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# Monitoring of Wind Turbine Using ZIGBEE

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**ABSTRACT:** The purpose of this project is to monitor the wind turbine using zigbee. Wind Turbine blast is identified as major problem against green energy. It is not only the threatening factor for the people but also causes serious hazards for human life. To overcome this problem and to increase the dependence on green energy, a simple system is introduced to monitor Small Wind Turbine.

**KEYWORDS:** Small Wind Turbine, Fault Monitoring, PIC Controller, DC motor, ZigBee Wireless module.

### I. INTRODUCTION

In this paper our main objective is to monitoring of wind turbine and prevents the damage to the turbine blast as well as to the environment. Through this we are going to control four parameters of the system namely temperature, speed, oil level and vibration using sensors. For temperature measurement we use LM35 sensor, for vibration measurement we use Piezo Vibration Sensor and for oil level and speed we use IR sensor. PIC controller is the heart of this system which is of the family of PIC16. The interfacing of hardware and software part is to be done here and zigbee module is used for the wireless communication. There are two parts in this project transmitter and receiver, transmitter part contain all sensors, microcontroller, wind mill and power supply. And receiver part contains zigbee and pc/computer. zigbee and computer are connected through RS232. The overall operation of the system is to be monitored on a PC via a serial communication port RS232.

### II. METHODOLOGY

This monitoring system is based on the study of four parameters i.e. Vibration, Temperature, Oil level and Speed. These acquired data from sensor and send it to the PIC microcontroller. The PIC which we used here is 8-bit microcontroller, which is used for analyze the data obtained from wind turbine. The analyzed output data is sent to Zigbee transmitter, the Zigbee transmitter and microcontroller are interfaced by using max232 to convert the output to CMOS from TTL.

### III. TRANSMITTER SECTION

In this section the system is developed to monitor wind turbine. The block diagram explains the hardware components which are used in the Wind Turbine. In this system, the different sensor senses the parameters values and sends the data to the PIC Controller. Then in controller data acquisition and processing is done and send it to the PC/computer via wireless ZigBee. The temperature sensor senses the temperature and sends the data to PC, and it is possible to showcase the current status of the Wind Turbine. The speed sensor senses the rotational speed from the turbine; the level sensor senses the lubricant oil level from the Wind Turbine components and vibration sensor senses the occurrence of vibration in any part of the Wind Turbine components. All these data parameters are sending to the PC/computer via wireless ZigBee. The display unit is placed in the Wind Turbine section to show the parameters details which acts as the reference for operator in case of checking the working condition.

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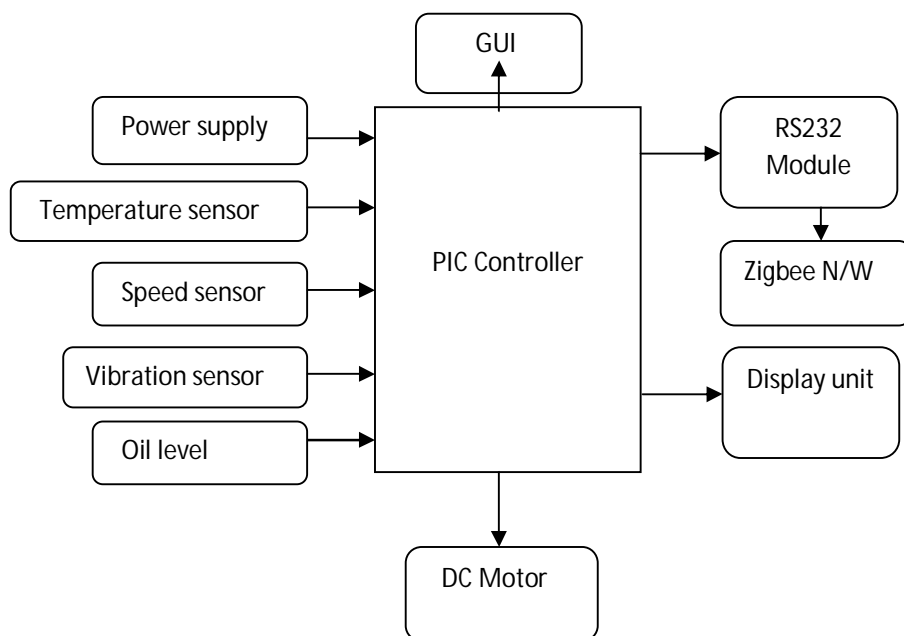


