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# RECENT SURVEY ON IOT APPLICATION: SMART AGRICULTURE

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**Abstract** — In ancient Days Farmers used to figure the maturity of soil and predisposed reservations to develop which to kind of yield. Less concentration about the humidity, level of water and especially climate condition which terrible a farmer increasingly The Internet of things (IOT) is remodeling the agri-business empowering the agriculturists through the extensive range of strategies, for example, accuracy as well as practical farming to deal with challenges in the field. IOT helps in assembly information on circumstances like climate, dampness, temperature and fruitfulness of soil, Crop web based examination empowers discovery of wild plant, level of water, bug location, creature interruption in to the field, trim development, horticulture. IOT techniques utilize farmers to get related with his residence from wherever and at whatever point. Remote sensor structures are utilized for watching the homestead conditions are utilized to control and mechanize the home shapes. In this paper, we presented the survey about the IoT smart agriculture and its techniques to future along future enhancement.

**Keywords —** IoT; Agriculture; challenges; WSN;

## I. INTRODUCTION

Internet of Things (IoT) is an environment of connected physical objects that are available through the internet. Objects that have been allocated an IP address and can gather and exchange information over a network without manual help or mediation. The embedded technology in the objects encourages them to interact with inside states or the outer environment, which thusly influences the decisions taken. Agriculture is considered as the basis of life for the human species as it is them in source of food grains and other raw materials. It plays vital role in the growth of country's economy. It also provides large sample employment opportunities to the people. Growth in agricultural sector is necessary for the development of economic condition of the country. Unfortunately, many farmers still use the traditional methods off arming which results in low yielding of crops and fruits. But wherever automation had been implemented and human beings had been replaced by automatic machineries, the yield has been improved. Hence there is need to implement modern science and technology in the agriculture sector for increasing the yield. Most of the papers signifies the use of wireless sensor network which collects the data from different types of sensors and then send it to main server using wireless protocol. The collected data provides the information about different environmental factors which in turns helps to monitor the system.



 

Monitoring environmental factors is not enough and complete solution to improve the yield of the crops. There are number of other factors that affect the productivity to great extent. These factors include attack of insects and pests which can be controlled by spraying the crop with proper insecticide and pesticides. Secondly, attack of wild animals and birds when the crop grows up .There is also possibility of the first when crop is at the stage of harvesting. Even after harvesting, farmers also face problems in storage of harvested crop. So ,in order to provide solutions to all such problems, it is necessary to develop integrated system which will take care of all factors affecting the productivity in every stages like; cultivation, harvesting and post harvesting storage. This paper survey about what is useful in monitoring the field data as well as controlling the field operations which provides the flexibility. The paper aims at making agriculture smart using automation and IoT technologies. The highlighting features of this paper includes smart GPS based remote controlled robot to perform tasks like; weeding, spraying, moisture sensing, bird and animals caring, keeping vigilance, etc. Secondly, it includes smart irrigation with smart control based on real time field data. Thirdly, smart warehouse management which includes; temperature maintenance, humidity maintenance and theft detection in the warehouse. Controlling of all these operations will be through any remote smart device or computer connected to Internet and the operations will be performed by interfacing sensors, Wi-Fi or Zig bee modules, camera and actuators with micro-controller and raspberry pi.

