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Wind Speed Monitoring System for Sailing

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ABSTRACT: -Environmental conditions affect outdoor sports performance in the sport of sailing, where environmental parameters are influential as they interact directly with strategic analysis of the race area. For these reasons, this research presents an innovative methodology for the strategic analysis of the race course that is based on the integrated assessment of meteorological data measured on the ground, meteorological data measured at dam during the training activities and the results. The results obtained by the above analysis are then integrated into a graphical representation that provides to coaches and athletes the main strategic directions of the race course in a simple and easy-to-use way. On the other hand, the results of this analysis can be used effectively for the improvement of athletes' performances

KEYWORDS*:* -Wind speed sensor, Temperature sensor, Arduino Uno, SIM900 GSM Modem, Battery, Solar panel, 16x2 LCD Display, Voltage sensor, Relay.

I. INTRODUCTION

The effect of weather and environmental conditions on sports has been studied over the years. The data measured by system stations have been used to determine the weather requirement is satisfies for the sailing sports. This paper explains the development of wind monitoring system from there mote location of dam. The steps involve investigating the wind speed, designing the system, developing the system, testing, and validating. The result shows that the system can measure the wind speed on the spot in real time and send this data to the thing speak server. On the other hand, it also informs the forecast of wind speed according to weather web services data few hours before. Applying this system will help the water sports enthusiasts to determine the weather condition so flake side where water sports is learned and practiced. Wind intensity varies and wind direction remains almost constant (or also there is a variation of the "wind pressure"). The determination of the regatta field type is essential to set up a correct strategy. Wind speed analysis is useful for both coaches and athletes.

II. LITERATURE SURVEY

The main objective of [1] Strong wind allows uproot the trees and causes human victims to be injured or dead. Unfortunately, the strong wind comes suddenly to the trees on the street and many people and traffic are around there. It needs wind speed monitoring and strong wind early warning to avoid the victims due to fallen tree. This paper explains the development of wind monitoring and early warning system using wind speed sensor and weather forecasting. The steps involve investigating the wind speed, designing the system, developing the system, testing, and validating. The result shows that the system can measure the wind speed on the spot in real time and trigger the alert to the people around if the strong wind was occurred. On the other hand, it also informs the forecast of wind speed according to weather web services data few hours before. Applying this system will help the government to prevent the victims of fallen tree due to strong wind.

[2] This paper aims to build a low-cost, reliable, weather monitoring system capable of acquiring and recording data. The proposed system has three sensors that measure the temperature, wind speed and wind direction, respectively. The analogue outputs of the sensors will be transmitted through the air and received by the weather system to be converted to digital signals and further processed by a microcontroller, acting as data logger. The logged data can then be transferred to a PC having a graphical user interface program for further analysis or printing the measurements. Thesystem has many advantages like it is a small size and have huge memory capacities, have on device LCD display, lower cost if compared with other climate monitoring system and have high processing speed, high precision and greater portability.

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In paper[3] The current generation of sailing robots require a small number of essential components in order to function successfully. These include some kind of sail and a device for detecting the direction of the wind, in order to ensure that the angle of attack of the sail is suitable for the course to be sailed. These two devices present some of the most difficult engineering and control system challenges in building sailing robots. This paper summarizes a number of experimental designs and approaches to the construction of these components. In particular a number of wing sail construction and control techniques are presented as well as designs for mechanical and ultrasonic wind direction sensors. All of the devices presented have been built and tested by the authors. Commentary on the performance and interaction of the devices is also presented.

III.PROBLEM IDENTIFICATION

Human activity is influenced by weather conditions, monitoring of weather conditions can help in controlling the activity. It is important to monitor and study thewind speed in the sport of sailing. Traditional method is only showing the direction of the wind and the presence of the wind.

IV.BLOCK DAIGRAM

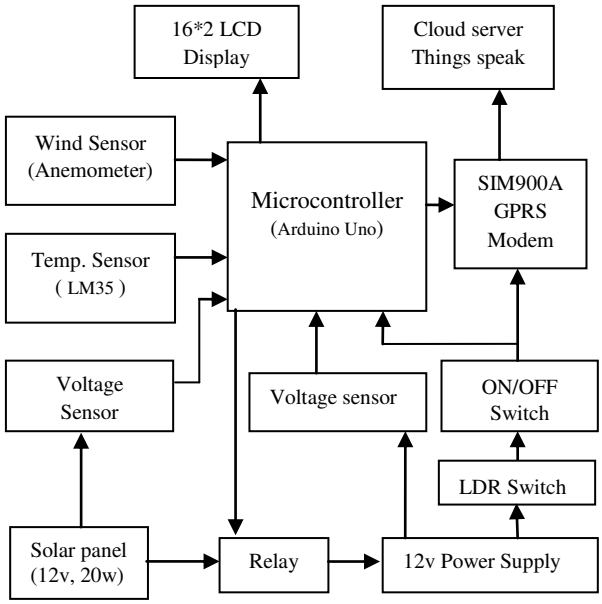

Fig. 1.BlockDiagram.

