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Weather Monitoring, Recording & Displaying System Designed By Using Digital Electronics Circuits

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Abstract:- **Over the years, there has been attempt to gather information about the weather conditions. We designed Weather Monitoring, Recording and Displaying System in which rain, temp, Wind speed, wind direction, humidity are measured. An Electronics system carry measurements of different parameters and with signal processing provides output to the computer system through the parallel port. Different weather parameters are displayed on PC monitor. The measurement carried is simultaneously recorded. Different digital electronics circuits are used for the effective signal processing like MUX, latches, ADC, buffer , counters, ripple counter *etc*. main objective of the electronic system is to get data from different sensors and finally convert the same into binary values. These binary data is useful for the PC system now this data is processed by the VB codes so that it is producing the display for the producing the different values and symbols for the different parameters[1]. When the measurement process is going on the PC simultaneously generate the word and notepad file for the record of the measured data. These files are labeled as per current dates and when the option is given to see the previous record these files are the main references for the reproduction of the graphical record for the one hour and the bar chart record. Individual record is represented in graphical form and combined record of different parameters is also available. The cost of the Project is less as compared to other available weather stations**

Keywords- weather monitoring , weather recording , weather analysis.

I INTRODUCTION

Weather forecasting is the application of science and technology to predict the state of the atmosphere for a future time and a given location. Human beings have attempted to predict the weather informally for millennia, and formally since at least the nineteenth century[2]. Weather forecasts are made by collecting quantitative data about the current state of the atmosphere and using scientific understanding of atmospheric processes to project how the atmosphere will evolve.

A. Objectives :

First objective is to measure different weather parameters correctly. These weather parameters then reproduced in binary data to interface with personal computer. Second objective is to record the data in different files. These recorded data is reproduced whenever required. Ultimate objective of the project is to use multitasking of the Personal computers. An Electronics system is interfaced to the Personal Computer and Efficient and correct measurement are conducted. The recorded data is in the binary format and can be further used for different objectives. Record produced can be used for the Weather forecast and Prediction of different natural disasters. Project can be extended for the development of mathematical models of the behaviors of the Measured parameters. Thus we will be able to predict the weather changes.

II SYSTEM DEVELOPMENT

PC Based weather station is designed by using different sensors to convert the physical parameters into electrical signals. These electrical signals are converted into suitable signals by means of different hardware implemented. Finally all these signals are converted into digital signals and serially by the use of multiplexer sent to the personal computer through parallel port.

B. Working:

The data for wind in acquired from a weather wave, which is mounted on a 360 turning pot. A rotating blades arrangement on the weather wave is connected to digital tachometers. There in a water collection jar with a funnel for rainfall calculation. The rainfall is calculated on the number of drops falling in to the jar. A temp. & Humidity provide the other information. All these entire signals are converted in to digital output, which in then fed to the PC. The program in the PC process, all this information and displays it on the screen in a graphics format. As a let of information in constantly changing the monitoring and display system provide a continuous display. A/D converter and used to provide digitals signals to the PC. The mechanical components are mounted on a high building to provide accurate data. The information from the PC can be printed out for further distribution[4]. This is a very useful device for airports and other weathers for casting agencies.

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A. Block Diagram Description:

