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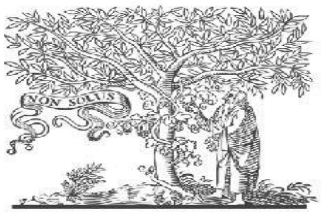

ELSEVIER SSRN

IJIEMR Transactions, online available on 8th Oct 2021. Link
:http://www.ijiemr.org/downloads.php?vol=Volume-10&issue=ISSUE-10

DOI: 10.48047/IJIEMR/V10/I10/03

Title **IOT enabled smart village monitoring system with solar technology**

Volume 10, Issue 10, Pages: 18-24

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IOT enabled smart village monitoring system with solar technology

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ABSTRACT

Agriculture is an integral part of Indian economy. Over 60% of Indian population based upon agriculture and one third of the income of nation arises from agricultural practices. Hence it plays a vital role in the development of the country. Various issues related to farming is continuously hampering the development of the country. Possible solution for these problems is to opt for modernized agriculture that comprises of modern trends. Hence, agriculture can be made smart using IoT and other technologies. Smart agriculture increases crop yield, decreases water wastage and imbalanced use of fertilizers. The main goal of my project is to use IoT in the agriculture field in order to collect data instantly (Soil Moister, Temperature, Light…), which will help one to monitor some environment conditions remotely, effectively and enhance tremendously the production and therefore the income of farmers. The present prototype is developed using Raspberry Pi technology, which comprise specific sensors, and a Wifi module that helps to collect instant data online. Worth mentioning the testing of this prototype generated, highly accurate data because while we were collecting them remotely any environmental changes were detected instantly and taking in consideration to make decisions

I. INTRODUCTION

Internet of Things (IoT) is the interconnection or network of physical devices that is interrelated computing devices, digital and mechanical machines, people or animals, objects that can sense, accumulate and transfer data over web without any human involvement.

Everything is provided with unique identifier. It is a progressed examination and mechanized frameworks which uses detecting, organizing, enormous information and man-made consciousness innovation to convey total framework for an administration. Basically, IoT is about extending the power of internet beyond smart phones and computers.

IoT has changed today's world. Smart cities, smart car, smart homes everything around us can be turned into a smart device with the help of IoT. It also has applications in agriculture, business sectors, healthcare, transport and logistics.
There are four main components of IoT-

• **Low power embedded system**- High performance and less battery consumption are the inverse factors that play an important role in design of electronic system

• **Cloud computing**- Data collected from devices is stored on reliable storage servers so here cloud computing comes into action

• **Availability of Big Data**- As IoT is highly dependent on sensors that are real time. So the usage of electronic devices is spread throughout every field that is going to trigger a massive flux of data

• **Network connection**- For communication, internet connectivity is necessary where each physical object is assigned by an IP address. A network connection is build between the devices with the help of these addresses.

II. LITERATURE SURVEY

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.

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 in

remote areas via cloud computing technologies.

Chandan Kumar Sahu, Pramitee Behera, "A LowCost 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 the 9 phone and gmail account of the farmer. This model also enables the farmer to switch on and offmotor 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.

III. DESIGN REQUIREMENTS

1. RASPBERRY PI:

The Raspberry Pi is a credit-card sized computer that plugs into your TV and a keyboard. It is a capable little computer which can be used in electronics projects, and for many of the things that your desktop PC does, like spreadsheets, word-processing and games. It also plays high-definition video. We want to see it being used by kids all over the world to learn how computers work, how to manipulate the electronic world around them, and how to program.

Fig raspberry pi

The Raspberry Pi is a low cost, **credit-card sized computer** that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

2.LIGHT DEPENDENT RESISTOR

A photo resistor or Light Dependent Resistor(LDR) or CdS Cell is a resistor whose resistance decreases with increasing incident light intensity. It can also be referred to as a photoconductor. A photo resistor is made of a high resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron (and its hole partner) conduct electricity, thereby lowering resistance.

