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Review Article

A SURVEY ON SECURITY ISSUES IN SENSOR CLOUD ENVIRONMENT FOR AGRICULTURE IRRIGATION MANAGEMENT SYSTEM

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Abstract
Wireless sensor networks are used in various fields, such as military, healthcare, agriculture, environment monitoring, Monitoring and preparation of critical infrastructure. However, due to some of the restrictions of WSNs on storage, power consumption, communication, computation, scalable, security and privacy; people are looking forward cloud environment with large storage framework for the processing and storing of real time data. The cloud environment is providing large storage space and better services to the people in scalable manner. Sensor-cloud infrastructure is popular, providing an open, flexible and reconfigurable platform for many monitoring and control applications. In this work presenting a sensor-cloud infrastructure for storing data related to agriculture, Infrastructure that shows how to transfer data from WSNs to the cloud. In addition we addressed malicious attacks, issues and challenges in sensor cloud infrastructure. The idea of our proposed work is to collect all the samples for the soil. We choose the most favored plants around the India, then, select three plants, namely rice, sugarcane and wheat. After selecting the plants we collect data related to agriculture irrigation from different types of sensors such as soil moisture, temperature, humidity, and soil PH, CO2 and light sensors. Based on the data collected, our proposed system advice to farmers that usage of pesticides, fertilizers which are most suitable to their lands at the same time, we integrate to improve agriculture productivity in India.

Keywords: Agriculture, Security, WSN, Sensor Cloud, SLA, Soil Moisture, Temperature, Humidity, Soil PH, CO2 , Light Sensors, Standardization Issues, Design Issues, Irrigation Management System, Hardware.

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INTRODUCTION

In the India's economy, Agriculture Plays an important role and provides long term employment to the common people. Agriculture depends on climate such as temperature, soil moisture, rain fall and CO_2 resulting in low productivity of crop irrigation; it is an important issue in the developing countries like India. Most of the agriculture problems are connected to inexperienced house management and watching atmosphere. As compared to population growth, the agriculture productivity is very low. So, to improving the productivity of agriculture requires, continuous monitoring of agriculture environment parameters likes temperature, soil moisture, humidity, light, and CO2. To improve the agricultural productivity the land has been monitored continuously and the information regarding environmental condition is been gathered. The collected information on agriculture should be shared among all farmers.

Agriculture irrigation control field used to monitor crop irrigation in a Sensor –Cloud Environment to manage and improve agriculture irrigation. Deploy the various types of sensors listed above and collect information from a variety of sensors. Forward the information to cloud through gateway for storing, further processing, providing the service and alerts to farmers about their crops irrigation. This process will do continuously for the farmers to track the health of their crops.

WSNs provide the effective solutions for different type of large real time applications. WSNs are used in many fields. People are looking towards the cloud environment for processing and storing of WSNs information in accordance with the limitations of WSNs. Here proposed system warns the farmer to take make the right decisions at the right time.

The storage and processing of irrigation data is done through cloud computing technology and at the same time is serviced by cloud technology to end users like agriculture professionals. The cloud computing is a good technology to overcome the limitations of WSNs. Nowadays, Sensor Cloud most popular Technology to provide open, more flexible and reconfigurable to monitoring and controlling the several applications.

The main advantage of our proposed work should be providing proper irrigation of crops. Our Agriculture irrigation management system provides a potential solution to optimize yield and increase the water consumption effectively for fields with availability of water. Along with water regulation and weather conditions, controlling of pest is important to increase the yield, which can be done by farmer, after providing proper information; as well as it corresponding government departments, so they can take proper steps and provide a better agriculture yield.

Issues and Challenges in Sensor Cloud

There are a various types of issues in sensor cloud environment such as engineering, designing, reliable connection, continuous data flow and power issue. These issues need to be addressed when proposing a Sensor-Cloud infrastructure for Agriculture irrigation application. Some major issues in the sensor cloud such as maintenance issues, storage issue, authorization issue,, security and privacy issues, energy efficiency issues, cost issues, interface standardization issues, design issues, hardware and resource compatibility issues.

Design Issue: There are many issues while designing the system in real time scenario for agriculture irrigation, which require

reliable continuous data transfer, fault tolerant from sensors to server.

Storage issue: Storage of data at cloud side (server) and transferring data from sensor devices to cloud must have to be considered. To overcome this issue while transferring the data packet they will add timestamp to that packet and they will send to the server. Most of the data processing is done at server side so the system must be design to avoid the unnecessary data processing because multiple users connected to the system simultaneously. The designed system must be accommodating multiple users at the same time.

Authorization Issue: A web based user interface is used for agriculture professionals to inspect and analyze the agriculture crop related results through remote environment. So the system offer different types roles for users and authenticated via web interface.

Security and Privacy Issue: There are some requirements for security and privacy like data confidentiality, integrity, authentication, while data sending and storing at cloud. While maintain the privacy, better security and privacy policies are demanding to offer the services to agriculture professionals (users).

Energy Efficiency Issue: In agriculture field for continuous monitoring, data collection and transmission sensor devices consuming more energy and it will reduce the lifetime of network. Energy efficiency major issue, so in the middle of sensor-cloud reduce the duplicated data, it improves the energy efficiency.

Cost Issue:

In Sensor Cloud, agriculture professionals access the services via mobile, pc.etc. Here based on user requirement providing a service with price. Price for service is having many issues like.

i) How to set the price?
ii) How to make the payment?
iii) How to distribute the price among all services?

Interface Standardization Issue: The sensor cloud users access the services via web interface. Web interface may have overhead because this interface not particularly designed for mobile or smart phones. Thus, interoperability is a major issue when users access the services.

