

ABSTRACT

Hydroponics is an agricultural system that utilizes water as a medium to replace soil. This is very much needed by most urban communities who have limited land. In hydroponic farming systems require stable air quality to improve the quality of plants, but the shortcomings in hydroponic farming systems if implemented in a room that is too large will cause the air quality in it to be difficult to control and monitor, resulting in less than optimal plant growth in the room.

This research is the design of a farm rack as well as a control and monitoring system for air quality in the farm rack. This system uses a farm rack that has an oxygen sensor, carbon dioxide sensor, DHT11 sensor, the three sensors as parameters used to monitor air quality in the farm rack. The system is also equipped with a cooling fan and a heating fan that can blow hot and cold air into the farm rack automatically. With this system, the air quality in the farm rack is maintained and can improve plant growth in the farm rack.

The results of the research and system design show that the results of parameter measurements for temperature, humidity, and O₂ on closed shelves do not occur very significant changes because the shelves are tightly closed and can be controlled and monitored properly and stably, while CO₂ changes significantly because there is no ventilation or exhaust fan to remove CO₂ outside the farm shelf area. Based on sensor reading test data, at hour 0 minute 0 to hour 0 minute 30 there is no decrease and increase in temperature. There was a change in temperature at 0 minutes 30 which was 23.00 ° C to 0 minutes 40 of 22.60 ° C. There was no significant change because the rack was tightly closed and could be controlled and monitored properly and stably. The results of O₂ in a closed rack are maintained stability because it has an average difference value below 0.01%. CO₂ results experienced a very significant change from hour 0 minute 0, namely with a value of 36.77% to hour 0 minute 10 with a value of 39.00% this is due to a decrease in humidity in the farm rack room, causing the CO₂ value to also increase.

Keywords: *Hydroponics, Oxygen Sensor, Carbon Dioxide Sensor, DHT11 sensor, ESP32.*