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Smart Farming using Block Chain

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Abstract - *Farm monitoring concept using sensor network is the most useful innovation for the people in India. Since agriculture plays an important role in our day to day life. By decreasing the cost, time and human effort we tend to increase the crop productivity. Using Internet of Things (IoT) the information collected from the agriculture fields are stored and monitored from the database. It is quit challenging to increase the efficiency of the agricultural work by integrating Raspberry Pi with IoT and sensors. As an outcome of challenge, the field monitors the temperature, humidity, soil moisture, fire and pH content. In the present farming system these specification such as temperature, humidity, fire, moisture and pH content are detected manually. In this paper this disadvantage of manual labor can be overcomed by an irrigation process carried out automatically using various sensors. The moisture content of the soil is detected by the Soil moisture sensor, where the water pump is switched on automatically with the help of relay if the moisture content is less. The DHT11 Module measures the temperature and humidity. In which one device (master) controls single or multiple devices (slaves) in agriculture using Master-Slave communication protocol. Using IoT in Smart farming to collect the data from various types of sensors which acts as slaves and sends it to the main server using Raspberry Pi which acts as a master and the parameters are been monitored using LCD display . Blockchain in smart farming can also be implemented for future enhancement.*

Key Words: Agriculture, Raspberry Pi, Sensor Network, IoT, Block Chain.

1. INTRODUCTION

There is a need for technical solution in farming in order to increase the crop production, by increasing the usage of nature favorable practices and by reducing the applications of agro-chemicals. The cost of production is decreased which is a major advantage in this. Many hurdles for enactment, including reservations by the agriculturalist have been achieved by the recent year's rapid technological approach and evolution. In order to find a systematic elucidation, advancement in crop production and decreased cost. Farmers, researchers and technical manufactures, all together combine their energy. Combining the latest research and development concerning novel sensors and their usage is the main aim in Smart Farming. A wide range of farming task are been addressed by sensor networks. Farmers can use sensors based on their requirements to meet the agricultural actions that is to be addressed. Problems noticed from old methods like green house, organic farming, organic park, irrigation can be overcomed by adapting the new technologies. The system which is been proposed in this Smart farming consist of wireless sensor network technology. Since this system is technically efficient it can be used by every individual. With the help of android mobile the farmer can instantaneously check the environment conditions with the help of different sensors that are deployed at appropriate locations to measure the actual conditions of the plants. Despite the fact that our nation claims to have created regarding science and innovation, unpredictable power supply or finish breakdown for a considerable length of time together as daily routine.

2. RELATED WORK

To build a Farming system, sensor nodes and gateway based wireless sensor networks are deployed in the agricultural field. Sensor node is a microcontroller based Arduino including connected sensors and wireless module [1]. Data acquisition, ecological monitoring, and precision farming can be done as described in the paper WSN in agriculture by usage of multilevel sensor network [2]. While considering different factors for agriculture like electricity and sunlight water is one of the major requirement, so conserving existing water resources and managing it for agriculture is very important. Conservation is possible by using IoT monitoring farm and by using cloud based analysis [3]. Farming depends on various aspects like weather, yield and so on. Agriculture can give better production by using big data analytics and distribution channel in spite of varying weather condition [4]. Robotization is one of the developing advancements developing in every one of the fields, all things considered in this paper mechanized control highlights with most recent electronic innovation is proposed. Microcontroller which turns the directing engine ON and OFF on recognizing the moistness substance of the earth enables the GSM to telephone line to gauge the temperature and mugginess through applications [5]. To make agriculture more advanced Zigbee network, protocol stack, WSN, and Zigbee applications are utilized with sensors in crop field area [6]. There are many methods adopted for smart agriculture and analyzed how the automated system is used to make effective utilization of water resources for agriculture using GSM [7]. Automatic irrigation system is a good thought but the problem is over or under watering hence the need for regular irrigation system is proposed in the IoT based smart irrigation system [8].

