Smart Farmer - IoT Enabled Smart Farming Application

Literature Survey:

[1] Neha Patil and Vaishali D. Khairnar - Smart Farming System using IoT and Cloud - September 14 2021

Due to the unprecedented increase in human population, agriculture plays an indispensable role in satisfying their daily needs. Henceforth, improving farm productiveness is indeed a huge challenge in the existing farming industry, which lacks continuous record management to satisfy the constantly emerging food needs. Along with the increasing population, global warming and climate transition also remain as an increasing challenge in the agricultural sector. In this scenario, this research has attempted to develop a smart farm management method, which incorporates cloud as well as the Internet of things (IoT) to take appropriate action. For instance, smart farming helps to provide a variety of important data such as air temperature. The paper has provided a smart device for farm field tracking, which controls dry run, motion detection, soil moisture detection, rainwater detection, humidity, and temperature. Also, this research work implements proper measures for those concepts on receiving the collected information without human input and later the detected quantities are stored for further data analysis within the cloud. Real-time feeds are being supervised upon this webpage as well as on the cell phone messaging. These would encourage farm workers and cultivate agricultural crops in a more modern way.

[2] Smart Farming and Smart Village Technology - Ahmad Latif Virk, Mehmood Ali Noor, Sajid Fiaz, Saddam Hussein, Hafiz Athar Hussain, Muzammal Rehman, Muhammad Ashan & Wei Ma - February 08 2020

Increasing population and abrupt weather fluctuations around the world has put huge pressure on agricultural food products for quality and sustainable food production. Revolution and advancement in food growing agricultural practices become advanced with the passage of time. In this modern age, improved technology-based agricultural practices are replacing the existing old-fashioned farming practices. These novel technologies are quite efficient but still require the consistent attention of researchers and scientists for better application and output of this technology. Smart farming involves the integration of information and communication technology for better utilization of resources from sowing, irrigation, fertilizer, pesticide, and herbicide application, and finally harvesting. But this system involves autonomous vehicles, robots operated through GPS and connected through smart applications. The precise application of this technology along with Internet of Things (IoT) supposed to be the helpful technology for farmers to uplift their living standards, with high production and profit and also can be a good indicator for food security. Nowadays, there are still limitations for the adaptation and conversion of smart farms due to high cost, non-availability of internet, and lack of application knowledge in the farming community. In autonomous vehicle and drones, there are also some major gaps regarding their application (positioning), efficiency, and workload. So, this area of research needs more explorations.

[3] Secure and Self-Adapting smart indoor farming framework - Clemens Gnauer, Harald Pichler, Markus Tauber, Christoph Schmittner, Korbinian Christl, Johannes Knapitsch & Martin Parapatits - October 21 2019

Facing the increase in world population and the stagnation in available arable land there is a high demand for optimizing the food production. Considering the world-wide and ongoing reduction of the agricultural labor force novel approaches for food production are required. Vertical farming may be such a solution where plants are being produced indoors in racks, cared by robotic appliances which will be operated by specialized software. Given the multitude of parameters which determine the ideal condition, a lot of data needs to be acquired. As this data is used to adapt the entire Cyber-Physical System to a changing environment the data has to be secure and adaptations have to consider safety aspects as well. Such systems must hence be secure, safe, scalable and self-adaptable to a high degree. We present an important element for such solutions, a cloud, IoT and robotic based smart farming framework.

[4] Smart Farming: Big Data on a Farm - Max v.Schönfeld, Reinhard Heil & Laura Bittner - October 18 2017

Digitization has increased in importance for the agricultural sector and is described through concepts like Smart Farming and Precision Agriculture. Due to the growing world population, an efficient use of resources is necessary for their nutrition. Technology like GPS, and, in particular, sensors are being used in field cultivation and livestock farming to undertake automatized agricultural management activities. Stakeholders, such as farmers, seed producers, machinery manufacturers, and agricultural service providers are trying to influence this process. Smart Farming and Precision Agriculture are facilitating long-term improvements in order to achieve effective environmental protection. From a legal perspective, there are issues regarding data protection and IT security. A particularly contentious issue is the question of data ownership.

[5] Smart Farming Analytics - El Medhi. Ouafiq, Abdessamad Elrharras, A. Mehdary, Abdellah Chehri, Rachid Saadane & M. Wahbi - May 30 2020

The concern over Smart Farming is growing, where Internet of Things (IoT) technologies are highlighted in the farm management cycle. Also a large amount of data is generated via different channels such as sensors, Information Systems (IS), and human experiences. A timely right decision-making by monitoring, analyzing, and creating value from these Big Data is a key element to manage and operate the farms smartly, and is also bound to technical and socio-economic constraints. Given the fact, in this research, we work on the implication of Big Data technologies, IoT, and Data Analysis in agriculture. And we propose a Smart Farming Oriented Big Data Architecture (SFOBA).

