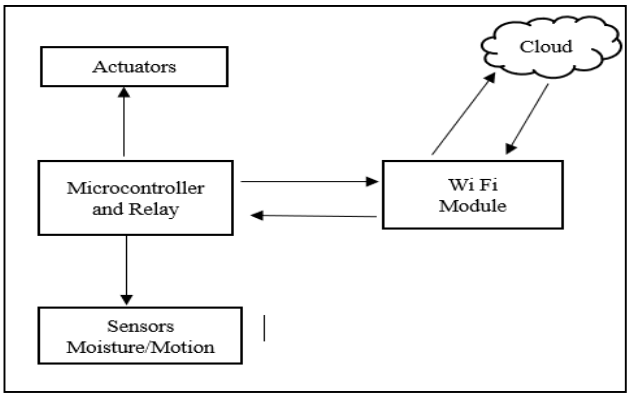

Figure 1: Conceptual Design of Project.

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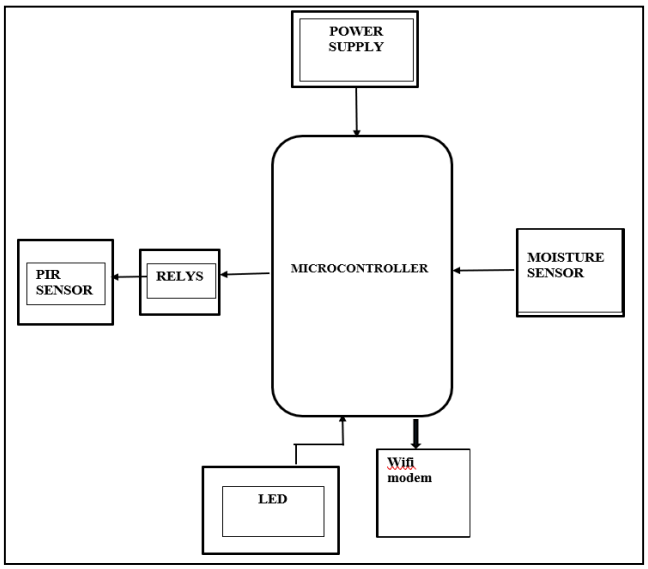

Figure 2: Conceptual Design of Project.

III. MOISTURE SENSING SECTION

The proposed system includes soil moisture measurement because the most module. Irrigation to the sector and acknowledgment to the user are done supported the water content within the soil. Soil moisture sensors measure the volumetric water content within the soil. Since the direct gravimetric measurement of free-soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using another property of the soil, like electrical resistance, dielectric constant. This sensor type is Analog and also, we use Analog to Digital Converter to convert analog inputs into digital inputs.

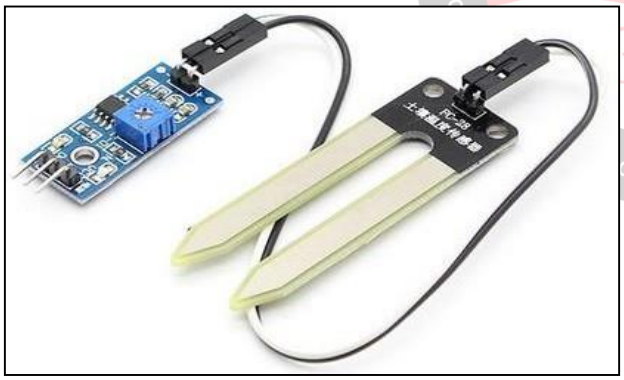

Figure 3: Soil Moisture Sensing Sensor.

3.2 Animal Movement Detection

PIR SENSOR: A passive infrared sensor (PIR sensor), it is a device that measures infrared (IR) light radiating from objects in its field of view. motion is detected when an infrared source with one temperature, like a human, passes ahead of an infrared source with another temperature, like a wall.

PIR sensor detects any species moving around within approximately 20 feet from the sensor.

The main aim of our project is to protect the crops from damage caused by animal also divert the animal with none harm. Animal detection system is supposed to detect the presence of an animal and offer a warning. During this project we used PIR and ultrasonic sensors to detect the movement of the animal and send signal to the controller. It diverts the animal by producing sound to require precautionary measures to protect farm from such harmful species, we developed a device that recognizes the movement of the species along with the body temperature and alerts the user by creating an alarm.

