A Comprehensive Study with Challenges of Internet of Things (IoT) based Model for Smart Farming

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Abstract: In most developing countries, the majority of the population heavily rely on agriculture for their livelihood. The yield of agriculture is heavily dependent on uncertain weather conditions like monsoon, soil fertility, availability of irrigation facilities and fertilizers as well as support from Govt. The main challenge in this study if the agricultural yield which is quite less compared to the effort put in due to inefficient agricultural implements and lack of knowledge on the other hand. It is therefore essential for the farmers to improve their harvest yield by acquisition of related data such as soil condition, temperature, humidity, availability of irrigation facilities, availability of manure etc and adopt smart farming techniques using modern agricultural equipment. A trend has started amongst the farmers to shift from traditional conventional farming to smart farming using the Internet of Things (IoT) technology, which can help improve yield with reduced effort at economic cost. The main focus of this paper is to present work related to these technologies in the agriculture field. This also presented their challenges & benefits related to smart farming. For improving the system, IoT will interact with other useful systems like Wireless Sensor Networks. It can help for understanding the job of data by using IoT and correspondence advancements in horticulture division. This will help to motivate and educate the unskilled farmers to comprehend the best bits of knowledge given by the huge information investigation utilizing smart technology and also provide data analysis in terms of temperature, humidity that can help farmers to reduce computation time. It will also help to identify water utilization in prior.

Index Terms: Agriculture Technology, Data Analytics, IoT, Smart Farming, Smart Agriculture, Smart Technology, Wireless Communication etc.

1. Introduction

With the updation of technology in today era, the use of artificial brains becomes more popular as compared to the normal brain. The human generates smart technological equipment by the use of artificial intelligence. The term IoT is basically 'Internet of Things' that uses the concept of a Three-phase model mainly communication, cost-saving & automation by use of technology. The IoT emerging work provides a novel solution that can help to improve various aspects in the farming sector. The collection of data can be easier in this decade due to the use of smart technologies in rural areas. This is due to development in all layers of the network that provides better communication nowadays. This technology becomes a hot subject in modern studies and is equally used in all fields to improve product innovation is moreover connected with remote innovation, this innovation is comprehended as Wireless Sensor Network (WSN). These networks are used for measuring data, act as a transmitter and receiver, and can behave as a data storage device. The signal is taken by the recipient that at that point changes over the remote radio signal into the predetermined

message. The job of IoT innovation is frequently applied in human life to help gadgets to get data rapidly and extra precisely. Numerous applications might be finished by this innovation is inside the utilization of soil sensors. This gadget can offer data regarding the different parameters inside the soil of the farm. Nowadays, the IoT advancement has been gotten famous in various fields, for example transportation, mechanical automation, human administrations, clinical medicinal services, agribusiness, vigilant condition, individuals and society. It also handles various troublesome issues. The Internet of Things is positively assisting with taking care of the current issues of low proficiency of plant structure, and help to achieve the fast and proficient improvement of cultivating. Agriculture data can in like manner be accumulated by methods for the Internet of Things, and the tremendous data taking care of development is used to experimentally administer crops and related assets, thereby accomplishing proficient creation process. Sensors could be gathered all the information on that field at a specific time and circumstance.

Agriculture is the main subject of economic growth in India. It is the major source of food in most parts of India. During the lockdown period, people can survive only by agricultural efforts. Change in climate now becomes a major barrier in the farming process that contains huge rainfall, disasters, excess heat, etc. Fig.1. shows the importance of IoT in the agriculture field. These are the major factors on which agriculture with IoT depends to improve its performance. Due to advancement in technology, it can help to improve or survive millions of people in India.
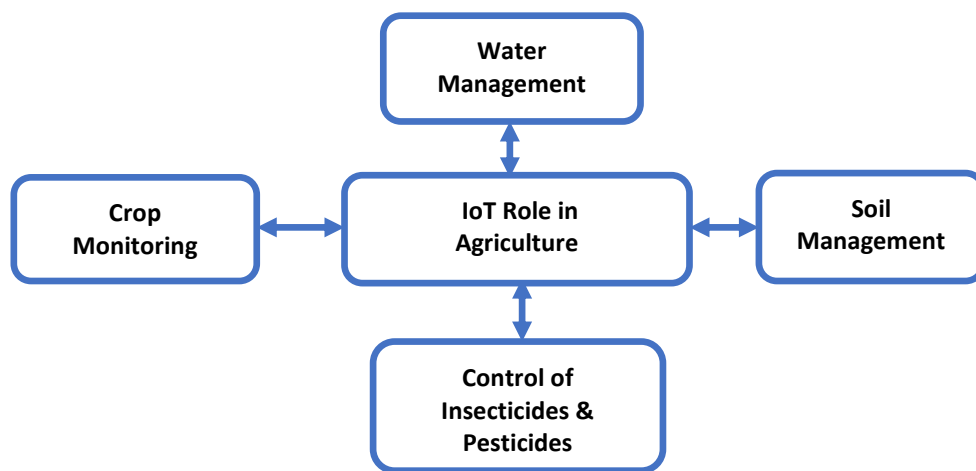