[6] Real Time Analysis of Weather Parameters - George Suciu Jr., Hussain Ijaz, Ionel Zatreanu & Ana-Maria Drăgulinescu - September 14 2019

Modern day agriculture and civilization demand for increased production of food to feed fast increasing global population. New technologies and solutions are being adopted in agricultural sector to provide an optimal alternative to gather and process information while enhancing net productivity. At the same time, the alarming climate changes, increasing water crisis and natural disasters demand for an agricultural modernization with state-of-the-art technologies available in the market and improved methodologies for modern era agricultural and farming domains. Internet of things (IoT) has been broadly applied to every sector of agriculture and has become the most effective means & tools for booming agricultural productivity and for making use of full agricultural resources. The advent of Internet of Things (IoT) has shown a new way of innovative research in agricultural sector. The introduction of cloud computing and Internet of Things (IoT) into agricultural modernization will perhaps solve many issues. Based on significant characteristics of key techniques of IoT, visualization, Libelium and Adcon can build up data regarding agricultural production. It can accelerate fast development of agricultural modernization, integrate smart farming and efficiently solve the issues regarding agriculture. Our motive is to perform the research that would bring new solutions for the farmers to determine the most effective ways to manage and monitor the agricultural fields constantly.

[7] Adaptive IoT System for Precision Agriculture - V. Geetha Lekshmy, P.A. Vishnu & P.S. Harikrishnan - January 18 2022

Precision agriculture refers to the application of modern tools and techniques to increase crop productivity in an environment-friendly manner. In the proposed work, a model of self-adaptive system for precision agriculture is developed. This Internet of Things (IoT)-based agriculture system mainly incorporates two functions, automated irrigation and pest detection and is augmented with machine learning models to make it self-adaptive. It handles the sensor failure events automatically by predicting the possible sensor values and keeps the system running without interruption. The system notifies the user about the failure so that it can be replaced later, thus avoiding abrupt termination or malfunctioning of the system. Another adaptive aspect of the proposed system is that it can adjust the system parameters based on prediction of stochastic environmental parameters like rain and temperature. Occurrence of rain is predicted by a machine learning model, and based on this, the system parameters like frequency of getting moisture sensor values are adjusted. This adaptation is fruitful during occurrence of continuous rain when the soil is wet and the moisture content information can be collected less frequently, thus saving the power consumption involved in data collection. The learning models long short-term memory (LSTM) and random forest are used in implementing adaptive functions. The automated irrigation becomes active on fixed times, and the amount of water dispensed is based on the values obtained from soil moisture sensors deployed. The pest detection module captures the images of field and detects mainly the bird pests attacking the crop. The object detection technique, Yolo4, is used to spot the pest.

[8] A Cloud-based prototype for the monitoring and predicting of data in precision agriculture based on internet of everything - K. Suresh Kumar, S. Balakrishnan & J. Janet - November 11 2020

To empower knowledgeable resolution and to gratify informational needs, farmers obligate agricultural information and appropriate knowledge. In India, day by day, the agriculture sector is diminishing, and it devastates the mass production ability of the ecosystem. It is a crucial need to resolve the complication in the sector to reimpose vibrancy and place it back on elevated progress. With the aim of to offer superior agricultural development, the Internet of Everything (IoE) has been developed and accomplished that recognize agricultural habitat data gatherings like soil moisture, humidity, light and temperature. Every sensor node can transform tracking information into the cloud. Data mining principles are utilized with takes cause of discovering communicative systems in the atmospheric constraints recorded by the sensor network. The implementation of this exploration was carried as a use case within the farmhouse in Chennai, India. This paper, we are presenting a formal provision of Peer-to-Peer Central- Registry biased Internet of Everything Protocol (P2PRioEP) which is an application medium registry for hybrid peer-to-peer IoT networks. The results are obtained over a duration and discussed.

[9] Internet of Applications: Opportunities and Threats - Amir Masoud Rahmani, Suleyman Bayramov & Benham Kiani Kalejahi - August 18 2021

In the century of automation, which is digitized, and more and more technology is used, automatic systems' replacement of old manual systems makes people's lives easier. Nowadays, people have made the Internet an integral part of humans' daily lives unless they are insecure. The Internet of Things (IoT) secures a platform that authorizes devices and sensors to be remotely detected, connected, and controlled over the Internet. Due to the developments in sensor technologies, the production of tiny and low-cost sensors has increased. Many sensors, such as temperature, pressure, vibration, sound, light, can be used in the IoT. As a result of the development of these sensors with new generations, the power of the IoT technology increases, and accordingly, the revolution of IoT applications are developing rapidly. Therefore, their security issues and threats are challenging topics. In this paper, the benefits and open issues, threats, limitations of IoT applications are presented. The assessment shows that the most influential factor for evaluating IoT applications is the cost that is used in 79% of all articles, then the real-time-ness that is used in 64%, and security and error are used in 57% of all reviewed articles.

[10] IoT-Based Smart Security System for Agriculture Fields - Sukhwinder Sharma, Puneet Mittal & Anuradha - October 02 2021

Farmers face well-known challenges of crop protection from insect pests, diseases, and weeds along with protection from contrary weather conditions like hail or frost. However, they face another important challenge of protecting crops from wild animals that may cause severe damage to their grown crops by feeding on plant parts or trampling over the crops. As most of farmers stay away from their fields, continuous monitoring of fields is not possible due to distance as well as costs involved to appoint manpower for this purpose. Present technologies have made it possible to provide low cost, easy to install, and user friendly solution to such problems. This paper aims to develop and install IoT-based security system for agriculture fields capable to detect and communicate presence of wild animals using PIR sensor and GSM module. It generates SMS alerts on the farmer's mobile phone whenever some animal crosses specific area. It helps farmers to take timely action for crop protection. The security system is deployed in real environment to validate its applicability and possible future extensions.