

WIND TURBINE MEASUREMENT SYSTEM USING MICROCONTROLLER AS DATA ACQUISITION

O.Maheshwari¹,S.M.Ramesh²,M.Mohana Arasi³,C.Lakshmi Priya⁴

¹ M.E Embedded Systems, Department of ECE
² Assosiate professor, Department of ECE
^{3,4} Assistant Professor, Department of ECE

Bannari Amman Institute of Technology, Sathyamangalam

Abstract— Wind energy is used as an alternate form of energy to meet the increasing energy crisis. wind farms are setup in highly exposed sites. wind is fluctuating in nature and hence a continuous monitoring system is needed. wind turbine is used for converting wind energy into useful form of energy. In this paper the various parameters of wind are measured and monitored by setting up an instrumentation system. The interface to pc is done using a microcontroller which is used as a data acquisition system and labVIEW is used for real time monitoring. The idea of using microcontroller as a data acquisition will be economic and more convenient for the users.

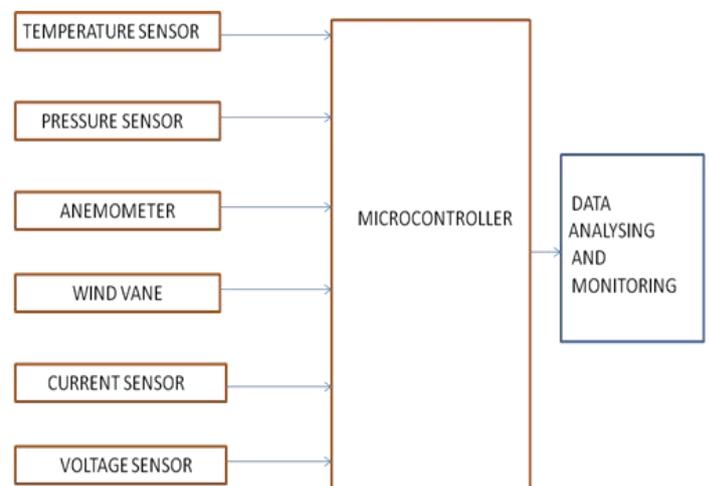
Keywords—wind energy, instrumentation system, labview

I. INTRODUCTION

“Energy can be neither created nor destroyed”. Today because of increase in human resources the need for energy resources is also increasing. The surplus amount of resources has been decreasing. Hence there is an urge to find any alternate resources .Energy can be renewable and non renewable. The use of non renewable energy resources reached a particular extent. It is better to use any renewable form of energy resources. Among the renewable energy resources wind energy is widely used. It has its own advantages such as availability, non polluting no green house gases emission, etc. Wind energy can be converted to useful form of electrical energy using wind turbines. For any process to get the perfect results the process should be controlled and monitored at regular interval of times. The importance of instrumentation system lies here. The various parameters like wind speed, temperature, direction are measured periodically and monitored to check if any deviations occur. Usually the interfacing to computer is done using a data acquisition card. To avoid economic problems and to provide more convenience to the users we are using a microcontroller as data acquisition system. As usual the control and monitoring process is carried out. The software part includes labVIEW for real time monitoring of any system. labVIEW programs are called virtual instruments (VIs).The programming part is much more simpler when compared to other tools.

II. ARCHITECTURE

The main components in the system includes a microcontroller, pc, sensors. The parameters to be measured are wind speed ,wind direction, pressure, temperature, current and voltage. The sensors are used to collect information regarding these parameters. The sensor output is given to the microcontroller which acts as a data acquisition system. Today microcontrollers have built in features to act as a data acquisition (DAQ). The output from microcontroller is converted in to digital form and sent to the pc. The pc can read digital form only. The real time monitoring and control can be done with the help of a tool called labVIEW.