Hardware and Resource Compatibility Issue: In this case sensors or resources are damaged or lost, due to the Climate changes or whether environment changes. To handle this type issues also important.
The main Challenges of sensor cloud environment such as a network access control, efficient information dissemination, SLA violation, and bandwidth limitation.

Bandwidth Limitation: Bandwidth limitation is one of the big challenges in the Sensor Cloud framework. The bandwidth allocation with gigantic infrastructure, huge number of devices and cloud users, the task of allocating bandwidth to every device and users become very difficult.

Network Access Management: There is various numbers of networks to deal with sensor cloud architecture applications. For that a proper and efficient access management scheme for these networks is needed because this will optimize the bandwidth usage and improve link performance.

Service Level Agreement Violation (SLA): The agriculture professional's dependency on cloud providers for their resource needs on demand may require a specific QOS to be maintained. If the cloud provider unable to satisfy the users even in critical situations, it would result service violation and cloud provider must be responsible for that. So, we need a reliable dynamic collaboration among cloud providers, but opting for the best combination of cloud providers in dynamic collaboration is a big challenge in terms of cost, time, and discrepancy between providers and QoS.
Need for Efficient Information Dissemination: In Sensor-Cloud an efficient information dissemination mechanism is needed that can match the published events or sensor data to appropriate user's applications.

Since the data sets and their relevant access services are distributed geographically, the allocation of data storage and dissemination becomes critical challenges.

The Main Objective of proposed work are

1. Study on Agriculture Irrigation Management System Using Sensor- Cloud Environment.
2. Secure Data Aggregation for Agriculture Irrigation using Sensor -Cloud Environment.
3. Mitigating and Preventing Security Attacks while transmitting and storing the Data in Sensor –Cloud Environment.
4. A secure user authentication and key agreement scheme using sensor cloud Infrastructure for agriculture irrigation monitoring system.

LITERATURE SURVEY

Agriculture Application in Sensor Cloud Environment

An overview of sensor-cloud infrastructure including applications and architecture is studied and demonstrated by Atif Alamri et.al (2013). The present research interests in this work include merits, demerits, previous works, challenges and algorithms as well as future ways mentioned. Here the author's have reviewed a number of applications, implementing technologies and monitoring schemes that are closed to nature to manage more critical situations in the real environment via the ability of proposed framework.

An experimentally discussed and integrated Cloud and WSN based architecture is presented by Mohamed Rawidean et.al (2017). Purpose of this architecture is to transfer collected information from WSNs to Cloud environment. Here the data obtained and used fully at any time.In this work SIM (Secure Identity Management) will take care about the authorized users. Here Agriculture environment management system (AEMS) is designed based on integrated Cloud and WSN infrastructure. Many technologies and Architectures will be looking towards sensor cloud.

An experimentally evaluated and proposed Sensor-Cloud framework by Tamoghna Ojha et.al(2017). The author discusses the benefits of sensor-cloud framework to effectively address various agriculture problems. This work addresses the challenges associated with the sensor-cloud framework for agriculture applications. The proposed system underlying mathematically devised the virtualization technique by taking into account the challenges. In this work energy optimization for sensor-cloud infrastructure is demonstrated and duty scheduling to save energy also discussed. Existing works do not define the components associated with sensor cloud for agriculture. Case studies of various applications the authors presented as example of the framework. For choosing the framework for agriculture application justified by simulation results presented. In this work they are discussed comparisons between the traditional WSNs and Sensor-Cloud framework.

Experimentally investigated and Cloud computing based WSNs for agriculture Management have been proposed for optimal integration of wireless sensor networks with cloud computing services for the agriculture by Gorakhnath U et.al (2018). The cloud-based system can be used for large database storage needed to store farm operations data. By using open source cloud computing, farmers can view farm information on a computer with a smart phone. Graph of relative values against time or date of all parameters displayed (temperature, soil moisture, rainfall, light, humidity). The task of the proposed system in this work is to solve problems and challenges with the purpose of connecting the wireless sensor network through the cloud using the Internet of Things services.

Experimentally studied and proposed an IOT system architecture for agriculture application based on WSNs by Tien cao-hoang and Can nguyen Duy (2017). The proposed system allows the user to monitor environmental data for agriculture using a web browser, including sensor nodes and gateways. The proposed system developed for mainly supporting the farmers. The proposed system for agriculture has been used to increase crops and support the farmer in decision making based on provided monitoring information. In this work Real time Data can seen from a web browser via gateway with WIFI or internet connection.

WSNs are the best way to address agricultural issues related to agricultural resource optimization and land monitoring and decision support studied by authors Mohamed Rawidean et.al (2014). After analyzing the weakness and problems with current WSNs system developed a novel Intelligent Greenhouse Management System (IGMS). It is specially designed for Greenhouse Monitoring to optimize the agriculture production. With the help of IGMS Management increase the production efficiency. This work is done with the help of precision farming such as temperature, humidity, soil moisture and light along with the most relevant parameters in environmental monitoring. Soil moisture sensor is the important sensor to the measurement of precision agriculture (PA) field. In a greenhouse environment using WSN, our test clearly shows that automatic irrigation is more efficient than scheduled irrigation. Automatic irrigation optimizes the use of water and fertilizers. This work is further extended to maintain the moisture level and health of the plant.

