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Planning System Gauge Strength Wind Based on the Internet of Things

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Abstract

The wind moves air from place One to somewhere else because there exists a different pressure of air. There are many benefits of wind for creatures living in the world, especially humans among them use wind by fishermen, generators of electricity power wind, and sports flight like kites. Prevention of disaster Because wind only can give warning to minimize casualties and damage in the area that occurs nipple pickaxe namely Anemometer as gauge speed wind. Besides a lot of benefits wind, however own impact bad adverse winds man. This tool is designed To measure the speed of the wind as well as minimize disasters caused by wind. This tool uses the ESP32 microcontroller as the main connected system through device wifi as Anemometer connections and sensors used as gauge strength wind, connected web server with a microcontroller via wifi as an interface for monitoring. Making tools using the data collection method used that is literature study, observation, and interviews. The system development stage consists of analysis, implementation system design as well as testing. Testing on the system is carried out with a test Anemometer sensor in an open area with monitoring using a connected web server with a microcontroller via wifi site testing with exists tool This measuring system design strength wind based on the Internet of Things.

Keywords: *gauge strength wind, Arduino, Anemometer Sensor, module wifi ESP32, Web Server*

1. INTRODUCTION

The wind is air that moves from one place to another because of differences in air pressure. The expansion of air creates a difference in air pressure and creates air movement. The principle of air movement is that air moves from high-pressure areas to low-pressure areas. Areas that receive more solar heat will have heat so the temperature is high and produces low air pressure. [1]

There are many benefits of wind for living creatures in the world, especially humans, including the use of wind by fishermen, wind power generation, aviation sports such as gliding, and natural pollination for plants. Apart from the many benefits of wind, wind has negative impacts that are detrimental to humans, such as what often happens in Indonesia, namely tornadoes. Prevention of natural disasters due to wind can only be done by providing warnings to minimize casualties and damage in areas where tornadoes occur, namely anemometers as a measure of wind speed. However, this device is less useful because there is no warning that functions as an alarm for a disaster caused by wind. The use of an anemometer must be monitored directly at the location where the device is placed. There are technological developments that can directly monitor wind speed in real time over long distances. The use of IoT (Internet of Things) means that wind speed monitoring data can be sent and the latest data obtained. [2]

The results of the data can be depicted in the form of graphs and figures periodically. There are graphs and detailed wind speed figures so that you can add safe wind speed limits. IoT is a concept of internet-connected tools that can carry out all processes starting from collecting data, processing data, sharing data, and running periodically. [3]

The use of the IoT system will produce data known as Big Data, then the data will be processed and then displayed. Research on the Design of a Wind Speed and Direction Measuring Instrument Based on the ATmega8535 Microcontroller using a Light Sensor System. The tool system used to measure wind speed and wind direction consists of a microcontroller, LCD (liquid crystal display), Schmitt trigger circuit, and photodiode circuit. The research measured wind speed using a bowl system that was replaced by a generator and then replaced with a lighter sensor disk. The calculation of wind speed using the sensor disk is that every 1 revolution of the disk is equal to 0.61 m/s. Wind direction using blades. The instrument test validation of 99.10% with the AM-4206 anemometers is certainly better than the BMKG permanent bowl anemometer test with the AM-4206 anemometers which only got 90.47%. Many technologies are developing rapidly in almost all fields, one of which is the development of sensors. [4]

Based on the novelty of this tool compared to existing ones, it uses the Internet of Things (IoT) wind speed using the ESP8266 Microcontroller. Some of the relevance of related research is that researchers will design an IoT-based wind strength measuring system. [5] The devices that will be used are turbines, wind speed sensors, monitors, and ESP32 microcontrollers. These tools are then connected using IoT and additional LCD features to display wind speed observations. Apart from that, there is an additional buzzer feature as an alarm that will sound when the wind speed exceeds the safe limit and there is a notification via the web.

2. RESEARCH METHODS

2.1. Object Study

Object study This is a place that has a risk in happen disaster wind with speed high, like place settlements in Pnggir the beach of course own risk wind tight, that's possible harm Good in treasure objects or even fatalities. This tool is designed using, Arduino IDE, Visual Studio code, the Internet of Things, Anemometer.

2.2. Method of collecting data

2.2.1.Literature Study Method

A literature review is a method directed data collection to search information through documents, documents written, photos, drawings, or document electronics that can support the writing process. At this stage, the researcher collects journals related use of the Internet of Things and journals with other related title.

2.2.2.Observation

Observation is the process of collecting data systematically directly in the field. Here is this process related to collecting related data problems that occur.

2.2.3.Interview

The interview is a method of collecting useful data to obtain information by asking for answers. The interview is done To get the necessary materials in deep making tool.

2.3. Planning system

The design stage system is the stage where the identification process of the problem becomes the foundation of research, the stage beginning from the planning system. designing get up appropriate implementation with the system required.

