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REMOTELY MONITORED MULTIFUNCTIONAL FARMING APPROACH BASED ON INTERNET OF THINGS

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Abstract: *Cultivation of crops is the main occupation of our country's people. Almost 30% of India's GDP depends on crop cultivation. Due to lack of proper knowledge and good agricultural techniques we are not progressing well in this sector. By employing latest automation technologies to traditional farming we can conduct agricultural practice in a smarter way. Main highlight if the paper is an intelligent automaton remotely operated by an android application. Plucking the unwanted plants, maneuvering the insect repellant in fields, detecting the dampness level of soil, distressing animals, land look out, are the major tasks performed by the machine. On a further note smart irrigation in combination with intelligent selection choices relying on precise real time field information is used. Finally, intelligent handling of godown parameters such as climate changes, moistness monitoring and catching the thieving activities are carried out by linking various detectors with wireless networking, capturing devices, and actuators with microcontrollers interfaced with V380 pro camera to a computer device.*

Index terms: **smart farming, remote controlled robot, smart warehouse management.**

I. INTRODUCTION

Farming is regarded as the foundation of social adaptability. With the use of IoT technology and robotization, the study intends to convert farming into an intelligent practice as it is the primary supplier of grain crops as well as other commodities. This research highlights a clever GPS-based remotely operated robot that can execute duties such as harvesting, sprinkling, humidity detection, frightening of living creatures, vigilance and more. It is critical to the economic development of the country as it provides significant number of job opportunities.

Technological advancements pave the way for latest automated agriculture system. Introducing automation in the field of agriculture will help the manufacturers and growers to lessen the damage and increase the output by managing the application of manure in order to improve the productivity of plants.Numerous detectors are used in conjunction with programming of irrigation system. With this approach, the crop growers can easily regulate their herds, develop harvest, reduce expenses, and conserve resources. Smart agriculture approach is an elevated framework to cultivate healthy and durable crops in bulk quantities. Integrating parameters such as harvest, weather conditions as well as hardware to self-modify temperature, moisture and various factors allows for automatic modification of farming equipment.

1.1 Objective

Major aim is to create an IoT based farm surveillance system. This technique protects the farms against a variety of issues. We are building a platform to track the warehouse factors as well, which will aid in crop damage monitoring. The field work has been completely automated using the robot.

II. LITERATURE SURVEY

[1] Agriculture is primarily reliant on processes developed centuries back and does not include sustainable management. The modern picture of declining groundwater tables, draining streams and reservoirs, and an uncertain ecosystem necessitates adequate water management. We now possess the tools to establish a connection between water consumption and waste. Most innovative infrastructure is extremely pricey and sophisticated for a typical grower to comprehend. Our goal with this work is to provide low-cost, dependable, cost-effective, and modern mechanism that will aid in water saving and agricultural automation. We suggested placing temperature and moisture sensors in strategic areas for crop monitoring. [2] To maximize water utilization for grain production, an intelligent watering application was built. Detectors capable of regulating thermal conditions and water content of soil are preinstalled within root areas of crops. An access point also processes data from the sensors, initiates actuators, and sends information to the user server. To manage water levels, an algorithm comprising temperature and soil humidity model parameters was devised and loaded into a micro - controller interface. Solar arrays operated the equipment that had bidirectional network connectivity, permitting information evaluation and channeling of water to be configured wirelessly. The robotic prototype was evaluated for 136 days inside a wise old farm field, as well as moisture efficiency of up to 90% have been accomplished when tried to contrast to farmland region conventional crop irrigation. Again for last few months, three multiple copies of the computerized method are being used effectively in numerous different locations. The method has the capability of being helpful in water-stressed, remote and rural areas due to its power independence and relatively inexpensive. [3] The advancement of technology in Intrusion Detection has enabled them to be used in the management and surveillance of hydroponic garden parameters in crop monitoring. Caused by uneven native range of rainwater collected, it is critical for farm owners to regulate and manage the equivalent water supply to all harvests throughout the land or as needed by the growing season. To select the best technique, all greenhouse specifications must be thoroughly examined. With the advancement of wireless sensor technologies and miniaturized sensing devices, they can be used for instantaneous landscape monitoring and managing greenhouse metrics for Precision Agriculture (PA) applications.