Fig.1. Importance of IoT Role in Agriculture [1]

The major advantage of the use of IoT in Farming or cultivation work is to share the recent advancement of technology use with farmers. The other benefits are described as below:

- Water wastage can be minimized by the use of technology with IoT
- Land monitoring with necessary precautions provided
- Can help to increase productivity
- helps to reduce manpower by use of technology
- Parameters related to Soil management can be traced
- helps to identify disease management in crops

This work describes a considerable review on Agriculture with IoT. This includes existing work of some researchers with their challenges & benefits. The remainder description of paper is as per the following; Section II described the use of IoT system in Agriculture field. Section III examines the surveyed work presented by different researchers in Agriculture IoT Field. Section IV presents the major gaps identified during this study. Some work to be done against these gaps with design architecture are presented in section V. Section VI described the main conclusion part & some suggestions for the future.

2. IoT System for Agriculture

This section presents brief description of Smart Agriculture with IoT as presented in Fig.2. The IoT system for agriculture is used as a technology to improve high level of productivity with efficiency in smart way. It also helps the system to perform better with economic cost. It comprises some important components such as:

- *Sensing Devices*
- *Technology for Communication*
- *Internet*

- *Processing & Storage Devices*

A. Sensing Devices

The sensing devices comprise of some actuators with connected sensors. These are known as smart sensors in IoT. These sensing devices generally consists of an embedded system with large number of electronics components embedded on it, it also comprises sensing modules, some memory chips, interfacing input & output device module, modules for communication purpose in this system. These sensing modules are used for sense real time data from field and act as a monitoring device. Some examples are location sensor, temperature & pressure sensor ,etc. Table 1 provides the description of sensing devices which are useful for smart agriculture.

Table 1. Description of Sensing Devices

Sensor Types	Applications of Sensors
Optical Sensor	To Measure Properties of Soil by use of Light
Mechanical Sensor	To Measure mechanical Resistance by use of Probe
Electrochemical Sensor	To Measure flow of ions in Soil by use of Electrodes
Location Sensor	To Measure the exact location by use of GPS

B. Technology for Communication

This is an important part of IoT system. This communication can be classified into short range and long range communication based on range of devices for communicate. It consists of some standards, spectrum etc. Fig 2 shows the smart agriculture system with IoT. It consists of field monitoring by drones, water management, sensors for soil monitoring and machines for routine work etc.
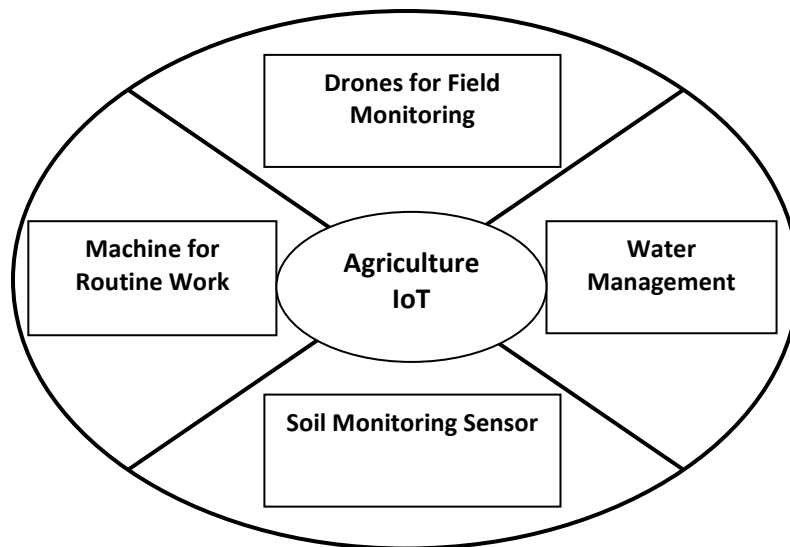

