LITERATURE SURVEY

Survey on Smart Agriculture Using IOT

One of the important applications of Internet of Things is Smart agriculture. Smart agriculture reduces wastage of water, fertilizers and increases the crop yield. In the current agriculture system the specification such as temperature, moisture, humidity are detected manually which increases the labor cost, time and also monitoring cannot be done continuously. In this paper irrigation process is done automatically using different sensors which reduces the manual labor. Here a system is proposed to monitor crop-field using sensors for soil moisture, humidity and temperature. By monitoring all these parameters the irrigation can be automated.

Survey for smart farming technologies: Challenges and issues

Internet of Things (IoT) has been a major influence in Agriculture since its application to the sector. This paper provides an extensive review of the use of smart technologies in agriculture and elaborates the state-of-the-art technologies for smart agriculture including, Internet of Things, cloud computing, machine learning, and artificial intelligence. The application of smart farming to crop and animal production and post-harvesting is discussed. The impact of climate change on agriculture is also considered. This paper contributes to knowledge by iterating the challenges of smart technology to agriculture while highlighting the issues identified from existing framework of smart agriculture. The authors identify many gaps in existing research affecting the application of IoT in smart farming, and suggest further research to improve the current food production globally, to provide better food management and sustainability measures across the globe.

Survey, comparison and research challenges of IoT application protocols for smart farming

Smart farming era has already begun and its societal and environmental implications are expected to be huge. In this context, the Internet of Things (IoT) technologies have become the major path forward towards novel farming practices. The unprecedented capability of data collection and management offered by IoT is based on several factors of the underlying communication network architecture and technology, one of the most important being the application level protocol that is used among IoT nodes, gateways, and application servers. This work offers an up-to-date survey of research efforts on the IoT application layer protocols, focusing on their basic characteristics, their performance as well as their recent use in agricultural applications. Furthermore, it provides a comparison among them, in terms of well-accepted key performance indicators and comments on their suitability in the framework of smart farming as well as the corresponding challenges that have to be faced towards their efficient implementation.

Smart farming for improving agricultural management

The food shortage and the population growth are the most challenges facing sustainable development worldwide. Advanced technologies such as artificial intelligence (AI), the Internet of Things (IoT), and the mobile internet can provide realistic solutions to the challenges that are facing the world. Therefore, this work focuses on the new approaches regarding smart farming (SF) from 2019 to 2021, where the work illustrates the data gathering, transmission, storage, analysis, and also, suitable solutions. IoT is one of the essential pillars in smart systems, as it connects sensor devices to perform various basic tasks. The smart irrigation system included those sensors for monitoring water level, irrigation efficiency, climate, etc. Smart irrigation is based on smart controllers and sensors as well as some mathematical relations. In addition, this work illustrated the application of unmanned aerial vehicles (UAV) and robots, where they can be achieved several functions such as harvesting, seedling, weed detection, irrigation, spraying of agricultural pests, livestock applications, etc. real-time using IoT, artificial intelligence (AI), deep learning (DL), machine learning (ML) and wireless communications. Moreover, this work

demonstrates the importance of using a 5G mobile network in developing smart systems, as it leads to high-speed data transfer, up to 20 Gbps, and can link a large number of devices per square kilometer. Although the applications of smart farming in developing countries are facing several challenges, this work highlighted some approaches the smart farming. In addition, the implementation of Smart Decision Support Systems (SDSS) in developing countries supports the real-time analysis, mapping of soil characteristics and also helps to make proper decision management. Finally, smart agriculture in developing countries needs more support from governments at the small farms and the private sector.

Internet of Things (IoT) and Agricultural Unmanned Aerial Vehicles (UAVs) in smart farming: A comprehensive review

Internet of Things (IoT) and Unmanned Aerial Vehicles (UAVs) are two hot technologies utilized in cultivation fields, which transform traditional farming practices into a new era of precision agriculture. In this paper, we perform a survey of the last research on IoT and UAV technology applied in agriculture. We describe the main principles of IoT technology, including intelligent sensors, IoT sensor types, networks and protocols used in agriculture, as well as IoT applications and solutions in smart farming. Moreover, we present the role of UAV technology in smart agriculture, by analyzing the applications of UAVs in various scenarios, including irrigation, fertilization, use of pesticides, weed management, plant growth monitoring, crop disease management, and field-level phenotyping. Furthermore, the utilization of UAV systems in complex agricultural environments is also analyzed. Our conclusion is that IoT and UAV are two of the most important technologies that transform traditional cultivation practices into a new perspective of intelligence in precision agriculture.

