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A STUDY ANALYSIS ON SMART FARM SECURITY SYSTEMS

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ABSTRACT

Farming plays an important part of living as it is the primary source. Being in an open environment, the risk increases to maintain the productivity and effectiveness of food as farmers need to face the changing environment and weather conditions. The researchers are facing challenges to work on the automation and security of the farms, especially in the large-scale farms. Farmers need to maintain the moisture level, pH level of soil, monitor the growth and keep an update about the weather conditions. Many researchers have invented and suggested smart systems with the help of IoT and AI. These have given rise to the increase in data on the cloud which needs security and protection. So, the present study mainly focuses on the research done by the researchers for the security systems of smart farming. Also, the study deals with the view of researchers towards the smart farming. The primary goal of the research is to get an overview to build smart farm security systems using recent technology. The present study also aims to explore the various current security measures that have been deployed in smart farming. It also aims to study the scope and limitation of the current security system of farming.

Keywords: *Agriculture, Smart Farming, Security, Technology.*

Introduction

In today's 5G world where all work is modernized by use of smart technologies, farming as a part of need of food for living, plays an important role. One of the most daunting challenges that pose a great concern to the world is the drift toward automation and security in large-scale farming. Most of these automated strategies can be adopted by small-scale farmers to increase efficiency on a large scale. Modern farming faces a critical problem within its environment: the unpredictability of environmental conditions, largely because of climate change. It has become important in the process to monitor environmental factors such as soil pH, soil moisture, temperature, rainfall, oxygen, carbon dioxide levels. This needs to be controlled for a minimum of three years. These records, therefore, help increase farming standards. Increased population means increase in the supply of food which means increase in the need of today's technology considering the smart farming. The quick procedures in the business are a result of the growing demand for food that is of greater quality and in larger quantities. Modernization brought about by advancements in infrastructure, technology, and superior growing methods. The past few decades, specifically. There are several possible uses for the Internet of Things in the contemporary agricultural industry. Traditionally when it comes to the root of living i.e. agriculture, it is

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a fact that the need for the labor sector has rapidly evolved if it is integrated with the advanced technologies or in other words known as smart farming. Smart farming practices enhance the productivity and efficiency of the crop but when it comes to the security, it increases the risk. Security is the most challenging part. Smart farming results in the increase of use of IoT (Internet of Things) devices, also increase of automated machinery and data-driven monitoring systems as well. When these devices are used and the data is stored, the risk of vulnerabilities increases. To reduce these risks, smart farm security systems have become an important part which includes surveillance, to protect integrity data protection is needed. Also, with integrity access control also becomes an essential part for protecting valuable agricultural resources, their data, and the operations. The use of these systems helps to address physical as well as cyber threats.

Objective

When it comes to the analysis of smart security farming, the main objective focuses on efficient and safe farm management of large-scale farms that are automated using advanced technologies. Also to study the environmental factors such as pH level of soil, moisture level of soil, carbon dioxide (CO2), the oxygen level, the amount of rainfall, the temperature and the snow in case of farming in the areas which possess temperature below zero degrees, which is needed within this automated farming according to the crop and area to improve productivity with these automated technologies. The aim also focuses on how real-time farm monitoring is carried out with the security by use of various technologies like IoT, Global Systems for Mobile Communication (GSM) and Global Positioning System (GPS) which ease farmer timely monitoring of farms. The analysis of the study also aim to how researchers prefer the collection and storage of the farm data, the parameters taken into consideration and the decision making platform. The analysis also focuses on the preferred machine learning techniques and different algorithms used by the researcher.

