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Wind Power Generation Monitoring System: A Survey

Miss.Nadaf Shabnam Ajij[1]
Miss.Sawant Pradnya Shrirang[2]
Miss,Pandit Pritam Shankar[3]
UG Students,
Dr.D.A.C.O.E.'Karad;Maharashtra, India.

Miss. Supriya S. Kadam,[4]
Assistant Professor;
Dr.D.A.C.O.E.'Karad;Maharashtra, India

Abstract - Wind is clean & renewable nature resource for power generation. At present the greatest widespread solution of wind power generation in the world is based on the turbines. With the importance of alternative energy sources increasing, monitoring & economical design of alternative energy generators becomes more critical. To implement a practical monitoring system, characterization of the dynamic behaviour of the structure under consideration is a necessary first step. Acquisition of dynamic output data under a wide variety of condition can be a time consuming & costly process. In recent years, low cost wireless sensors have emerged as an enabling technology for just such monitoring application. In this paper wireless sensor technologies are deployed on two wind turbine structures to provide better models of wind turbine dynamic behaviour & response to loading. Also this paper deals with power control of a wind generation system for interconnection operation with electric distribution system. Power control strategy is to extract the maximum energy available from varying condition of wind speed while maintaining power quality at a satisfactory level. In order to capture the maximum power, variable speed, voltage control is employed for turbine system. The grid interface inverter transfer the energy drown from the wind turbine into grid by keeping common DC voltage constant. It provide uninterrupted power, effective utilization of source, improves life time of battery & minimized usage of diesel. This paper present viability study of integrated renewable power system for telecommunication application. .

Index Terms-
PIC16F877,Sensors,MAX232,Mobile,GSM etc.

I.INTRODUCTION

The development and using of the renewable energy source can effectively alleviate the predicament of the supply of energy and the change of climatic. The wind energy is regarded as new energy which has the broadest prospect of development and using. As the developing of the technology, the economic and environment is more and more remarkable And the majority systems which were already applied in the power station and the contentof research is too unitary But the wired method has many flaws. In this project a set wind power generation observation system takes the wireless sensor network the foundation flaws. In this project we generate the energy from wind and monitor the voltage,speed and current by using wireless sensor. This study examines condition monitoring of wind turbines by investigating the dependence of turbine responses on external weather conditions. Based on a set of sophisticated statistical tools, we investigate the variations due to external environmental effects, and discriminate them from those caused by faults. In this project a set wind power generation observation system takes the wireless sensor network the foundation flaws. In this project a set wind power generation observation system takes the wireless sensor networking as the foundation .During various nodes in this system selects the wireless communication method to carry on the data to lose, could effectively solve many difficult problems by the wired way in observation system.

II.LITERATURE REVIEW

Wireless sensor network deployed at ground level with low altitude,atmospheric sensing for wind speed of local wildfire spread has been used.An indirect approach in sensing wind speed has been proposed as an alternative to the bulky conventional wind anemometer to save cost and space[1].

An enhanced monitoring and forcast system for electrical power generated from wind.Instantaneous electrical and meterological quantities of each wind power plant can be monitor continuously through the wind power monitoring forcast center[2].The first looks at finding the relationship between weather condition and turbine response[3]..Wind and solar energy have been deemed clean,inexhaustible,unlimited and environmental friendly.

In India is currently adding 8-10 million mobile subscriber every month 40% power requirement are met by grid electricity and 60% by diesel generator.so it causes the emittes 5 mollion tons of co2.so the wind and alternative renewable sources of energy will resulting reduction of 5 million tons of co2 emission[4]..Exploration,production,processing and transportation of fossiel fuel and nuclear energy resource,development and harvesting of renewable resources and generation and distribution of electricity and fuel[6]..Wireless monitoring system implements real time monitoring and management of wind power generation by using the wireless sensor network..We can calculate direction of wind, current,voltage which will be transmitted wirelessely to the control room or base station by using transceiver.[5]

The vibration analysis, vibration signals produced by the rotating components in Wind Turbine's

whose current health conditions need to be diagnosed are commonly analyzed either by broad band based methods or spectral line analysis methods. In our paper we declare the system with ARM and CAN protocol to monitor and diagnose the problems in the wind turbine application. The project deals with the data transmission between two unitsin the exact time without any disturbance. The data transmission time is increased with the CAN protocol [7]. This paper aims in describing the health monitoring system for wind turbine using Controller Area Network (CAN) bus. This system is accountable for monitoring the tower, blades, shaft, gear box, generator and overall conditions in nacelle/hub. This includes a variety of sensors for e.g. accelerometers, temperature sensors, oil/liquid level sensors[8]. This paper presents condition monitoring in wind turbines, and related technologies currently applied in practice and under development for aerospace applications, are reviewed. Condition monitoring system estimate the current condition of a machine from sensor measurements, whereas prediction systems give a probabilistic forecast of the future condition of the machine under the projected usage conditions. Current condition monitoring practice in wind turbine rotors involves tracking rotor imbalance, aerodynamic, surface roughness and overall performance and offline and online measurements of stress and strain.[9].