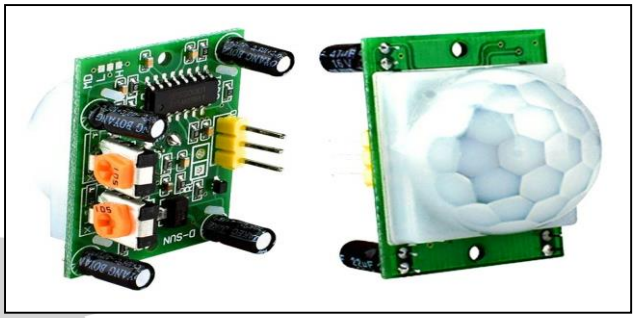

Figure 4: Motion Detection Sensor (PIR sensor)

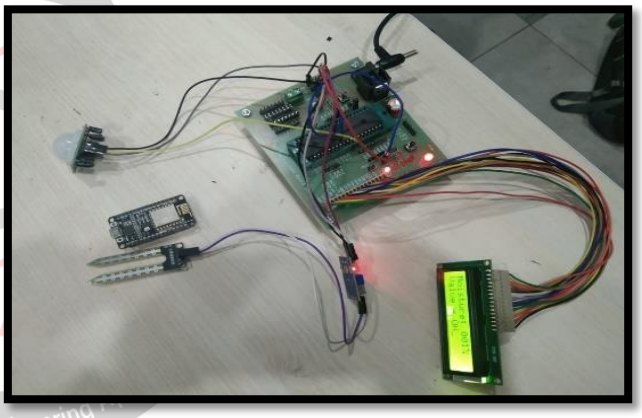

Figure 5: Development of the Project

3.3 Control Section

Once data is collected i.e., data actuation is completed then all the data is serially sent by the Wi-Fi module to the cloud for data storage and analysis for further processing. Also, the moisture level and water tank/pump state are displayed on the LCD.

It helps farmers, the values obtained through sensors enable the system to switch the water tank on or off. A farmer can manually /remotely monitor the irrigation process on the farm by using an app from any place of the world. Also, the system automatically operates by itself on the basis of given inputs, and gives alerts as:

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1.On the LED when water tank is on and start irrigate to the field.

2.Blinking of LED on -off when motion is detected around the field alert the user by creating an alarm.

3.4 IOT SECTION

This section comprises of an App which displays the present cistern status i.e., on or off and moisture level also, button which redirects the user to perform an action depending upon the values.

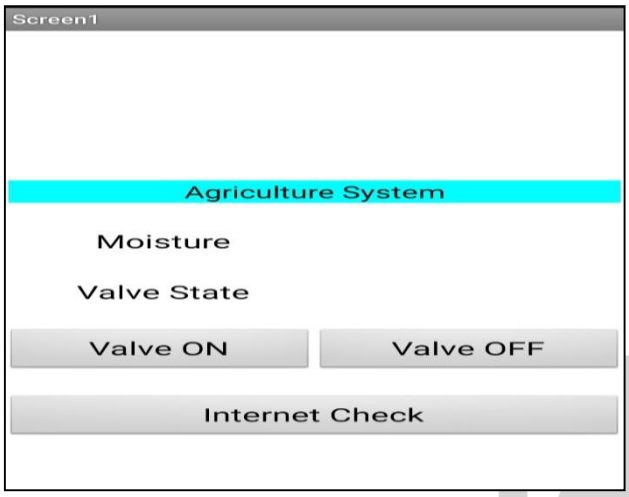

Figure 6: Interface of App showing Tank and soil moisture status.

IV. METHODOLOGY

Water sprinkler control is achieved by setting a threshold value at which irrigation should begin. When the sensors detect the moisture is less than the threshold, then the Water tank is switched on till the soil is completely moist. Following fig. shows the flow chart of the system.