The information exchange in the Serial bus theory is regulated primarily by an appropriate cabled communication system. [4] Irrigation control is a significant problem in numerous droughts - prone and sparsely populated farming system. Divvied up in-field sensor-based water supply have the capacity to foster site-specific water management, allowing producers to maximize efficiency whilst also conserving water. This article includes descriptions of adjustable rate agricultural architecture as well as measuring instruments, as well as a detection system and applications for actual in-field signaling and regulation of a location accuracy sequential water supply. Six in-field detector channels have been spread throughout the region depending on a land surface chart, and ground requirements had been sporadically analyzed & remotely conveyed to an access point. A watering device was fully automated by a computer program control algorithm that alerts the spatially distributed position of sprays from a variable Global Positioning System. [5] Cordless sensing arrays with reduced wattage and cheap cost are now possible thanks to evolving field. A modular detection system for sensing soil factors like as heat and moisture is presented in this research. We created sensor clusters that are entirely buried & gather soil readings. Embedded terminals employ mobile antennas to transmit the acquired data to several foregoing base stations. Relays units having lengthy seamless connectivity subsequently send the information recorded from the program's Iot devices to a base unit that is linked to workstations. To obtain a really small duty cycle and thus an extended life for soil remote monitoring, the general architecture wireless sensor network employs a stochastic data transmission.

III. EXISTING METHODOLOGY AND PROPOSED SYSTEM

The oldest and existing method of agriculture is the human way of evaluating the agricultural factors. Growers in person will examine the condition of crops and carry out the necessary modifications. It is however a time consuming and hectic task for the farmlands located in very remote areas. The prevalent method monitors for just soil water and presets the mechanism of water channeling.

The presented technique makes use of latest microcontroller board, various detectors and driver devices. The data specifically related to the harvest is worked upon by the Arduino Uno. The project comprises of two main sections: a probing system and a remotely operated water channeling system.

IV. SYSTEM DESIGN AND IMPLEMENTATION

4.1 Block diagram and working principle

Implementation consists of three nodes and a wireless application to handle the system. Every node is connected to a specific device with specific task to accomplish. All of them are linked to a main hub by cordless information carrying modules. Information provided by the user to nodes is sent and received by the server device.

4.1.1 Node 1

A wirelessly monitored automaton forms node 1 of the proposed system.

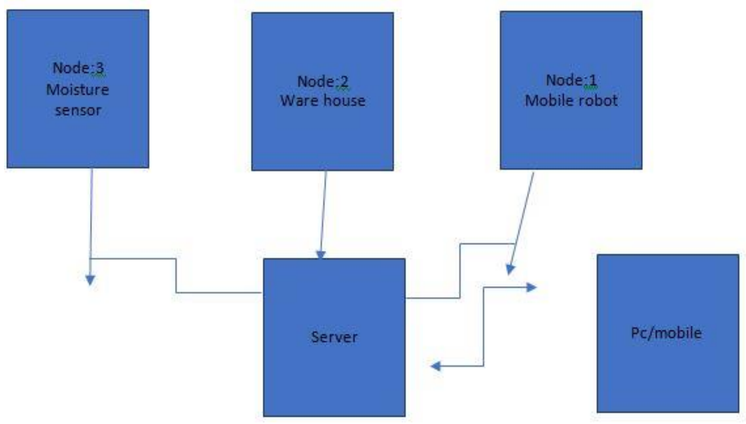

Figure 1: Pictorial representation of smart farming system

Figure 2: Block diagram for mobile robot

Plucking undesirable plants, applying pest control, moistness detection, prey protection are some of the tasks performed by mobile robot.

4.1.2 Node 2

A storage space or godown forms node 2 of the system. Equipments for warehouse management includes: movement sensing device, brightness detector, moisture indicator, thermal detector, warmer device for room, cooling ventilator, all of them linked to a node microcontroller. When the safety mode is turned on movement sensing device will capture the activities happening inside the warehouse and gives away alert signals to the concerned person through Arduino Uno thereby providing anti-theft feature. Thermal and moisture detectors will sense if there is change in the particular set value and accordingly thermal heating or ventilation is provided.