Related Work

Narsimha Rao Yamarthi and et. al., in their work, has selected a village plot near Amaravathi to transcribe soil moisture levels. The authors collected the data for interpretation. The authors in their work designed SAS model which is useful for Coconut farm, Mango farms, Palm oil farms, etc. The researchers have used the deep learning Convolutional Neural Network model for the data analysis and prediction which have achieved higher accuracy of 94.2%[1]This research proves that the security systems for smart farming can be achieved by use of various deep learning algorithms. The Internet of Things technology used by J. Muangprathub et. al. in their work used a web application, hardware components and a mobile application to to control environmental issues in agriculture estates. [2]When it comes to farming being in open environment different environmental factor affects the quality of crop. By the help of this research it clarified that the use of IoT can reduce the factors that affect the crops. This research will help to bring in the use of IoT technologies the yield the productivity. Mainly if the work focuses on Mobile application integrating with the sensors. M. Mahbub in their work has provided an intelligent agricultural monitoring device that gauges soil moisture and warmth without human intervention. The system analyzes the discovered data and proceeds with the required action based on temperature and humidity readings of the soil. [3] This research in a way is helpful to increase the productivity of the crops. The use of sensors marks an important field to monitor and control the water level to the crop. This research helps in designing more new intelligent devices by use of different Artificial Intelligence algorithms. Aganaet. al. in their work tackled the issue of construction of a deep learning-based drought forecasting system. It offered an ensemble approach to long-term agricultural output prediction. The two metrics utilized to create an anticipation are classification error and precision.[4]This research helps to move on with other models other than ensemble learning to identify the drought to protect the field and give good yield. Ahmed in their work focused on the improvement of agricultural information system by automating the tasks and also controlling temperature which could be safe and healthy for farming by use of cyber security which included deployment of firewall, antivirus software, RC4 encryption technique and examination of the security protocols.[5] Priyanka et. al. focused on the use of IoT devices in automated irrigation system with monitoring.[6] This research helps in a way out to focus on the protecting the data that has been collected while monitoring of irrigation systems. The security system which will protect the irrigation data would save the farmer to get the wrong inputs from the intruder. Keerthi et. al. in their work also focused on irrigation system with the help of Arduino microcontroller which senses the moisture level of plants which is displayed on LCD. [7] This work also gives a way of research to protect the integrity of the soil moisture level while sending it to users. A comprehensive summary of the various methods for crop selection, crop seeding, threat identification, system monitoring, and eventually production was provided by Khalaf et al. [8]. Threat identification and

system monitoring can be taken up as a research area with the help of this research. Several machine learning models have been examined by I. U. Din et. al., in their work described the benefits to a wide range of fields and uniqueness like IoT-based machine learning applications and methodologies for management of agriculture, the environment, and energy.[9]A protocol was outlined by Kishore et al. in their work to forecast the water level using the Collective model in accordance with the severity of the disaster (flood).[10] The study mainly gives a way of research to focus on the design of devices.

Conclusion

After studying the above research done by various authors it, collectively underscores the main role of technology, preferring IoT and AI, in smart farming solutions. Through different approaches like monitoring soil moisture, automated irrigation techniques, drought forecasting and agricultural monitoring, researchers have given a broad view of the use of these technologies that can optimize the productivity of farm, also improve the data accuracy, and enhance the security measures. Researchers proved that the Deep learning models are effective in analysing the agricultural data with high accuracy, which enables better prediction and give proactive decision-making in crop management. Also, the integration of IoT, with mobile and web applications has proved to aid in environmental monitoring, control and reducing the impact of any environmental factor on crops. The study also concluded that the security considerations, such as protecting the data on online platform of agriculture through encryption and firewall measures, also play an important role to protect the integrity, also focusing on safeguarding valuable agricultural information from manipulation. Summarizing the study, these research emphasizes on the transformative potential of IoT and AI in creating a resilient, an efficient, and secure smart farming systems.

Future Scope

The above studies helped in a much more way to open the areas of research in the upcoming researches in smart farming technologies. One of the work could be to focus on improving the accuracy and resilience of the deep learning models for different environmental conditions which makes these models more and more adaptable through different crops and climates as well. The integrating of IoT with mobile applications and the use of advanced sensor networks could even lead to more precise, a real-time monitoring and possessing the predictive capabilities, which benefits the crop management and help in the conservation of resources. Other research could be focused is cyber security in smart farming which ensures that the collected data whether it would be from automated irrigation or environmental monitoring or even yield prediction systems are more secure from intrusion and manipulation. Exploring the research work further a research on advanced encryption methods as well as robust security protocols will help in to protect the integrity of agricultural data and the systems. Also in the cross-disciplinary innovations combining AI with IoT,it may contribute to the development devices which are intelligent in agricultural area which are capable of autonomously responding to the changing environmental conditions, further optimizing the productivity and sustainability. Also, the integration of climate forecasting and the disaster prediction models mainly focusing on drought and flood, also holds significantly potential risk mitigation in agriculture, supporting more resilient farming practices.

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