Smart Agriculture Using IoT

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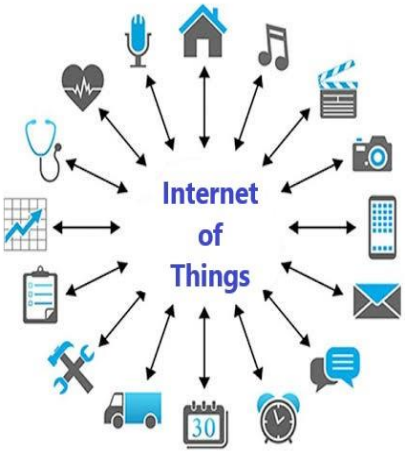
Abstract— The research in agriculture area is improved in many ways to improve the quality and quantity of productivity of agriculture. Many researchers worked on many different types of projects for identifying the soil attributes, different weather condition as well as watching crops. Some worked on fields and some worked on their research labs or poly houses. Smart agriculture is the recent one which plays a vital role in agriculture, for smart agriculture researchers used different types of algorithms and various methods to identify the climate change, weather, condition of soil, status of crops etc. For smart agriculture many have used IOT and also AI (artificial intelligence). Iot plays vital part nowadays in most of the areas that too mainly in Agriculture fields, Smart farming is an upcoming concept because IOT sensors are capable of providing information about what is happening in their fields. This article deals with the prediction of weather, soil moisture, and many actions that are performed using Iot in the agriculture.

Index Terms— IoT, Smart Agriculture, Soil Moisture.

INTRODUCTION

Internet of Things (IoT) is broadly utilized in interfacing gadgets and gathering information data. Internet of Things is utilized with IoT structures to handle and collaborate with information and data. IoT framework is used by clients which can enlist their sensors, and make use of information that are received from the sources. IoT are applicable in different approaches of Utilizations. Applications of IoT are Smart Cities, Smart Condition, Smart Water, Smart Metering, Security and Emergency, Industrial Control, Smart Farming, Home Automation, e-Health and so forth. 'Internet of Things' depends on gadget which is equipped for investigating the found data and at that point transmitting it to the user. The Main use of IoT is there is no need of manual work which means everything is automated in doing work, the IoT device maybe any kind of thing with built-in-sensors which will help the users to do the work. IoT is a device which connects the people through internet and which helps the people to reduce their man work. Nowadays the concept of IoT is more implemented and use by many people which shows the growth of technology. The figure 1 shows the different applications of IOT.

Fig 1. Applications of IOT



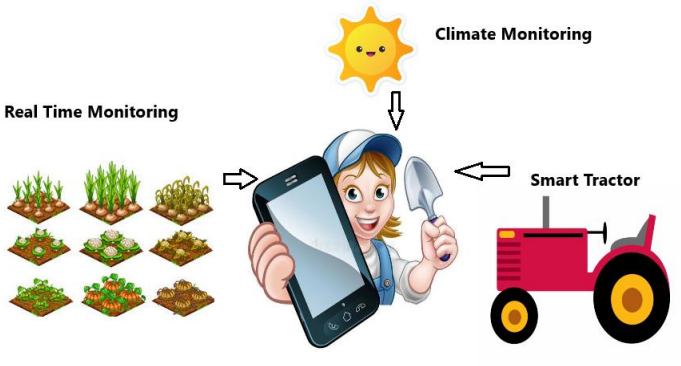
Internet of Things (IoT) in Agriculture

From survey of many countries, agriculture is the most important for the people to survive because without food no one can live in this world. Still many farmers use their traditional and old methods

to do agriculture, which produce less amount of rice, wheat, fruits, vegetables, etc. since the population increases day by day the need of food is in more demand. Agriculture is the basis for the human species as it is the main source of food and it plays important role in the growth of country's economy. The agriculture gives more employment to the people and many opportunities for their growth but many doesn't know how to do smart work in it. So, the crop cultivation can be increased by using automated machineries, for that we should implement modern technologies and some basic ideas in it. By using IoT we can expect the increase rate in production and also the work of mankind will be reduced comparatively. The combination of traditional methods with latest technologies as Internet of Things and Wireless Sensor Networks can lead to agricultural modernization. There are many factors which stops us by using IoT device to do smart agriculture. Agriculture is fully based upon the nature like rain, weather, soil condition, which is unpredictable by humans. Attacks of insects, pests can be controlled by using pesticides and also the attack of wild animals while crop is growing should be prevented for the better production of crops. IoT used for environmental monitoring helps us to know about the air, moisture, soil, methane level, and also monitoring the intrusion of animals into the fields. IoT in agriculture can be a pathway between agriculture fields and farmers, because farmers can't track their entire field all the time manually but it is possible using IoT device.

The figure 2 shows the functionality and applications of the IOT in agriculture.

