IOT BASED AUTOMATIC FARMING SYSTEM USING RASPBERRY PI

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Abstract–This paper presents a smart way of the farming system using the Internet of Things {IOT} and RASPBERRY PI-based. The main purpose of this paper is to develop farming. Farming is the most common work for updating rural efficiency and in this manner development of the farming system has been a key arrangement in the improvement of cultivating in India. In this system at whatever point there is an amount change in temperature, stickiness, and current status of surrounding environmental factors, the sensors which we will use in this system detect the adjustment in temperature and moisture and gives an interface with the raspberry pi. Due to the overwater usage, it affects plant growth as well as harms soil moisture and due to fermentation causes biological risks like water squandering and saltiness. This is why using this type of proposed system helps to decrease vitality, proficiency, and efficient growth of plants.

Key Words -Cloud, Internet of Things (IoT), Raspberry pi; Soil moisture sensor; Water motor.

1. INTRODUCTION

In India farming is the main occupation for a rural economy, and all its assets depend upon the farming land. Indeed, even in the advanced range of industrialization, farming is the key area that chooses the financial development of India. Farming is the most common work when comparing with other types of work in India. The Water system is the study of what's more can be done with it, making a productive, less effort, financial water system structured in such a way that it can fit regular conditions. The development of an appropriate supply of water system and provides sufficient water to increase yield growth while harvesting. There are various types of water systems that are widely used by the farmers now a day's which can improve income as well as the growth of the yield. It is a simple project more useful in watering plants automatically without any human interference. This project is an excellent solution for such kind of problems. In an existing automated water management system, we cannot take decision sat that instance by taking different attributes of agriculture soil.

Many irrigation systems available such as,

I. Bennis, H. Funchal, O. Zytoune, D. Aboutajdine [1]says "The Model includes soil moisture, temperature, and pressure sensors to monitor the irrigation operations. Specifically, we take into account the case where a system malfunction occurs, as when the pipes burst or the emitters block. Also, we differentiate two main traffic levels for the information transmitted by the WSAN, and we use an adequate priority-based routing protocol to achieve high QoS performance".

Joaquín Gutiérrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Ángel Porta- Gándara [2]said"In this paper, the System has a distributed wireless network of soil moisture& temperature sensors placed in the root zone of plants. An algorithm was developed with threshold values of sensors that were programmed into a microcontroller-based gateway to control water quantity".

Sangamesh Malge, Kalyani Bhole, [3]said"The PIC18F4550 microcontroller interfaced with GSM module works as a brain and several sensors like temperature, level and rain works as the eyes of this ESD. If and only if the eyes of the ESD see all parameters are within a safe range, the PIC18F4550 starts the irrigation process by starting the irrigation pump. The farmer gets time to time feedback from ESD through SMS about the action that has taken place by PIC18F4550".

Nikhil Agrawal, Smita Singhal [4]said "The commands from the user are processed at raspberry pi using a python programming language. Arduino microcontrollers are used to receive the on/off commands from the raspberry pi using ZigBee protocol".

Pravina B. Chikankar, Deepak Mehetre, Soumitra Das [5]said "In the research field of wireless sensor network power-efficient time is a major issue which can be overcome by using ZigBee technology".

Sneha Angal [6] said that"The paper presents a home automation system which is based on Raspberry Pi, Arduino microcontrollers, and ZigBee and relay boards to water plants. This paper presents an efficient and fairly cheap automation irrigation system. By using a moisture sensor we will make the irrigation 12 system smart and automated. The System once installed has no maintenance cost and is easy to use".

2. Body of Paper

At the current time, the water system supply and control in India through manual control. This type of procedure contains more water. The Automated water system provides the required amount of water which has been performed to be important in water use effectively in the farmland. These days, a few systems use innovation to decrease the number of laborers and to calculate the time required to water the plants. With this type of system, the control and supply of the water are restricted. This automatic Water system plays a key role that is utilized unnecessarily. The Excess flow of the water system is the strategy that is utilized to water the plant. The system contains the various parts, which play their operation respective work.Through this type of system, farmers can monitor and control the flow of water from any remote location. Also, we are using the GSM module to ON and OFF the pump motor directly. For making and attaching this type of system over the farmland, it will cost one time only and this will consume the time and efforts of the farmer frequently over the day by day.