Fig.2. Smart Agriculture System with IoT [2]

The spectrum is basically licensed and non-licensed. The unlicensed band generates large number of issues like interference and security related issues. This interference interrupt the radio signal for communication and affect the bandwidth utilization with poor system performance. While licensed spectrum provides better communication with security and proper management of traffic with bandwidth utilization.

C. Internet

Due to advancement in technology, Internet plays an important role in today's life and is growing day by day. Internet has its own network with large number of layers. These layers are used for data transmission & reception. Internet provides a path for exchange of information between corresponding networks at a very fast rate.

D. Processing & Storage Devices

It comprises various devices for processing & storing data in network or server. The data can be of any form like image, text, audio etc. This information can be of any form like historic, real time or sensing data etc. The server allows to save this information into the cloud for further use.

The analysis of data with IoT plays an important role in Smart Agriculture. This is used in the system to improve its efficiency and reducing time. There are large number of ways for improving system performance like interfacing of WSN with IoT or image processing with IoT ,etc. The main benefits of use of IoT in agriculture are described below:

- *For Promoting Community Farming*
- *To provide food safety & prevention from Fraud*
- *Can enhance the productivity*
- *Can establish new business models*
- *Reducing the Waste & Cost*

3. Existing works Related to IoT in Agriculture

The research in the agriculture sector can help to enhance the utilization of manpower as well as its productivity. It can be done by the use of smart work done in this sector by the use of IoT. IoT is a combination of different kinds of sensors and WSN that watch each circumstance of phases of conditions like water level, stickiness, ph value, temperature, development of creatures, dampness content in soil, etc. Various smart works were proposed for reasonable farming observing dependent on IoT time. The machine assumes an incredible job in measurements shooting, preparing, transmission and gathering capacities. The fundamental motivation behind their tests is to acknowledge brilliant agribusiness gadget, in which the machine productivity is to control the environment field and lower the expense of cultivating charge and spares vitality utilization. Because of this module horticulture checking will get programmed and creation will be expanded. This module clarifies sharp checking and control of climate conditions and replaces the conventional focused on age to Wi-Fi, additionally reducing labour costs. A module is proposed for crop development which can be observed utilizing a warm creative mind system. Here, the water system temperature appropriation size method has been placed into development. In real-time, the caught data including caught values gives an improved water system.

A methodology to survey utilizing Wi-Fi module systems utilized in actualizing computerizing farmer framework and realities is passed on to the Arduino module through GSM correspondence. The various sensors are executed and used to encounter the temperature estimation, stickiness estimation, ph estimation, dampness estimation and impediments for the harvest following. At the point when the specific estimations of any parameter which is under perception go beneath then just notice is given by sensor to the farmer through a content short message. In IoT SMS caution device is fused using a GSM shield. The farming area is advancing by incorporating a few key rising innovations towards another and well encouraging period of agribusiness nourishment creation. Table 2 presented the recent related work done with IOT with the agriculture field. It provided the latest work done related to smart agriculture.

Table 2. Recent Review Work on IOT in Agriculture

Authors	Reviewed Area
G. Suciu et al. [21]	Smart Agriculture Monitoring Technique using IoT
Saha et al. [11]	Drone based Technology in Agriculture Field by IoT
Amandeep et al. [2]	Smart Farming using IoT
Mohanraj et al. [18]	Automation with Monitoring of Agricultural Field by IoT

IoT may be defined as the combination of different networks or technologies that mixed together and expands due to growth in internet technologies. In latest study, Wi-Fi and mobile technologies are mostly preferred over other technologies[1].Amandeep et al. introduced a novel structure way to deal with improve the creation. Brilliant cultivating with the assistance of IOT had been structured. A remote-controlled vehicle worked on both programmed and manual modes, for different agribusiness activities like splashing, cutting, weeding and so forth. The controller continued checking the temperature, mugginess, soil condition and in like manner supplies water to the field [2]. A. Boursianis et al. depicted the primary standards of IoT innovation, including smart sensing, systems and conventions utilized in agribusiness, just as IoT applications and arrangements in keen cultivating. Besides, it introduced the job of UAV innovation in savvy farming, by examining the utilization of UAVs in different situations, including water system, preparation, utilization of pesticides, weed the board, plant development observing, crop sickness the executives, etc. Besides, the usage of UAV frameworks in horticultural situations was additionally broke down [3-4].

