

ABSTRACT

SMART HYDROPONIC URBAN FARMING SYSTEM (SHRUBS):
IOT BASED HYDROPONIC INDOOR FARMING WITH LED GROW LIGHT

Laura Fawzia Sambowo : 0055494018

Naufal Ahmad Sanaya : 0051065147

SMA NEGERI 2 DEPOK

Many people do farming in cities (Urban Farming), especially during the current COVID-19 pandemic. This is developing because of the community's need for food security. Various technologies are widely used, including cultivation systems using hydroponics. Hydroponic plants will grow using water that contains nutrients and the fulfillment of the need for sunlight. Hydroponic systems require water and light control which can be replaced by Internet of Things based systems using sensors and lights for growth (Grow Light).

In this research, an IoT-based hydroponic system has been created which is named SHRUBS. SHRUBS is an acronym for Smart Hydroponic Urban Farming System. The SHRUBS system is made by using an ESP-32 microcontroller, DHT-11 sensor, DC Fan, and ultrasonic sensor to measure the plants height. The irrigation system in SHRUBS uses the Ebb and Flow system. This system uses a water pump to circulate the nutrient liquid from the water tank below to the tray of lettuce plants that live in water-soaked rockwool and hydrogel. The sensor data gathered by the microcontroller will be sent to the cloud server via a wifi connection. These results can be displayed on a smartphone, which was built using the Blynk application.

The results of the system implementation in the form of a hydroponic system prototype with LED Grow Light were then tested to measure the effect of using IoT and Grow Light on lettuce plant growth. The system is paired with a microcontroller connected to the Internet that will send data regarding the conditions of the growing elements of hydroponic plants in the form of temperature, humidity, lighting, and irrigation systems in real-time. A perspective light intensity control system using an LED Driver is also installed according to the needs of plant growth for indoor hydroponic cultivation applications.

Keywords: Hydroponics, IoT, microcontroller, LED, Grow Light, pH, Total Dissolved Solids (TDS), sensor, temperature, humidity, ultrasonic sensor.