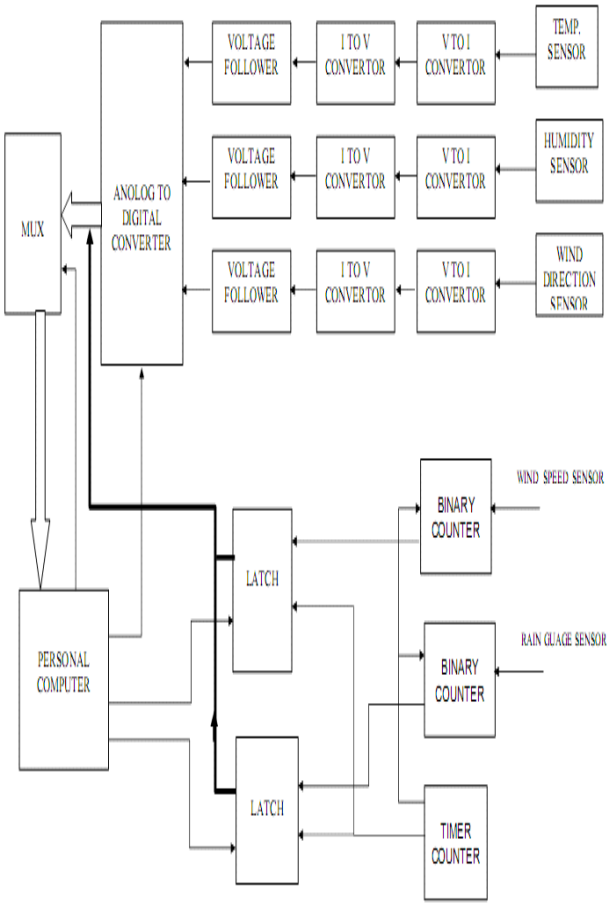


Figure 1 Block Diagram

C. Objectives :

First objective is to measure different weather parameters correctly. These weather parameters then reproduced in binary data to interface with personal computer. Second objective is to record the data in different files. These recorded data is reproduced whenever required. Ultimate objective of the project is to use multitasking of the Personal computers. An Electronics system is interfaced to the Personal Computer and Efficient and correct measurement is conducted. The recorded data is in the binary format and can be further used for different objectives. Record produced can be used for the Weather forecast and Prediction of different natural disasters. Project can be extended for the development of mathematical models of the behaviors of the measured parameters. Thus we will be able to predict the weather changes and will be able to produce warnings at different worst situations.

Figure 2 Assembled PCB used for the Project

D. LM35:

The LM35 series are precious integrated- circuit temperature sensors, whose output voltage is linearity proportional to the Celsius (centigrade) temperature .

E. Humidity Sensor :

Humidity is the amount of moisture in the air. It can be measured in various ways, but the most usual is to describe it as 'relative' humidity. This is expressed as a percentage. A relative humidity of 100% means the moisture content of the air is the maximum possible at any particular temperature. Figure 3: SY-HS-220-Humidity sensor.

F. Wind Speed Sensor :

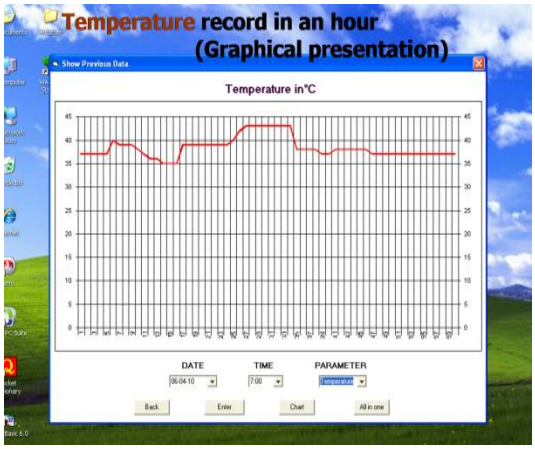
An anemometer kit from Fascinating Electronics has been selected The wind speed sensor selected is a three-cup anemometer. It contains a magnetic switch that toggles at a frequency that is linearly proportional to wind velocity. The linear output signal from the anemometer will be easily calibrated using the software that we choose. Wind speeds will be taken once every hour and the speed consists of an average taken over a one-minute period. The resolution of the instrument is one mile per hour and requires five volts.