Fig 2. IOT applications in agriculture



A. Literature Review

Prof. K. A. Patil and Prof. N. R. Kale published a paper regarding smart agriculture using IOT (Internet of Things). The problem that they discussed is climate change and rainfall has been a problem for every farmer over the decades. Due to that smart agriculture is invented by many Indian farmers. Smart agriculture is nothing but the automated and directed information technology used with IOT. A combined approach with internet and wireless Communication, Remote Monitoring System (RMS) is proposed by the authors, their major objectives is to get the real time data of agriculture environment and to send the message through Short Messaging Service (SMS) and intimate the farmers [1].

Meonghun Lee1, Jeonghwan Hwang2, and Hyun Yoe3 published a paper regarding smart agriculture using a industrial, logistics. The authors discussed about agricultural production framework for balancing out free market activity of farming items while building up nature sensors and forecast framework for the development and creates measure of edits by social occasion in its natural data. As of now, the request by utilization of rural items could be anticipated quantitatively, so the climate change, sickness of crops and soil condition and so on couldn't be anticipated by their own. so that the free market activity of agricultural items has not

been controlled appropriately. To overcome these problems, they have used IOT sensors to eradicate the problems faced by farmers. They have used unique technique to solve this problem [2]. Diego Inácio Patrícioa, Rafael Riederb published a paper regarding scouting the grain crops using Artificial Intelligence (AI). Grain production plays an important role in the global economy. In this sense, the demand for efficient and safe methods of food production is increasing. Information Technology is one of the tools to that end. Among the available tools from the results of the systematic review, it is possible to identify great opportunities, such as the exploitation of GPU (Graphics Processing Unit) and advanced artificial intelligence techniques, such as DBN (Deep Belief Networks) in the construction of robust methods of computer vision applied to precision agriculture [3].

Dr. D.K. Sreekantha, Kavya.A.M published a paper regarding a crop monitoring using IOT (Internet of Things). The authors what they propose is collecting information about conditions like weather, moisture, temperature and fertility of soil, crop online monitoring enables detection of weed, level of water, pest detection, animal intrusion in to the field, crop growth, agriculture. So, they use Wireless sensor networks are used for monitoring the farm conditions and micro controllers are used to control and automate the farm processes. They use this technique to view remotely the status of the crops, fields, weather in the form of image and video, wireless cameras are also used. The only thing that farmer need is the smart phone to view the status. IOT technology can reduce the cost and improvise the productivity of traditional farming [4].

Prathibha S R1, Anupama Hongal 2, Jyothi M P3 published a paper regarding a crop monitoring using IOT (Internet of Things). Internet of Things (IoT) plays a vital role in smart agriculture. Smart farming is an emerging concept, because IoT sensors capable of providing information about their agriculture fields [2]. The paper aims making use of evolving technology i.e. IoT and smart agriculture using automation. Constant monitoring environmental factors is the major step to improve the yield of the efficient crops. This paper discusses the process of monitoring temperature and humidity in agricultural field via sensors using CC3200 single chip. Camera is interfaced with CC3200 to capture images and send that pictures through MMS to farmers mobile using Wi-Fi [5].

Anand Nayyar and Er. Vikram Puri published a paper regarding a crop monitoring using IOT (Internet of Things). This paper proposes an IOT based agriculture stick which assist the farners by providing live data of temperature, soil moisture for better environment monitoring which leads to smart farming and increase the rate of yield as well as the quality of the yield. The Agriculture stick that has been proposed in this paper is built with Arduino Technology, Breadboard mixed with different sensors. The live data feed can be read from an online portal: Thingsspeak.com. The product being proposed is tested on Live Agriculture Fields giving high accuracy over 98% in data feeds [6].

B. Conclusion

The usage of IOT devices in the field or area of agriculture is a developing concept. Different forms of IOT is being implemented in different levels or stages of agriculture. Even though there maybe few limitations to these devices as well as the method, all the IOT based agriculture results in better yield. One of the major advantages of using IOT in

agriculture is that the device can be utilized for any crop production and it is compatible in almost all climatic condition. Among all the different IOT devices proposed in different research work, the IOT device that is used for collecting weather, moisture, temperature and fertility of soil data using wireless sensor has proven better result in terms of yield as well as the improvement in agriculture method. But still the efficiency of the sensors over time and constant exposure to different climatic condition can gradually reduce.

Since all of the IOT devices proposed in various research work is a combination of different sensor devices which nothing but an electronic device, they are prone to malfunctioning and as well as their efficiency varies due to external factor. Thus, one cannot rely completely on these devices but usage of these devices could improve the quality and quantality of the yield. Since IOT in the field of agriculture is an emerging field, as much as there is appreciation provided for new development a constant need of validating those methods and devices are required.

C. References

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