González-Briones, A. (2019) proposed a Novel Multi gent System(MAS) presented. The aim of this work is to design and develop the MAS to collect the data and based on this data it will make decision for agriculture crop irrigation.The goal of this MAS is develop the automation irrigation system for agriculture.In this work proposed system combine the both advantages and disadvantages like low water consumption and high water consumption.In this review the results shows like automated irrigation system gets reduction in water consumption for agriculture irrigation compare to privious existing systems in agriculture crop irrigation.

An experimentally studied and develop a model like Agri prediction model by (Dos Santos, 2019). In this work Agri prediction model combined with LORA technology and ARIMA prediction model and done the three experimental tests like energy consumption and generation test, connectivity test and assembling the experiments in arugula crop in green house. The proposed framework predict the form land information and send the notification to the farmers while when arugula cultivation needed and the farmers takes action immediately to solve the problems of arugula planting. In this work get the results positively and the authors knows the limitations of their work and they suggested for future. In this work the limitations are develop the mobile application for monitoring the real time environment and comparison of ARIMA online and offline with and without prototype.

Reviewed in various agriculture applications in recent times widely deploying the WSNs by (Ojha, Misra, & Raghuwanshi, 2015). In this work they introduced two types of WSNs such as Terrestrial WSNs and Under Ground WSNs. In this paper the authors discussed various existing problems in agriculture application as well as analyzed various communication techniques and issues and challenges of WSNs in Agriculture applications. The authors analyzed the existing problems with various agriculture applications and provide various solutions like future research technologies and through case studies globally and Indian scenarios for improving the agriculture productivity. Mostly they are suggested solutions for irrigation management, crop prediction and precision agriculture.

Studied experimentally and proposed PI (precise Irrigation)-Cloud by (Tyagi, Obaidat, Tanwar, Kumar, & Lal, 2018). The PI-Cloud Sensor is based on the cloud measurement and management (M2M) system. M2M is a cluster-based hierarchical architecture of the sensor cloud. In this work they used the mobile sensor robot (MSR) type of sensors for different parameters like soil and water sensors..Etc. This sensor can be replaced and recharged when it is required. In this they used novel parameters NRR (Number of replacement required) and FRA (First Time Replacement Analysis). Based on the novel parameters did simulation and gets the results like replacement and requirement reduced the energy harvesting to the Cluster Heads (CH). In they suggested for future to develop the design and algorithm for selecting the energy harvesting sensor nodes.

Table 1: Agriculture Application in Sensor Cloud Environment

S.NO	AUTHOR	ALGORITHM	ADVANTAGES	DISADVANTAGES
1	Atif Alamri et.al (2013)	Sensor –Cloud Infrastructure	control the service instances freely by end users, Continuous accessing data any time any where	Data sharing have a problem, DDOS attack. Malicious intrusion attacks
2	Mohamed Rawidean et.al (2017)	Agriculture environment management system (AEMS)	This System is reliable, Scalable, And Modular and developed with open source tools.	Required to concentrate on security issues while shifting the data from WSN to Cloud
3	Tamoghna Ojha et.al(2017)	Sensor-Cloud Architecture For Agriculture Applications	Cost effective Services, Reduce the Energy consumption and increase the network life time	Required to add mobility aware dynamic service management
4	Gorakhnath U et.al (2018)	A Cloud Computing Based WSNs for Agriculture Management	Improve the productivity of various agriculture applications.	As increasing the population day by day there will be need of improvement in agriculture productivity. Require Secure user friendly Communication.
5	Tien cao-hoang and Can nguyen Duy (2017)	Internet of Things system architecture based on wireless sensor network (WSN) for agriculture application	Low Cost ,Easy to use and Large scale development	Require to Concentrate on power consumption and security and privacy while linking with the cloud
6	Mohamed Rawidean	Novel Intelligent Greenhouse	System was	This system only developed for Greenhouse

	et.al(2014)	Monitoring System (IGMS) based on WSN for Precision Agriculture	Reliable ,portable, Scalable and Customizable	Monitoring in Precision agriculture
7	González-Briones, A. (2019)	Novel Multi gent System(MAS)	Reduce the Water Consumption	It require to concentrate on Power consumption
8	dos Santos, U. J. (2019)	Agri prediction model	Reduce the energy consumption	There is no Continuous monitoring
9	Ojha, T.,et.al(2015).	Latest WSNs technologies	Review provides the solutions for improving agriculture productivity.	WSNs having limitations like energy, storage..etc
10	Tyagi, S., et.al (2018)	PI (precise Irrigation)-Cloud	reduce the requirement and replacement of sensors	Require to select a proper sensor node for energy harvesting.

Security in Agriculture Application

(Ali, Pal, Kumari, Karuppiah, & Conti, 2018) Studied and addressed a problem of authentication to protect from unauthorized access in wireless sensor environment for agriulture monitoring .In this paper proposed a novel remote user authentication and key-agreement protocol for agriculture monitoring in WSNs.In this work protocol is valid with the BAN logic and simulated with AVISPA tool. The proposed protocol analyzes both formal security analysis with random oracle model and informal security analysis shows protocol is secure and protects against a various kind of malicious attacks. The results shows that the proposed scheme is applicable in real time applications.Here is a proposed protocol with high complexity.

WSNs (Chen et.al 2019) reviewed Ali.et.al work and studied and discussed the limitations of ali.et.al work and proposed a secure and efficient authentication and key agreement scheme in agriculture monitoring system in. The Ali.et.al work not provides strong security in many terms like user anonymity, node impersonation attack, Denial of service attack and user traceability. The proposed scheme overcomes the weakness of ali.et.al work. The proposed scheme used dynamic identity detection to guarantee user privacy and eliminate redundancy. In this study the proposed system is compared with ali.et.al, it eliminate the all drawbacks and results shows that while comparing with ali.et.al work it is 80 times more efficient.