3. SOIL MOISTURE SENSOR

The soil moisture sensor is one kind of sensor used to gauge the volumetric content of water within the soil. As the straight gravimetric dimension of soil moisture needs eliminating, drying, as

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well as sample weighting. These sensors measure the volumetric water content not directly with the help of some other rules of soil like dielectric constant, electrical resistance, otherwise interaction with neutrons, and replacement of the moisture content.

Fig soil-moisture-sensor-device

4.RAIN SENSOR:

With the weather being as unpredictable as ever, it's easy to leave your skylights open, only for it to suddenly start raining, leaving the interior below at risk. With this rain sensor, however, you can stop this from happening. You can use this sensor to monitor rain or slushy snow/hail and send closure requests to electronic shutters, windows, awnings or skylights whenever the rain is detected.

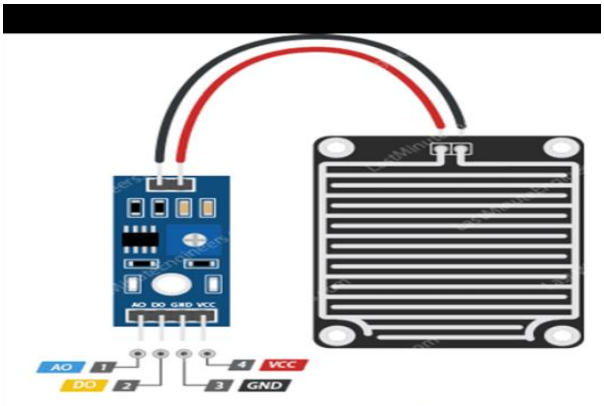

Fig Rain Sensor

5. TEMPERATURE SENSOR (LM35)

The LM35 series are precision integrated-circuit LM35 temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 sensor thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 sensor does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level.

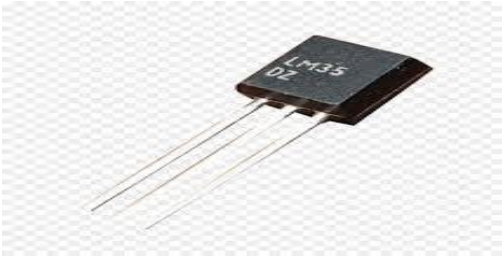

Fig LM35 Sensor

6. SYSTEM DESIGN:

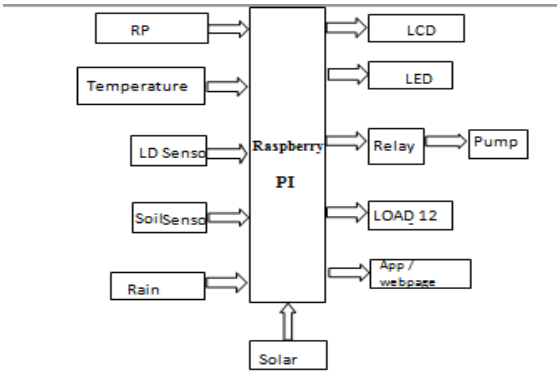

Fig Block Diagram of proposed method

Fig Block Diagram of proposed method

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7. PROPOSED SYSTEM:

The basic building blocks of an IoT System are Sensors, Processors and applications. So the block diagram below is the proposed model of our project which shows the interconnection of these blocks. The sensors are interfaced with Raspberry Pi, data from the sensor is displayed on the mobile app of the user. Mobile app provides an access to the continuous data from sensors and accordingly helps farmer to take action to fulfil the requirements of the soil.

IV. RESULTS

We have measured the moisture of soil at different times of the day and figures below show the results of all the sensor readings at different platforms

