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Water Flow Detection and Nutrient Level Analysis of a Coconut Tree

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Abstract: ***Agriculture plays a major role in the development of a nation. The basic aim of agriculture is to help the human in the development of their growth by supplying energy rich crops by improving the soil and water supply. Securing agriculture is really a difficult task in today's world. An increase in population increases the contamination of healthy food and water. To ensure better crop production and to minimize over utilization of water in a coconut tree, nutrient level analysis and smart water management system has been established. The use of sensors such as moisture sensor, flow sensor, Ph sensor helps in detecting moisture content of the soil and flow of water through the pipe and acidity level of the soil. A machine learning algorithm is proposed to predict the occurrence of a button shedding diseases in a coconut tree by observing the acidity level and moisture content of the soil. The motor is also attached with the flow sensors to observe the flow of water and to avoid overflow of water. Our project aims in the use of smart water management system to use the available water resources effectively. The main aim of our project is to increase the crop yield in a coconut tree and to avoid over contamination of water to agricultural fields.***

Keywords – moisture sensor, flow sensor, Ph sensor, Arduino-UNO, GSM module, mobile.

I. INTRODUCTION

Agriculture is one of the major areas for the development of a country. Traditional agriculture requires huge labours and it consumes almost months and years to cultivate crops. To avoid the huge investment cost there comes a concept of precision agriculture. Precision agriculture helps to increase crop yield and to reduce cost to labours. Precision agriculture brings new technologies that attempts to produce high yield of crops with expected investments. Precision agriculture helps farmers in saving time by adopting new technologies in agriculture. The Internet and its applications have become an important part of the human lifestyle of today. Internet has become an important part in almost all the fields. Scientists went beyond connecting only computers to the internet because of the enormous demand and need.

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Such inquiries led to the development of term called as the Internet of Things (IoT). Internet connectivity has evolved from users, devices, and now it has emerged into an interaction between user to devices. The IoT technologies have been suggested before many years but it's only in the initial stage of commercial implementation. Almost many fields include health care, transport the concept of IoT attained a huge benefit. There were a great demand for IoT in the field of agriculture. Still IoT is emerged in many fields and attaining its success randomly, there is a huge need for IoT in the field of agriculture. This paper aims to determine the benefits of IoT in agriculture. Since almost every process is performed over the internet, there is a huge requirement of highspeed internet connection. This IoT technology can be defined as a link between devices and human beings. Much of the operation is performed with the help of IoT sensors. The IoT will regulate and track all the devices we use in our day-to-day life. Everywhere, sensors are installed and these sensors translate raw physical data into digital signals. And we can track changes in the atmosphere remotely from every part of the world through the internet. This design of the systems will be based on the context of the realtime operations and processes. In the same way, the smart water management system operates with the combination of various sensors, namely moisture sensor, flow sensor and Ph sensor, showing their values at different rates respectively. Machine Learning is one of the most important technology in today's world. Machine learning concepts are applied in almost every field such as transport, healthcare, industry. Machine learning is a process that involves ability of a machine to learn from experience. Machine learning involves collecting the data, preparing it into a suitable format, training the collected data, evaluating the data and finally tuning the data. There are various machine learning algorithms that are proposed. A machine learning algorithm called support vector machine has been proposed in order to predict the occurrence of a button shedding diseases in a coconut tree. The values of sensor are sent to a cloud through a wi-fi module. The real time information can be viewed in a cloud platform through computers. Finally, a notification will be sent to the mobile phone of a farmers through GSM module.

II. USE OF FLOW DETECTION AND NUTRIENT LEVEL ANALYSIS

- Water flow management and diseases monitoring helps to reduce over utilisation of resources.
- Device is controlled from anywhere and at any time.
- Real-time data transmission and access can be done.
- Avoids the overflow of water.
- Improves the production of quality crops to the consumers.