A study showed the use of RFID technology can help to improve crop production with combination of WSN technology because of low power consumption. D. Glaroudis et al. offered a forward-thinking study of research endeavours on the IoT application layer conventions, concentrating on their essential attributes, their exhibition just as their ongoing use in horticultural applications. Besides, it gave an examination among them, as far as all-around acknowledged key execution pointers and remarks on their reasonableness in the structure of brilliant cultivating just as

the relating difficulties that must be looked towards their product usage [5]. Pratibha et al. introduced utilizing developing innovation for example IoT and shrewd agribusiness utilizing robotization. Observing natural elements was the central point to improve the yield of the effective harvests. Spreading of information was finished by Virtual Machine arrangement. The significant difficulties right now treatment of transmission capacity use and deferral in information handling [6]. N. Nawandar et al. focused to build up a minimal effort clever framework for the shrewd water system. It utilized IoT to make gadgets utilized in the framework to talk and interface all alone, with abilities like administrator mode for client cooperation, once arrangement for water system plan estimation, neural-based dynamic for savvy backing and remote information checking. An example crop proving ground had been decided to introduce after-effects of the proposed framework, that incorporate water system plan, neural net dynamic and remote information seeing. The neural system gave expected knowledge to the gadget that considers current sensor info and veils the water system plan for an effective water system [7].

R. Anitha et al. proposed a type of system by which an agriculturalist can take information regarding his field from anywhere in India. It can only be possible by the use of smart automation with IoT that helped human life easier. It isn't just give comfort yet besides effectiveness and efficiency. For this, the researcher used smart technology for irrigation purposes that included Raspberry pi with Weather API. This tool was used to optimize water level in farming and also provide alertness to the respective farmer [7-8]. R. Mythili et al. supported reasonable IoT based Agriculture Stick as agriculturalist help by getting Live information (Temperature, Soil Moisture) of homestead information. These live readings helped the agriculturalist to attempt sharp cultivating and to expand their normal harvest yields, likewise the nature of plants. The Smart Agriculture with Arduino Technology bolsters the agriculturalist to control the live homestead information and get the ideal yield development results [8-9]. C. Balamurugan et al. presented the use of sensing with IoT in the field of farming. It provided a system with the help of a cloud that collected the data of farming and gets stored in it by the use of IoT. This was used to reduce human disturbance and can handle off the field. This introduced the connection of the hardware system with IoT to improve the efficiency of the system and also reduced time complexity.

N. Putjaika et al. proposed a cultivating framework with Intelligence to improve the creation procedure in planting. It consisted of a combination of sensor & control framework that helped to improve system intelligence. This work mainly focussed on control parts that were used for sensing the data in farming by the use of a smart sensing system and then data was transmitted successfully to the cloud part. Since the detected information would not be constantly precise because of clamors, it applied Kalman separating to smooth the information before utilizing it as a contribution to our dynamic procedure. For the dynamic procedure, we don't consider just the detected information, yet besides the climate data. A choice tree model is produced to foresee the climate condition [10]. A. Saha et al. [11] gave that method by using drone fitted cameras, sensors and other useful sensing modules that helped in accomplishing simple, proficient, exactness horticulture. The author suggested that the interconnection of the drone system with advanced technology and IoT can improve the efficiency of the system and also reduced time complexity.

