

An Architectural Framework Proposal for IoT Driven Agriculture

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22/01/23

Words:

729 (errors:1)

Pages: 2

The use of IoT and other information and communication technologies in agriculture is leading to a new revolution in farming, known as Agriculture 4.0. The integration of these technologies, often referred to as "smart farms," is helping to automate many farming processes and increase food production. This is part of the larger trend of Industry 4.0, which is using IoT and other technologies to transform the capabilities of various industries, including agriculture. However, there is a hiccup in execution which is farms located in rural areas, especially in developing countries, have limited Internet connectivity, insufficient (or no) energy supply, and the high cost of the infrastructure relative to the income of an average farmer. The paper presents the challenges in adopting IoT in Africa's agricultural industry, to address issues such as population growth, food wastage, and reduced agricultural productivity. The authors propose a cost-effective, energy-efficient, secure, reliable and heterogeneous three-layer architecture for IoT-driven agriculture. Challenges faced in adopting IOT driven agriculture: 1.Insufficient power supply 2.Limited internet connectivity 3.High cost of internet connection 4.Insufficient skilled labour in the area of IOT, data science and agriculture 5.Cyber security challenges

Proposed architectural framework: The proposed architectural framework for IoT driven agriculture takes into consideration energy, internet connectivity, security and cost constraints. Our framework is made up of three layers which are: the sensor layer, the fog layer and the cloud layer. 1. The IOT layer The proposed architecture includes an IoT layer made up of various sensors and agricultural systems, a gateway layer, and a cloud platform for advanced data processing. The authors propose the use of low-power communication technologies such as LoRaWAN to connect the IoT devices to the gateway. They highlight the use of LoRaWAN technology to ensure low power communication, however, there are some challenges such as transmission of multimedia data. They recommend further study on power requirements and optimization for multimedia data transmission using LoRa. 2. The Fog layer The IoT-driven agriculture that combines LoRaWAN communication technology with fog computing, in order to mitigate some of the drawbacks of using only cloud-based data processing. The proposed architecture includes a LoRaWAN access point, a local computer, and a fog layer consisting of an IoT agent, a lightweight context broker, a complex event processor (CEP), a LoRaWAN gateway, and a WiFi access point. The architecture uses the FIWARE platform, which provides open specifications for IoT deployments and is independent of the protocols running on different IoT devices. The IoT agent translates different communication protocols into

NGSI specifications and the lightweight context broker keeps track of context entities and publishes/subscribes requests. The CEP filters, aggregates and merges data, and generates alerts when certain conditions are met. 3. The Cloud layer It suggests using a three-layer architecture, consisting of IoT devices, gateways, and a cloud layer, and utilizing low-power, long-range communication technology (LoRa) and the open-source FIWARE platform. The authors propose the use of fog computing to shift some of the data processing to the edge of the network, closer to the IoT layer, to improve real-time control and security. The paper also suggests using the SerIoT project's self-aware, secure SDN for transportation of IoT traffic from the fog nodes to the cloud servers.

My views - Pitfalls: The biggest challenges faced by IoT in the agricultural sector are lack of information, high adoption costs, and security concerns, etc. Most of the farmers are not aware of the implementation of IoT in agriculture.

The author has kept all the possible problems that might be faced by developing countries in adopting IOT based agriculture. The paper covers every part of the proposed architecture in detail.