Implementasion of a Telegram-Based Monitoring System for Hydroponic Seedlings to Optimize Plant Growth

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ABSTRACT

Hydroponics is a method of cultivation without using soil as a growing medium and without requiring extensive land, making it very suitable for urban areas with limited space. In the seeding process of the hydroponic method, proper regulation of lighting and irrigation is crucial. To ensure that plants receive adequate light, grow lights and DHT22 temperature sensors are used. The duration of lighting is adjusted according to the plants' needs. Automation is applied in the switching on and off of grow lights and mini water pumps through a microcontroller-based system. Communication between the user and the system is facilitated via a Telegram bot, allowing users to monitor plant conditions and lighting status (on/off) through Telegram. Test results show that the indoor hydroponic seeding box system functions well in measuring chamber conditions (humidity and temperature) and controlling actuators (water pump and grow light) as intended. The device performs automatic irrigation when humidity falls below 40% and stops when humidity reaches 45%. Information from the device can be accessed through various gadgets such as smartphones, laptops, and tablets. This system simplifies the control of hydroponic seedling conditions without the need for intensive manual supervision, ensuring ideal conditions for plant growth.

Keyword: *Hydroponics, grow light, mini water pump*