## ARCHITECTURE OF IOT INAGRICULTURE

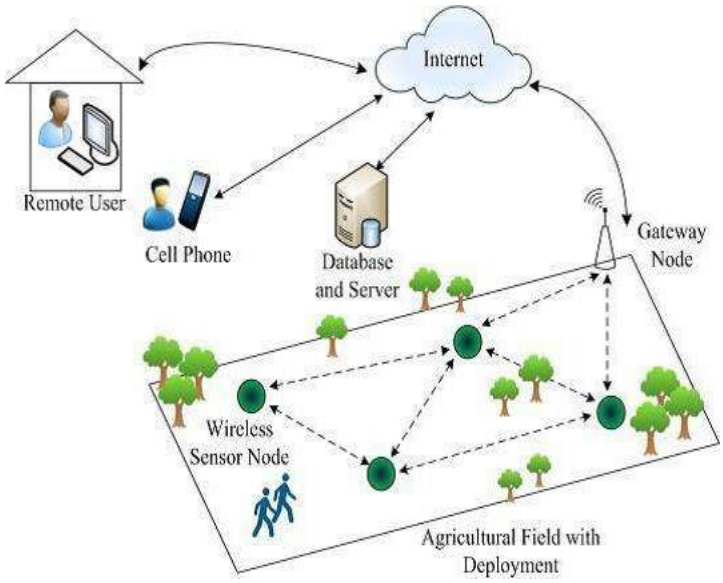


Fig 1: Basic architecture of IoT in agriculture

- **Smart Agriculture or Smart farming**

Data, tons of data, collected by smart agriculture sensors of soil quality, crop's grow etc. For, better control over the internal processes and, as a result, lower production risks. Thus enhances product quality and volumes which leads to high revenue.

- **Crop management**

The premier function is to monitor the crop growth utilizing digital means. This will give the accurate values of different parameters upon which the growth depends. Other than this, it will help the farmer to monitor more than one agricultural land at the same time.

- **Green house automation**

Greenhouse Automation Systems work around the clock to enhance the climate in greenhouse, increase crop yields, and reduce energy costs as well as labor costs. The system protects the entire green house against the weather conditions and immediately notify you with and alarm should something go awry, giving you the freedom to not have to monitor the greenhouse at all times yourself.

- **End-to-end farm management systems**

A sequence of activities that can be automatically or physically allotted to a user or set of users that will help to complete a task

## CHALLENGES IN IOT AGRICULTURE

**Deficient production information:**

- Less knowledge about the weather forecast
- Not enough sales distribution information.



 

- Poor ICT (Information and Communication Technology) infrastructure and ICT illiteracy.
- Lack of awareness among farmers about the benefits of ICT in agriculture.
- Marketing research skills and research Centre.
- Drastic changes in the climatic conditions
- Lackofinterestinagriculturepro fessionamongyoungandeducatedprofessionals.
- High cost machineries for work.
- More manual work.
- Keeping a track of record manually.

## LITERATURE SURVEY

It reviewed the variations of WSNs and their potential for the advancement of various agricultural application improvements. It features the main agricultural and cultivating applications, and examines the appropriateness of WSNs towards improved performance and profitability. It groups the system architecture, node architecture, and communication technology norms utilized in agricultural applications. The real-world wireless sensor nodes and different sensors such as soil, environment, pH, and plant-health are likewise listed. It present a thorough review of the state-of-the-art in WSN sending for advanced agricultural applications. It presented the system and node architectures of WSNs, the related factors, and classification according to distinct applications. It overview the different available wireless sensor nodes, and the various communication methods followed by the senodes[1].

Precision Agriculture (PA) utilized WMSN to enable proficient irrigation. It depict about IoT and WMSN in agriculture applications especially in green house environment. It can be explained and demonstrated the efficiency of feedback control technique in green house crop irrigation. A test was led to see the distinctive these two strategies. The techniques are irrigation by schedule or feedback based irrigation. Irrigation by schedule is to supply water to the plant at explicit time-spans. Feedback based irrigation is to irrigate plant when the moisture or level of media wetness came to predefined esteem. The test demonstrates that there is an average savings of 1,500ml for everyday per tree. In a greenhouse environment using WSN or WMSN, the test indicates specifically that a close loop system or an automatic irrigation is better contrasted to scheduled irrigation. Automatic irrigation will optimize the usage of water and fertilizer and further more keep the wetness or moisture level of the crop to be about at the similar level as advised by agronomist [2]. The Wireless Sensors Network (WSN) is broadly used to implement decision support systems. These systems overcome numerous issues in reality. The major interesting field having an increasing need of decision support systems is Precision Agriculture (PA). Through sensor networks, agriculture can be associated to the IoT, which enables us to make connections among agronomists, farmers and crops instead of the geographical differences. With the help of this methodology which gives real-time data about the lands and crops that will enable farmers make right decisions. The significant advantage is implementation of WSN in Precision Agriculture (PA) will reduce the usage of water fertilizers while maximizing the yield of the crops and further more will help in investigating the weather conditions of the field. It isolates the control of the entire deployed frame work in a single system. Which will make it simple to deal with and better understanding of the results by naïve users. Just as it keep the farmer updated by the notifications for almost every related event that happens in the field. It mainly focuses the sensor network structure that empowers connecting the agriculture to the IoT. The connection sets up the links among agronomists, farms, and in this way improves the production of agricultural items. It is a comprehensive system intended to accomplish precision in agriculture [3].