M. Naresh et al. introduced another framework coordinating the in-vehicle CAN/OBD organize and an IoT system of remote gadgets with an Intelligent Transport System sent adhering to the benchmarks discharged by ETSI inside the Technical Committee. Through the use of IoT, farmers can take the information from time to time at any point. They can take climate-related information and take necessary actions against them. The use of remote cameras with sensing devices helped to improve productivity and optimize the loss [12]. N. Suma et al. discussed a controller-based system in which various types of sensing devices were attached like moisture sensors, temperature sensors, etc. Location was traced by GPS and other security devices were also attached. They were used for detecting real-time climate change as well as a change in water level in the agricultural field. This work was used for the betterment of Farmers and helped to improve their productivity [13]. O. Savale et al. introduced that with the use of IoT, the system allowed to connect agriculturalists and agronomists that also helped to connect with the geographical response system. With the assistance of this methodology which gave constant data about the terrains and harvests that will assist agriculturalists with settling on the right choices. The system was significant in terms of various utilization of parameters during yield of harvesting & also to estimate climate state during work in the field [14].

O. Elijah et al. introduced the concept of IoT with analytics to enhance the system performance in smart agriculture. In this work, wireless sensor networks played a crucial role in IoT to connect data and for proper utilization of resources in the farming field. This work provided a survey related to challenges & benefits with IoT in the agriculture field. It provided the interface of Data analytics with smart technology under IoT, presented their challenges & future outcomes [15]. K. Jha et al. discussed various smart technologies that helped work under smart agriculture. These technologies were IoT, Machine & Deep Learning, Neural Networks & Wireless Sensing Devices, etc. There are some areas in which farmers faced some challenges in the field like management of crop and weeds, control of pesticides, water wastages issues etc. This work provided detailed surveys done by researchers to improve the facilities for farmers in the field. It will be done by the use of automation methods. This work studied crafted by numerous analysts to get a short diagram about the present usage of computerization in horticulture. The work likewise examined a proposed framework that can be executed in organic homestead for bloom and leaf distinguishing proof and watering utilizing IOT [16]. A. Kjellby et al. introduced a system that were using some electronic gadgets in farming. The gadgets were structured utilizing the ultra-low force nRF52840 microcontroller with Bluetooth 5 help and

encompassing vitality reaping. An intensity of 942W was reaped in an indoor domain. The gadgets were along these lines appropriate for both indoor and outside use, as regular daylight will give unquestionably more vitality contrasted with counterfeit indoor lights. The sensor information was transmitted to an entryway, which then transmitted the relevant information to cloud by using network layer [17].

Table 3. State of Art Technology for IoT in Agriculture

Method	Authors	Benefits
Agro Meteorology System by use of IoT for Precision Agriculture	G. Suciu et al. [21]	Useful for Data Transmission and also good for security concept
Crop Management System by using Smart phones with ANN	K.Jha et al. [16]	Technology helped to select Fertilizers and also about which crop was suitable for harvesting
Used a protocol with low power microcontroller & Bluetooth	A. Kjellby et al. [17]	Data Transmission with high efficiency and less delay and also provided optimization in agriculture
Inertial Navigation System based on IoT for Crop Management	A. Saha et al. [11]	Provided Time Reduction as well as improve better cultivation with less amount of Energy
IoT with Data Analytics in Smart Agriculture	O, Elijah et al. [15]	Discussed related to Agriculture Security & Cost
Temperature & Humidity Monitoring in Field using Sensors	S. Pratibha et al. [5]	Provided less power consumption with low cost with beneficial in agricultural fields

Table 3 presented the important work done by some researchers related to smart agriculture based on IoT. It consists of their use of technology and their benefits in brief. The detailed description of some researcher's work based on IoT with Agriculture is described as below. These existing techniques are based on smart system and have some challenges also.

Mohanraj et al. proposed an application which was based on E-Agriculture that contained some modules related to database & knowledge-based. It also provided some monitoring tools in this application for surveying purposes. A Farmer requires useful data from time to time-related to its farms & other requirements. This data was generally spread out and not collected at a single time in traditional ways. This data was only be collected by the use of smart work and some techniques based on IoT. This system was helpful in this way and also reduced its cost and helpful for data collection, water-related information [18]. R. Shahzadi et al. introduced that the agriculture part was developing with the coming of the data and correspondence innovation. Endeavors' were being made to upgrade the efficiency and lessen misfortunes. As the greater part of the agriculturalist were unconscious of the innovation and most recent practices, numerous master frameworks had been created on the planet to encourage the agriculturalist. This work presented a smart system based on IoT that collected important agricultural data proactively and help to prevent the limitations [19-20]. K. A. Patil et al. considered a technology based on sensing devices & IoT and provided a review on agricultural activities based on smart technology. A technology proposed was based on remote sensing devices with wireless data transmission & reception. The main objective of this work was to gather data on real-time from fields & then analysis was done to get significant output .