Described the designed and implementation of wireless sensor network for improving agriculture crop. In this paper used IPV6 protocol for routing by (Shiravale & M. Bhagat, 2014). While designing the WSN architecture for agriculture there are many issues and challenges those all are discussed in this wok. With the help of recent technologies they suggested to overcome the agriculture farming issues. In the framework security is important that also having issues. The continuous monitoring of field data will help to overcome the design issues and optimization of distributing the nodes essential. With the help monitored information successfully overcomes the agriculture issues.

Addressed a problem of authentication of user for avoiding the unauthorized access by (Kumari & Om, 2016). In this work the authors presented a novel user authentication protocol scheme for coal mines in WSNs. They provide robust authentication to the user using BAN logic and follow a formal security analysis. Formal security analysis protect from various malicious attacks. In this work underground mines authentication is very important to minimize the loss of resources and human causalities. The proposed authentication protocol provide efficiently strong security in all aspects and while deploying the sensor networks in target area the proposed protocol increase the life of a device.

Reviewed the Turkanovicetal's et.al work by (Amin & Biswas, 2016). In this work they are concentrated on weakness of previous works and proposed a Novel architecture based remote user authentication and key agreement protocol for accessing the information from node of sensor in WSNs. The proposed scheme is very efficient to resist the security attacks and increase the lifetime of the network. The proposed scheme not only provide the security, it provide good functionalities like less energy consumption, user anonymity, user friendly password updating. Still they are working improve the proposed scheme for strong security in future. Compare to previous existing works the proposed scheme is more efficient.

Reviewed the Amin.et.al work and discussed their flaws and proposed a robust and secure dynamic ID based remote user authentication scheme with privacy protection for E-health care systems by (Li, Niu et.al 2016). The existing work Amin.et.al work having flaws such as user anonymity, traceability and in password updating process Dos attack is possible. So based on this existing works they proposed strong user authentication scheme. Finally it compared with previous works with parameters computational and communicational cost. The result clearly shows that proposed scheme better than others.

Reviewed the existing works and proposed a novel light weight two factor authentication scheme for WMSNs by (Wu et al., 2018). In this work they used proverif tool to proving the scheme is secure against various common attacks. They compared with existing works the proposed scheme is efficient. The proposed scheme achieves the low time and communication cost. Finally the simulation results show that it is applicable.

(Kumar, Chand, & Kumar, 2019) reviewed Om's and kumari's scheme problems in security aspects and proposed Light weight user authentication protocol for wireless sensor network to address the problems of Kumari's et.al work. Authentication is very important in coal mines. In this work shows their protocol satisfies all the security aspects with less computational and storage cost and more security features compare to existing works. They have done practically with NS2 Simulator.

Table 2: Security in Agriculture Application

S.no	Author's & Year	Methodology	Advantages	Disadvantages
1	Ali, R. (2018)	Novel remote user authentication and key-agreement protocol	Protect from malicious attacks and it is applicable for real time applications	DDOS attack is possible, no security for session key and inside attacks.
2	(Chen et.al 2019)	Secure and efficient authentication and key agreement scheme	Protect from malicious attacks .it is most suitable for agriculture monitoring	Required to concentrate on redundancy
3	(Shiravale & M. Bhagat, 2014)	WSN architecture for security	Reduce the energy consumption, fault tolerance	High cost

4	(Kumari & Om, 2016)	Novel remote user authentication scheme	Increase the life time of device, provide security in all aspects	Dos attack, Stolen attack, Smart Card loss is possible.
5	(Amin & Biswas, 2016)	Novel architecture based remote user authentication and key agreement protocol	Less energy consumption, compare to previous communication ,computation and storage cost is better	Still improvement is required for handling the future attacks
6	(Li, Niu et.al 2016)	A Robust and remote user authentication scheme with privacy protection	Less time cost, achieve the user anonymity and traceability and DOS attacks	Computation and communication cost is high
7	(Wu et al., 2018)	Novel light weight two factor authentication scheme	Low time, low communication cost	Decrease the packet delivery ratio and throughput while increasing the number of sensors.
8	(Kumar, Chand, & Kumar, 2019)	Novel Light weight authentication protocol	Less computation cost, Less storage cost	DDOS attack is possible when password updating takes place.

Data Aggregation in WSN

Solution for air quality monitoring applications in WSNs developed using the Leach-based aggregation algorithm by Hanady et al (2014). The author's provide a solution primarily for quality of air monitoring.

The hallmark of AQM-LEACH is, if it required than only it will send the data. Frequency sending of receivers Therefore, data is minimized when the air quality is good, this characteristic is having maximum of sleeping time, and it is extended the network lifetime. When quality of air is bad, maximum data should be sent for getting maximum accurate results and to raise any risk alarm if needed. The results show the presented solution responds well to any activity on the network with adjustments of frequency data transmission.

Proposed VSN architecture for measuring air quality for climate monitoring of urban areas and city areas that may be rationed as CO2 Change in the number of different regions and mobile nodes may be large by Shu-Chiung et al (2011).By using GSM short messages and geographical vehicles locations, the author used a few number of vehicles to understand fine grained monitoring in urban and city areas. So as to adjust among the excellent monitoring and charge of message, the author had planned an adaptive strategy to fine-tune the vehicular sensors rates reporting in accordance with the sensing interpretations variance and the quantity of vehicular sensors in every grid.