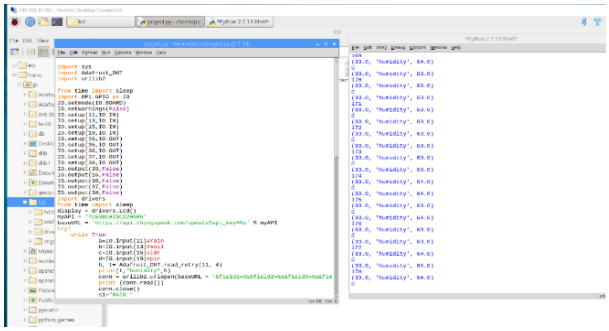

Fig: Sensor readings on serial monitor

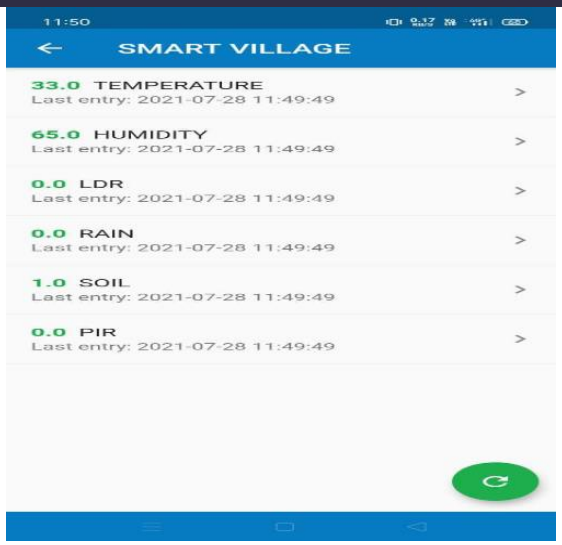

FIG:Readings on the Things speak App

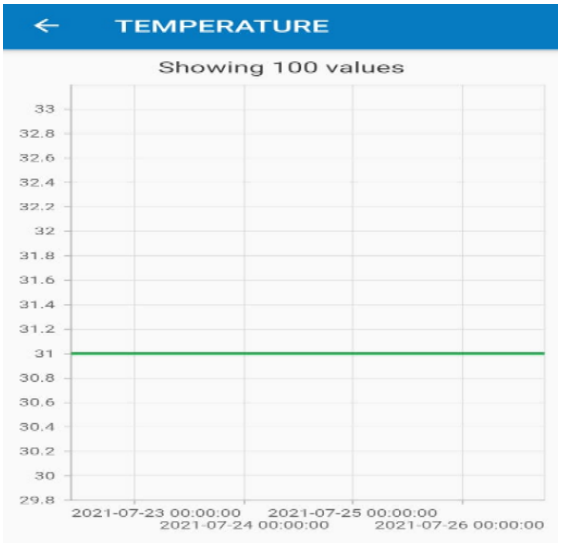

FIG :Graph of Temperature

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Fig :Graph of LDR

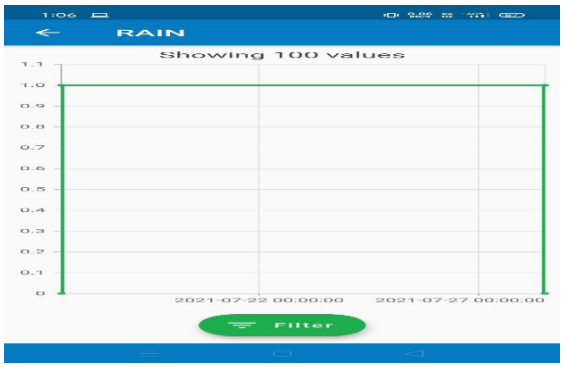

FIG :Graph of RAIN

FIG:Graph of SOIL

V.CONCLUSION AND FUTURE SCOPE

The proposed model explores the use of IoT (Internet of things) in the agriculture sector. This model aims at increasing the crop yield by helping in predicting better crop sequence for a particular soil. Thingspeak helps in real time sampling of the soil and hence the data acquired can be further used for analysing the crop. We have also taken many readings of the soil moisture, temperature and humidity of the environment for various days at different times of the day. Data on the cloud also helps the agriculturists in improving the yield, evaluating the manures, illness in the fields. This system is cost effective and feasible. It also focuses on optimizing the use of water resources which combats issues like water scarcity and ensures sustainability. This model focuses on the utilization of IoT in agriculture and the solutions proposed in this paper will improve farming methods, increase productivity and lead to effective use of limited resources.The future scope of this project could be including variety of soil sensors like pH sensor, Rain sensor and then collecting and storing the data on cloud server. This would make the predicting and analysing processes more accurate. It also includes making different data mining algorithms suitable for data analysis in agriculture.

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