WSN is an alternative and efficient approach to solve the farming resources optimization and decision making. Precision agriculture systems dependent on the internet of things (IOT) technology is explained in detail particularly on the hardware and network framework and software process control of the exactness of irrigation system. The system collect analyze and monitors information from the sensors in a feedback loop which activates the control gadgets based on pre-determined threshold value[4]. Smart GPS based remote controlled robot to execute tasks like weeding, spraying, moistures ensign, bird and animals caring, keeping vigilance and so forth. Besides it includes smart irrigation with smart control and intelligent decision making based on accurate real time field information. Finally, smart ware house management which incorporates temperature maintenance, humidity maintenance and theft identification in the warehouse. Controlling of every one of these operations by using any remote smart gadget or computer connected to Internet and the tasks will be performed by interfacing sensors, Wi-Fi or Zig Bee modules, camera and actuators with micro-controller and raspberry pi[5]. Monitoring temperature and humidity in the agricultural field by the use of sensors use CC3200 single chip. Camera is interfaced with CC3200 to catch pictures and send that images through MMS to farmers mobile using Wi-Fi. CC3200 is the main block of this proposed framework comprises of microcontroller, network processor and Wi-Fi unit on same die. It is portable, low power for battery-worked, secure and quick connection.



 

Environmental conditions variations will influence the general yield of the crop. Plants require legitimate quite certain conditions for optimal growth and health. Observing the condition of crop field is especially vital so sensors are used. Temperature infrared thermopile sensor-TMP007 is utilized, it as worked in digital control and math engine. It detects the temperature values in real time and humidity sensor HDC1010 track the overall moisture of air inside the farming field. Camera is interfaced with CC3200 camera booster pack by means of PC Busing MT9D111 camera sensor. This is utilized to capture current pictures of the specific field those pictures are sent to the farmer through GPRS[6]. E-Agriculture Application dependent on the framework comprising of KM-Knowledge base and monitoring modules. It portrays the advantages of having ICT in Indian agricultural sector, which demonstrates the way for rural farmers to replace portion of the conventional strategies. Observing modules are exhibited using different sensors for which the information sources are fed from Knowledge base. A prototype of the mechanism is done utilizing TICC3200 Launch pad interconnected sensors modules with other important electronic gadgets. A comparative study is made between the developed system and the current systems. The system overcomes limitations of traditional agricultural methods by using water resource effectively and furthermore reducing labor cost[7].

An automated irrigation system to reduce water usage in agriculture by consolidating the Internet of Things (IoT), cloud computing and optimization tools. The automated irrigation framework deploys low cost sensors to detect variables of interest for examples oil moisture, pH, soil type, and weather conditions. The information is stored in Thing speak cloud service for monitoring and data-storage. The field information is transmitted to the cloud utilizing Wi-Fi modem and using GSM cellular systems. The nano optimization model is used to figure out the optimal irrigation rates which are automated using a solenoid valve controlled utilizing an ARM controller (WEMOS D1). The factors of interest are stored in the cloud and offered as a support to the farmers. The proposed methodology is shown on a pilot scale agricultural facility and our outcomes demonstrate the reduction in water usage, increment in data availability, and visualization [8].

## CONCLUSIONS

Internet of Things is a new revolution of the Internet it is a key research topic for researcher in embedded, computer science information technology a read due to its very diverse area of application heterogeneous mixture of various communications and embedded technology in its architecture.

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