Jen-Hao et al (2012) proposes an air quality monitoring system of urban areas based on technologies of WSNs. With the help of WSNs schemes to obtain and storing monitored information for the objective of a fully automated monitoring system of air quality. In this work author proposed a monitoring system, which is implemented in real time. Proposed one consist sensor nodes, gateway node and centre for controlling and handled by lab view program. The control centre interacts with the users via transforming the messages. The system provides the best way to monitor the parameter of air pollution such as concentration of CO. Here the tasks performed by integrating sensor nodes with CO sensors. Each and every sensor nodes communicate with each other depends on protocol like Zigbee. In addition, high pollution situations have been reported near the Guang Guan Circle in Taipei City, Taiwan from monitored information. Data is a major resource when addressing the problems of motorcycle impacts passively to improve quality of air. In addition, CO concentration data can be monitored at a particular location by mobile devices like PDAs, phones and computers to help achieve real-time monitoring and control of air quality.

Shu-Chiung et al (2009) a new architecture based on VSNs for microclimate monitoring is presented, as discussed previously. The author demonstrates the design of ZigBee-based Intra VWNs.

Formulated an uncomplicated WSNs-based Air Quality Monitoring System (WSN-AQMS) for the convention of city and industrial regions by Mansour et al (2014). The proposed work is very easy while compared to the existing works. In this work the author innovates a well-organized cluster based routing protocol such as "cluster protocol for air sensor network (CPAS)" for the WSN-AQMS architecture. CPAS periodically transmit the data to the base station for short distance. This proposed architecture consist a group of sensors related to gas such as NO2, Ozone, and CO. These sensors are direct on stacks and a basic server and structural Zigbee WSN design to manage both long term advance planning and short-term real time event management. This framework had prepared by Libelium using open hardware and software gas sensing motes. By using low cost, less data, less power rate wireless communication technology provides low cost synchronized monitoring method. The system will be passed or distributed through various applications. The proposed system reported to be efficient in the energy consumption, network lifetime and the communicated data rate.

Presented a community network based on sensor for collecting the surrounding environmental data for analyzing the environment by Patricia et al (2010). The mesh network is created using the sensor nodes and it is used to send the data to base station or central site. The created networks use the crossbar sensor for monitoring the environment and risk identification. The author used geographical and temporal context for analysis of gathered data and presenting that data. The created network is called as green network since the gathered data is send to the base station periodically. To save energy by reducing the communication between nodes, the author removes the traditional global system clock from the network. The geographic data system (GIS) along with the spatial interpolation is used for improve the spatial coverage in the built-in network. The built network is used to monitor the surrounding environment and collect the data from the sensors are understand by methods.

Formulated a network for the purpose of outdoor and indoor air quality observation by Postolache et al (2009). Every node is deployed in a diverse room and comprises a series of tin dioxide sensors connected to obtain and control portion of the system. The nodes are either wirelessly or hardwired linked to the central monitoring unit. Two gas sensor impact measures such as temperature and humidity are also calculated to improve the gas density measuring and stopping counterfeit risks. Processing in advance is depends on single output and multiple neural networks can be implemented to obtain temperature, humidity and compensated gas density values at the network nodes. Utilization of energy and abnormal function of the network nodes also considered.

Formulated sensor isolation and fault detection method based on PCA (Principal Component Analysis) to supervise an air quality monitoring system by Mohamed et al (2006). The network model PCA is most favorable regarding a reformation error criterion. The method fault detection of sensor is performed in several continuing subspaces by means of new index detection. For this application, this detection index enhances the comparison of performance against common detection index SPE. The

reformation approach permits the defective sensors to isolate and, in contrast, to approximate the defects of amplitudes.

S. Siva Ranjani et al (2014) experimentally investigated and modified the existing algorithm like Energy efficient Cluster based Data Aggregation (ECBDA) and proposed Secure Cluster based Data Aggregation (SCDA). In this work used the cluster concept for data aggregation to detect the malicious node and Bayesian fusion algorithm for calculating the trust probability to enable secure transmission. In this work produce the results like reduce the energy consumption and improve the security and privacy.

A novel algorithm called adaptive recommendation routing (ARR) is proposed by shiva rama Krishnan.S and arun kumar.T(2019). The proposed system can be applied to WSNs for reducing the energy consumption and increase the network lifetime. This prescribed work describes in detail about incorporating swarm intelligence with bio-inspired computation for determination of the cluster head and making the routing efficient and simple.

Table 3: Data Aggregation in WSN

S.NO	Author	Methodology	Advantages	Disadvantages
1	Hanady et.al(2014)	LEACH based aggregation algorithm	Packet delivery ratio is high	The CH nodes is unambiguous for counting
2	Shu-chiung et.al (2011)	VSNs for micro climate monitoring	Increased yield And quality, accurate frost prediction and optimized use of resources	Overhead ,packet loss is occurred
3	Jen-hao et.al(2012)	Automatic air quality monitoring	high performance, Continuous online measurement, Low costs	Expensive and Complex High skill needed to manage and operate high cost.
4	Shu-chiung et.al (2009)	Air pollution monitoring	Low cost easy to operate Reliable.	High over head and high aggregation latency
5	Mansour et al (2014)	Wireless Sensor Network-based Air Quality Monitoring System (WSN-AQMS)	Historical Datasets Available, Reliable	Wireless Sensor Network-based Air Quality Monitoring System (WSN-AQMS) taking the samples from the Industrial center sometimes per day which means that there is no data about time distribution of polluted materials intensity.
6	Patricia et al 2010	Air and environment monitoring system based on green networks	Determining whether an area is meeting the standards	The resulting measurements are not always a good indication of the burden of air pollution in specific area.
7	Postolache et al (2009)	Indoor and Outdoor air quality Monitoring System	It improve the air quality	Specific tin dioxide sensor arrays depend on the concentration of other gases and vapors. It affects the measurement value.
8	Mohamed et al (2006)	Sensor fault detection and isolation method depending on Principal Component Analysis (PCA)	Improves the fault detection compare existing SPE(Squared prediction error)	Mathematically, it is difficult to prove that the new index has better fault sensitivity than the SPE
9	S. Siva Ranjani et al (2014)	Secure Cluster based Data Aggregation (SCDA)	Improve the security and reduce the energy consumption	Still required to improve the security and authorization