Maram et al. introduced that the total populace was turning out to be all the more relatively developed land and harvest yield. It was basic for the world to build the yielding of the harvest by receiving data innovation and correspondence assumes an imperative job in savvy cultivating. The goal of this work was to introduce devices and best practices for understanding the job of data and correspondence innovations in the agribusiness part, rouse and make the unskilled agriculturalist to comprehend the best experiences given by the huge information examination utilizing AI [21-22]. G. Suciu et al. meant to show how the handling of Big Data and the idea of decentralized cloud activity can answer the requests of IoT applications in horticulture and how keen cultivating will assist agriculturalist with working all the more proficiently and more made sure about [23]. Another strategy for cost estimation for utilizing in Hybrid-VANET convention was proposed by P. Boonnithiphat et al.. The proposed strategy was increasingly viable in the term of parcel misfortunes and figuring intricacy. It assessed our proposed strategy by re-enactment. The test results demonstrated that our technique improves the parcel misfortunes and bundle delays over Hybrid conventions [24-27]. M. Carignani et al. introduced another framework coordinating the in-vehicle CAN/OBD organize and an IoT system of remote gadgets with an Intelligent Transport System sent adhering to the benchmarks discharged by ETSI inside the Technical Committee on ITS [28-30]. T. Chang et al. meant to assemble a powerful situating and following technique under Ad-Hoc arrange, to upgrade the exactness with GPS or remunerate the sign while missing GPS circumstance. The exploration applied various RSSI signals with a novel scientific calculation and α-β-γ channel to build up an efficient casing, to find and track the moving hub in a dependable range [31-33]. Table 4 shows the summary of IoT based approaches that are used in agriculture field with their challenges and some solutions for improvement in this study. IoT enabled agriculture helps to improve productivity and efficiency in the field. It uses latest technologies for further development. This helps to produce the processes faster with low cost.

Table 4. Summary of IoT Approach in Agriculture

S.N.	Author	Measures	Technology	Challenges in Study	IoT Solution for Issues
1	Venkate et al. [2017] [26]	✓ Soil ✓ Moisture	✓ Wi-Fi ✓ Bluetooth	✓ Cost of Labour ✓ Water Wastage	✓ Can use Smart Sensing Devices for Temperature and water level
2	Zhao et al. [2017, 27]	✓ Water Level	✓ LoRa Technology	✓ High Cost ✓ High Consumption of Power	✓ Can Minimize cost and cover large area
3	Sagar et al. [2017, 28]	✓ Moisture & Water Level	✓ Mobile Tech	✓ High Electricity & Water Consumption	✓ Can reduce the power cutoff
4	Saraf et al. [2017, 29]	✓ Temperature & Humidity	✓ WSN and ✓ Zigbee	✓ Water Consumption issue	✓ Controls the water consumption issue
5	Upadhyay et al. [2017,30]	✓ Water & Moisture Level	✓ Wi-Fi	✓ Water Management issue	✓ Can control and monitor water requirements

4. Gaps in Study

IoT has distorted many companies and their work with agriculture field is not an exception. The IoT has introduced some smart devices, wearable sensors, automated parts etc. However, it brought the greatest impact in Agriculture. As population is increasing day by day and it will almost double in 2050. So, agriculture industry will have to adopt smart IoT things to feed this massive population. The use of IoT is being a driving force for improved production at lower cost in agriculture sector. Some study reports showed that the use of IoT in agriculture can improve the annual growth of 20%. Due to less advance communication network and lack of services in rural areas are facing lot of challenges during implementation work.

Some many gaps or challenges came from a related survey that is associated with IoT in the agriculture field. Some challenges are privacy issues, data security, business-related challenges, social challenges, etc. Profit is very less in the agriculture sector so the use of technology must be cost-effective as well as saving time. There are several technologies in IoT for agriculture that consists only hardware cost one time. After the setup of the system, there is a challenge of real-time data collection by the use of sensors in the agriculture field. Some IoT devices can show a problem of signal interference with other smart devices. Lack of Knowledge in farmers is also a big factor for adopting IoT in the field. Most farmers are uneducated in rural areas and they believe only farming in traditional ways. The data security is also a gap in this study. This data security must be adequate so that no loss of data can happen. The suitable choice of technology for suitable type work is also a big challenge in this study.

