ECP 2024 Conference
The 3rd International Electronic Conference on Processes
29–31 May 2024 | Online

EcoSense: A Smart IoT-Based Digital Twin Monitoring System for Enhanced Farm Climate Insights

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INTRODUCTION & AIM

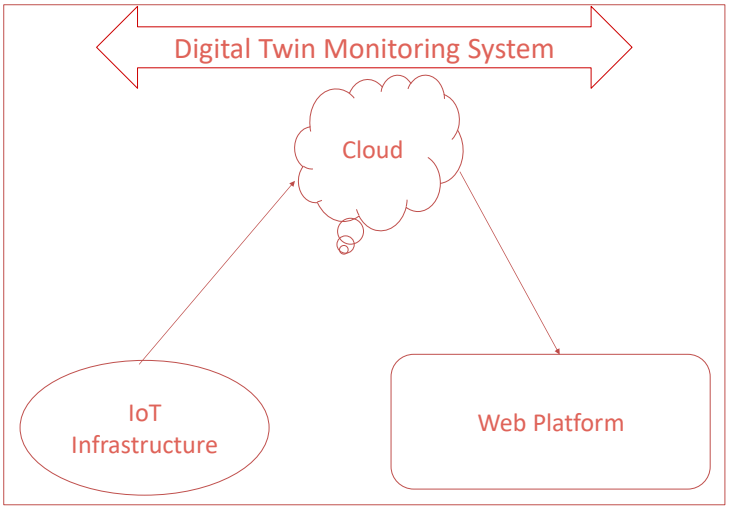
The convergence of digital technology and agriculture has given rise to innovative solutions aimed at augmenting productivity, sustainability, and efficiency in agriculture. One transformative idea that has garnered significant attention is the "Digital Twin" (DT), transcending boundaries and finding applications in various sectors, including agriculture.

This contribution introduces the design and implementation of a Smart IoT-Based Digital Twin Monitoring System that gathers real-time critical climate data.

METHOD

Our methodology consists of the design and implementation of a Smart IoT-Based Digital Twin Monitoring System that gathers real-time data on Total Volatile Organic Compounds (TVOC), signifying the total concentration of volatile organic compounds present in the air, contributing to indoor air pollution. Equivalent Carbon Dioxide (eCO2) provides an indication of the amount of CO2 in the air. Noise pertains to unwanted or disruptive sound in the environment. Humidity denotes the amount of water vapor present in the air. Temperature is a measure of the warmth or coldness of the air, water, or any substance, and its monitoring is crucial in various applications, including climate studies, weather forecasting, and industrial processes. Air Quality pertains to the state of the air in the environment concerning the presence of pollutants, particulate matter, and other substances. Its monitoring is essential for public health and environmental protection.

RESULTS & DISCUSSION



As a result, our Digital Twin monitoring system enables us to collect real-time climate data and send it to the cloud. We then fetch this data from the cloud, prepare it, and store it locally to make predictions based on the data. The collected data is sent to the cloud for storage and analysis. This climate information is indispensable for the farmer to make informed decisions at the opportune moment, take actions based on the gathered data, and predict crop yield.

CONCLUSION

In conclusion, this study shows the potential and necessity of using digital twins in all fields, especially in the agriculture sector, to aid farmers in monitoring and decision-making.

FUTURE WORK / REFERENCES

Our intelligent system has the potential, in the near future, to make decisions and manage automatic irrigation using solenoid valves based on the real-time collected data.