3. PROPOSED SYSTEM

This paper work aims to create an appropriated Farm Management System by estimating the quality and accommodating the mercantile soil sensors. The system consists of two subsystems called the master and slave, Raspberry-pi is the master node and wireless sensor units act as slave node. They are bundled with an experiment

sensor to detect the wetness in the soil. Raspberry pi is then integrated with these sensors. The analog signals received from the sensors are sent to the ADC (analog to digital converter). Then the Raspberry pi receives the converted data. IOT embedded web based application is developed for monitoring and controlling the devices remotely any time and from anywhere. The database or the servers collects information from the sensors. Proposed framework assist client with enhancing standard and size of their homestead yield by watching encompassing temperature, dampness, soil dampness content, and furthermore recognizes fire if happened in the ranch by any way. Every task mentioned is performed without human interaction. By using wireless sensor networks and IoT system can be efficient. The Smart farm Monitoring System is mainly made of three parts: sensor networks, raspberry pi and IoT Interface. Fig.1. Illustrates the system block architecture on how the Smart farm monitoring system for agriculture works.

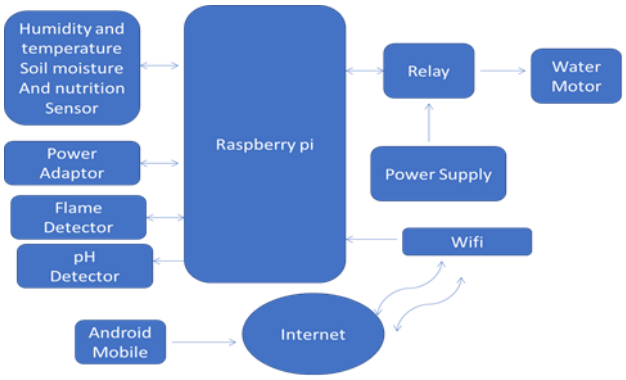

Fig -1: Block diagram of Smart Farming.

4. EXPERIMENTAL RESULTS

Smart farm monitoring system consists of wireless sensing devices that are placed in agricultural areas to gather data such as moisture, temperature, humidity and fire. Using Master Slave communication model the gathered information are communicated to Raspberry pi via Wi-Fi. 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 web application based on IoT platform which is the user alliance allows the users to maintain a 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 comes in the areas of agricultural fields, agricultural research stations, cultivation areas and nursery plants. Fig.2. represents the architectural representation of the Smart farm monitoring system. This system setup shows how the sensors can be deployed in the agricultural field by taking a planter for example. This setup can be useful in any kind of the agriculture field and can get better yield.

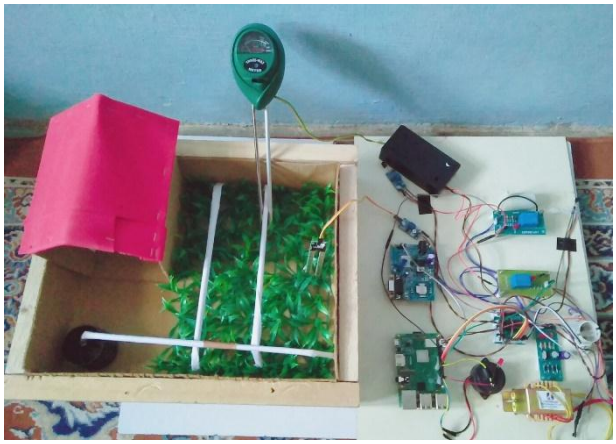

Fig -2: System setup for Smart Farming.

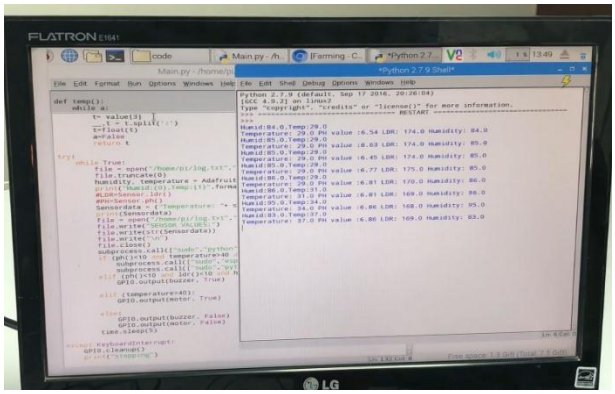

Fig -3: Output Results.