Smart Farming in Europe

Smart Farming is the new term in the agriculture sector, aiming to transform the traditional techniques to innovative solutions based on Information Communication Technologies (ICT). Concretely, technologies like Unmanned Aerial Vehicles (UAVs), Unmanned Ground Vehicles (UGVs), Image Processing, Machine Learning, Big Data, Cloud Computing, and Wireless Sensor Networks (WSNs), are expected to bring significant changes in this area. Expected benefits are the increase in production, the decrease in cost by reducing the inputs needed such as fuel, fertilizer and pesticides, the reduction in labor efforts, and finally improvement in the quality of the final products. Such innovative methods are crucial in recent days, due to the exponential increase of the global population, the importance of producing healthier products grown with as much fewer pesticides, where public opinion of European citizens is sensitized. Moreover, due to the globalization of the world economy, European countries face the low cost of production of other

low-income countries. In this vein, Europe tries to evolve its agriculture domain using technology, aiming at the sustainability of its agricultural sector. Although many surveys exist, most of them tackle in a specific scientific area of Smart Farming. An overview of Smart Farming covering all the involved technologies and providing an extensive reference of good practices around Europe is essential. Our expectation from our work is to become a good reference for researchers and help them with their future work. This paper aims to provide a comprehensive reference for European research efforts in Smart Farming and is two-fold. First, we present the research efforts from researchers in Smart Farming, who apply innovative technology trends in various crops around Europe. Second, we provide and analyze the most significant projects in Europe in the area of Smart Farming.

The Digitisation of Agriculture: a Survey of Research Activities on Smart Farming

The impulse towards a larger introduction of <u>Information and Communication Technology</u> (ICT) in the agricultural field is currently experiencing its momentum, as digitisation has large potentialities to provide benefits for both producers and consumers; on the other hand, pushing technological solutions into a rural context encounters several challenges. In this work, we provide a survey of the most recent research activities, in the form of both research projects and scientific literature, with the objective of showing the already achieved results, the current investigations, and the still open challenges, both technical and non technical. We mainly focus on the EU territory, identifying threats and concerns, and then looking at existing and upcoming solutions to overcome those barriers.

Survey on Security Threats in Agricultural IoT and Smart Farming

The agriculture sector has held a major role in human societies across the planet throughout history. The rapid evolution in Information and Communication Technologies (ICT) strongly affects the structure and the procedures of modern agriculture. Despite the advantages gained from this evolution, there are several existing as well as emerging security threats that can severely impact the agricultural domain. The present paper provides an overview of the main existing and potential threats for agriculture. Initially, the paper presents an overview of the evolution of ICT

solutions and how these may be utilized and affect the agriculture sector. It then conducts an extensive literature review on the use of ICT in agriculture, as well as on the associated emerging threats and vulnerabilities. The authors highlight the main ICT innovations, techniques, benefits, threats and mitigation measures by studying the literature on them and by providing a concise discussion on the possible impacts these could have on the agri-sector.

Systematic review of Internet of Things in smart farming

Agriculture unquestionably is one of the traditional occupations, which feeds all mankind in the world. Continuous changes are happening in the agricultural field to increase production. Researchers are applying various techniques to improve farming methods. To monitor plants even from remote places and to improve the yield of plants, Internet of Things (IoT), which is a boon in today's world, is applied in farming, in general, known as smart farming. Smart farming is a way where the farmers can monitor their field and manage farming activities from remote places. This reduces man power and increases resource utilization in farming. In this article, we have studied the architecture of smart farming and studied different smart farming techniques, also we have classified smart farming techniques into three categories, namely, IoT-based agricultural monitoring and controlling system, automatic irrigation system, and plant disease monitoring system. The review for the article is selected based on the systematic literature review method, and articles published from 2011 to 2019 are considered for review. Different IoT technologies such as sensors, gateway, communication system, user interface and experiment nature, plant type, disease type, advantages, and limitations are also reviewed. Future research direction and challenges in smart farming techniques are also discussed.

Smart agriculture sensors in IOT

IoT is a new and upcoming trend in technology that finds its application in almost every field. Things, when connected to the internet and to each other, make the entire system smart. We have used IoT in every way of life: Smart Cities, Smart homes, Smart retail and many more. Using IoT in agriculture and farming practises is the need of the hour as the global population will hit a peak of 9.6 billion by 2050, to meet that kind of demand the agriculture industry needs to supply at an even faster rate. This is made possible by using modern technology and mainly IoT. IoT makes

labour free farms a possibility. Not only in major farming practices but it can also be used in maintaining livestock, greenhouse farming, managing farms etc. The most important tool used for IoT is Sensors, sensors are devices that collect essential data which is interpreted to get the desired analysis. For agriculture, sensors are mainly used to get readings used to measure NPK values, detect diseases & moisture content in the soil. This paper explores its application in the agricultural sectors. Smart agriculture is called precision agriculture because it uses precise data to reach conclusions. It shows the various sensors which aid IoT and agriculture, their applications, challenges, advantages and disadvantages.