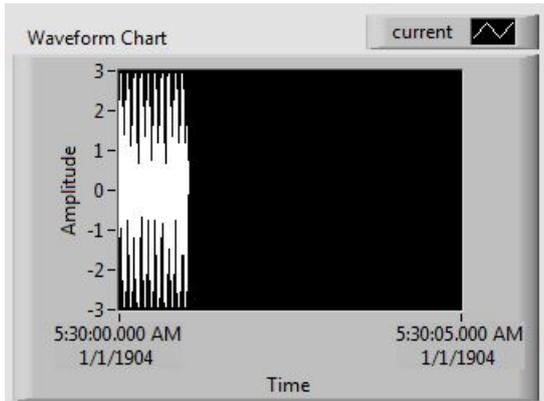
III. MEASUREMENT SYSTEM

The sensors are used for collecting various information and sending them to a controller. The sensor used to measure temperature is LM 35 temperature sensor. The sensor used to measure pressure is MPXA6400A sensor. The current and voltage are measured using LA25NP and LV20-P. The direction of wind can be measured with the help of wind vanes. The speed of wind is measured using anemometer.

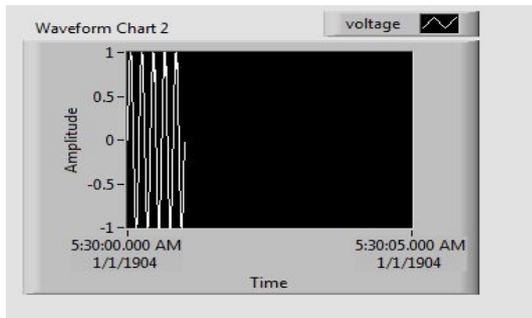
IV. SIMULATION RESULTS

LAB view is different from other languages in two ways. First, the programming is performed by wiring the icons together and compiled directly. Second, G programming is a data flow language as it executes according to the data flow

rules. The G code is easy to understand for the users and easy to learn for the beginners

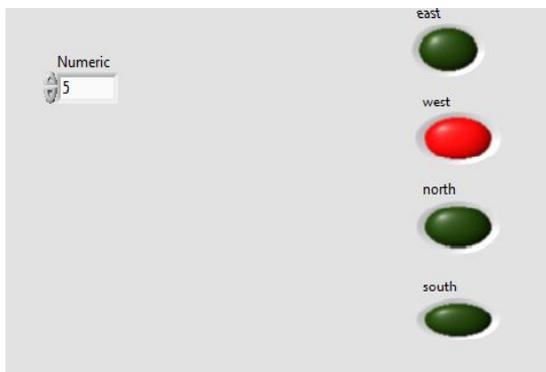


Measurement of current



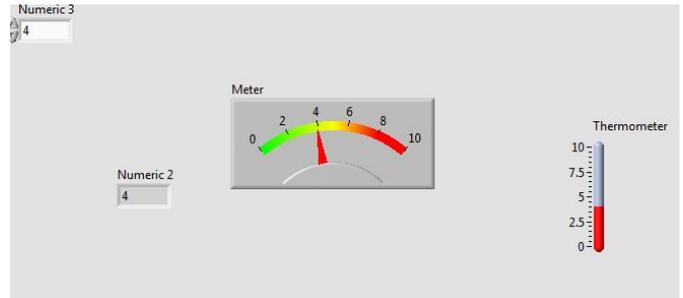
Measurement of voltage

The value of current and voltage are measured. The output waveform for current and voltage of wind turbine is graphically obtained in LabVIEW.

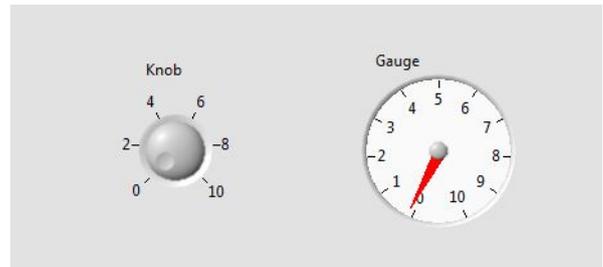


Measurement of wind direction

The direction of wind can be represented using VI by selecting a range of voltage for each direction. Each direction is represented by a particular color LED. Here the direction west has the range of voltage between 5-8. When a voltage between the range is entered, the red color LED glows.



Measurement of temperature



Measurement of pressure

The value of temperature and pressure are indicated by the thermometer and pressure gauge.

V. CONCLUSION AND FUTURE WORK

A monitoring system was developed to measure the parameters of wind turbine. The data acquisition system contains a microcontroller which will be more comfortable to users. The simulation results are obtained using LabVIEW software. In future, a GSM module will be added to the system and the readings are sent to the owner of the wind turbine via short message service.

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