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STUDY ON EMERGING IMPORTANCE OF CLOUD BASED IOT SCHEME WITH WIRELESS SENSOR NETWORK IN PRECISION AGRICULTURE USING CRYPTOGRAPHIC ALGORITHM

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ABSTRACT

For many mission-critical related wireless sensor net-work applications such as military and homeland security, user's access restriction is necessary to be enforced by access control mechanisms for different access rights. Public key-based access control schemes are more attractive than symmetric-key based approaches due to high scalability, low memory requirement, easy key-addition/revocation for a new node, and no key pre-distribution requirement. Precision farming is an approach where inputs are utilised in precise amounts to get increased average yields, compared to traditional cultivation techniques. Precision agriculture refers to the precise application of agricultural inputs with respect to soil, weather and crop need in order to improve productivity, quality, and profitability in agriculture. ... It enables farmers to use crop inputs more efficiently including pesticides, fertilizers, tillage and irrigation water

Keywords: Elliptic Curve Cryptography (ECC), public-key cryptography, user access control, energy-efficient, energy harvesting; precision agriculture; wireless communication technology, WSN.

[1] Introduction

The Wireless Sensors Network and the Internet of Things are nowadays commonly used to build decision support systems to solve the problems in the real-world. One of the most important fields having an increasing need of decision support systems is precision agriculture.

The global population is predicted to touch 9.6 billion by 2050 – this poses a big problem for the agriculture industry. Despite combating challenges like extreme weather conditions, rising

climate change, and farming's environmental impact, the demand for more food has to be met. To meet these increasing needs, agriculture has to turn to new technology. Smart farming based on IoT technologies will enable growers and farmers to reduce waste and enhance productivity from optimizing fertilizer use to increase the efficiency of farm vehicles' routes.

[2] Literature Review

In this paper we present a survey of wireless sensor network in precision agriculture with different Cloud-based IoT schemes. These methods are used to solve the agricultural related problems like farming resources optimization, decision making support, and land monitoring.

In IoT-based smart farming, a system is built for monitoring the crop field with the help of sensors (light, humidity, temperature, soil moisture, etc.) and automating the irrigation system. The farmers can monitor the field conditions from anywhere. IoT-based smart farming is highly efficient when compared with the conventional approach.

The applications of IoT-based smart farming not only target conventional, large farming operations, but could also be new levers to uplift other growing or common trends in agricultural like organic farming, family farming (complex or small spaces, particular cattle and/or cultures, preservation of particular or high-quality varieties, etc.), and enhance highly transparent farming.

In terms of environmental issues, IoT-based smart farming can provide great benefits including more efficient water usage, or optimization of inputs and treatments. Wireless Sensor Networks (WSNs) can be used in agriculture to provide farmers with a large amount of information. Precision Agriculture (PA) is a management strategy that employs information technology to improve quality and production. Utilizing wireless sensor technologies and management tools can lead to a highly effective, green agriculture. Based on PA management, the same routine to a crop regardless of site environments can be avoided.

From several perspectives, field management can improve PA, including the provision of adequate nutrients for crops and the wastage of pesticides for the effective control of weeds, pests, and diseases. This review outlines the recent applications of WSNs in agriculture research as well as classifies and compares various wireless communication protocols, the taxonomy of energy-efficient and energy harvesting techniques for WSNs that can be used in agricultural monitoring systems, and comparison between early research works on agriculture-based WSNs.

The challenges and limitations of WSNs in the agricultural domain are explored, and several power reduction and agricultural management techniques for long-term monitoring are highlighted. These approaches may also increase the number of opportunities for processing Internet of Things (IoT) data.

[3] Methodology

Technology has changed over time and agricultural drones are a very good example of this. Today, agriculture is one of the major industries to incorporate drones. Drones are being used in agriculture in order to enhance various agricultural practices.

The ways ground-based and aerial-based drones are being used in agriculture are crop health assessment, irrigation, crop monitoring, crop spraying, planting, and soil and field analysis.

