SMART CROP PROTECTION SYSTEM

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This work aimed to design and develop a control system using node sensors in the crop field with data management via smartphone and a web application. The three components are hardware, web application, and mobile application. The system can send notifications through LINE API for the LINE application. The real-time information from IoTs devices in each village was used to control on-off switching of water sprinklers, automatically. This control box was designed for real-life testing. The implemented design connected to and received IoT information from any field in this study. The second part was the web-based application designed and implemented to manipulate details of crop data and field information. In this step, large-scale data from IoT is stored and utilized in data analysis.IoTs was applied in agriculture to improve crop yields, improve quality, and reduce costs. For these reasons, we proposed WSNs application to watering crops, in this paper. We designed and implemented a system to control environmental factors in the crop fields. This control box included hardware and electronic control system to connect to sensors and obtain data on crops. The control box was designed for real-life testing. The implemented design connected to and received IoT information from any field in this study. The second part was the web-based application designed and implemented to manipulate details of crop data and field information. In this step, large-scale data from IoT is stored and utilized in data analysis. As one key contribution, this work applied data mining by association rules to discover useful information on effects of environment and climate. The results showed that suitable temperature for high productivity of homegrown vegetables and lemons was between 29 °C and 32 °C.

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The Internet of Things (IoT) and cloudcomputing paradigms offer advances to enhance PA connectivity. Nevertheless, their usage in this field is usually limited to specific scenarios of high cost, and they are not adapted to semi-arid conditions, or do not cover all PA management in an efficient way. Highly-flexible three-tier architecture for PA that fosters software and hardware modularity across the different abstraction levels of the solution.An NFV-based solution is proposed in an edge layer toperform local operation decisions in a PA-

based envi-ronment, which can be deployed opportunistically at different levels of the network.Efficient and reliable PA operations are assured through distributing responsibilities between edge and CPS planes, avoiding problems originated from network failures when using a remote cloud control.The work presented in the paper describes the design, development and evaluation of a system that covers extreme PA requirements by using automation, IoT technologies, and edge and cloud computing through virtualisation. Cloud and edge planes are powered by FIWARE, including the use of regulated data formats and network interfaces, and a proper connection with local and global data analytics modules has been developed.As a relevant future result, we are currently porting the platform to a urban farming setting in frames of the HIDROLEAF project. In this environment we make use of intermodal containers to create portable crops. This implies extreme climatic environments that makes the most of our PA platform.

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Capability of data collection and management offered by IoT is based on several factors of the underlying communicationetwork 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.Message Queue Telemetry Transport (MQTT) MQTT is a messaging protocol.Its simplicity and very small header size compared to other protocols make it one of the most important choices for IoT applications.Constrained Application Protocol (CoAP) is a Web transfer protocol based on the Representational State Transfer (REST) architecture, similarly to HTTP . Extensible Messaging and Presence Protocol (XMPP) can be used for messaging, chat, voice and video calls, etc., allowing all of these applications to provide authentication, access control, and encryption services. It is a protocol based on text messages that uses XML (Extensible Markup Language) through which it can implement both request/response and publish/subscribe methods by using appropriate extensions.Based on the most recent literature, seven protocols (MQTT, CoAP, XMPP, AMQP, DDS, REST-HTTP and WebSocket) were presented, analyzed and compared with respect to their performance, measured in terms of relevant key indicators, i.e., latency, energy and bandwidth requirements, throughput, reliability and security. Important issues posed by contemporary and future smart farming applications were discussed, aiming to provide a strong basis for real-life implementation choices and to drive future research efforts that will

address the described challenges towards a reform of smartfarming systems and applications that will effectively and efficiently cover societal needs.

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The growth of the global population coupled with a decline in natural resources, farmland, and the increase in unpredictable environmental conditions leads to food security is becoming a major concern for all nations worldwide. These problems are motivators that are driving the agricultural industry to transition to smart agriculture with the application of the Internet of Things (IoT) and big data solutions to improve operational efficiency and productivity. The IoT integrates a series of existing state-of-the-art solutions and technologies, such as wireless sensor networks, cognitive radio ad hoc networks, cloud computing, big data, and end-user applications. This study presents a survey of IoT solutions and demonstrates how IoT can be integrated into the smart agriculture sector. To achieve this objective, we discuss the vision of IoT-enabled smart agriculture ecosystems by evaluating their architecture (IoT devices, communication technologies, big data storage, and processing), their applications, and research timeline. In addition, we discuss trends and opportunities of IoT applications for smart agriculture and also indicate the open issues and challenges of IoT application in smart agriculture. We hope that the findings of this study will constitute important guidelines in research and promotion of IoT solutions aiming to improve the productivity and quality of the agriculture sector as well as facilitating the transition towards a future sustainable environment with an agroecological approach. The benefits of applying IoT and big data in agriculture were discussed. In addition, we also pointed out the challenges we need to overcome to be able to accelerate the deployment of IoT in smart agriculture. However, there are still some challenges that need to be addressed for IoT solutions to be affordable for the majority of farmers, including small- and medium-scale farm owners.

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Internet of things (IoT) is a promising technology which provides efficient and reliable solutions towards the modernization of several domains. IoT based solutions are being developed to automatically maintain and monitor agricultural farms with minimal human involvement. The article presents many aspects of technologies involved in the domain of IoT in agriculture. It explains the major components of IoT based smart farming. A rigorous

discussion on network technologies used in IoT based agriculture has been presented, that involves network architecture and layers, network topologies used, and protocols. Furthermore, the connection of IoT based agriculture systems with relevant technologies including cloud computing, big data storage and analytics has also been presented. In addition, security issues in IoT agriculture have been highlighted. A list of smart phone based and sensor based applications developed for different aspects of farm management has also been presented. IoT smart farming security. Furthermore, many important dimensions of IoT based agricultural including technologies, industries trends and countries policies have been also been presented to facilitate various stake holders. Government has started patronizing IoT in agriculture and it is anticipated that soon IoT in agriculture will revamp the conventional farming method. It is also clear that many big organizations have started investing and developing new techniques for farm management system using IoT.