

ABSTRACT

Weather conditions in coastal areas greatly affect community activities, especially fishermen and the tourism sector. One important factor that needs to be observed is wind speed and direction. This research designs and implements an Internet of Things (IoT)-based wind speed and direction monitoring system that works independently with energy sources from solar panels. The system uses ESP32 microcontroller, wind speed and direction sensor, and LoRa communication module to send data remotely. Data is displayed in real-time through LCD and MQTT platform. The test results show that the portable design of the system is designed to be disassembled, making it easier for users to move to another location. Test results on a system that uses waterproof materials, the system continues to operate properly after being exposed to water. The results of testing independent energy sources from solar panels, the system is very suitable for use in remote areas or where conventional electricity is rare. The results of testing telecommunications technology, the system shows that the farther the distance between the transmitter and receiver, the weaker the received signal. The test results on sensor capacity show that the wind speed sensor has an error rate of 0.27% and an accuracy of 98.6%, while the wind direction sensor has an error rate of 1.3% and an accuracy of 98.7%. These values indicate that the sensors are proven to work optimally.

Keywords: *ESP32, LoRa, MQTT, Wind Speed, Wind Direction, IoT*