V. HARDWARE DESCRIPTION:

1) Wind Sensor (Anemometer)

An anemometer is one of the tools used to measure wind speed. A device consisting of a vertical pillar and three concave cups, the anemometer captures the horizontal movement of air particles (wind speed).

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Fig. 2 Anemometer.

Wind sensors measure the wind speed usingthe voltage difference.According to the rotation of cupmillivoltage generatedthatused to calculate how fast the wind is blowing.

2) Temperature Sensor.

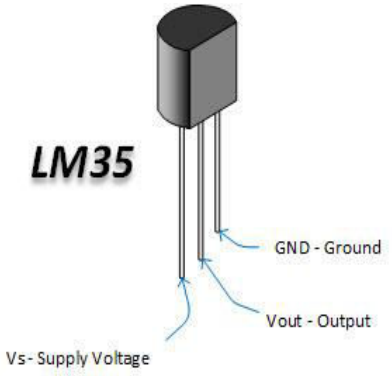

Fig. 3. LM35 Temp.Sensor.

The LM35 is one kind of commonly used temperature sensor that can be used to measure temperature with an electrical o/p comparative to the temperature (in °C). It can measure temperature more correctly compare with a thermistor.

3)Arduino Uno.

The Arduino Uno is an open source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc and initially released in 2010. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE, via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts.

Fig. 4.Arduino Uno.

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4) Sim900 GSM Modem:

GSM is stand forGlobal System for Mobile Communications. It is also sometimes referred to as 2G, as it is a second-generation cellular network. To use GPRS for internet access, and for the Arduino to request or serve webpages,you need to obtain the Access Point Name (APN) from the network operator. Among other things, GSM supports outgoing and incoming voice calls, Simple Message System (SMS or text messaging), and data communication (via GPRS).Arduino perspective, the Arduino GSM shield looks just like a modem

Fig. 5 Sim900 GSM Modem.

5) LCD 16X2 display.

As the name suggests, it includes 16 Columns & 2 Rows so it can display 32 characters (16×2=32) in total & every character will be made with 5×8 (40) Pixel Dots. So, the total pixels within this LCD can be calculated as 32 x 40 otherwise 1280 pixels.

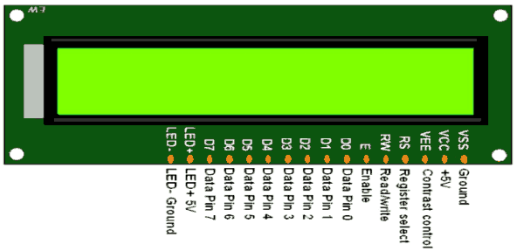

Fig no. 6. LCD 16X2 display.

6) 12 Volt Li-ion batterypack.

A Lithium-ion or Li-ion battery is a type of rechargeable battery which uses the reversible reduction of lithium ions to store energy.Li-ion batteries have high energy densities, low self-discharge, and no memory effect

Fig. 7 Li-ion Battery.

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VI. PROJECT SOFTWARE DESCRIPTION.

1) Arduino Software (IDE):

Fig. 8 Arduino Software (IDE).

The Arduino Integrated Development Environment - or Arduino Software (IDE). It connects to the Arduino hardware to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension. uno. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

2) Thing Speak (Cloud Server):

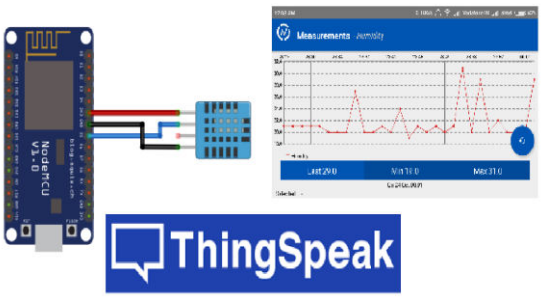

Fig. 9 Thing Speak (Cloud Server).

Thing Speak is a platform providing various services exclusively targeted for building IOT applications. It offers the capabilities of real-time data collection, visualizing the collected data in the form of charts. The core element of Thing Speak is a 'Thing Speak Channel'. A channel stores the data that we send to Thing Speak.

VII.ADVANTAGES AND APPLICATIONS

Advantages:

1) It constantly measures and displays the prevailing wind speed and air temperature at the location and on cloud
2) Display precise data.
3) Highly reliable system.
4) Fully automatic system.
5) System run only day time (LDR swtich)
6) Charging auto cut off when battery fully charged.

Applications:

1) Water Sports - Sailing.
2) Marine travel.
3) Industrial work sides.