5. CONCLUSIONS

This system of smartly monitoring the farm plays a very important role to farmers as it supports them by providing automated irrigation system with automatic sensing techniques. Farmer can get the information about the agricultural field like humidity, temperature and moisture content of the sand through android mobile. The goal of Smart farm monitoring system is achieved by these practical applications of sensors manufacturing tools. Many hurdles for enactment, including reservations by the agriculturalist have been achieved by the recent year's rapid technological approach and evolution.

6. FUTURE ENHANCEMENT

Blockchain for Managing Agricultural Finances:

Underlying the agri-food systems is the essential data and information on the natural resources that support all forms of farming. Data and information flow while products flow from inputs to output through various value-adding stages as well as financial flow from output to inputs. Different actors and stakeholders generate and manage data and information as per their needs and capacities. Smart agriculture is featured by the utilization of ICT, internet of things (IoT), and various modern data collection and analysis technologies including unmanned aerial vehicles (UAV),

sensors and machine learning. A key issue of establishing smart agriculture is developing a comprehensive security system that facilitates the use and management of data. Traditional ways manage data in a centralized fashion and are prone to inaccurate data, data distortion and misuse as well as cyber-attack. For example, environmental monitoring data is generally managed by centralized government entities that have their own interest. They can manipulate the decision-making related to data.The blockchain technology serves to store data and information that various actors and stakeholders generate throughout the entire value-added process, from seed to sale, of producing an agricultural product. It ensures that the data and information are transparent to the involved actors and stakeholders and all recorded data are immutable. Figure 1 shows how what type of blockchain (permissioned or permission less) used on what kind of platform (Ethereum or Hyperledger) along with which consensus mechanism [Proof of Work/Proof of Stake and (Practical) Byzantine Fault Tolerance] might be suitable to collecting data and information at different stages in crop agri-food systems. The blockchain technology generates security through decentralization rather "security of obscurity" that traditional technologies rely on (Ibm Institute for Business Value, 2015). Distributing data to stakeholders' computers all is less vulnerable to data loss and distortion than storing data in servers centrally managed by administrators. A blockchain is a database that contains timestamped batches of transactions and activities related to a product. Storing data in servers centrally managed by administrators are more vulnerable to loss and distortion than distributing them to servers on the Internet. The database is incredibly helpful for developing data-driven mobile applications that help optimize farming. Moreover, the blockchain denotes the challenge in creating a comprehensive secure infrastructure for integrating numerous technologies and IoT used in ICT e-agriculture. Many smart farming models are proposed and implemented based on the joint application of IoT and blockchain technology. For example, Patil et al. (2017) propose "a lightweight blockchain-based architecture for smart greenhouse farms." In the greenhouses, IoT sensors act as a private local blockchain that centrally managed by the owner. Lin et al. (2018) propose a blockchain and IoT based smart agriculture framework for general use. The core of the framework is a platform that helps establish trust among actors using blockchain. Agents related to products from its plantation to sale can access the data stored in the blockchain through smart mobile phones. Lin et al. (2017) propose a blockchain-based ICT e-agriculture model for the use at the local and regional scale, in which each actor has a piece of real-time water quality data stored in the blockchain. Many companies involve themselves to the applications of blockchain in smart agriculture. For example, the company Fliament provides devices for connecting physical objects and networks through smart farming technology. It developed penny-sized hardware that can handily be used with existing machines or devices through any connected USB port for securely transacting against a blockchain. Inorder to make their farming practice smarter most farming organization use blockchain. For example, farmland irrigation associations in Taiwan use blockchain to archive the data collectively and better interact with the public (Lin et al., 2017). Each association operates as a "public juridical person" and publish their own data and information about irrigation management to the blockchain that can be accessed by the public. The transparency evokes the public's contribution to irrigation management and increases its efforts to improve water resource use. Over time, the longitudinal database created using blockchain can be used to inform decision-making on such as the construction and maintenance of irrigation canals. Smart agriculture with blockchain breaks the technological barrier for farmers to participate. Importantly, it is better motivated to collect trustworthy data from large farmers rather from smallholders for uploading the blockchain. Large farmers are been involved in blockchain-based smart agriculture and are benefited from it. This thus can create or increase the discrepancy between large farmers and smallholders.

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