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AN IOT BASED ANALYSIS OF AGRICULTURE MONITIRING SYSTEM

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ABSTRACT

Agriculture is the primary occupation in our country for ages. But now due to migration of people from rural to urban there is hindrance in agriculture. So to overcome this problem we go for smart agriculture techniques using IoT. This project includes various features like GPS based remote controlled monitoring, moisture & temperature sensing, intruders scaring, security, leaf wetness and proper irrigation facilities. It makes use of wireless sensor networks for noting the soil properties and environmental factors continuously. Various sensor nodes are deployed at different locations in the farm. Controlling these parameters are through any remote device or internet services and the operations are performed by interfacing sensors, Wi-Fi, camera with microcontroller. This concept is created as a product and given to the farmer's welfare.

: Water is the important source in human life. Around 80 % to 90 % water used in agriculture field. As due to day by day growth in globalization and population water consumption is also increases. There is challenge in front of every country to reduce the farm water consumption and provide fresh and healthy food. Today automation is one of the important role in human life. The system is not only provides comfort but also reduce energy, efficiency and time saving. Whenever there is a change in temperature, humidity and current status of rain of the surroundings these sensors senses the change in temperature and humidity and gives an interrupt signal to the raspberry pi. Now a day the industries are using an automation and control machines which are high in cost and not suitable for using in a farm & garden field. So in this work we design a smart irrigation technology based on IOT using Raspberry pi. The system can be used to control the water motor automatically and can also monitor the growth of plant by using webcam. We can watch live streaming of farm on mobile phone using suitable application by using WiFi network. Raspberry pi is the main heart of the overall system.IoT devices and communication techniques associated with wireless sensors encountered in agriculture applications are analyzed in detail. What sensors are available for specific agriculture application, like soil preparation, crop status, irrigation, insect and pest detection are listed. How this technology helping the growers throughout the crop stages, from sowing until harvesting, packing and transportation is explained. Furthermore, the use of unmanned aerial vehicles for crop surveillance and other favorable applications such as optimizing crop yield is considered in this article. State-of-the-art IoT-based architectures and platforms used in agriculture are also

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highlighted wherever suitable. Finally, based on this thorough review, we identify current and future trends of IoT in agriculture and highlight potential research challenges.

I.INTRODUCTION

India is one of the largest freshwater user in the world, and our country uses large amount of fresh water than other country. There is a large amount of water used in agriculture field rather than domestic and industrial sector. 65% of total water is contributes as a groundwater. Today water has become one of the important source on the earth and most of used in the agriculture field. As the soil-moisture sensor and temperature sensor are placed in the root zone of the plants, the system can distributed this information through the wireless network. The raspberry pi is the heart of the system and the webcam is interfaced with Raspberry pi via Wi-Fi Module. Python programming language is used for automation purpose. The system is a network of wireless sensors and a wireless base station which can be used to provide the sensors data to automate the irrigation system. The system can used the sensors such as soil moisture sensor and soil temperature sensor and also ultrasonic sensor. The raspberry pi model is programmed such that if the either soil moisture or temperature parameters cross a predefined threshold level, the irrigation system is automated, i.e. the relay connected to the raspberry pi will turn ON or OFF the motor. This paper present an efficient, fairly cheap and easy automated irrigation system. This system once installed it has less maintenance cost and is easy to use. By using the webcam with suitable application on mobile phone we can easily online monitoring the actual situation of the field and sensors such as soil moisture and temperature are used to provide the information about changes occurs in the field. It is more advantageous than the traditional agriculture techniques

As the world is trending into new technologies and implementations it is a necessary goal to trend up in agriculture also. Many researches are done in the field of agriculture. Most projects signify the use of wireless sensor network collect data from different sensors deployed at various nodes and send it through the wireless protocol. The collected data provide the information about the various environmental factors. Monitoring the environmental factors is not the complete solution to increase the yield of crops. There are number of other factors that decrease the productivity to a greater extent. Hence automation must be implemented in agriculture to overcome these problems. So, in order to provide solution to all such problems, it is necessary to develop an integrated system which will take care of all factors affecting the productivity in every stage. But complete automation in agriculture is not achieved due to various issues. Though it is implemented in the research level it is not given to the farmers as a product to get benefitted from the

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resources. Hence this paper deals about developing smart agriculture using IoT and given to the farmers..