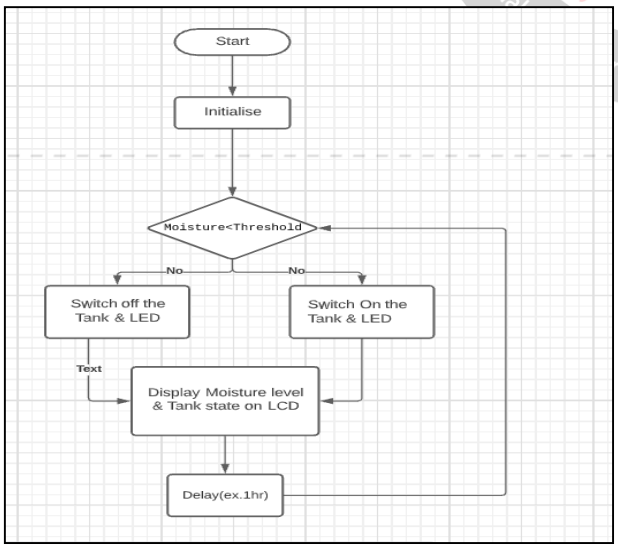

Figure 7: Flow chart of the Soil moisture sensor.

When motion is not spot around the farm field LED is in an off state and motion is detected around the farm field LED is in

one state.

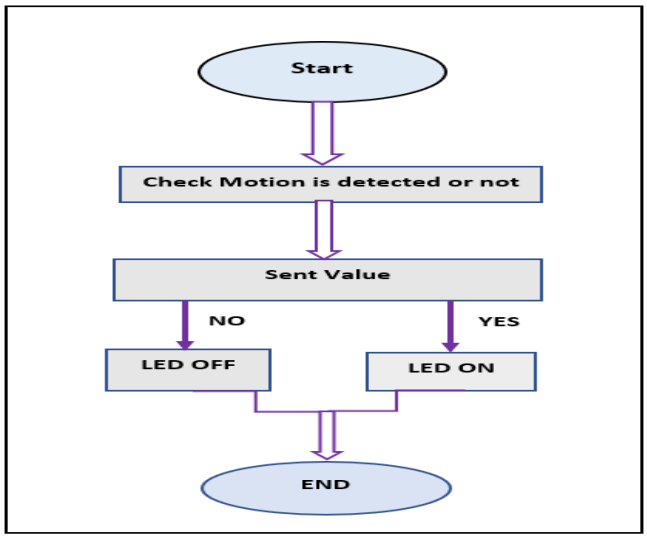

Figure 8: Flow chart of the PIR sensor.

Figure 9: Flow chart of the system.

The system first initializes the parameter, sensor values and assign the special function register (SFR). Then the system check condition if moisture is detected or not and also collects the soil moisture data.

Once the data is collected and it displays the moisture level and the tank state on the LCD along with that it also, sends the data to user though the cloud. The values from sensors are transmitted to a web database from where it is used to display on an app. The app displays the moisture content in soil which has been divided into two categories: Low and High. Tank is to be switched on when the moisture content is low. The threshold values depend upon the type of soil used.

APP for the Internet of Things that enables you to collect and exchange, store, analyses, visualize, and act on data from sensors or actuators.

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V. RESULTS AND DISCUSSION

The values obtained through sensors enable the system to switch the Tank on and off. A farmer can remotely monitor the irrigation process on the farm field. So, the system contributed to making a smart farm. Following table depicts the readings of soil moisture sensors taken over a period of half of an hour.

Time	Moisture Level	Tank ON/OFF
10.00	00.00%	Tank on
10.30	31.4%	Tank on
11.00	40%	Tank on
11.30	56.78%	Tank off
12.00	52.4%	Tank off
12.30	45.67%	Tank off
1.00	43.89%	Tank off
1.30	37.56%	Tank on

Table 1: Sensor Readings

Table 1. shows the real time data which is collected from the readings of soil moisture sensor.

The data was taken over the 30 minutes of time span and it shows that when the soil moisture is less tanks turns on and when the moisture is high the tank turns off.