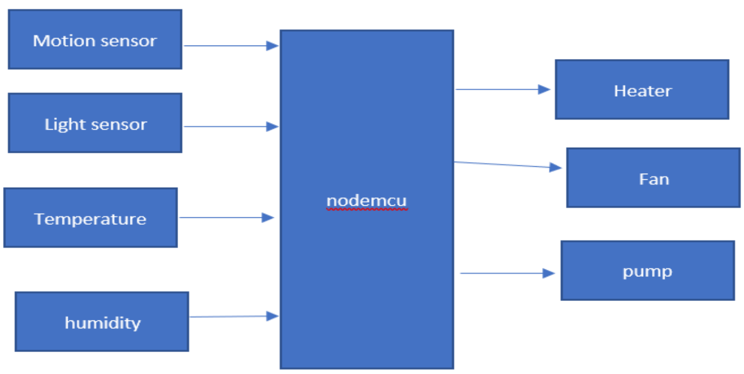

Figure 3: Block diagram of node 2

4.1.3 Node 3

Node 3 works for intelligent water channeling. Pump motor is operated through seamless internet service. Two operating modes: automatic and physical. In automatic phase the water pump switches to on/off state on its own by utilizing the information related to moisture level of soil, hence regulating the watering devices. In physical mode farm owner is capable of monitoring the pump state wirelessly by making use of mainframe or cellular device constantly putting to work an android application or PC commands.

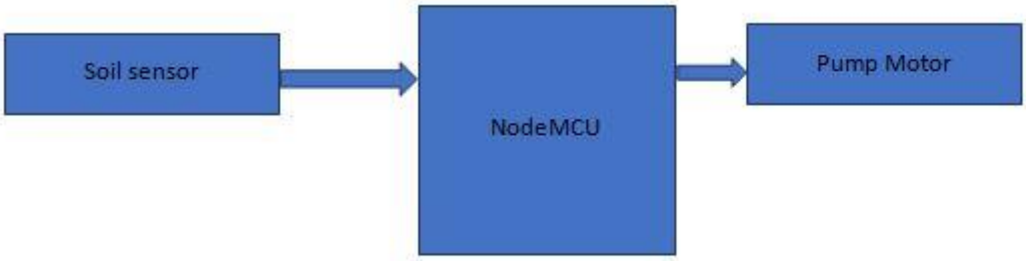

Figure 4: Block diagram for node 3

In node3, moisture sensor received soil data and there it is processed byNodeMcu in order to control the operation of waterpump.

4.2 Hardware and software requirements

- Node MCU
- Arduino UNO
- Soil sensor
- Light sensor
- Obstacle sensor
- DHT11 sensor
- Motion sensor
- Camera
- Motors
- Pump motor
- Motor driver

Software requirements:

- Python
- C++
- Arduino compiler
- Adafruit server
- Proteus simulator

V. RESULTS

5.1 Initial Results

Digital Soil sensor tested with dry and wet soil and it work properly NodeMCU Wi-Fi controller tested with mobile hotspot connection and it responded well with Adafruit server by sending and receiving values of soil sensor. Dc pump motor tested directly with supply voltage. Fan tested with direct supply.

5.2 Expected results

Spraying of seeds is done using android app. All sensors like temperature, humidity, soil can be viewed on a live web server. Ware house automation achieved completely.