The major benefits of using drones include crop health imaging, integrated GIS mapping, ease of use, saves time, and the potential to increase yields. With strategy and planning based on real-time data collection and processing, drone technology will give a high-tech makeover to the agriculture industry. So in this work we have to do the following processes:

- Monitor and collect the Soil and weather condition based crop cultivation using IoT and WSN.
- Collect the cultivation details based on area where the particular crop will grow and time when we can cultivate the particular crop.
- Store the collected details in cloud.

[4] Water and Energy Utilization

Irrigation is the artificial application of water to the soil through various systems of tubes, pumps, and sprays. Irrigation is usually used in areas where rainfall is irregular or dry times or drought is expected. There are many types of irrigation systems, in which water is supplied to the entire field uniformly. Irrigation water can come from groundwater, through springs or wells, surface water, through rivers, lakes, or reservoirs, or even other sources, such as treated wastewater or desalinated water.

Modern agriculture needs modern energy - the two are closely linked. For many developing countries, agriculture is the dominant sector in developing the economy. Increasing productivity and the modernisation of agricultural production systems are the primary drivers of global poverty reduction and energy plays a key role in achieving this. Energy input to modern and sustainable agricultural production and processing systems is a key factor in moving beyond subsistence farming towards food security, added value in rural areas and expansion into new agricultural markets. In many cases, renewable energy technologies and hybrid systems can provide energy services that neatly support the production process, e.g. by providing irrigation (pumps) or post harvest treatment (cooling) or processing (drying, milling, pressing).

- In this phase, we have to monitor and store the water utilization and energy utilization details separately according to the soil, time and area respectively.For the above process we are using wireless sensor network technique.

[5] Classification Technique

We apply any one of existing classification algorithm to classify the above data to identify where the selected crop can grow well according to the season, Soil type and area.Based on this classification result, we can come to a decision and tell the former to choose their crop cultivation at right time with right location.

[6] Secured Cloud Storage Using Proposed Cryptography Algorithm

The storage and retrieve the data from cloud is most important process, because the data should be accessed by authorized persons only. To protect the data in cloud we can use our proposed cryptographic algorithm.

The above algorithm should keep the records safe and also the data can be accessed only by the admin or authenticated users like registered formers.