To improve the agricultural yield with fewer resources and labor efforts, substantial innovations have been made throughout human history. Nevertheless, the high population rate never let the demand and supply match during all these times. According to the forecasted figures, in 2050, the world population is expected to touch 9.8 billion, an increase of approximately 25% from the current figure [1]. Almost the entire mentioned rise of population is forecasted to occur among the developing countries [2]. Furthermore, income levels will be multiples of what they are now, which will drive the food demand further, especially in developing countries. As a result, these nations will be more careful about their diet and food quality; hence, consumer preferences can move from wheat and grains to legumes and, later, to meat. In order to feed this larger, more urban, and richer population, food production should double by 2050 [4, 5]. Particularly, the current figure of 2.1 billion tons of annual cereal production should touch approximately 3 billion tons, and the annual meat production should increase by more than 200 million tons to fulfill the demand of 470 million tons [6, 7].

II.LITERATURE SURVEY

The existing method and one of the oldest ways in agriculture is the manual method of checking the parameters. In this method the farmers they themselves verify all the parameters and calculate the readings. [1]It focuses on developing devices and tools to manage, display and alert the users using the advantages of a wireless sensor network system. [2]It aims at making agriculture smart using automation and IoT technologies. The highlighting features are smart GPS based remote controlled robot to perform tasks like weeding, spraying, moisture sensing, human detection and keeping vigilance. [3]The cloud computing devices that can create a whole computing system from sensors to tools that observe data from agricultural field images and from human actors on the ground and accurately feed the data into the repositories along with the location as GPS coordinates.[4]This idea proposes a novel methodology for smart farming by linking a smart sensing system and smart irrigator system through wireless communication technology.[5]It proposes a low cost and efficient wireless sensor network technique to acquire the soil moisture and temperature from various location of farm and as per the need of crop controller to take the decision whether the irrigation is enabled or not.[6]It proposes an idea about how automated irrigation system was developed to optimize water use for agricultural crops. In addition, a gateway unit handles sensor information.[7]The atmospheric conditions are monitored and controlled online by using Ethernet IEEE 802.3.The partial root zone drying process can be implemented to a maximum extent.[8]It is designed for IoT based monitoring system to analyze crop

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environment and the method to improve the efficiency of decision making by analyzing harvest statistics.[9]In this paper image processing is used as a tool to monitor the diseases on fruits during farming, right from plantation to harvesting. The variations are seen in color, texture and morphology. [10]In this paper, greenhouse is a building in which plants are grown in closed environment. It is used to maintain the optimal conditions of the environment, greenhouse management and data acquisition.

P. A. Bhosale and V. V. Dixit have proposed in [6] an
indigenous low cost time depended microcontroller based
irrigation scheduler which consists with various sensors for
detecting moisture, temperature and wind. This system derives
appropriate actuators (relay, solenoid valves, motor)
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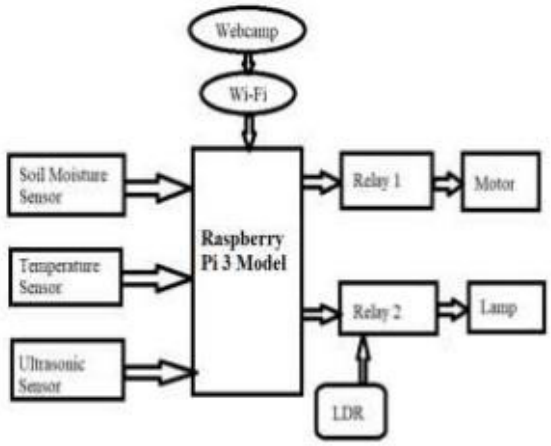
II.SYSTEMARCHITECTURE



II. RELATED WORK:

After extensive research in the agricultural field, many researchers found that the agriculture area and its productivity are decreasing by the day. With the Use of different technology in the field of agriculture we can increase the production as well as reduce manual efforts. This paper shows the technology used in agriculture sector based on IOT and Raspberry Pi. Chandan kumar Sahu proposed a system on "A Low Cost Smart Irrigation Control System". It includes a number of wireless sensors which are placed in different directions of the farm field. Each sensor is integrated with a wireless networking device and the data received by the "ATMEGA318" microcontroller which is on the "ARDUINO-UNO" development board.