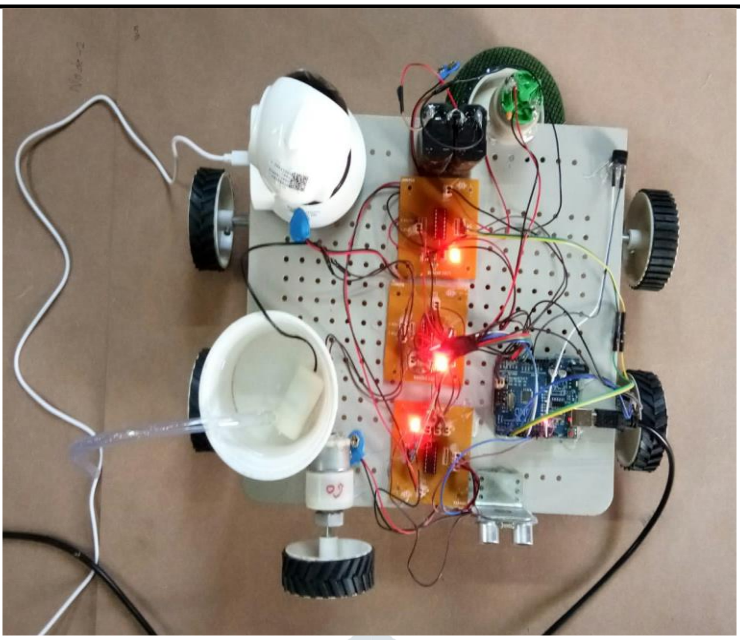

Figure 5: Node 1 Experimental setup for Mobile Robot

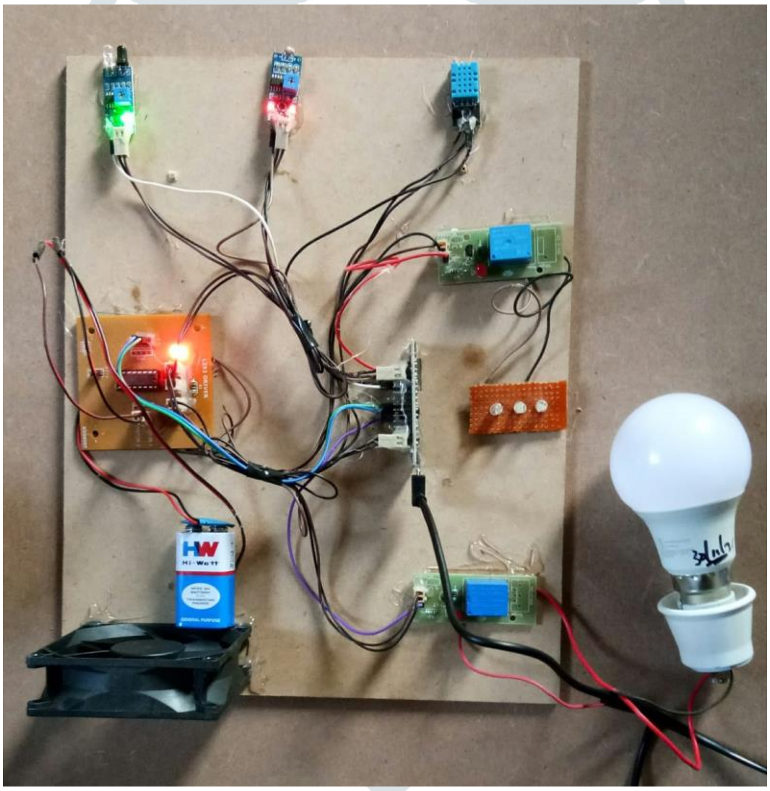

Figure 6: Experimental setup for Node 2

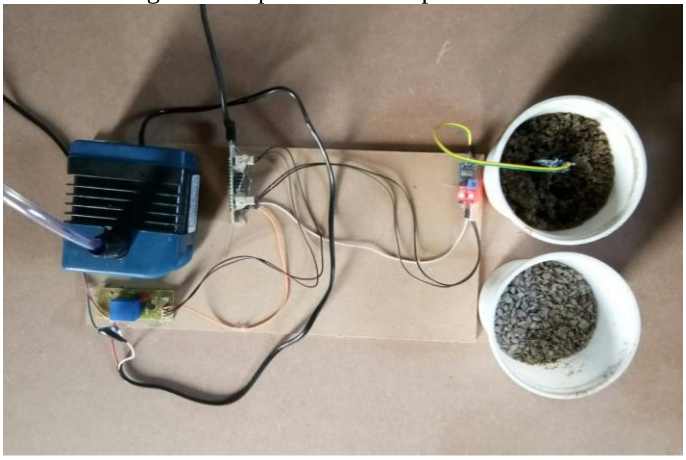

Figure 7: Experimental setup for Node 3

Results of node 3 for different soil conditions on Adafruit server are depicted in the figures below.