With introduction of IoT in agriculture, the use of more sensors are deployed. These are connected to satellite network for implementation. The use of IoT provides helping hand for farmers for monitoring water level in tanks in real time that helps to make an efficient process of irrigation. The use of technology by farmers are done by deploying sensors at each step to monitor everything like time, temperature etc. This technology helped the farmers to reduce their cost and increase efficiency at a same time. But the problems in these devices is to handle its performance and sensing controlling. A IoT system consists of large number of smart devices on a single chip or system for exchanging large number of data. For this, a cloud computing setup is required for storing and analysing large data at a time. Due to requirements of large number of devices at a time, IoT must setup all features on a single chip or system with high efficiency. There are large number of similar issues that linked with IoT applications. The main issue is the security of data that needs to be privately controlled and addressable. The attacker can use the low security data by any means and can use it in wrong way. While installing the technology, the deploy and installation cost of setup needs to be addressable and will be in controlled manner.

5. Proposed Work & Design Architecture

Presently, Manpower management & water utilization becomes a challenge in this field. This work contributes a capable and productive technology framework structure that moves around IoT seeing of cultivating field with the help of Long-Term Evolution (LTE). These days IoT innovation is one in all the quickest developing advancements. An IoT can be a gadget fit for agriculture work which changes all real-time collected data into corresponding electrical signals. Smart Farming is an advanced System that is a mix of programming blocks included substances. The hardware fuses introduced embedded and programming program is the controlling module. Images will be taken by the instrument and then will process by the use of suitable software. There are some challenges that came during study of IoT with Agriculture. These challenges must take into account for further processing or getting some useful output from system. These are presented by Fig.3. below. The main challenges are related to business & technical field. The profit in this work is very small, so business related activities must take into account. This work prefers to consider some technical issues and will design a system that can handle these technical related issues sp that the system performance may enhance. The agricultural field is sensitive with IoT devices installation, because these devices can damage by some animals movement or excess use of water, etc. Electronics components are available in these devices which are very sensitive to unwanted attack. Also there is a limited access of memory in the system. Due to this, IoT will continue to work in these areas to resolve these types of issues related to farming and presents a concept of precision farming.
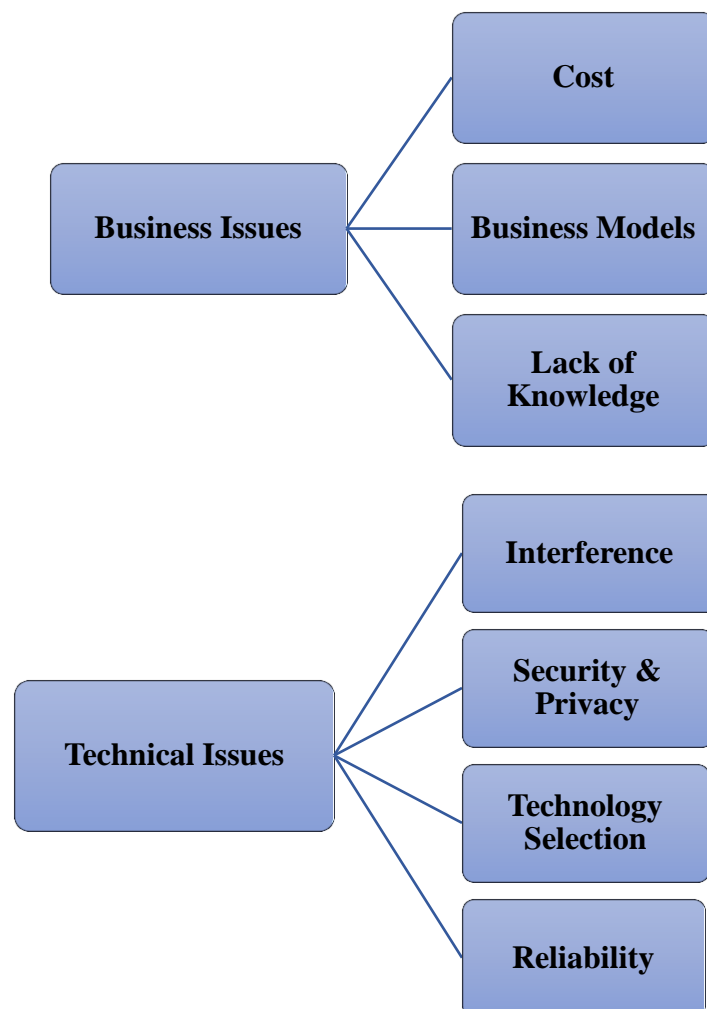

