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A Review Paper on Optimize Yield Production Using Data from Sensors

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Abstract - *Agriculture is one of the rare industries where the technology has not been widely adopted. One of the reasons for this is the economic situation of most farmers in India or other developing countries. The shortage of agricultural products around the world will increase day by day due to two main factors, namely overpopulation and urbanization. With overpopulation, the general demand for agricultural products will increase. Urbanization has led to a process of converting much agricultural land into non-agricultural (NA) fields for infrastructure development near urban areas. In principle, rural areas are declining significantly from day to day and the share of agriculture is also decreasing, which can lead to a decline in agricultural production. Precision farming is an approach whereby agricultural crops are fed the optimal amount of resources required by the crop for the precise amount of time. The traditional irrigation process has a typical time-based irrigation (irrigation) practice where the farmer irrigates the crops after a certain period of time (usually a few days). However, the problem with this approach is that sometimes the plants do not need water as quickly, which ultimately leads to water wastage, and sometimes the plants need water a little sooner.*

Key Words: **Agriculture, IoT, Machine learning, Sensors, Optimization, Precision farming**

1. INTRODUCTION

The world's population has nearly doubled in the last century, dramatically increasing the need for food for a population of over 7 billion people. According to the FAO, agricultural production must increase by 70% by 2050. And in order to increase production, plant's growth must be maximized. Plant growth depends on several factors such as Soil characteristics, soil moisture, temperature, weather, light, etc. In order to manage all the necessary information and the complexity of plant growth, a system based on IoT technology and able to measure, analyze and act is required. IoT is a solution for precision farming. A precision farming system that is distributed in the field far from power and communication sources must have low power consumption and be able to process the information received and easily send the most relevant information to the cloud for further statistical analysis. This system recommends harvests based on detected parameters using different WSNs. It will be able to measure the most important parameters for plant growth through a set of sensors and correct some of these parameters through actuators if necessary. To overcome the problems related to agricultural productivity and processes, precision farming can be used. Precision farming is about precisely managing fluctuations in the field to produce more food with fewer resources and lower overall production costs.

2. LITERATURE SURVEY

2.1 Parameter Monitoring for Precision Agriculture, Volume II, Issue X, October 2015 IJRSI, Kiruthika, Shweta Tripathi, Mritunjay Ojha, Kavita S

Precision farming, a technique of applying the right amount of inputs (water, fertilizers, pesticides, etc.) to the right place and time on a farm to increase production and thereby improve crop quality, uses other wireless systems. Precision farming is the ability to manage variations in productivity within a field and maximize financial returns, reduce waste and minimize environmental impact through automated data collection, documentation and use of that information to make strategic decisions. Precision farming is defined as a technique that applies the right amount of inputs. Several techniques are available in Precision Agriculture (PA) to monitor and control the environmental parameters required for a particular crop. The use of wireless sensor networks for large and small areas is becoming increasingly popular in precision agriculture.

2.2 Application Of Wireless Sensor Networks For Greenhouse Parameter Control In Precision Agriculture, International Journal of Wireless & Mobile Networks (IJWMN) Vol. 3, No. 1, February 2011

Technological development in wireless sensor networks enabled their use in monitoring and controlling greenhouse parameters in precision agriculture. Due to the uneven natural distribution of rainwater, it is very important for farmers to monitor and control the equitable distribution of water to all crops across the farm or per crop . There is no ideal watering method that is suitable for all weather conditions, soil structures and

plant types. This article is an attempt to design a WSN application for controlling and monitoring greenhouse parameters in the precision farming scenario.

2.3 Environment Monitoring System for Agricultural Application using IoT and Predicting Crop Yield,Vol-7 Issue-3 2021, Sardendu Pandey , Shubham Kumbhar , Shrikant Shirsath , Nikhil Mahajan , J. V. Shinde

Today's Internet is facing an exponential increase in the number of electronic devices connected over it. Therefore, the IoT can exchange data between machines, and data that was previously available on private servers is now readily available on the Internet for efficient access. This system shows the increasing use of IoT in surveillance applications. The core idea is to collect all these parameters one by one and make the final decision accordingly. A sensor node must be developed that collects all necessary resource parameters and then sends the data to the cloud for further processing.

The basic building blocks of this System are Sensors, Controllers, and applications. So, the block diagram below is the proposed model of our project which shows the interconnection of these blocks. The sensors are connected to microcontrollers and the sensor data is displayed on the user's mobile app. Mobile app provides access to the continuous data from sensors and accordingly helps farmers to take action to fulfill the requirements of the soil.

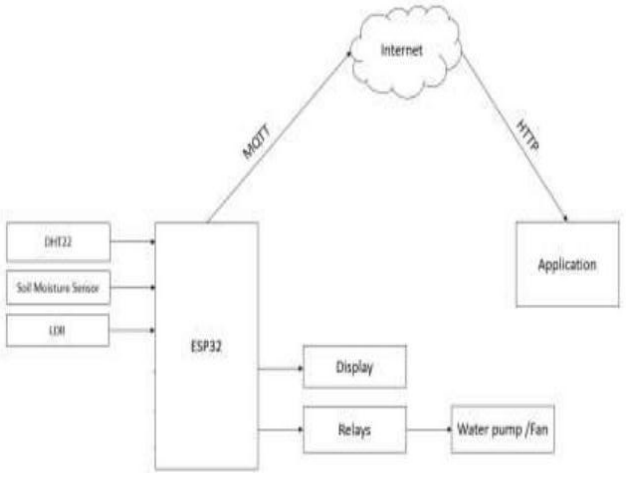

Fig -1: System Architecture

2.4 Intelligent System For Precison Agriculture by Madalina Mioara Anghelof; George Suciu; Razvan Craciunescu; Cristina Marghescu Published in: 2020 13th International Conference on Communications (COMM)

The environmental parameters are measured by various sensors and based on the data set, the system decides and controls the appropriate climatic conditions for each crop. The data is transmitted via the MQTT protocol (Message Queuing Telemetry Transport) to an Android application that allows the user to view and configure the environmental conditions. The proposed greenhouse monitoring system, based on wireless communication, consists of several sensors that provide information on temperature, humidity and light intensity, a database in which all parameters are stored and a mobile application. In this work, a smart irrigation and monitoring greenhouse has been developed, which is a viable and cost-effective solution that can be implemented at any scale.