The main parts of this system contain the hardware structure, software part or application, IoT gateway or connectivity, user respectively.

From the following figure, we can easily understand the system and application process which can be commonly used and monitor the data in the field.

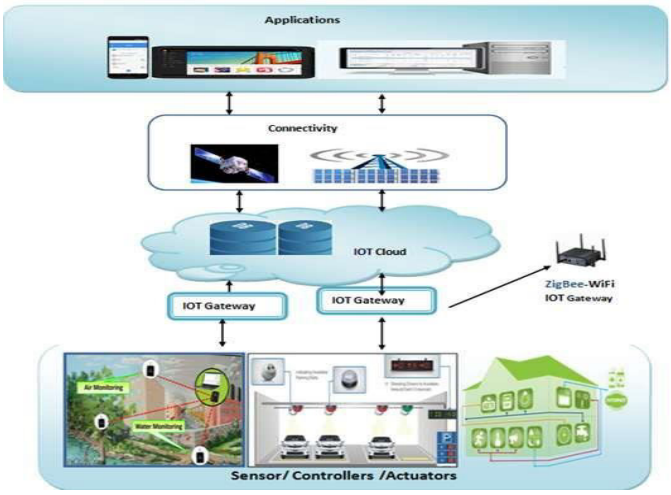


Figure 1: Applications of IoT System

3. PROPOSED SYSTEM

In this work, various types of sensors are interfaced with the Raspberry Pi 3 development board, using Wi-Fi Module. Raspberry Pi is the core of the general existing system. The Raspberry Pi Model 3 contains various improvements and new highlights. Improved force utilization, augmented network and more accurate IO are among the upgrades to this amazing, little, and lightweight GPIO (General Purpose Input Output) pins.

The Raspberry Pi can't read the analog data which comes from the attached sensors. To read the analog data we are using MCP3008 analog to digital converter IC. This A to D converter IC helps to read the data signals coming from the sensors we attached to the raspberry pi. It has just zero volts or 3.3 V. We need a 12V power adaptor or power supply to drive the overall system. All things considered, we need a driver circuit. The driver circuit takes the low-level info and gives the 12V accurate supply voltage to drive the system. We are utilizing here 2 power supplies to turn on the Water pump, hardware structure. LDR sensor, moistness sensor, humidity sensor, temperature identification sensor are associated with the Raspberry Pi board through a comparator circuit. The light-dependent resistor (LDR) has a potentiometer to settle on a choice the darkness level above which the yield of the comparator goes high. That advanced data is given to the raspberry pi board. In the running system that the LDR is over

the darkness level and moisture is high and the temperature is high, at that condition the water pump will be on. In the other scenario if the darkness level, moisture, the temperature is low the engine will be off through system. With all the parameters, it additionally check is it working properly? In this type of condition if the system works properly so the water pump won't on for 30 minutes and again the following 30 minutes it will compare the recent data and the status of the surrounding area through the climate determining report if stormy so water pump will on for just 10 minutes.LDR is used for controlling light naturally, at around evening time light will be ON respectively with around evening time likewise utilizing cell phones.

The following figure shows the flow chart of the proposed system, in which we can see the conditions appear while running the whole system.

