

## ABSTRACT

Cyber-Physical Systems (CPS) are becoming a key element in realising the implementation of the 4th generation of the industrial revolution. CPS integrates automation systems, electronic technology, internet networks, and machine learning. The application of CPS in the agricultural sector is considered an important step in supporting the sustainability of the agribusiness system. Precision agriculture and pervasive computing in agriculture have the potential to provide optimal benefits for stakeholders. One example of the application of CPS is a smart farming system designed to produce a measurable and maximised harvest without harming soil nutrients, which is carefully monitored according to weather conditions. Previously, several studies have developed LoRa communication-based systems to monitor local weather and measure soil nutrient conditions, which can be accessed through the internet network.

This research will involve the integration of CPS with LoRa communication-based agricultural monitoring and control nodes by considering local conditions in the Research and Recreation Park, Telkom University, as well as in partner agricultural industries as a real implementation model. The results show that the use of advanced sensor technology increases the accuracy of weather measurements up to 99% so as to be able to automatically measure and record meteorological parameters optimally with the best time at 09.00 - 13.30 WIB and get an accuracy value of 98% with a latitude and longitude error rate on the T-Beam of 0.004. Data transmission from nodes and gateways reaches a distance of 1.2 km with 0% packetloss so that the percentage of success is 100%. The website display is able to work well after testing the accuracy of data, graphics, date and time with data sent by the server to the dashboard with the overall test is 1.4 s and the average beta testing of 95%.

**Keywords:** Cyber Physical System, Smart Agriculture, Long-Range Communication, Soil Nutrients, Weather.