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AN IoT-BASED REAL-TIME MICROCLIMATE MONITORING AND CONTROLLING SYSTEM FOR GREENHOUSE

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Abstract

The agricultural industry is experiencing a profound transformation with the integration of Internet of Things (IoT) technology. This study presents the development and evaluation of a web-enabled microcontroller embedded system integrated with IoT technology for real-time monitoring and control of microclimate parameters, viz. temperature, relative humidity (RH), and light intensity inside a naturally ventilated greenhouse (polyhouse). The new IoT-based automated microclimate monitoring and controlling system comprised of microcontroller (Arduino Nano 33 IoT), temperature and humidity sensor (DHT22), light sensor (BH1750), and actuators (exhaust fans and foggers). It was designed to optimize the environmental conditions, critical for crop cultivation inside a polyhouse. It enabled remote monitoring and control via an IoT platform and Global System for Mobile Communication (GSM) module anywhere in the world. The IoT-based automation system was effective in maintaining an average temperature, relative humidity (RH), and light intensity of 34°C, 64.33%, and 32,000 lx, respectively, during the test period, resulting in an average temperature reduction of 3°C and an increase in RH of 4%. The data observed from inside and outside the polyhouse demonstrated the capability of the IoT-based automation system’s real-time monitoring and controlling of optimum microclimate parameters inside the polyhouse.

Key words: Arduino, automation, greenhouse, Internet of Things (IoT)

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