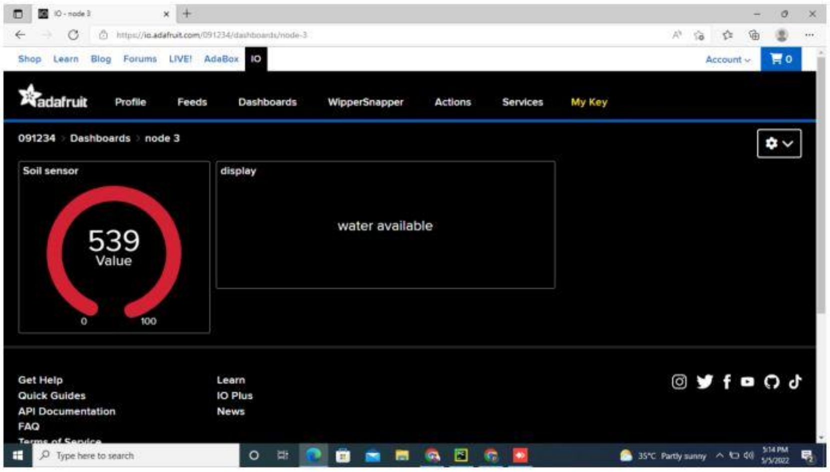

Figure 8: Soil condition is wet with availability of water

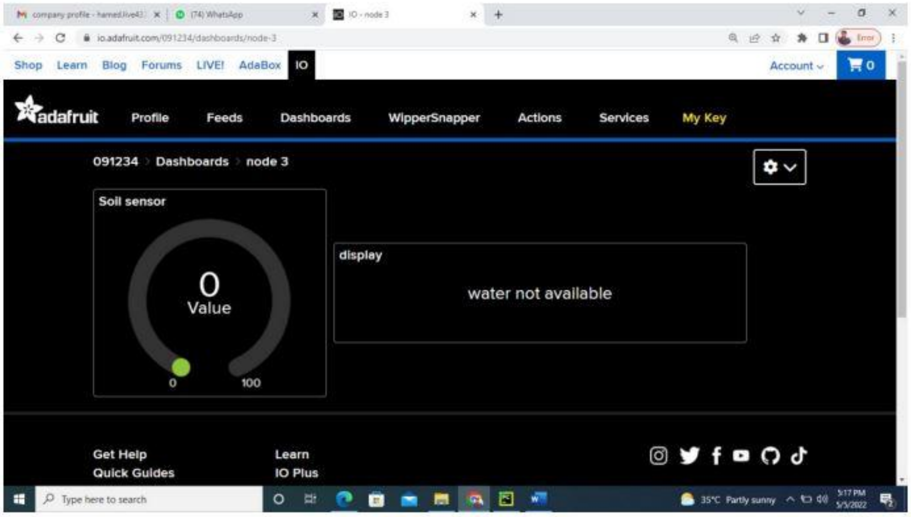

Figure 9: Soil condition dry with no water present

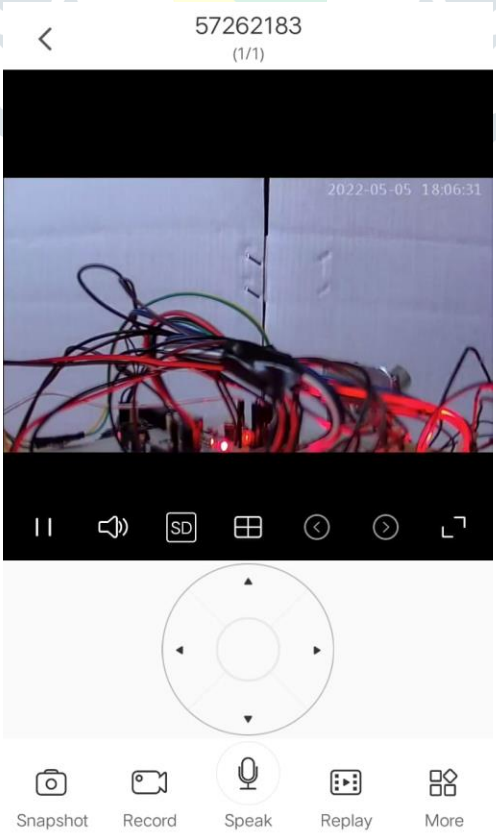

Figure 10: Bluetooth terminal of android app

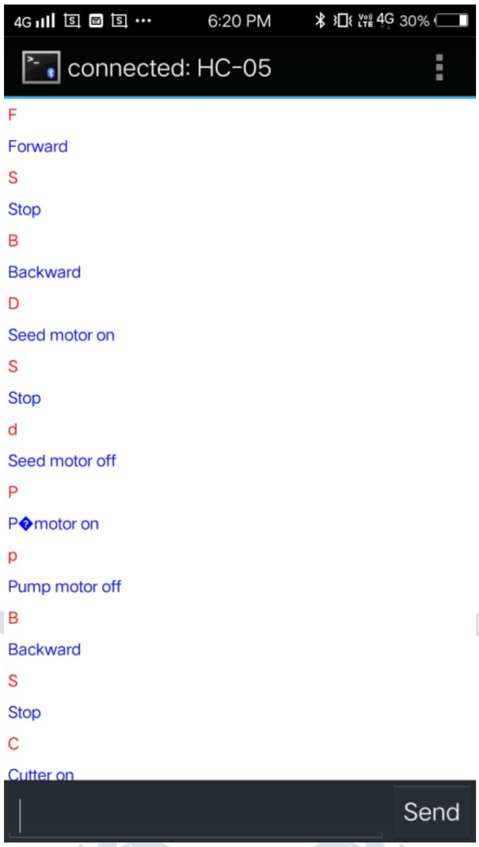

Figure 11: Actions performed by mobile robot

VI. ADVANTAGES AND DISADVANTAGES

6.1 Advantages

- Improved harvest treatment increases the yield.
- Limited utilization of water
- Crop growers can predict range of yield, moistness of soil, degree of sunlight in real time and wirelessly.
- Reduced cost as there is less wastage of resources and manual errors.

6.2 Disadvantages

- As it is completely wireless and robotic in working the proposed system can come under variety of network failures.
- Humongous implementation of intelligent farming will be a huge battle to take on.
- It is the biggest challenge for the large-scale implementation of smart agricultural framing across the country.
- Given any security measures, the system offers little power and can lead to various kinds of network attacks.
- It is very complicated to plan, build, manage and allow the broad technology to IoT framework.

VII. CONCLUSION AND FUTURE SCOPE

All the three nodes sensors and devices are successfully interfaced with the Arduino Uno, allowing for wireless communication between them. Overall investigations and experimental tests demonstrate that the method implies a wirelessly operated robot, an intelligent irrigation system and a intelligent warehouse control system to provide a comprehensive approach to agricultural tasks, watering issues, and storage difficulties. The deployment of this mechanism within the farm may greatly increase agricultural output and total production.