- This method can be used by any fields like dry land or a wet land.
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III. STATE OF ART:

[1]. A State of Art analysis in "Smart Farming – IoT in Agriculture", by Rahul Dagar, Subhranil Som, Sunil Kumar Khatri. It gives an idea about the use of IOT in the field of agriculture. It also gave an idea to use various sensors to prevent overflow of water and to predict the occurrence of a deadly diseases in a coconut tree.
[2]. "Providing Smart Agricultural Solutions to Farmers for better yielding using IoT", by M.K.Gayatri, J.Jayasakthi, Dr.G.S.Anandha Mala. It helps the farmers to collect the real time information, store the data in the cloud platform and retrieve the data for the future use. The use of cloud computing is emerged through this paper.
[3]. "IOT Based Monitoring System in Smart Agriculture", by Prathibha S R1, Anupama Hongal 2, Jyothi M P3. This paper gives an information about the use of wi-fi module to fetch data from the sensors and upload the data to the cloud. It also provides an additional information about the message notification to the farmers via GSM module.
[4]. "Automation in Agriculture and IoT", by Mrs. Vaishali Puranik, Mrs. Sharmila, Mr. Ankit Ranjan, Ms. Anamika Kumari. This paper gives an idea about an automation in the field of agriculture. Crop monitoring, water management can be done easily with the help of automation. The yield of a crop can be increased by the automation.
[5]. "A Low Power IoT Network for Smart Agriculture", by Soumil Heble, Ajay Kumar, K.V.VDurga Prasad, Soumya Samirana, P.Rajalakshmi, U. B. Desai. This paper provides an idea to use low power and low-cost devices. It gives an idea to measure the important factors of a soil such as moisture and acidity the increase the growth and quality of food crops.

IV. EXISTING SYSTEM:

If the water flow exceeds the required level, there is no proper intimation to the farmers. This will lead to water scarcity in the society. The farmers need to visit the field frequently to check the flow of water. A motor needs to be turned off manually by the farmers. This results in loss of time for farmers. It does not have an efficient water monitoring system. There is a chance for occurrence of a button shedding diseases in a coconut tree which cannot be predicted by the existing system. This will lead to a huge financial loss for the farmers.

1. Demerits Of Existing System

- Manual monitoring is a great deal for farmers to be correct in almost all their works.
- The entire field is dependent upon individuals to increase the growth and production.
- Manual monitoring can be done only in the suspected field.

V. PROPOSED SYSTEM:

In the proposed system it will help to avoid the overflow of water. It gives the information about the level of the water that flows using flow sensor. It will send the message immediately when the water over flows than its limit. Then warning message will be displayed. The cost of this existing system is low. The resources are utilized effectively. It predicts the occurrence of button shedding disease. It will also reduce the wastage of time and energy for farmers.

1. Merits Of Proposed System

- Water flow management and diseases monitoring helps to reduce over utilisation of resources.
- Device is controlled from anywhere and at any time.
- Real-time data transmission and access can be done.
- Avoids the overflow of water.
- Improves the production of quality crops to the consumers.
- This method can be used by any fields like dry land or a wet land.

2. Block Diagram

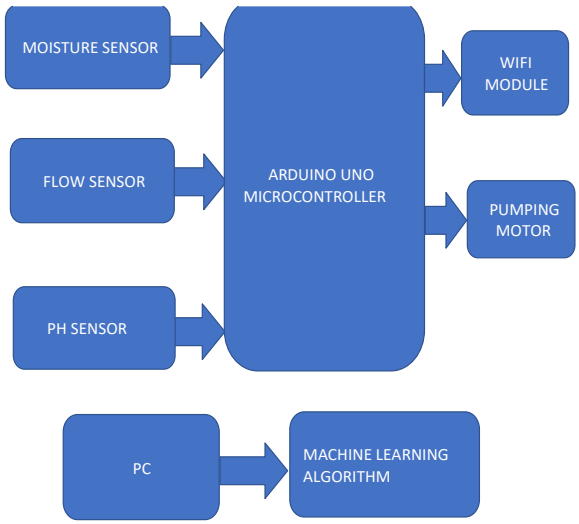


Table 1. Sensors used for measuring water flow and nutrient level

Parameter to be Tested	Sensor Used
Moisture sensor	Moisture content of the soil
Flow sensor	Amount of water flow
Ph sensor	Acidity level of the soil

3. Working

The moisture sensor is dipped at the bottom of the soil to measure the moisture content of the soil. The output of the moisture sensor is measured in terms of cubic meters which is given as an input to the Arduino board. The flow sensor is placed along with the flow pipe to determine the amount of water that flows through the pipe. The output of the flow sensor is measured in terms of liters per hour which is also inputted to the Arduino board. The Ph sensor which examines the acidity level of the soil to predict the occurrence of a deadly diseases called button shedding diseases.