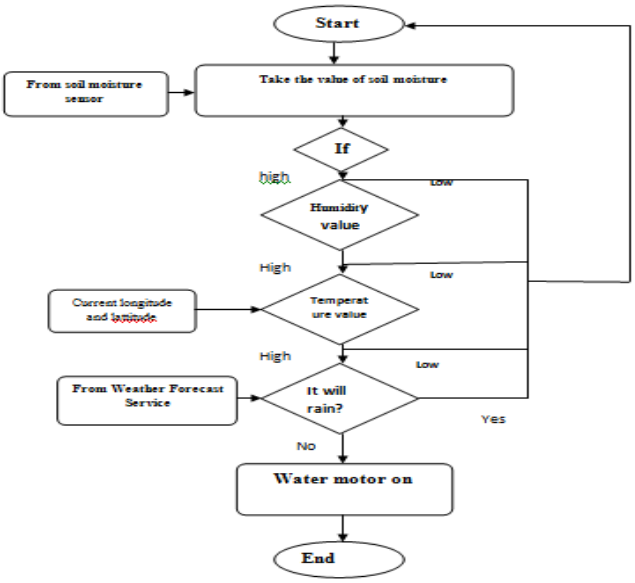


Fig -2: Flow Chart of Irrigation System

The Proposed Algorithm is as follows:-

Step (0): Initialization: Initialize the username and secret that is supported to the python.

Step (1): browse the device info.

Step (2): Connect the Raspberry pi to Wi-Fi.

Step (3): show the message with reading and detects the fault in sensors.

Step (4): transfer info to the cloud (Server).

Step (5): browse the command from the cloud (Server).

Step (6): Check knowledge of real-time simulation.

Step (7): Check knowledge on real-time simulation on assuming speak.

Step (8): finish.

This proposed system is very useful for time-consuming and proper growth of the yield. As a result, there is a chance to get plants or yield damaged continuously. This type of automated project is an excellent solution for such kind of problems. In an existing automated water management system, we cannot decide at that time by taking different attributes of agriculture soil. The current automated irrigation system only works on one parameter at one time. The soil has different parameters like soil moisture and temperature, humidity, etc. Soil moisture is below the threshold value then the water valve is open for water supply and after proper water supply if it goes above the threshold value water valve is get close.

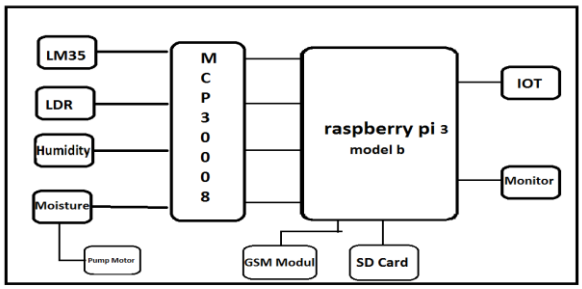


Fig3: System Block Diagram Charts

5. RESULT ANALYSIS

Once we tend to put on the system, then 1st put on the raspberry pi board by connecting the USB cable to giving 230 potential units, fifty rate powers provide with providing users portable WI-FI connections. Once the WI-FI is open then the overall system device is activated and needed

current for all the instrumentality in the planned system. The sensor unit senses the corresponding motor parameters and feeds to the raspberry pi three B model. Raspberry pi reads the info from varied sensors and it'll analyze per the given directions. Then sends the device info to MCP 3008, which converts the A/D converter through WI-FI, In parallel, and raspberry pi three reads the commands from the web which can manage the induction motor. The show the message with reading provides the visual illustration of device info. Check the fault of the induction motor by persecution varied kinds of devices in real-time simulation with assume speak cloud computing.