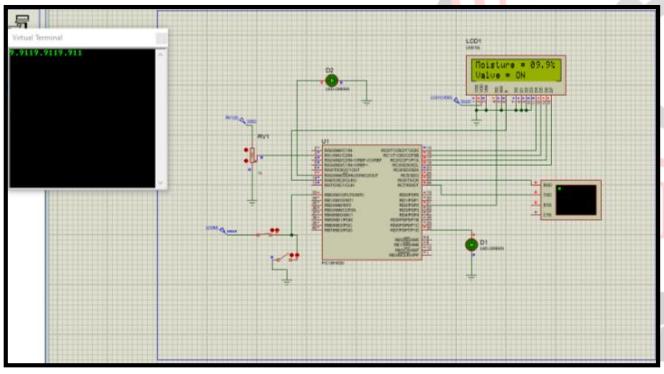

Figure 10: Simulation of project

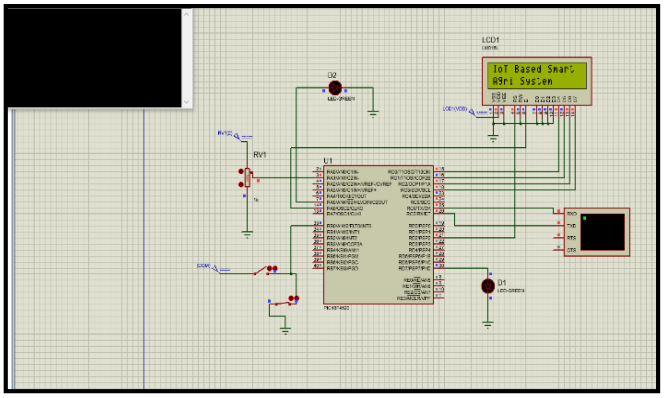

Figure 11: Simulation of the project at initial stage.

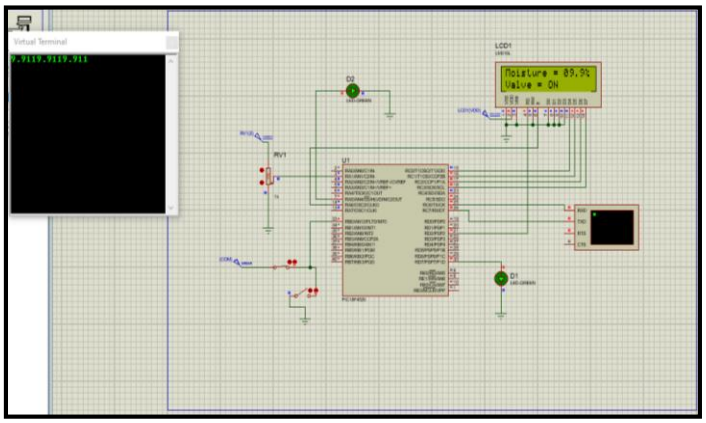

Figure 12: Simulation of the project at First stage – Tank ON

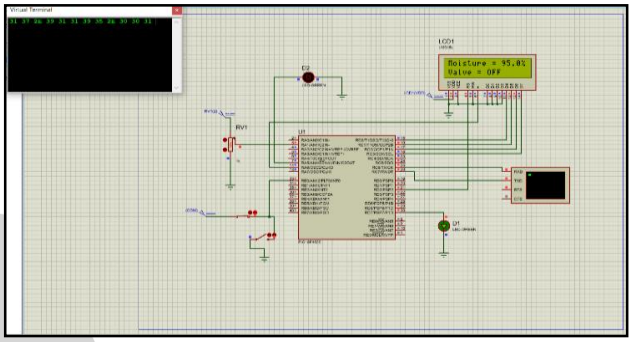

Figure 13: Simulation of the project at Final stage- Tank Off

Here in the simulation, we are using two switches to indicate the functionalities of sensors that we are going to use in the actual hardware project.

Inputs:

1) Switch1

2) Switch2

Output: 1) D1: - LDE /D1 shows the value of the PIR sensor i.e., it indicates motion is detected or not.

2) D2: -D2 shows the value of moisture sensor i.e., Tank is in on state or off state.