Data Storage and Retrieval in Sensor Cloud

Studied for possible connection between WSN and Cloud Computing and shift the data to the cloud from WSN by Khandakar Ahmed and Mark Gregory (2011). This work proposed a Novel Sensor and cloud integration framework. The objective of this integration framework is providing the facility to shift the information to cloud environment from WSNs. The proposed framework provides an optimal approach for user management, network access control, retrieval and storage of distributed information. So that economically and scientifically valuable data may be utilized fully. In implementation the sensor network connected to the cloud via gateway for transforming the information to cloud. The cloud provide the services to user request through service layers such as IaaS, PaaS ,SaaS. The services provided from cloud DC (data centre), it collecting the data from sensors. Most of the organizations will get benefits by this frame work for processing and storing and retrieving WSN generation of data.

Zahra shojaeerad et.al (2015) studied in this work and proposed and presented integration model for combining WSN and Cloud Computing and able to support for large amount of data storing. Presently this solution is running now. Wireless sensor networks restricted to processing the data, battery lifetime, Communication speed instead of that cloud computing is applied. It is attractive for long term observation and used different types of environments and projects. In this work encryption system is applied for security policies and provides the security while sending the messages and receiving the messages. Presented the trust evaluation model based on theory of evidence and sliding window protocol for cloud computing. Simulation results indicate trust degree of existence increased slowly using this model and distrust would be fast.

Studied and presented Sensor-Cloud infrastructure including applications, architecture by Atif Alamri et.al (2013). Here discussed the current research merits, demerits, challenges, problems, and existing possible ways for solution and algorithms as well as future directions. In this work they reviewed several applications, discussed implementing technologies and monitoring schemes were closed to nature, handle the more complicated situations of real time through proposed system.

Reviewed various technologies used for wired and wireless sensor networks by Hemraj Sharma and Sukesha Sharma (2014). The author discussed here WSNs consist few features such as WiFi, Z-Wave, ZigBee, Eno Ocean, Wavenis and Bluetooth. A brief discussion of the various real time applications of sensor networks is also presented. In WSNs, the performance of the network is evaluated with the parameters such as packet delay, reliability, fault tolerance, energy consumption. Importance of these parameters varies from application to application. The WSNs used in real time applications such as agriculture, air pollution monitoring, smart city, environmental monitoring, defense areas, and medical. The WSNs obtain good results while implementing in real environment.

Mr.K.Sindhanaiselvan and Ms.T.Mekala (2014) surveyed the benefits Sensor-Cloud framework in variety of applications. The proposed system allows the sensor data to be categorized, processed, and stored. The proposed framework is easily

accessible, cost-effective, and timely available based on its characteristics. However, connecting the sensor networks and cloud can accepts extensible, open, interoperable, scalable, and reconstruct networks for many areas.

Discussed about technologies and applications of WSNs and cloud by Sajjad Hussain Shah et.al (2013). Here presented a new framework for possible integration between WSN and Cloud and shift data to the cloud environment from WSN and over into the public domain. The proposed Novel framework is based on ideas of various technologies which are studied and supported in depth. The author presented framework and its useful applications and importance in medical application. But here security problems are involved in this process of integration need to focus critically.

E. Kanagaraj, et.al (2015) experimentally investigated and proposed a cloud based remote environmental monitoring system architecture and implementation. In this work collection and transforming the environmental data to the cloud done with the help of developed embedded system, it is a local server. The proposed system offers to the users to see the monitored environment data from the distributed weather stations with the help of web applications.

Tamoghna Ojha et.al (2014) are experimentally evaluated and proposed dynamic duty scheduling scheme in a sensor cloud framework for minimizing the energy consumption of WSNs field. Here the proposed system is used to overcome the existing problems with sensor cloud framework like low network life time, low resource utilization, high energy consumption and high cost. The author presented system improves the energy efficiency and cost effectiveness.

Table 4: Data Storage and Retrieval in Sensor –Cloud Environment

S.NO	Author	Methodology	Advantages	Disadvantages
1	Khandakar Ahmed and Mark Gregory (2011)	Novel framework or Sensor and cloud integration framework. Identity and Access Management Unit (IAMU)	Processing and storing and retrieving WSN generation of data.	Here Still required to improve processing, storing and retrieving methodology
2	Zahra shojaeerad et.al (2015)	Encryption System Trust evolution model based on theory of evidence ,sliding window	Its implementation is simple	Still Security Issues are largely open, Varity of threats and attacks are possible
3	Atif Alamri et.al (2013)	Sensor –Cloud Infrastructure	Control the service instances freely, Use the virtual sensor nodes, data are accessible e all the time.	While sharing the data it will not give accurate results, It is vulnerable to DDOS attacks, Continuous connectivity is needed.
4	Hemraj Sharma and Sukesha Sharma (2014)	Various Technologies in WSN like Zigbee, Wifi,Bluetooth and Z-wave	This technologies applicable in various real time applications like agriculture, environment and health .etc	In WiFi, Bluetooth technologies having high data rate and high power consumption and battery cost issues.
5	Mr.Sindhanaiselvan.k and Mekala (2014)	Novel sensor- cloud framework	Low cost, easily accessible, and timely available.	Security Issues are largely open, Varity of threats and attacks are possible
6	Sajjad Hussain Shah et.al (2013)	Novel Framework for Integrating Sensor-Cloud	Reliability ,availability and extensibility	Security is open issues. Required to critical focus on attacks.
7	E. Kanagaraj, et.al (2015)	Cloud-based Remote Environment Monitoring System	It is simple, Cost Effective, Availability, Reliability and monitoring facility.	Security Issues are largely open, Varity of threats and attacks are possible
8	Tamoghna Ojha et.al(2014)	Dynamic Duty Scheduling scheme in Sensor- Cloud Framework	Reduce Energy consumption, cost. Improve the Network life time and Resource utilization	Require to implement real world scenario and require to overcome QOS and Bandwidth Issues