Fig.3. Main Challenges Related to IoT in Agriculture

The use of new deployed technologies will help to improve long range communication. This will help to attract farmers for using these types of technologies with IoT. This system will help to support any type of field or crop. This system will become a platform for universal fields.
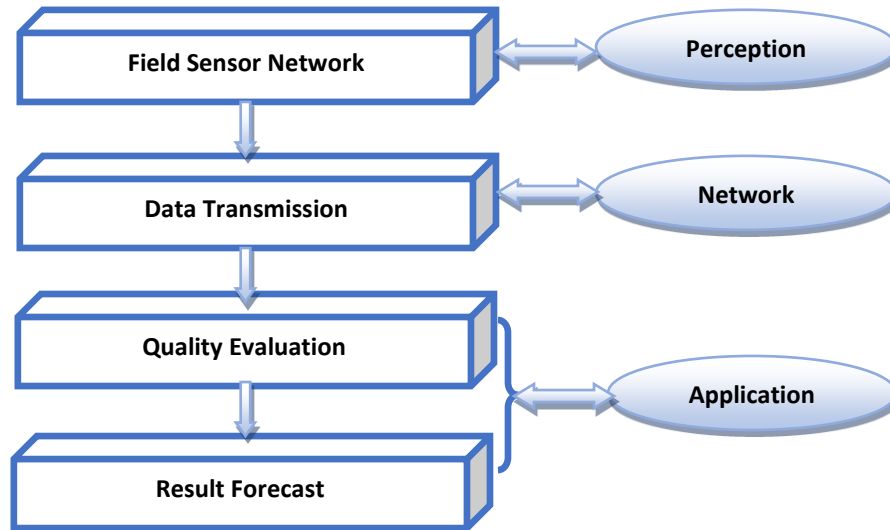
Fig.4. Design Architecture of IoT Based agriculture System

The use of IoT in field will lead to signal interference and can damage the signal strength. Due to this, system can collapse and not providing useful output. There are some other factors that can also affect system performance. Due to this, this work will lead to face these challenges and will design a system that will help to resolve these issues.

This work will design a software-based system using IoT that will interconnect with WSN. This work will use to resolve interference & security related issues in Agricultural Field so that system will achieve higher productivity in less time. For this, Fig.4. shows the system architecture of smart agriculture using IoT. This architecture contains establishment of sensing devices in field where system has to get data in form of images or video. These sensing devices will be GPS, temperature & pressure sensing devices, etc. After sensing the data, these devices will transmit the data to cloud server for further analysis. At the time of sensing, data can be interfered with noise or some can attack by some foreign particles. These challenges must be rectified before final evaluation, otherwise it may generate error or falsification of data. The data will be evaluated in Quality Evaluation phase. The performance will be measured in terms of accuracy of data. Based on this data, further data can forecast for future help. This will lead to increase productivity with high efficiency.

6. Conclusion

IOT based brilliant agribusiness module can demonstrate to be useful for agriculturalists since over just as less water system isn't useful for horticulture. Limit esteems for climatic conditions like dampness, temperature, and dampness can be fixed depending on the ecological states of the specific land area. The framework likewise faculties the inclusion of creatures which is an essential purpose behind the decrease in crops. This framework creates a water system plan dependent on the detected ongoing information from the field and information from the climate conditions. A consistent web network with little transmitting receiving wire is likewise a necessity of this framework which can transmit messages persistently to the rancher. This can be overwhelmed by stretching out the framework to send recommendations through SMS to the rancher legitimately on his versatile utilizing the GSM module rather than a portable application.

In the Future, The IoT technology will continue to introduce new technologies in this field. The introduction of the IoT platform must be universal, can be used for any crop or any field. It will help to modify the system suitably depends upon the situation. The data security will always be a challenging part that must be improved from time to time.

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