VI. CONCLUSION

A system to control moisture levels within the soil is designed and the project provided an opportunity to review the existing systems and study their features and drawbacks. The proposed system can be used to switch on/off the water Tank according to soil moisture levels thereby automating the process of irrigation which is one of the most time-consuming activities in farming. Agriculture is one of the most water-consuming activities. The system uses data from soil moisture sensors to irrigate soil which helps to stop over irrigation or under irrigation of soil thereby avoiding crop

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damage. The farm owner can monitor the process online through an APP.

Also, preventing the farm by avoiding unwanted species entering into the farm using PIR motion detection sensor. Through this project it is often concluded that there is often considerable development in farming with the utilization of IOT and automation. Thus, the system is a potential solution to farmers can remotely monitor the irrigation process on the farm. Hence system Contribute to making smart irrigation system.

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REFERENCES

[1] Dr. S. Velmurugan, V. Balaji, T. Manoj Bharathi, K. Saravanan, "An IOT based Smart Irrigation System using Soil Moisture and Weather Prediction", *International Journal of Engineering Research & Technology (IJERT)ISSN: 2278-0181 Published by,* www.ijert.org *ECLECTIC - 2020 Conference Proceedings.*

[2]Muskan Vahora, Kalpesh Chudasma, Neel Patel, Shalini Pandey, "IoT BASED SMART IRRIGATION SYSTEMS", *International Research Journal of Engineering and Technology (IRJET,*www.irjet.net, Volume: 07, Issue: 04 Apr 2020

[3] Laura García, Lorena Parra, Jose M. Jimenez, Jaime Lloret, and Pascal Lorenz, "IoT-Based Smart Irrigation Systems: A summary on the Recent Trends on Sensors and IoT Systems for Irrigation in Precision Agriculture", Received: 24 December 2019, accepted: 10 February 2020, Published: 14 February 2020

[4] Tushar V. Dhurjad1, Ankita S. Bhadane2, Shruti N. Borse3, Rohit S. Dhurjad, "Smart Irrigation System Using IOT and ML", *International Research Journal of Engineering and Technology (IJIRT)*, Volume 6 | Issue 12, ISSN: 2349-6002, May 2020

[5] Olatunji K. A, Oguntimilehin A., Adeyemo O, " A Mobile Phone Controllable Smart Irrigation System", *International Journal of Advanced Trends in Computer Science and Engineering*, Volume 9, No.1, January – February 2020

[6] Prof. Panchal Sachin.D1, Kaldate Anuja.V2, Bagwan Shaista.C3, Jadhav Sonali. D4, "IOT Based Smart Irrigation System*", International Journal of Advanced Research in Electrical, Electronics, and Instrumentation Engineering (A High Impact Factor, Monthly, Peer Reviewed Journal),* Website: www.ijareeie.com, Vol. 8, Issue 5, May 2019

[7] Priyanka Lahande1, Dr. Basavaraj Mathpathi2, "IoT Based Smart Irrigation System", *International Journal of Trend in Scientific Research and Development (IJTSRD) International Open Access Journal, ISSN No: 2456 - 6470, www.ijtsrd.com,* Volume - 2, Issue – 5,2018

[8] Joshi, A., Ali, L.," An in-depth survey on auto irrigation system", *IEEE Conference on Emerging Devices and Smart Systems,* 2017

[9] Viswanathan, A., Shibu, N.S.B., Rao, S., Ramesh, M.V., "Security challenges in the integration of IoT with WSN for smart grid applications", *IEEE International Conference on Computational Intelligence and Computing Research (ICCIC), Coimbatore,* 2017

[10] Shah, S.H., Yaqoob, I., "A survey: Internet of Things (IoT) technologies, applications, and challenges", *4th IEEE International Conference on Smart Energy Grid Engineering,* 2016

[11] Rajkumar, N., Abinaya, S., Venkatesa Kumar, V., "Intelligent irrigation system- an IoT based approach", *IEEE International Conference on Innovations in Green Energy and Healthcare Technologies*

[12] Sales, N., Remýdios, O., Arsenio, A., "Wireless sensor and actuator system for smart irrigation on the cloud", IEEE *2nd World Forum on the Internet of Things (WF-IoT), pp .*

 DOI : 10.35291/2454-9150.2021.0291