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4) Air Travel.
5) To improve building efficiency.
6) Weather Station.

Disadvantages:
1) Internet connectivity required.
2) Initial cost is high.

VIII. RESULT

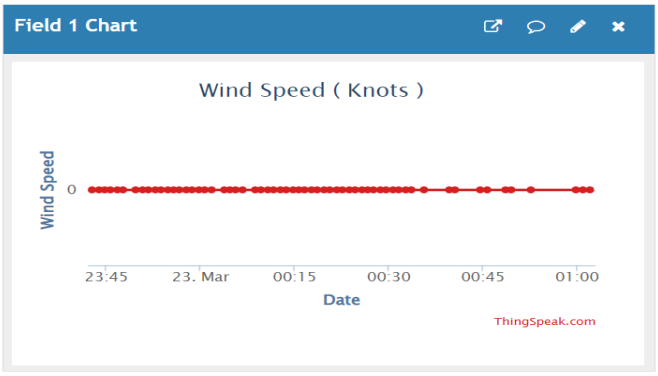

Fig. 10. Wind Speed Graph.

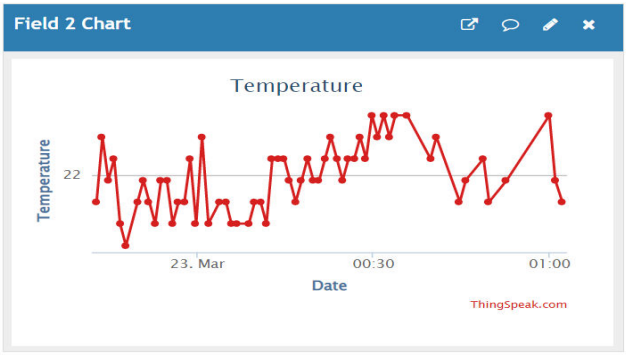

Fig. 11. Temperature Graph.

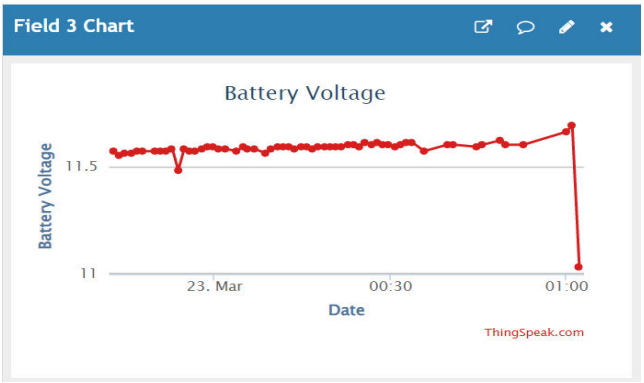

Fig. 12. Battery Voltge Graph.

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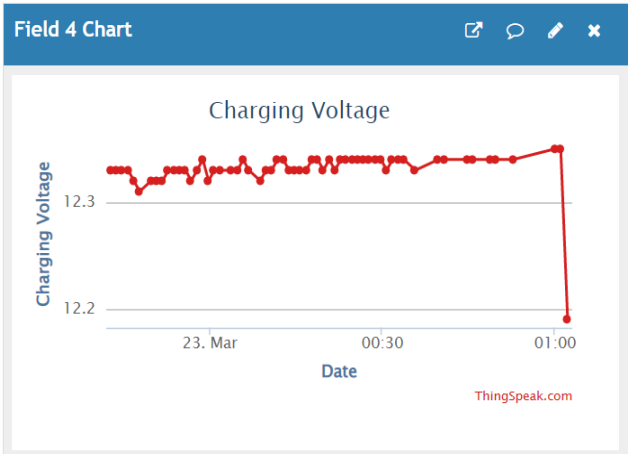

Fig. 13. Charging Voltage Graph.

Entry Id	Wind Speed	Temp.	Battery AAVoltage	Charging Voltage
220	0	23.16	11.57	12.33
221	0	22.32	11.6	12.34
222	0	22.74	11.6	12.34
223	0	21.48	11.59	12.34
224	0	21.9	11.6	12.34
225	0	22.32	11.62	12.34
226	0	21.48	11.6	12.34
227	0	21.9	11.6	12.34
228	0	23.16	11.66	12.35
229	0	21.9	11.69	12.35
230	0	21.48	11.03	12.19

Fig. 14. Data Entries Table.

IX. CONCLUSION

System send the real time data of wind speed, temperature battery parameters and solar panel output voltage to the thinkspeak server, system is highly reliable. When battery is fully charged it disconnected from charging through relay and battery management system cut off supply when low battery voltage, so it increases the battery life, Wind speed which in knotscan be monitored at system location on display and anywhere in the world on thingspeak. Thingspeak data can export in XML file and this data can analyze for the wind surfing or sailing sports.

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