

**ABSTRAK**  
**IMPLEMENTASI INTERNET OF THINGS SISTEM MONITORING PH**  
**AIR TANAMAN PAKCOY HIDROPONIK**

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Budidaya tanaman pakcoy secara hidroponik memerlukan pengelolaan kualitas larutan nutrisi, salah satunya nilai pH yang idealnya berada pada rentang 5,5–6,5. Penelitian ini mengembangkan sistem monitoring pH air berbasis Internet of Things (IoT) menggunakan ESP32 dan sensor PH-4502C. Nilai pH ditampilkan pada LCD dan aplikasi Blynk, disimpan sebagai data record pada database, serta sistem mengirimkan notifikasi Telegram apabila pH berada di luar rentang ideal.

Hasil pengujian menunjukkan sistem mampu melakukan monitoring secara real-time, menyimpan data hasil pengukuran, dan mengirimkan notifikasi sesuai kondisi pH. Hasil kalibrasi sensor memperoleh rata-rata error sebesar 7,48%. Uji Paired Sample T-Test menghasilkan p-value sebesar 0,67 ( $> 0,05$ ), yang menunjukkan tidak terdapat perbedaan signifikan antara hasil pembacaan sensor dan alat ukur referensi. Dengan demikian, sistem dapat digunakan untuk monitoring pH larutan nutrisi tanaman pakcoy hidroponik secara real-time.

**Kata kunci:** Internet of Things (IoT), hidroponik, pakcoy, monitoring pH, ESP32, PH-4502C, data record.

## ABSTRACT

### IMPLEMENTATION OF INTERNET OF THINGS-BASED pH WATER MONITORING SYSTEM FOR HYDROPONIC PAKCOY PLANTS

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*Hydroponic cultivation of pakcoy requires proper nutrient solution management, particularly maintaining an ideal pH range of 5.5–6.5. This research developed an Internet of Things (IoT)-based water pH monitoring system using an ESP32 and PH-4502C sensor. The pH values are displayed on an LCD and Blynk application, stored as data records in a database, and Telegram notifications are sent when the pH is outside the ideal range.*

*The test results show that the system can monitor pH in real time, store measurement data, and send notifications according to the detected pH conditions. Sensor calibration resulted in an average error of 7.48%. The Paired Sample T-Test obtained a p-value of 0.67 ( $> 0.05$ ), indicating no significant difference between the sensor readings and the reference measuring instrument. Therefore, the developed system can be used for real-time pH monitoring of nutrient solutions in hydroponic pakcoy cultivation.*

**Keywords:** *Internet of Things (IoT), hydroponics, pakcoy, pH monitoring, ESP32, PH-4502C, data records.*