Figure 1 Block diagram of transmitter section

## IV. RECEIVER SECTION

On PC/computer, it is possible to view the current status of the Wind Turbine. The receiver Zigbee receives the data from the Wind Turbine and it is connected to PC using Serial Communication port RS232. Whenever the fault occurs in the Wind Turbine, according to the type of fault the comment will be sent from the PC to Wind Turbine to overcome the fault and to prevent blasting hazard.

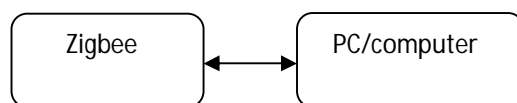


Figure 2 Block diagram of receiver section

## V. SIMULATION STUDY

For programming of microcontroller, we use c language which has to be done in MPLABX (c compiler) software. And for simulation purpose, we use PROTEUS 8 software and for PCB layout we are use EAGLE software. In this project, the uses of different sensors are as follows: vibration is measured by Piezo Vibration Sensor, temperature is measured by LM35 sensor, speed and oil level is measured by IR sensor. LM35 sensor are available in simulation software but vibration, speed and oil level are not available in simulation software so we use switch for simulation purpose and programming according to this.

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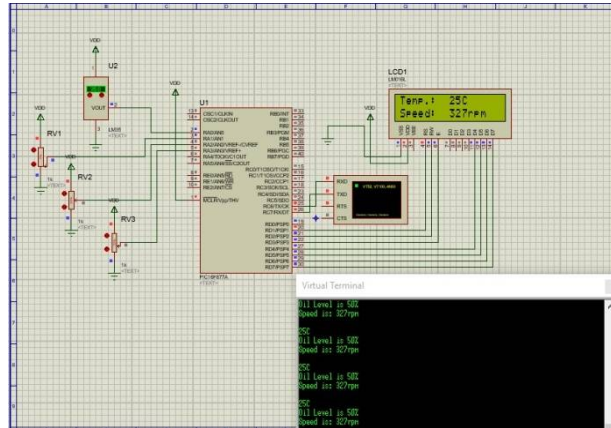


Figure 3 simulation

## VI. RESULTS

As shown in below figure 4 implementation part of the system is done. In order to check if the hardware is working as per the requirement, an experimental setup is done. In this, temperature and speed is continuously display on LCD module. And at the receiver side zigbee receive the data and send to computer by RS232. This project deals with the data transmission between two units in the exact time without any disturbance.

The results of proposed system are shown on LCD module and computer.

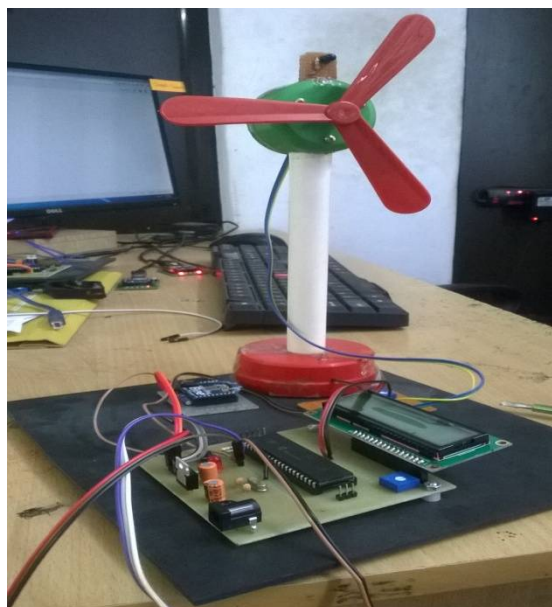


Figure 4 hardware set-up



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## **VII. CONCLUSION**

The proposed system used for the monitoring of vibration, temperature, speed as well as lubrication level of the Wind Turbine using the developed methodology to avoid blasting hazard. The ZigBee Wireless communication enables the remote controlling system of all these parameters from wind turbine to PC/computer. This is simple, convenient, time saving and high security system for Wind Turbine.

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