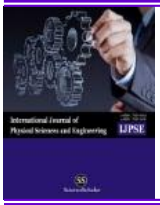

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Web-based Speed Monitoring Tools

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Microcontroller;
SIM800L;

Abstract

The development of communication technology and science in this globalization era is very rapid. In utilizing this technology using laptops and the internet using Web as a means to monitor wind speed data in real-time. Wind measurement using an anemometer is a field from the weather forecasting agency by making an intermediary tool similar to the one on the weather forecast station using a simple anemometer that is connected to the laptop as a data observer. Anemometer or cup type wind sensor that has 3 cup counter wind speed gauges. In addition to using wind sensors, it is also needed ATmega328 microcontroller, SIM800L, and DHT11 sensors. Besides being able to measure wind speed in real time this tool can also measure air temperature and humidity. Wind speed measurement data can be accessed through a database and web that can be accessed on a server computer.

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1. Introduction

Wind is the flow of air in large numbers caused by the rotation of the earth and also because of the difference in the surrounding air pressure. The wind moves from a high-pressure air to a lower air pressure. Wind speed measurement can be measured using wind speed measuring devices. The wind speed measuring instrument that is usually used is an anemometer (Sawita, et al., 2005). The anemometer used is a type of cup that has 3 propellers (Utama, 2016; Fatoni, et al, 2015).

The utilization of this wind speed monitoring tool is expected to monitor wind speed in real time. With WEB and SIM800L so that maximum wind speed monitoring is possible. In addition to measuring wind speed, this tool can also monitor air temperature and humidity in real time. The design of this WEB-based wind speed monitoring tool is expected to help the community in providing information about wind speed, temperature and humidity in certain areas in real time (Saputro & Wibawanto, 2017; Azlinaa, 2013).

2. Materials and Methods

Cup anemometer is a device used to measure the rate of wind where the wind rate sensor consists of three cups connected by an arm attached to the edges. All cups face in one circular direction so that when the wind blows the rotor rotates in a fixed direction (Hadi, et al., 2018). This tool responds to the dynamic style that comes from the wind that works on the device. The dynamic force of the wind on the cup concave surface is greater than the convex surface of the cup. The axis rotation of the cup system is connected mechanically or electronically with a device called a signal generator, for recording purposes. This signal generator is around counter (Palupi, 2006). For Anemometers that have three cups can be seen in Figure 1 (Hidayat, 2015).

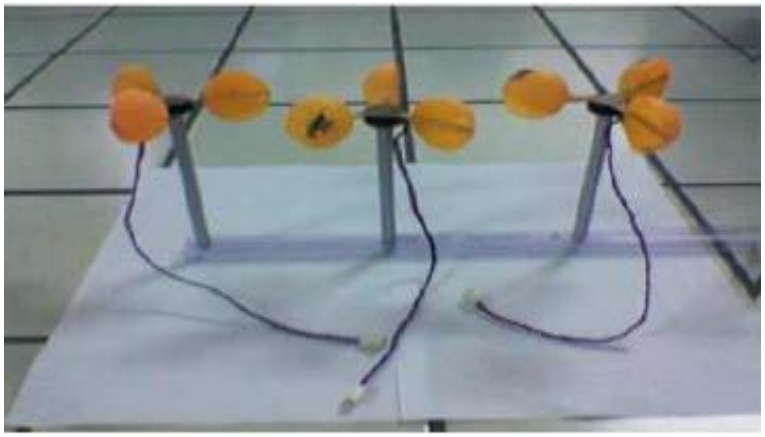

Figure 2.1 Cup anemometer (Hidayat, 2015)

3. Results and Discussions

The design results from the tools obtained from this study are as shown in Figure 2.

Figure 2. Wind speed monitoring tool with an anemometer, measuring temperature and humidity using DHT11 sensor and SIM800L module based on ATmega328 microcontroller

The functions of the section in Figure 4.1 are as follows.

a) Adapter serves as a voltage source.
b) Wind sensor QS-FS serves to measure wind speed.
c) Sensor DHT11 serves to measure the temperature and humidity of the air.
d) The minimum range of ATmega328 systems and Liquid Crystal Display (LCD), functions for data processing of wind sensor output voltage and DHT11 and LCD functions as a viewer of measured wind speed, temperature, and humidity.
e) The SIM800L circuit serves as the sender of wind speed, temperature, and humidity data measured to the server.
f) Display data on wind speed, temperature, and humidity in the android application on the smartphone serves to monitor data measured by design tools.

The data on the programmed anemometer on the ATmega328 microcontroller is also connected to the World Wide Web (WEB). Thus it can make it easier for users to monitor wind speed by opening the WEB to check wind speed data in real time.

Software

The program used in the design of the tool in this study uses the Arduino software built-in program, which combines C ++ and Java languages. Following are the initialization sub-programs as follows:

```
#include <LiquidCrystal.h>
//#include "SIM900.h"
//#include "sms.h"
#include <SoftwareSerial.h>
#include <PString.h>
#include <DHT11.h>
int pin=19;
DHT11 dht11(pin);
```

The updated data every 1 minute is displayed on a database that is connected to a server computer with the SIM800L module using the General Packet Radio Service (GPRS) signal. The data display on the database can be viewed on the server computer by opening *cpanel* on google and accessing phpMyAdmin, but the database in phpMyAdmin can only be accessed by the server computer because it uses special access such as passwords and usernames. The database view is shown in Figure 3.