Security Attacks in Sensor-Cloud Environment

Investigated the advantages and disadvantages of Electronic government deployed information systems, proposed the cloud based solutions by Dimitrios Zissis et.al (2011). In this work proposed a hybrid solution Electronic voting system to overcome the electronic voting safety Problems and vulnerabilities, reactions. The proposed system using the described structure, overcoming by the number of IS security issues like attacks and the ability to restore confidence in it All government election processes. The proposed system is like a cloud based architecture and proposes enabling electronic vote casting by minimizing threats through offering "desktop as a service".

Experimentally investigated and proposed model in which all the traffic intended for cloud passes through intermediate virtual fog servers by Deepali and Kriti bhushan (2017). This work propose a framework for DDOS attack detection and efficient resource provisioning in cloud environment with the help of Fog computing by using an efficient algorithm to service cloud request effectively by intermediate fog servers. Hence, provide the quick response time and efficient utilization of resources. In addition, the large billing for customers with services that are not yet known as EDOS (Economic Denial of Sustainability) Attack as illegal traffic resulting from these sources of fatigue. When all the fog servers are busy and cannot serve the request in optimal time i.e. during the peak hours when the load on fog server suddenly increases to a huge extent than the requests are forwarded to cloud server DC6 (Data centre).our approach work only for TCP SYN flood attack, it can be improved to deal with more attacks like ICMP, UDP, Flash crowd attack etc.

To detect a DDOS vulnerability when moving requests and responses through Fog Defender, the authors provide the infrastructure by applying the rules in this layer and sending legitimate requests only for the cloud server by Deepali and Kriti bhushan (2017). Therefore, the requests to reach the cloud are legitimate. Detecting and mitigating of DDOS attacks takes place at the edge of the network, improve the time of response and service resource usage in the cloud.

Experimentally investigated and presented a FilterFog like defense scheme has been introduced to prevent the cloud from attacking DDOS by Bhumika Paharia and Kriti Bhushan (2018). FilterFog is implemented to provide two main criteria's such as the first criterion summarizes the reason why fog computing first came into the picture, i.e. a cloud extension. Fog computing basically provides cloud services to edge of the network. The second criterion fog computing provide the service as a cloud protection mechanism against DDOS attacks. Here are some

script files and some IP table forwarding rules to filter traffic. Here proposed defense mechanism FilterFog experimentally implemented in TCP SYN flooding and UDP SYN flooding with the help of following tools, HOIC (High Orbit Ion Cannon), UDP Unicorn.

Bhumika Paharia and Kriti Bhushan (2018) presented fog layer is basically used as a defense architecture between the cloud and users. This is a novel mechanism of defense architecture that uses two stage defense frameworks against DDOS attacks in the fog to protect malicious users in the cloud. Here two stages used such as the first stage of IP spoofed and Captcha verification and the second stage of test tools and protocols checking (sniffing and scanning tools used). A framework is proposed here to prevent malicious traffic caused by DDoS attacks from users to the cloud by taking advantage of fog computing. The fog acts as a filter layer for generated traffic and is placed between the user and the cloud. Here the proposed system primarily concentrates to improve the network performance and reduce the traffic to cloud.

Experimentally investigated and discussed about DDoS attacks in cloud environment and compared various technologies that were used recently to detect and protect DDOS attacks by Mahmud Said and Marianne (2018). The author's introduced a novel mechanism based on Remote Triggered Black Hole (RTBH) to mitigate the effect of DDOS attacks earlier it reaches the victim. Black Hole Routing (BHR) technique utilized to reduce the DDOS attacks. The major issue with BHR is that it deletes the entire traffic. In this scheme proposed a modify BHR solution .During a DDOS attacks, traffic forwarding to the victim's server is redirected to the cleaning centre instead of falling. The author presented BGP (Border Gateway Protocol) is powerful routing protocol utilized for connecting different systems like autonomous. The BGP based on some of attributes that are enabled the administrator of network to choose the good path based on maximum available options.

Ashwini Khadke et.all (2016) the author's goal is to design collaborative defense architecture to defense against DDOS attacks in cloud area. The author's concentrates on two important steps, such as filtering and anomaly detection of malicious traffic to achieve the goal. In this work the creator's introduced attacks like Stealthy DDOS attack. The author's proposed a detection mechanism based on time series decomposition, to identify stealthy DDOS attacks at an early stage. The proposed system divides the series of time into static random and trendy components, and analyzes various components to identify anomalies in long-term period and short-term period modifications of the transmission flow in the cloud environment.