However, the existing simulators consisting of a motor and a generator are not suitable for this purpose, because they have not the general configuration of wind turbine systems. To solve this problem, we are now developing a novel wind turbine simulator that is composed of blades, a step-up gearbox and a generator. This paper presents a developed condition monitoring system and the design procedure of the wind turbine simulator.[10]

III. PROPOSED WORK

Block Diagram:

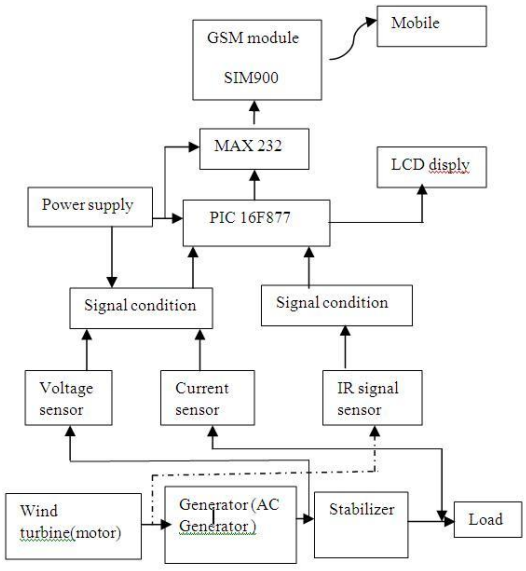

FIG [1]-Block Diagram

IV. HARDWARE COMPONENT

1] Sensors : A sensor is a transducer whose purpose is to sense some characteristics of its environments.It detect events or changes in quantities and provides a corresponding output.Generally as an electrical or optical signal.In this project we use voltage sensor,current sensor and speed sensor.Current sensor is a device that detect and convert current to measured output voltage.For this project IR sensor is used for measure the speed.Speed sensor has accurate measurement.Voltage sensor is used to sense the voltage .

2]Lcd Display: LCD supporting more than 80 characters to make use of HD 44780 controllers.LCD is a type of display used in digital watches and many portable computers.LCD are used in wide range of application including computer monitors,Televisions,instrument panels.common use in calculators,gamming device,clocks,watches,video players.LCD is more energy efficient.

3]Dc Motor: DC motor can convert electrical energy into mechanical energy.In this project the DC motor is used for generation of electrical energy from wind into mechanical energy.The direction of rotation of this motor is by flemmings left hand rule.

4]Pic 16f877: PIC has 35 instruction set.it has inbuilt ADC and Watchdog timer.it has 10 bit A to D converter.it is automatic decision making device.code density is low and hardware circuitary is simple.It is RISC architecture.PIC execute most of its instructions in 0.2 microseconds.It has program memory 8K*14 words,Data memory 368*8 bytes,EEPROM data memory 256*8 bytes.

5]GSM : It is Global system for mobile communication. GSM modem is a specialized type of modem which accepts a SIM card and operates over a subscription to a mobile operator just like a mobile phone. GSM modem must support on extended AT command set for sending or receiving messages. AT command are instructions set for control modem. GSM modems are a cost effective solution for receiving SMS messages.SIM900 offers improved GPRS functionalities useful in web enabled application.

V. WORKING

The above figure shows that the block diagram of our project. The exact working of our project the rotor is connected to DC motor & the generator. Generator can convert mechanical energy to electrical energy and generator can convert alternating current to direct current. This electrical energy may get stabilized & given to load (LED). Voltage sensor sense the voltage from the generator output, this voltage is in electrical form. They identify the under-voltage or over voltage. They provide voltage sensing for both single and three phase installation. The voltage sensor is given to signal condition. Signal condition is divide the voltage and amplify that signal. Current sensor sense the current

from the stabilized output & gives to signal condition, signal condition divide the voltage. Current sensor is a device that detect and convert current to measured output voltage. Each sensor is suitable for specific current range and environmental conditions. Applications of current sensors are motor control, power conversion, battery monitor, over current fault protection. The speed sensor sense the speed from wind turbine & given to signal condition. The signal condition is given to PIC at ADC pin, ADC pin can convert the analog to digital. And this voltage, current & speed display on 16X2 character LCD display. It has two internal byte wise resistors one for command and second for character to be displayed. PIC is used because it has in built ADC it is automatic decision making device. Power supply is given to MAX 232, PIC & signal condition.MAX 232 is used for logic level converter and also for interfacing between PIC and GSM module. The output of the MAX232 is given to the GSM module which accepts a SIM card and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator prespective, a GSM modem looks just like a mobile phone and GSM modem to communicate over the mobile network,many of them can also be used for sending and receiving SMS.

VI. RESULT:

FIG [3]-Result.

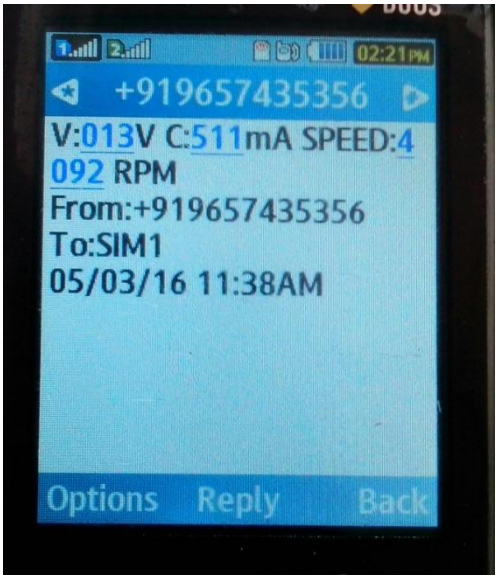

FIG [3]-Message display on mobile

VII. CONCLUSION

We conclude that ,from this project We will generate electricity from Wind turbine and monitor the Wind speed ,voltage and current by using wireless sensor networking. power store in the batteries which will be used to compasate energy lacks & the efficiency of control strategy We have used. We will implement real time monitoring system and management of wind power generation.The type of connection of the different component to the system is just as important.Currently wind energy is used for various different application.monitoring of wind turbine is required with the help of monitoring system we can identify the type and location of fault before they are occuring.and are transmitted from wind turbine to the control center through RF module.

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8] 1GEETANJALEE R. POLAWAR, 2T. S. MOTE
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