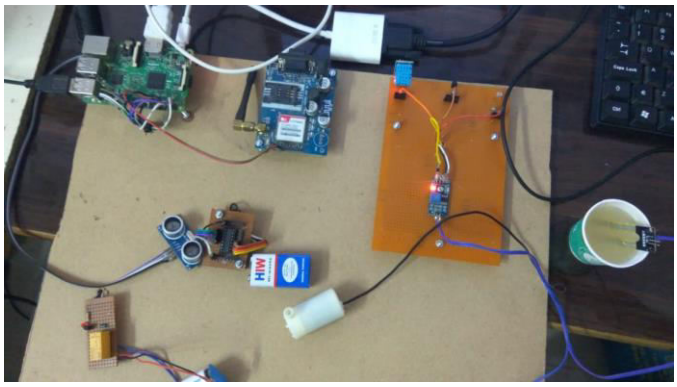
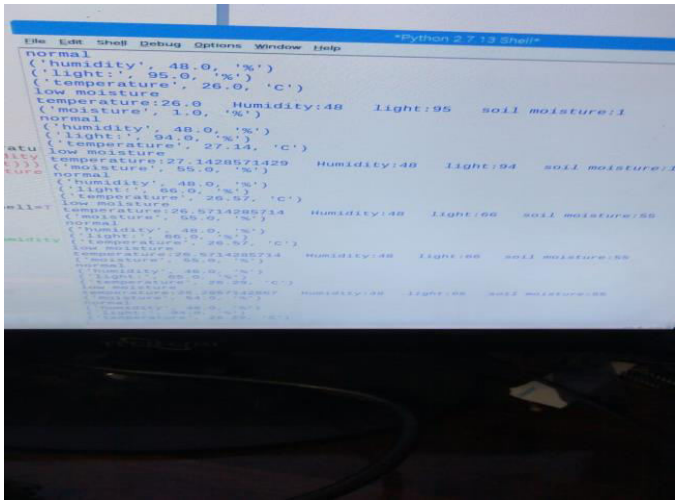


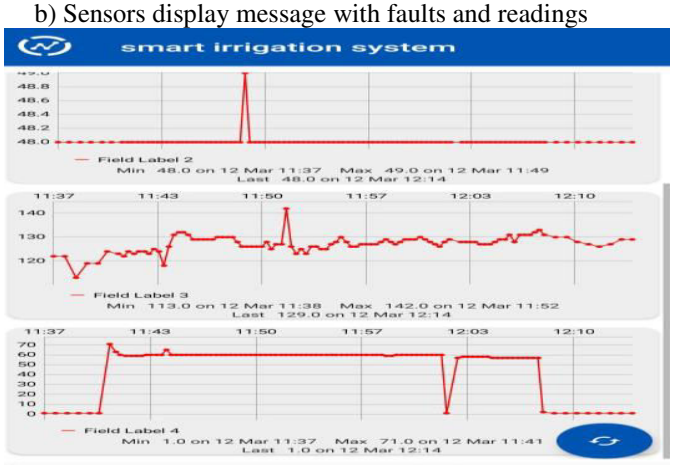
Fig 4: a) setup of a proposed system

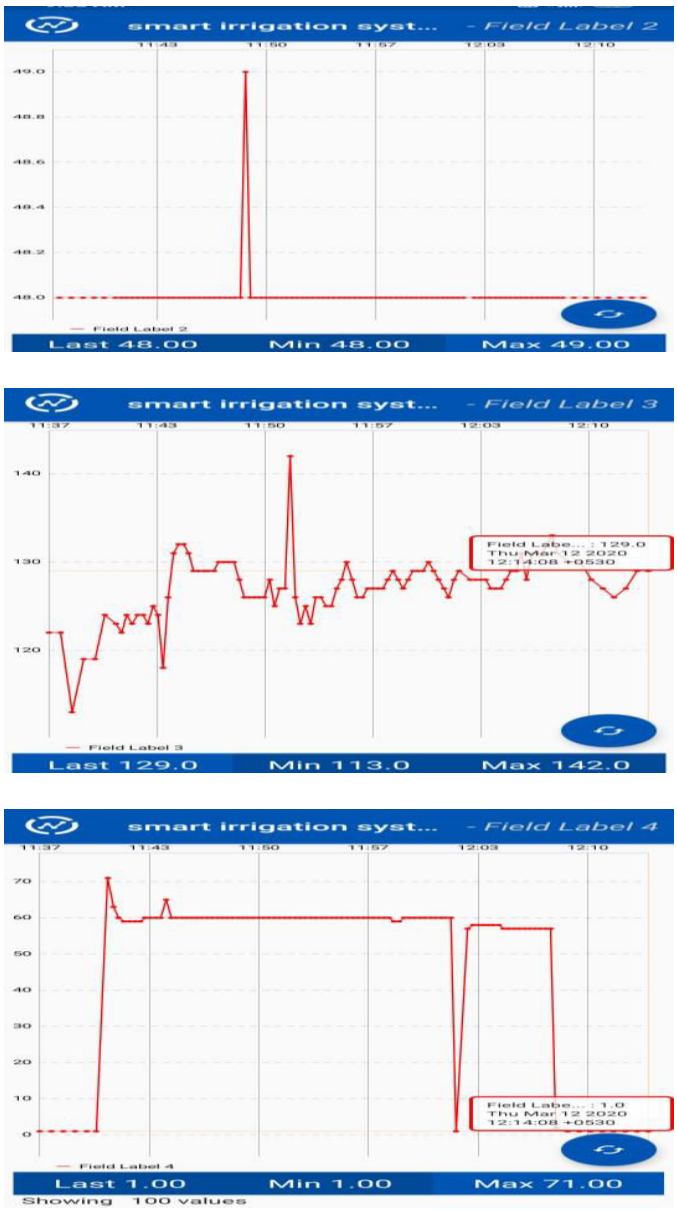
The user application will have a GUI which will show all the information to the client. The modes as determined can be chosen by the client on the application itself.