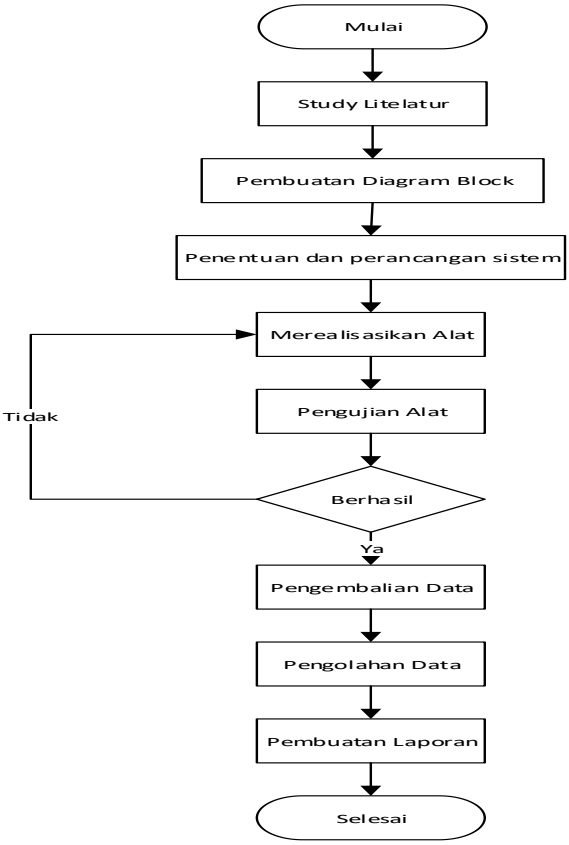

Figure 1. Planning system

2.4. Block diagram

Figure 2. Block diagram

In Figure 2 above, the system consists of input and output, on the device entry, consisting of a wind vane that furthermore will be processed on Esp32, and the results output will be shown via the Web.

2.5. System flowchart

Planning device software on the system This is with creating an Esp32 program, in the Arduino IDE software and the step furthermore is uploading the program to the Esp32 microcontroller board, as for the flowchart from the system is presented in Figure 2.3 as follows:

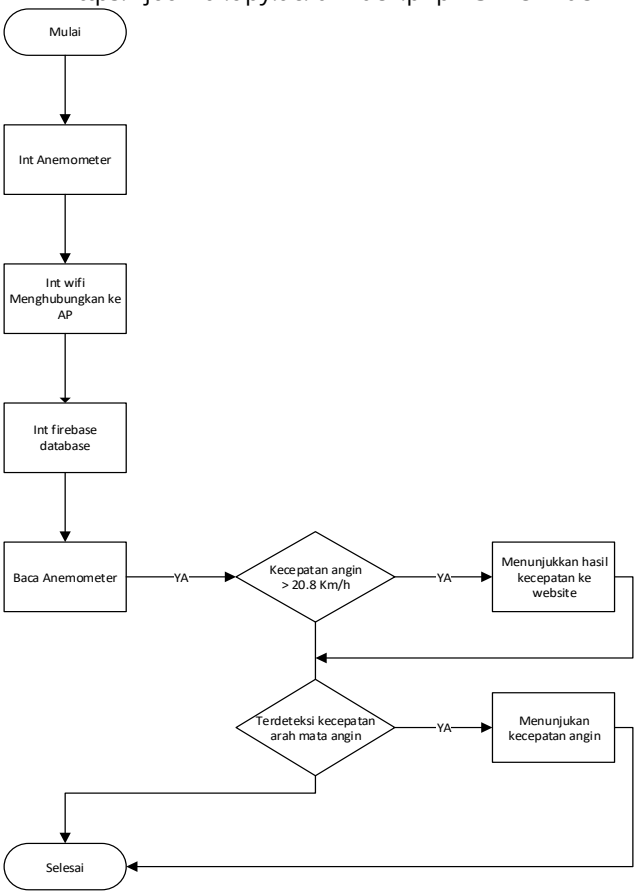

Figure 3 System flowchart

Figure 3 above, illustrates the flow of the system that will be built, on the device input consists of the next Anemometer sensor that will be processed, if there is one from calcification that has been programmed then will be shown to the Web.

2.6. Interface Display

Appearance speed monitoring dashboard page wind is shown in Figure 4. On p This user can see information speed wind in m/s and km/h as well many sensor rotations in rpm. The measurement data log is displayed in the form of graphs and tables.

Figure 4 Interfaces

2.7. Tool design

Figure 5 Tool design

Ways of working tool can be explained as follows:

The anemometer works with the method to determine the speed of the wind and yield data output from the Windvane speed. On research This the specified data is carried out. And will send data to the Esp32 which then will be shown via monitor.