[7] Architecture of the System

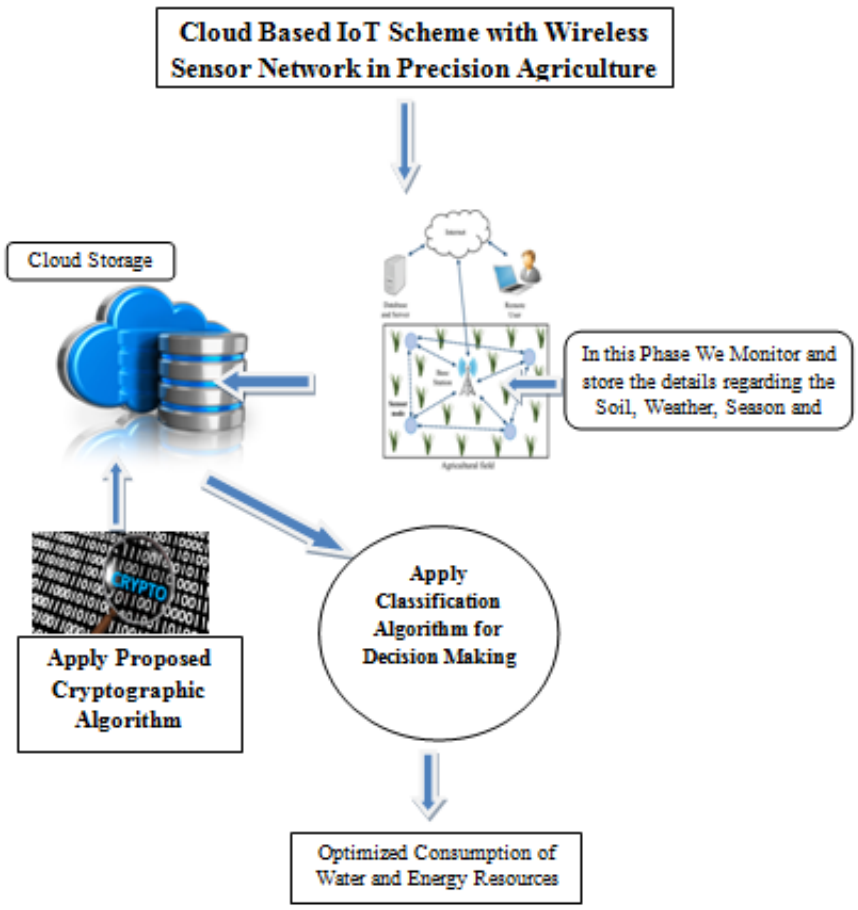

Figure1. Architecture of the Proposed Work

[8] Comparative Study on Algorithms

In this phase, we try to prove that our proposed algorithm will secure the cloud data compared with the existing algorithms.

To prove that, we can use different existing cryptographic algorithms and check the accuracy level of each algorithms. After comparing the different algorithms, we produce the result in graphical and table representation.

[9] Conclusion

In general, water, energy issue and irrigation methods play an important role in agriculture field for efficient usage of water and energy and increase productivity.

So, water and energy consumption reduction will helps the farmers economic at the small farms with low water resource. The stored accurate information about weather condition and crop type details can help to make decisions for the next process.

To achieve this goal we use the IoT and WSN technology. By using this technique we can improve the productivity and can reduce the usage of water and energy resources. Also we can protect the data while storing and accessing the data to and from the cloud.

[10] Scope for Future Enhancement

As future work, can design application software like Mobile Application for access and control the hardware systems used in precision agriculture along with AI and machine learning methods.

References

[1] Ahmed Khattab, Ahmed Abdelgawad, "Design and implementation of a cloud based IoT scheme for *Precision Agriculture", 201*-204, 2016.

[2] I. Akyildiz, W. Su, Y. Sankarasubramaniam, and E. Cayirci, "A survey on sensor networks," IEEE Commun. Mag., vol. 40, no. 8, pp. 102–114, 2002.

[3] Herman Sahota, Ratnesh Kumar, Ahmed Kamal, Jing Huang "An Energy-efficient Wireless Sensor Network for Precision Agriculture".

[4] Xuan Hung Le, Sungyoung Lee, Ismail Butun, Murad Khalid, Ravi Sankar, Miso (Hyoung-IL) Kim, Manhyung Han, Young-Koo Lee, and Heejo Lee "An energy-efficient access control scheme for wireless sensor networks based on elliptic curve cryptography".

[5] Gura, A. Patel, A. Wander, H. Eberle, and S.C. Shantz, "Comparing el- liptic curve cryptography and RSA on 8-bit CPUs," in Proc. CHES, 2004, vol. 3156, LNCS, pp. 119–132.

[6] Karlof and D. Wagner, "Secure routing in wireless sensor networks: Attacks and countermeasures," in Proc. SNPA, May 2003, pp. 113–127.

[7] Perrig, R. Szewczyk, J. D. Tygar, V. Wen, and D. E. Culler, "SPINS: Security protocols for sensor networks," Wireless Netw., vol. 8, pp. 521– 534, Sept. 2002.

[8] Newsome, E. Shi, D. Song, and A. Perrig, "The sybil attack in sensor networks: Analysis and defenses," in Proc. Intl. Symp. Inf. Process. Sensor Networks, USA, Apr. 2004, pp. 259–268.

[9] Wood and J. Stankovic, "Denial of service in sensor networks," IEEE Computer, pp. 54–62, Oct. 2002.ANSI X9.63, Elliptic Curve Key Agreement and Key Transport Protocols, American Bankers Association, 1999.

[10] Benenson, L. Pimenidis, F. Freiling, and S. Lucks, "Authenticated query flooding in sensor networks," in Proc. the 4th IEEE Conf. Pervasive Com- put. Commun. Workshops, Pisa, Italy.