2.5 A Comparative Analysis on Smart Farming Techniques using Internet of Things (IoT), Pramod Mathew Jacob, Prasanna M, Parveen Sultana H, VIT University, Vellore, Tamil Nadu, India

Advanced technology is able to automate different phases of cultivation such as irrigation, fertilization, harvesting and much more. To make the growing stages smarter, we use smart sensors on fields to detect water levels, photo sensors to ensure there is enough sunlight available for crop growth, sensors to detect nitrogen levels and of course alert the farmer to take steps to ensure appropriate fertilization.

IoT system	Microcontroller or Board used	Software platform used	Sensors used	Communication Technologies used
Intelligent Agriculture Greenhouse monitoring system	CC2530 chip, 8051 microcontroller, STM8S103F3 chip	LabView	Temperature sensor Humidity sensor Pressure sensor Light sensor	Zig-bee, GPRS, 802.15.4 (6LowPAN)
Water regulation in field using IoT	Not mentioned	Not mentioned	Soil hygrometer, VRS-20 SDI-12 radar sensor, RFID	GSM
IoT system for agriculture	Arduino board	Arduino IDE, Open CV	Humidity, Temperature, Soil moisture	Bluetooth, Wi-Fi
AgriSys –Smart and ubiquitous controlled environment agricultural system	Phidget interface 8/8/8	LabView	Humidity sensor Temperature sensor Soil moisture sensor Light sensor pH sensor Thermocouple sensor	GSM
Smart Agriculture using IoT and WSN	Raspberry PI, AVR microcontroller	Raspbian OS	Humidity sensor Temperature sensor Soil moisture sensor PIR motion sensor Ultrasonic sensor	GPS WSN Wi-FI Zig-bee
Weather based smart watering system	ARM processor	Android App	Soil moisture	GPRS
Smart drip irrigation system	Raspberry PI, Arduino board	Arduino IDE, Python	Ultrasonic sensor	Zig-bee, GPS
A control system for intelligent farming	Arduino board	Arduino IDE	Humidity sensor Temperature sensor Soil moisture sensor Light intensity sensor	Wi- Fi
Smart agriculture using IoT and image processing	Arduino board	MATLAB, Arduino IDE	Soil moisture sensor Temperature sensor Humidity sensor Serial JPEG camera module	Wi- Fi

Table -1. Summary based on physical and logical resources used

The Internet of Things (IoT) is playing a notable role in all sectors of the world, such as agriculture, aviation, transportation, healthcare, etc. Our work addresses the

growth and advancement of IoT-based systems used in agriculture. It all started with the use of Zigbee-based Wireless Sensor Networks (WSNs), later followed by centralized IoT boards and processors like Arduino, Raspberry PI, etc.They use a wide range of sensors such as temperature and humidity sensor, light sensor, soil moisture sensor, pH sensor, PIR motion sensor, etc. The main challenge for researchers in this field is to develop more accurate and useful sensors to help in monitoring the help plant growth.

2.6 Impact of Internet of Things (IoT) in Smart Agriculture, O. Vishali Priya, Dr.R. Sudha Department of Computer Science, PSG College of Arts & Science, Coimbatore, Tamilnadu, India

The ideas help connect real-world devices equipped with sensors, actuators and computing power, allowing them to collaborate on a task while remaining connected to the Internet, dubbed the "Internet of Things" (IoT). Any aspect of conventional farming strategy can be changed at a very simple level by implementing the latest advances in sensors and IoT in farming practices. Right now, the constant convergence of wireless sensors and the Internet of Things in Smart Farming will push farming to previously unimaginable heights. The IoT can help drive solutions to various typical farming problems such as drought response, yield optimization, rationality, water system, and bother regulation by adopting the principles of smart farming.

2.7 Smart Farming: IoT Based Smart Sensors Agriculture Stick for Live Temperature and Moisture Monitoring using Arduino, Cloud Computing & Solar Technology, Anand Nayyar, Er. Vikram Puri

This paper is integrated with Arduino technology, a breadboard combined with various sensors and a live data stream can be accessed online at Thingsspeak.com. The proposed product is tested on live agricultural fields and offers high accuracy of over 98% across all data feeds. The stick has high efficiency and accuracy in capturing live data of soil temperature and moisture. The agriculture stick proposed in this paper will help farmers increase agricultural yield and take care of food production efficiently, as the stick always helps farmers to get accurate live feeding of temperature, environment and soil moisture with more than 99% accurate results.

3. CONCLUSION

To overcome problems related to agricultural productivity and process precision farming can be used. Precision farming is about managing variations in the field accurately in order to grow more food with fewer resources and reducing overall production costs. The current work aims to develop a smart system using various sensors such as soil moisture sensor, water sensor, digital humidity and temperature sensor, and sunlight sensor (LDR Sensor). This sensor senses values and reports it to the cloud server. Crop recommendation can be done based on various parameters. This system is very useful for small farmers as the initial cost is very low. IoT is used in various agricultural domains to improve time efficiency, water conservation, crop monitoring, soil management, bug spray and pesticide safety, and so on. It also eliminates human labor, deconstructs agricultural methods, and creates a difference in smart farming implementation.

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