3. RESULTS AND DISCUSSION

3.1. Anemometer Sensor Testing

The anemometer sensor works as a sensor for detecting many round consequences such as Power push wind. The more Power pushes the wind so speed turn the sensor will increase.

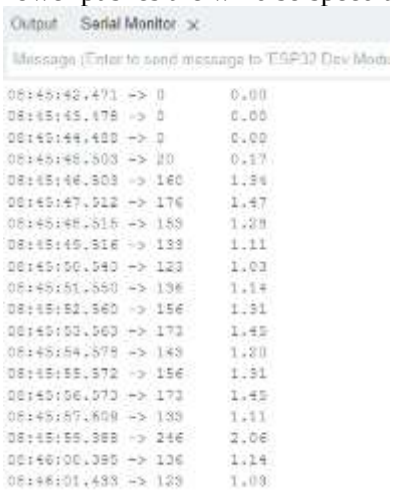

Figure 6. Current anemometer sensor testing enhances the speed of wind between 1-2 km/hour via the Arduino serial monitor

3.2. Web Interface Testing

3.2.1.Monitoring dashboard testing

Appearance speed monitoring dashboard page wind shown in Figure 7. On p This user can see information speed wind in m/s and km/h as well many sensor rotations in rpm. The measurement data log is displayed in the form of graphs and tables.

Figure 7. Speed Monitoring Page Testing Wind

3.2.2.Graphics menu testing

The graphics menu works For displaying chart results measurement speed wind from time to time. The appearance chart is in Figure 8.

Figure 8 . Testing Chart Speed Wind

Chart speed rotation sensor for displays results Sensor rpm measurements are in Figure 9.

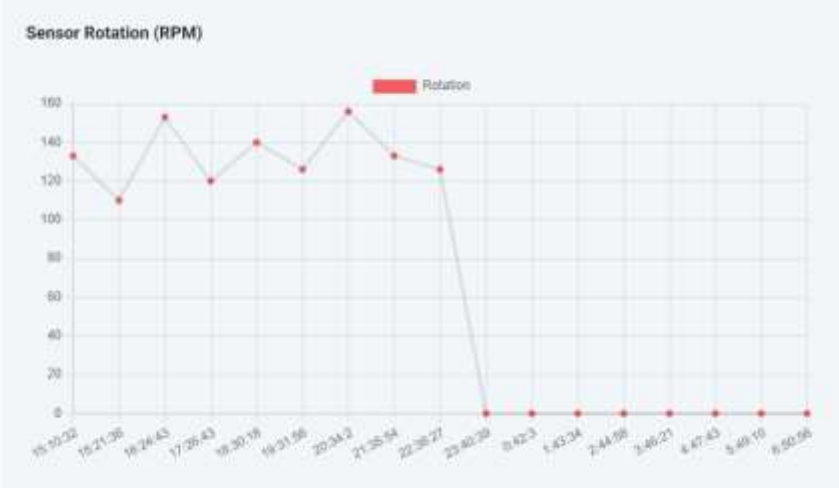

Figure 9 . Testing Chart Wind Sensor Rotation

Discussion of the research and test results obtained is presented in the form of theoretical descriptions, both qualitatively and quantitatively. Experimental results should be displayed in the form of graphs or tables. For graphics, you can follow the format for diagrams and pictures.

3.3. Alpha testing

Alpha testing is performed consisting of 20 (Two Twenty) respondents. Respondents operate tools and fill out a list of questions (questionnaire) as a response to the performance tool. Test results This containing appearance tools and websites are in Table 1 below:

Table 1 Alpha Test

No	Question	SS	S	T.S	STS
1	Does the system differentiate wind power?	8	12		
2	Can the system measure wind strength and display it on the web?	1	19		
3	Does the system can display wind conditions on the web?	1	19		
4	Does the system give information conditions wind on the website?	2	18		
5	is the system connected to the Internet?	10	10		
6	Does the tool display results wind information on the website?	5	15		
7	Does the tool display information on wind speed conditions on the web?	13	6		
8	Can a tool be turned on using a source of 5 USB volts?	9	11		
9	Whether the tool can infer wind conditions based on condition?	1	19		
10	Is the website easy to access?	3	17		
11	is appearance And use easy website used?	13	7		
12	is tool be accessed from a distance Far through the Internet?	12	8		
13	is the appearance easy website understand?	4	16		
14	Does the tool give information that is by Circumstances?	12	8		
15	is the tool easy to move (Portable)?	13	7		

From the results percentage table 1 Design system gauge strength wind based The average *Internet of Things* is 82.79% so the system can be implemented

4. CONCLUSION

That conclusion can be obtained from planning system gauge strength wind based *The Internet of* Things has been created and implemented testing. So it can be explained conclusions as follows:

Design get up planning system gauge strength wind based A functioning Internet *of Things* as gauge speed wind run by a connected ESP32 with firebase database.

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