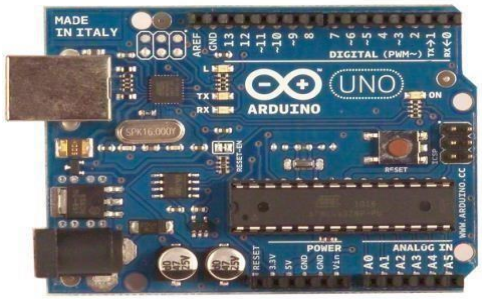
The output of the Ph sensor is expressed as a scale of range 0-14 which in turn also inputted to the Arduino board. A motor is also attached with the Arduino board to control the overflow if it exceeds the required level. A motor will be turned off if the water flow exceeds the level.

VI. TECHNOLOGIES USED

1. Hardware Specification

1.1 Arduino Uno

Arduino Uno is a micro controller board based on the ATmega328P. The board has both digital and analog input/output pins and a USB interface, Power jack, ICSP header and Reset button. Arduino Uno language is a combination of c and C++ functions.



1.2 Moisture Sensor

Moisture sensor measures the amount of water content in the soil. The moisture sensor consists of two major components a two-legged lead and two header pins. A two-legged lead is dipped in a soil to measure the water content and two header pins are connected to Arduino to get the output either in analog or a digital form. Moisture sensor plays a major role in the production of healthy food crops. When the soil is having water shortage, moisture sensor reminds the farmers to supply more water.

1.3 Flow Sensor

Flow sensors are used to measure the rate of flow of water. Flow sensors are used to analyse how much amount of water has been transferred through the pipe. Water flow sensor consists of a rotor and a plastic valve. It is important to note that right amount of water is flown at right place at right duration. Flow sensors play a major role in the management of water. Flow sensors can reduce water bills and can determine the leakage rates that helps the farmers in larger rate.

1.4 Ph SENSOR

A Ph **sensor** is a scientific instrument that is used to measure the acidity or alkalinity level of the soil. By measuring the acidity or alkalinity level, it helps the farmers to predict the occurrence of a diseases in a crop. The Ph value ranges from 0-14. If the Ph value is exactly 7, then the crop is free from diseases and remains normal. If the Ph value is less than 7 or greater than 7, then the crop is infected with diseases and remains abnormal. By measuring the Ph values, the farmers can improve the crop yield by following appropriate measures.

1.5 Wi-Fi Module – Esp8266

ESP8266 is a low-cost device and is capable of micro-controller unit. The ESP8266 is a userfriendly device which provides an internet connectivity to the devices. Thus, it can fetch and upload the real time data easily on an internet by making the Internet of Things easier. Automation become the easier part in working with ESP8266. The entire field of a farmer such as monitoring the crop yield and monitoring the water flow can be controlled by ESP8266 module.

1.6 Gsm Module:

The GSM module act as a circuit or a modem which connects the mobile device with the other devices. The GSM modem can hold sim card in it and it can send a notification message to the required users. Since GSM supports wireless communication, it is easy to send and receive data in the form of a messages.