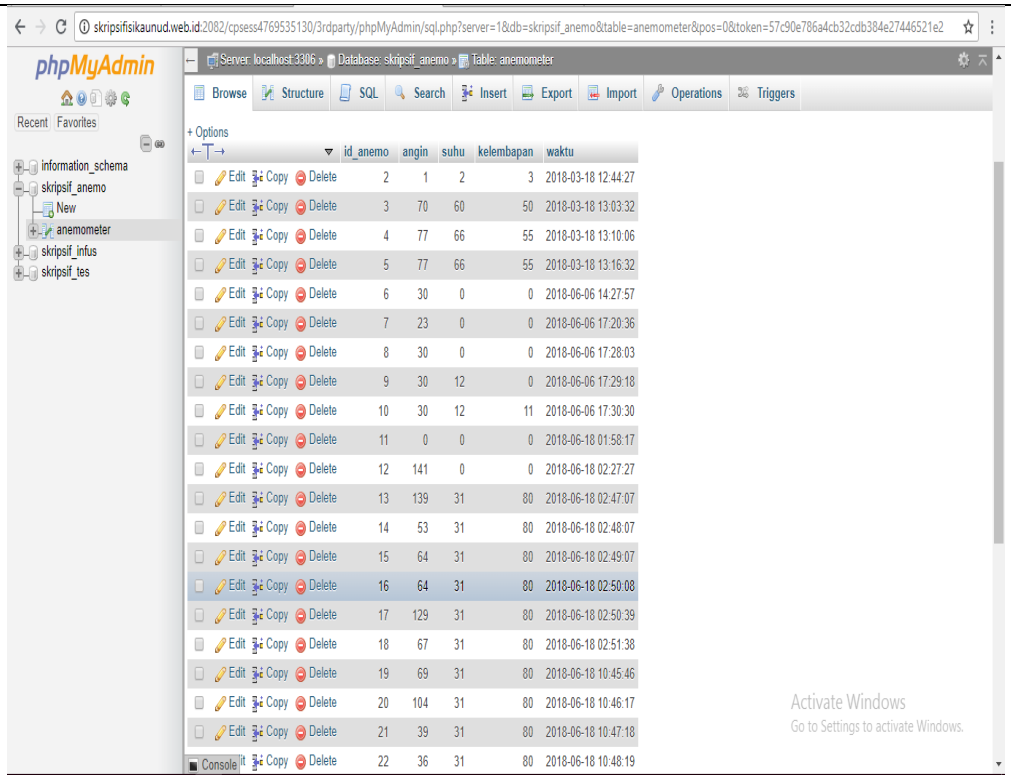

Figure 3. Database display

Display results of the measurement of wind speed data that can be accessed without using a password and username can be seen in Figure 4.

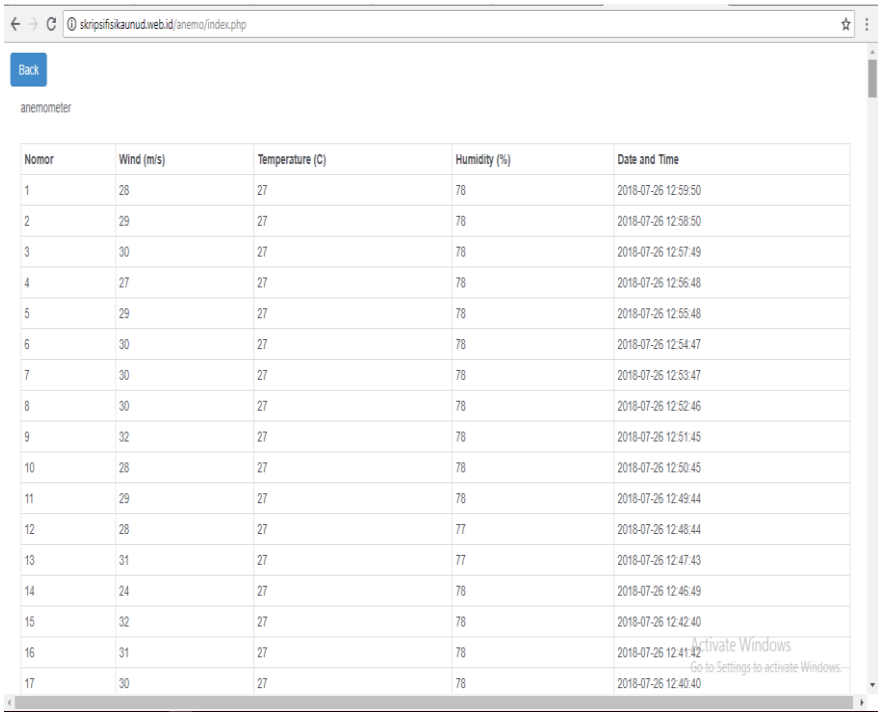

Figure 4. Display of wind speed measurement data

4. Conclusion

From this research, it can be concluded that there are several things, namely: A web-based wind speed monitoring tool has been created. Anemometers require wind to rotate 3 propellers and produce data. Wind speeds generated by the anemometer can be monitored in real time.

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