Figure 3 Wind speed Sensor and Rain gauge designed for the Project

For the design of the rain gauge in this project plastic beaker like vessel is used in which upper part is converted into the funnel in which the rain drops are collected. These rain drops are sent one by one through the meshed wire. Where the drops of water make shorting in between two adjacent pair of wires. When shorting is there the Voltages pulses are generated these pulses are counted by the counter circuits. rain drops are sent one by one through the meshed wire. Where the drops of water make shorting in between two adjacent pair of wires. When shorting is there the Voltages pulses are generated these pulses are counted by the counter circuits [3].

III SOFTWARE IMPLEMENTATION

Current data Display is ready on click of VB Project link.



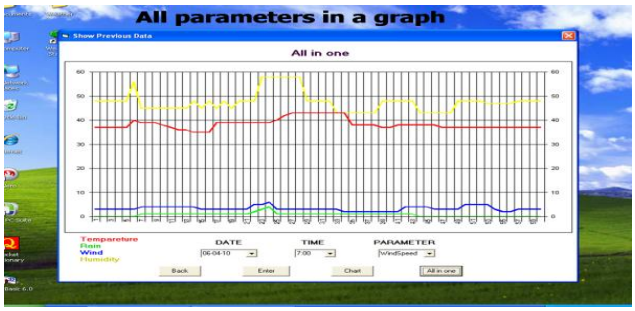


Figure 4 parameters record in an hour duration

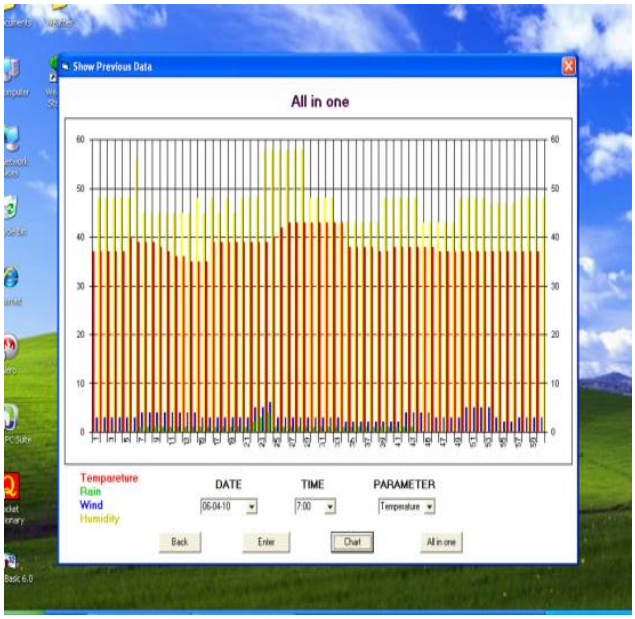


Figure 5 Bar graph displays of all parameters

IV PERFORMANCE ANALYSIS

After developing any system there is need to test the circuitry of the system for its performance.

B. Hardware test:

In hardware test we have got the complete monitoring over the operation of different sensors like rain , wind direction , wind speed , humidity and temperature. These all sensors are generating appropriate voltage signal at the different level of the parameter value. These values of voltages anr parameter values are explained by manufacturer data sheets. If the signals at the output are according to the data sheet explanation then we can say that the sensors are working correctly. Same case is true for the different integrate d circuits.

C. Software test:

In this project main role to present data for user is of the software Program. The software code designed in VB should be faithful enough to give actual readings. Here we have manually

set the different parameter values of the different sensors and these values are checked in software display windows if the difference between the actual reading and the expected value is observed then we have to calibrate the program by means of the software codes.

TABLE 1: VOLTAGE OUTPUT AT DIFFERENT TEMPERATURE

temperature	voltage o/p
15	142
55	538
…	….
75	739
80	789

Here in the graph attached we find linear behavior of the temperature sensor.