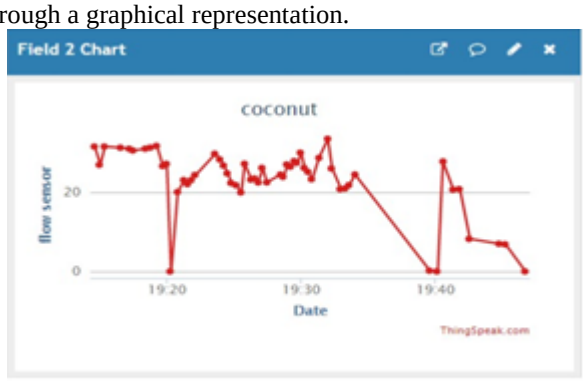
2. Software Specification

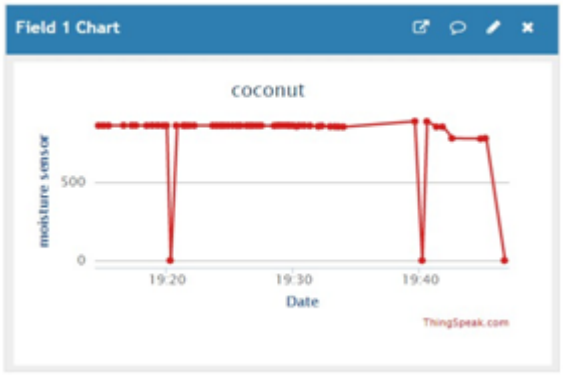
2.1 Arduino Ide

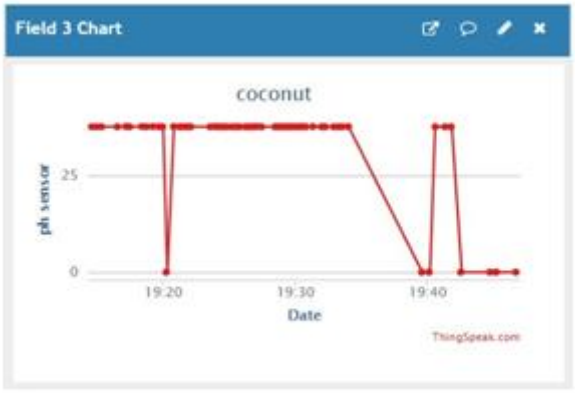
The Arduino IDE is an open-source software which enables the writing, compiling and uploading code to the Arduino board. It operates on cross platforms such as Mac OS, Microsoft Windows and Linux. Arduino IDE consists of two main parts such as editor and compiler. Editor helps in writing and compiler helps in compiling and uploading code to the board. The required libraries can be installed by selecting include library.A suitable board needs to be selected to upload the data. Once the code is successfully uploaded, Arduino board is blinked with LED light in it.

2.2 Thingspeak

Thingspeak is an IOT based cloud platform that allows to aggregate, visualize and analyze the real time data. The user can analyze, visualize and retrieve the immediate results through Thingspeak. Thingspeak comprises of a Thingspeak channel which can store the data which may be either public or a private. Thingspeak channel includes various fields that acts as a representation of data collected by the sensors through a graphical representation.







2.3 Machine Learning

Machine Learning is an ability of a machine to learn from experience without any human interactions. Machine Learning is further subdivided into three groups as supervised learning, unsupervised learning and reinforcement learning. Support Vector Machine algorithm is mostly preferred because of its high accuracy. SVM algorithm is further classified into linear SVM and non-linear SVM.

SVM algorithm is most suitable for classification strategies. A classifier needs to be used to classify the two separate pairs of data such as moisture reading and Ph reading. The moisture and Ph readings undergo a training process. Based on the trained data sets, the classifier will predict whether a crop is in normal or an abnormal condition. Thus, with the help of SVM algorithm the farmer can prevent the coconut crops from the occurrence of a button shedding diseases.

VII. RESULTS AND DISCUSSIONS

- ✓ The proposed model is used in efficient manner to save more water and help the farmer to increase the growth and yield of crops.
- ✓ This system helps the farmers with its high accuracy of prediction by support vector machine algorithm. It greatly increases the economy of a farmers.
- ✓ The proposed model is achieved with help of sensing, analyzing, collecting, processing the collected data and getting output result for effective utilization of water and preventing the button shedding disease.
- ✓ This system helps in the process of manual irrigation technique and reduces the difficulties that are faced due to button shedding disease.
- ✓ The performance of the system needs attention in the fields of:
- ✓ Tracking the usage of motor pump.
- ✓ Notifying the Water level in the field.
- ✓ Tracking the acidity level of a soil.

VIII. CONCLUSION

This paper represented the development of a smart water management and diseases monitoring system. This is very useful in improving the efficient utilisation of water resources, especially in the area of wet lands. The yield of a coconut crops will be increased by predicting the occurrence of a button shedding diseases in prior.

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AUTHORS PROFILE

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