

## A STUDY ON DESIGNING AN AUTOMATED IoT SYSTEM TO AID HYDROPONIC AGRICULTURE FOR DOMESTIC PURPOSE

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### Abstract

The population of the global is predicted to grow daily and reach 9.3 billion people by the year 2050. Thus, in order to ensure a sufficient supply of food, agricultural productivity needs to be raised. In addition, the cost of food in Sri Lanka rose in July 2022 at a record-breaking pace of 90.90% compared to the same month the previous year. Traditional farming, hindered by insufficient fertilizers and pesticides, fails to address the heightened demand, further diminishing productivity. The aim of the research is to design an automated IoT system for the deepwater culture method of hydroponics for domestic Water Spinach plant purpose. The results obtained were compared with the results obtained from the traditional cultivation method. The MQTT platform is used when cultivation uses the IoT method which is designed for IoT. In addition, Kincony esp32 A8 is used as the hardware and sensors and controllers are connected. The data received from those devices is configured with the Tasmota firmware and sent to the EMQX MQTT broker. Through the integration of Node-Red and the app via broker, this project enables users to acquire real-time cultivation data and exercise control over cultivation process accordingly. After connecting the hydroponics system, the parameters of pH, TDS and temperature were obtained in the form of graphs and the parameters of lights, fan and pump to be controlled were set to work manually. Results showed that reading the accuracy of the sensors temperature, TDS and humidity is, 98.21% for temperature, 95.51% for TDS and 96.45% for humidity. The proposed system aims to provide an efficient, cost-effective, and easy-to-use solution for domestic hydroponic agriculture. The system's automation reduces the need for constant manual monitoring, and the remote access feature allows users to monitor and control the system from anywhere.

**Keywords:** Conventional cultivation, Cost-effective, Hydroponic system, IoT, MQTT

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