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The Raspberry pi is used to send various types of data like text messages and images through internet communication to the microcontroller process [1]. Supraha Jadhv proposed, automated irrigation system using wireless sensor network and raspberry pi that control the activities of drip irrigation system efficiently [2]. Sebastian Hentzelt proposed a paper on the water distribution system and gave results to decompose the original nonlinear optimal control problem (OCP) [3]. Joauin Gutierrez attempted a paper that research automated irrigation system using a wireless sensor network and GPRS module instead of the Raspberry pi [4]. Ms. Deweshvree Rane Proposed "Review paper based on Automatic Irrigation System Based on RF Module" it is based on the RF module, this device is used to transmit or received radio signal between two devices. It's design is complex because of the sensitivity of radio circuits and the accuracy of the components [5]. Karan Kansara proposed "Sensor based automatic irrigation system with IoT", this irrigation system is used a rain gun pipe, one end connected to the water pump and another to the root of plant. It doesn't provide water as a natural rainfall like sprinkler and also it uses only soil moisture sensor [6]. G. Parameswaran proposed "Aurdino based smart irrigation system using Internet of Things", the researcher has not used Raspberry pi instead the work is done using aurdino controller without use of soil moisture sensors [7].

1. S.Sivachandran, K.Balakrishnan, K.Navin, "Real Time Embedded Based Soil Analyser", International Research Journal of Engineering and Technology (IRJET). Volume: 3 Issue 3 | March 2014 [1] In this paper, authors propose an embedded soil analyser with measures the pH value of the soil and based on this value gives measure of various soil nutrients. The system proposed here uses signal conditioning, display, microcontroller unit, sensors, power supply and thermal printer. This model helps in prediction of the soil sequence based on the availability of nutrients. Many techniques monitors various soil parameters and this paper points at soil fertility. The main aim of this model is to replace the conventional method of soil testing by automated soil testing. It automatically measures the major soil nutrients like potassium, phosphorus and nitrogen by calculating the pH value.

2. Anand Nayyar, Er. Vikram Puri, "IoT Based Smart Sensors Agriculture Stick for Live Temperature and Moisture Monitoring using Arduino, Cloud Computing & Solar Technology" May 2015. [2] This paper presents an IoT based smart stick that enables live monitoring of the different agricultural parameters. This stick helps farmer acquire live data of temperature, soil moisture. The agricultural IoT stick gives the idea of plug and measures in which farmers can instantly enact smart monitoring system by positioning the stick in the field and obtaining live data feeds on different smart gadgets like smart tablets, phones etc. and the information which is produced through sensors could be simply analysed and processed by agricultural experts even

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in remote areas via cloud computing technologies.

3. Chandan Kumar Sahu, Pramitee Behera, "A Low Cost Smart Irrigation Control System", IEEE sponsored 2nd International Conference on Electronics and Communication System (ICECS2015) [3] In this paper, the author proposes a model where the flow and direction of water is supervised and controlled. This is done with the help of DHTT11 and soil moisture sensor. This method also proposes a way to select the direction of water and this information is also sent to thephone and gmail account of the farmer. This model also enables the farmer to switch on and off the motor with a single click. This paper proposes a prototype where number of sensors are deployed at different positions in the field. This paper also shows how the proposed model makes the traditional irrigation system more effective and sustainable. This paper also suggests an efficient energy and network model. This paper presents a model that is energy efficient, sustainable, automated and cost effective.