Sukhada B and Dr.Deven (2017) presented in this work mainly concentrate upon Soft Computing Techniques used against attacks such as DDOS,SQL injection, Cross site Scripting(XSS),Cross Site request Forgery(CSRF). DDOS is one of the major security attacks to the cloud hosted websites. Economic Denial of Sustainability (EDOS) is a special type of DDOS attacks; it exploits the cloud's Pay-As-You-Go model. Attacker generates the anomalous HTTP request that cause up scaling of the architecture and this put financial burden over website owner. This work is to realize whether existing techniques can be used for defending EDOS attack. The existing techniques not satisfied to avoid the EDOS attack. In this work proposed a Soft Computing Techniques that are differentiating between genuine and malicious traffic based on existing techniques.

Anand Motwani and Vimal dhote (2016) Suggested in this work optimized AODV routing with alert based technique to enhance the security of WSNs from sinkhole like attacks. The proposed technique improves the QOS parameters like time delay and packet delivery ratio in WSNs, while detecting and eliminating the attacks efficiently. The simulation results shows the proposed technique outperform than existing techniques.

Monika and gurpreet kaur (2016) presented a framework that clarified the impact of cloud computing on confidentiality preservation by making step wise recommendations on data confidentiality of data stored, processed and transmitted in cloud environment. The aim of the research is to ensure privacy and security at the server side using AES algorithm and at client side using RSA algorithm. They suggested for future including data integrity and load balancing.

Pradeep semwal and MK Sharma (2017) studied various types of cryptographic techniques such as DES, 3DES, AES, and RSA. In this process of choosing study strength, weakness, cost and performance of each algorithm provide valuable insights. Authors implemented and analyzed in detail cost and performance popularly used cryptographic algorithms and shows overall performance analysis.

Table 5: Security Attacks in Sensor-Cloud Environment

S.NO	Author YEAR	Algorithm	Attack	Limitation	Results
1	Dimitrios Zissis and Dimitrios Lekkas 2011	Cloud Architecture DAAS (desktop as a service)	E-voting Security like DDOS Attack	The integrity of electoral System in danger	Overcome the various security issues and the ability to restore confidence in it All government election processes
2	Deepali and Kriti bhushan 2017	Framework for DDOS attack Detection &cloud computing efficient algorithm	DDOS & EDOS Attacks	It can be improved to deal with more attacks like ICMP, UDP, Flash crowd attack etc.	1) Deal with traffic during peak hours at fog layer itself. 2) Reduce the processing cost. 3) Handle the DDOS &EDOS attacks
3	Deepali and Kriti bhushan 2017	Defense Frame work for DDOS attack Fog Defender	DDOS,IP Spoofing, SYN flood Attacks	Still having possibilities of attacks.	Better response time and better utilization of resource
4	Bhumika Paharia and Kriti Bhushan 2018	FogFiter Defense mechanism	Need to mitigate the impact of DDOS Attack		Preventing cloud from DDOS Attack.
5	Bhumika Paharia, Kriti Bhushan	Naïve approach of defense architecture	DDOS attack	Differentiating the phases is very difficult. Easy implementation not	Increase the network overall performance and reduce the traffic to cloud.

	2018			possible	
6	Mahmoud Said Et.all 2018	RTBH	DDOS Attack	The real time implementation Is required	Reduces the impact of DDOS attacks.
7	Ashwini Kadke et.all 2016	Detection technique and collaborative defense framework	Stealthy DDOS Attack	Stealthy DDOS attack s difficult to detected by recent detection methods	Achieved a defense mechanism against DDOS attacks.
8	Sukhada Bhingarkar and Dr.Deven Shah 2017	Soft Computing Techniques	EDOS Attack & DDOS attack	Existing schemes Not satisfied to detect DDOS &EDOS attacks	Differentiating between genuine and malicious traffic based on existing techniques. Defend the attacks.

OBSERVATION

To improving the productivity of irrigation management system some criteria's are provided to the agriculture professionals. Controlling and monitoring of existing techniques identified. The problems in existing Agriculture Management Systems are power management, Security, Privacy, Network access management control, Authentication, Authorization and cost. To improve the irrigation Management as well as improve the India's economy indirectly reduces the farmer's deaths. To solve these issues in agriculture monitoring system, our work attempts to develop a best and suitable system for agriculture irrigation with Sensor – Cloud Environment on a real environment.

Table 6: Observation from Existing Work

Method	Throughput	Data Aggregation Latency	Packet Loss	Network Lifetime	Energy Consumption	Cost
Agriculture environment management system (AEMS)	Low	Medium	High	Low	Medium	Medium
Sensor-Cloud Framework for Agriculture Applications	Low	Medium	High	High	Low	Low
Cloud computing based WSNs for agriculture Management	Medium	High	Medium	Low	High	High
Agri prediction model	Medium	High	Medium	Low	High	Medium
PI (precise Irrigation)-Cloud	Low	Medium	Medium	High	Low	High
Novel Multi Agent System for agriculture irrigation	Low	Medium	Medium	High	Low	Medium
Novel Green house management system for agriculture	Low	Medium	High	High	Low	Low

CONCLUSION

In this paper, we surveyed the related issues and challenges while storing the agriculture irrigation data and processing the agriculture data; at the same time while providing the services to the end users like agriculture professionals for improving the irrigation in agriculture. Earlier, Most of the WSNs used for many applications but due to some limitations WSNs are integrated with the cloud. After integrating WSNs it will give better performance compare to the existing works. But while dealing with the Sensor cloud architecture for the agriculture irrigation applications. The future scope is to provide the secured sensor cloud environment for agriculture irrigation management system.

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