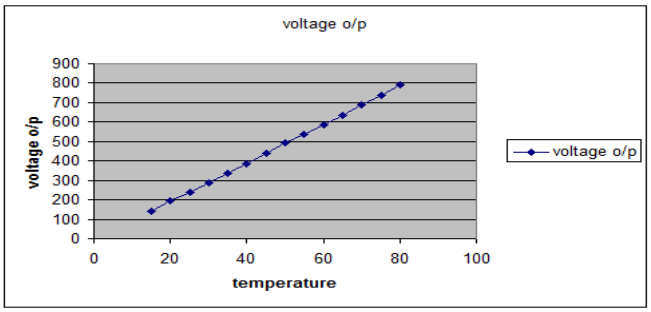


Figure 6 voltage output of sensor at different temperature values

When we plot the graph of the input temperature to the output voltage we find the graph is linear in nature. same graph we have already studied in the data sheets given by manufacturer of the LM-35.

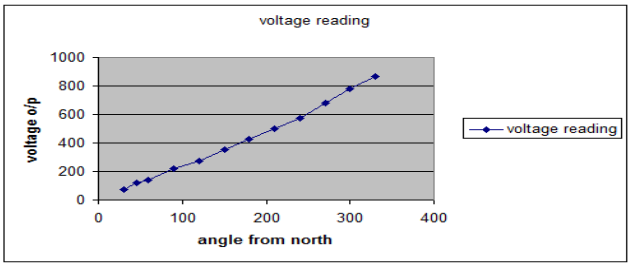
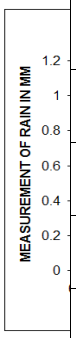


Figure 7 voltage output of sensor at different angles

TABLE 2 VOLTAGE OUTPUT AT DIFFERENT ANGLES OF DIRECTION



NO OF PULSES GENERATED	RAIN
3	0.1
6	0.2
9	0.3
12	0.4
15	0.5
18	0.6
21	0.7
24	0.8
27	0.9
30	1

Graph 1 measurement of Rain at different pulses values

From the above graphs and observations noted in the tables we conclude that behavior of all the sensor is in linear manner. Sensor show linearity and that is as per the behavior defined by their manufacturer. So there is no doubt about the initial stage of the project.

V CONCLUSIONS

A. Conclusions

We have achieved our basic goal of measurement of five weather parameters, measured data is recorded at round the clock.

We are also successful in graphical representation and bar chart representation as well.

PC- based weather system is accurate, real time measurement system with software based extended data processing.

B. Future scope :

PC-based weather station can be used for meteorological research.

By making integrated calculations and dependencies of different parameters on another parameters we can establish

mathematical models. These models will be useful in weather forecast .

This system can be used as data logger in industrial automation process.

C. Applications:

For vineyards and orchards ideal for frost and disease warning

For evaluating the climatic conditions of prospective vineyard and orchard sites

Agricultural applications include crop environment monitoring, optimising the timing of planting, harvesting and spraying

Ideal portable climate station for research projects

Ideal for using as an educational tool on the weather conditions at schools

Ideal for frost and disease forecasting because it uses data from your specific location

Remote Climate Monitoring: Using a modem and PC weather conditions on a vineyard or other area can be checked from home to asses conditions for spraying, frost probability.

REFERENCES

[1] Chepete, H. and Tsheko, T. 2006 , "*Hot and cold weather heat load dynamics of uninsulated broiler house in Botswana*", 152

[2] Charles M., "Weather Study and Effect on Agricultural", *Engineering International: the CIGR Ejournal*, 678, 2001.

[3] Holger Kantz and Thomas Schreiber, "The human ECG – nonlinear deterministic versus stochastic aspect", March 31, 2007.

[4] Lin, X., Lan, Y. Meyer, G., Hubbard, K. and Kocher, M., "*Development of a simple high speed".* Paper No. 98-3121. 1998.

[5] Maurice E. Cohen, Donna L. Hudson," *Diagnostic Potential of Nonlinear Analysis of Biosignals*", University of California, San Francisco, Fresno, CA 93703 USA, Proceedings of the 26th Annual International Conference of the IEEE EMBS , San Francisco, CA,USA September 1-5, 2004