IV.PROPOSEDSYSTEM

Farm monitoring system for farm application consists of wireless sensing devices that are placed in agricultural areas to gather data such as moisture, temperature, humidity and fire. The gathered information are communicated to Raspberry pi via Wi-Fi using Master Slave communication model. Raspberry pi, which acts as a master node, controls its devices or process known as slaves. This process consists of functions like storing data, collecting data from slaves, computing and integration of data.The raspberry pi can establish a Wi-Fi network and run the communication model that is used to collect data from sensors to raspberry pi and from pi to the server. The user alliance that is the web application based on IoT platform allows users to maintain agricultural data in actual time.The primary preferred standpoint of the proposed framework is that the cost of the setup progressively is low as raspberry-pi and other computerized sensors with web of things are utilized. The framework can without much of a stretch conclusion the encompassing condition. The application of the proposed system come in the areas of agricultural fields, agricultural research stations, cultivation areas and nursery plants. Fig. 2. Represents the architectural representation of the farm monitoring system. The system setup shows how the sensors can be deployed in the agricultural field by taking a planter for example. The setup can be useful in any kind of the agriculture field and can get better yield..

SOFTWARE USED:

a)Python:

Python is an interpreted high-level programming language for general-purpose programming. Created by Guido van Rossum and first released in 1991, Python has a design philosophy that emphasizes code readability, and a syntax that allows programmers to express concepts in fewer lines of code,[25][26] notably using significant whitespace. It provides

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constructs that enable clear programming on both small and large scales.

b) ThingSpeak: ThingSpeak is an open source Internet of Things application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. ThingSpeak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates. ThingSpeak was launched as a service in support of IoT applications.

WORKING PRINCIPLE:

As the Raspberry Pi is the heart of the system. This system contain webcam which is interfaced to Raspberry Pi via Wi- Fi module. The Raspberry Pi Model zero incorporates a number of enhancements and new features. This features of raspberry pi are improved power consumption, increased connectivity and greater IO which made this powerful, small and lightweight ARM based computer. The Raspberry Pi cannot directly drive the relay. It has only zero volts or 3.3 V. It needs 12V to drive electromechanical relay. In that case it uses a driver circuit which provides 12V amplitude to drive the relay. Various sensors are connected to the Raspberry Pi board give a resistance variation at the output. This output signal is applied to the comparator and signal conditioning.

VI.CONCLUSION

The smart irrigation system is suitable and cost effective for advance water resources for agricultural production. The system would provide feedback control system which will monitor and control all the activities of plant growth and irrigation system efficiently. If rain gun sensor can be added so that when it rains there won't be floods. Rain water harvesting can be done and this harvested water can be used to irrigate fields. We can also include many more water quality sensors that affect the crops..

VII.REFERENCES

[1]Accessed: Apr. 18, 2019. [Online]. Available: https://www.un.org/development/desa/en/news/population/world-population-prospects-2017.html

[2]Accessed: Apr. 13, 2019. [Online]. https://ourworldindata.org/world-population-growth

[3]Accessed: Mar. 15, 2019. [Online]. https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-rospects.html

[4]Accessed: Apr. 5, 2019. [Online]. https://www.un.org/press/en/2009/gaef3242.doc.htm

[5]Zhang, X., Davidson, E. A, "Improving Nitrogen and Water Management in Crop Production on a National Scale", American Geophysical Union, December, 2018

[6]How to Feed the World in 2050 by FAO, available at www.fao.org/wsfs/forum2050/wsfs-forum/en/

[7]Abhishek D. et al., "Estimates for World Population and Global Food Availability for Global Health", Book chapter, The Role of Functional Food Security in Global Health, 2019, Pages 3-24

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International Journal For Recent Developments in Science & Technology

Crossref

A Peer Reviewed Research Journal

[8]Elder M., Hayashi S., "A Regional Perspective on Biofuels in Asia", in Biofuels and Sustainability, Science for Sustainable Societies, Springer, 2018

[9]Accessed: Apr. 15, 2019. [Online]. World agriculture: towards 2015/2030 by FAO, Available at www.fao.org/3/a-y4252e.pdf

[10]Zhang, L., Dabipi, I. K. and Brown, W. L, "Internet of Things Applications for Agriculture". In, Internet of Things A to Z: Technologies and Applications, Q. Hassan (Ed.), 2018