Auto Indoor Hydroponics Plant Growth Chamber

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Abstract

The objective of this project is to build an auto indoor hydroponics plant growing chamber that has an auto monitoring and controlling system. A ESP32 based hydroponics electrical system is built with the attachment of hardware components such as temperature and humidity sensor, light intensity sensor, water level sensor, and water flow rate sensor. The software development of the system is through Arduino IoT Cloud platform, which has an overall suitability in terms of features, cost, and user intuitiveness for starters. Results have shown that ESP32 can ensure stable power supply. After testing and validation, all of the electrical components are stored in a power enclosure box to prevent contact with liquid. In short, the developed auto indoor hydroponics plant growth chamber has effectively demonstrated the ability in easing the plant cultivation procedure for agricultural community.

Keywords: Auto Indoor Hydroponics, ESP32, Controlling and Monitoring Hydroponics

1. Introduction

The global population is expected to reach 9.8 billion in 2050 [1]. Meanwhile, scientists anticipate that a growing population will result in a decline in the amount of available land. The scarcity of land in the future is predicted to become a bottleneck in all industries, but especially in agriculture [2]. Not to mention, a lack of available land will make traditional farming difficult and increase the likelihood of a food crisis due to rising food demand but low yield rates [3].

All the aforementioned issues have made it difficult to provide adequate and nutritious food, particularly in urban areas. Therefore, new methods of producing enough food must be developed in order to sustainably feed the world's expanding population. New and modern farming techniques marked a significant technological advance for humanity. The substitution of liquid as the new growing medium for traditional growing medium can be the different approach for consistent crop production, preservation of rapidly depleting land and food availability. On that being in case, the rapid growth of hydroponic system is getting attention and increasing