The developed system is tested under various conditions. The soil moisture test the soil for all climatic conditions and results are interpreted successfully. The moisture reading at different weather conditions is taken and updated. The wireless transmission was achieved using Wi-Fi. The data is stored in the cloud server; the data is then retrieved successfully from the cloud which is used for monitoring purposes. The soil moisture sensor value depends on the resistance of the soil. The value of the sensor varies from 0 being the wettest condition. The sensed value is sent to the controller and the motor pump is OFF in this condition. The maximum threshold value upon dry soil is 1023. When the sensed value by the sensor reaches the threshold value microcontroller triggers the relay and the motor is ON. The motor pump is turned ON and is turned OFF automatically when a sufficient amount of water is supplied to plants. In this work, we successfully develop a system that can help in an automated irrigation system by analyzing the moisture level of the ground. The smart irrigation system proves to be useful as it automates and regulates the watering without any manual intervention. The primary applications for this project are for farmers and gardeners who do not have enough time to water crops/plants.



b) Sensors display message with faults and readings





C) The above plots show the real time simulation of the variation of Moisture, Humidity, Light and Temperature sensor with respect to date.

4. CONCLUSIONS

By making this type of automatic system, we can decrease the number of labours, also automatic water distribution system helps to improve growth and increase benefits to the farmer.

• The automated water system is practically and financially cost-effective for advancing water assets for rural development.

• The system would give full control of incoming data on the IoT gateway and control all the exercises of the water system effectively.

The main applications for this automation are for farmers and nursery workers who need more an ideal opportunity to water their harvests/plants. This system additionally covers those yields that are inefficient of water during the water system. Also, this system helps in soil water detecting and utilizing to robotize water systems to increase the income from vegetable creation. In any case, research demonstrates that various sensors types perform under all conditions with no negative effect on crop yields with decreases in water use extend as high as 70% contrasted with conventional practices. In the current time, various water systems are overcome through manual control, in which an individual needs to water a nursery/land at ordinary periods. This procedure appears to expend more water and results in water wastage. Besides in some nursery zones where there is insufficient water storage or watering plants, the water system gets affected. Consequently, we require a computerized or atomize structure that will proper data and control the water flow in the farmland or nursery. Installing this water system structure in farmland it spares time and guarantees productive utilization of water. Also, this automatic system and Raspberry pi which guarantees provide less time for developing plants regularly.

ACKNOWLEDGEMENT

The authors wish to thank Dr. Ulhas Shiurkar, Director of the DIEMS, Aurangabad for technical support. The authors are thankful to Dr. Rajesh Autee, HOD Department of Electronics and Telecommunication Engineering, and Prof. P.M.Soni, DIEMS, Aurangabad for their guidance.

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