In the coming times the system can be made more intelligent and accurate able to analyze the user behavior, predicting nutritive level of crops, cultivation time span and many more. Machine learning algorithms can be made use in intelligent farming to make the system more accurate thereby greatly benefitting the farmers.

REFERENCES

[1]S. R. Nandurkar, V. R. Thool, R C.Thool, “Design and Development of Precision Agriculture System Using Wireless Sensor Network”, IEEE International Conference onAutomation, Control, Energy and Systems (ACES), 2014

[2]JoaquinGutiérrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Angel Porta-Gándara,"Automated Irrigation System Using a Wireless Sensor Network and GPRS Module", IEEE TRANSACTIONS ONINSTRUMENTATION AND MEASUREMENT, 0018-9456,2013

[3]Dr. V.Vidya Devi,G. Meena Kumari, "Real- Time Automation andMonitoring Systemfor Modernized Agriculture" ,InternationalJournal of Review and Research in Applied Sciences and Engineering (IJRRASE) Vol3 No.1. PP 7-12, 2013

[4]Y. Kim, R. Evans and W.Iversen, "Remote Sensing and Control of an Irrigation System Using a Distributed Wireless SensorNetwork",IEEETransactions onInstrumentationand
Measurement, pp. 1379–1387, 2008.

[5]Q. Wang, A. Terzis and A.Szalay, "A Novel Soil Measuring Wireless Sensor Network", IEEE Transactions on Instrumentation and Measurement, pp. 412–415, 2010