

Research and design of an environmental monitoring and control system for greenhouse.

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Abstract: This thesis presents the research and design of an environmental monitoring and control system for greenhouse applications. Addressing the need for precision agriculture, the study focuses on developing a system capable of regulating key microclimate parameters, including temperature, humidity, light intensity, and soil moisture. The proposed system integrates an array of sensors with a microcontroller-based central processing unit, utilizing a fuzzy logic control algorithm to maintain optimal growing conditions. Actuators such as fans, pumps, and shading nets are managed through a relay interface. A wireless communication module enables real-time data acquisition and remote monitoring via a user interface. Experimental results demonstrate the system's effectiveness in stabilizing the internal greenhouse environment, reducing fluctuations compared to uncontrolled conditions. The design offers a cost-effective and scalable solution for enhancing crop yield and resource efficiency in protected horticulture. This work contributes to the advancement of smart farming technologies in tropical and subtropical climates.

Keywords: environmental monitoring, control, greenhouse, IoT