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Pitch Control of Horizontal Axis Wind Turbine

Rajeev Rampuriya[1], Neha Tiwari[2]

[1]Department of M. Tech (Dual Degree) Electrical + Energy Engineering, Suresh Gyan Vihar University, Jaipur, Rajasthan, India

[2]Assistant Professor, Department of Electrical Engineering, Suresh Gyan Vihar University, Jaipur, Rajasthan, India

Abstract: ***Wind energy is a feasible choice of free pollution energy generation. In the grow thing of wind energy, the most of wind turbine installed in constant speed. The lot of wind turbine manufactured in different speed. The different speed of wind turbine are installing in wind farm. In this prototype model different speed of horizontal axis wind turbine control with pitch control. In this model we considered is controlled to tilted angle of wind turbine.Wind energy is known as renewable energy. This type model controlled tilted angle also measure rpm (root per minute) of wind mill.***

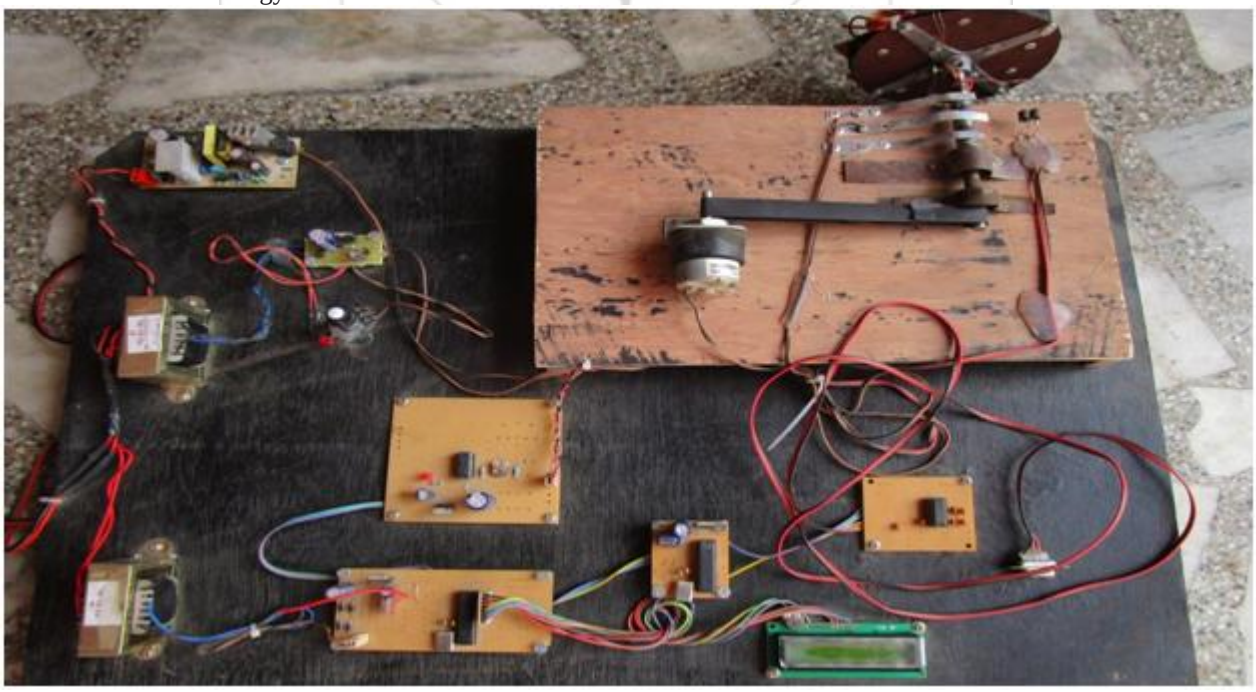
Keywords: servo motor, tilt angle, wind mill, crystal oscillator, measure speed sensor.

1. Introduction

We have third biggest wind power market in the world and provides great business opportunity for both household and foreign investors. The Indian wind power sector experienced record annual growth in 2011-2012 with the addition of more than 3-5 GW of new installation. Different incentives support by a long-term strategy and regulatory framework at the central and state levels have played a critical role in achieving this goal. Wind power is now increasingly accepted as a major balancing energy source for secure a sustainable and dirt free energy upcoming for India.India has good achievement in wind energy. India has extended seashore of 7458kilometers.In June 2012, the president of latest and renewable Energy constituted seashore wind energy steering committee below the chairmanship the secretary to constrain seashore wind power progress in India in the planned manner.

2. Materials and Method

We have design and construct the circuit diagram and hardware prototype model of pitch control of horizontal axis wind turbine for the improvement of the efficiency of the wind turbine and the efficiency of the wind energy is improved by pitch controlling method of horizontal axis with using of different equipments, which showing in the circuit. The circuit diagram of pitch control of horizontal axis wind turbine shown in below.



3. Construction Details

In this project, we have used two PIC16F73 controllers for the controlling of all systems. The pin diagram of this system has discussed in above chapter 4 but in this chapter we have explained about the connection of two microcontrollers and their programming.

First, we have discussed about the connection of two microcontrollers, which are describing in this chapter. This micro controller can be using for RPM scene, angle determine and also give to command next micro controller. Now we have explained MICROCONTROLLERPIC16F73. 28 pin using in the microcontroller. 28 pin can be divided in the three ports. 6 pin using in the port A. 8 pin using in the

port B. 8 pin using in the port C. Pin 1 is using for memory clear active for reset (MCCR) and pin 20 is using for 5volt supply in the microcontroller. Pin number 8 and 19 is connected to ground. Pin number 9 and 10 can be connected to crystal oscillator. Crystal oscillator provides frequency to micro controller. Crystal oscillator frequency is 3.57MHZ. Crystal oscillator is also connected to two stability of capacitor. Capacitor frequency is 22 and 28 micro faraday. In the port A (0 to 5) PA0 is connected to 5 volt supply and PA1 to PA5 is not connected in the micro controller. Now port B is using 8 pin. Port B pin can be divided into pin 21 to pin 28. Pin 21 and pin 22 cannot be using in the microcontroller. Pin 23 and pin 24 is connected to LCD16*2 pin 4 and pin 6. Pin 23 to pin 24 is also called control line. Pin 25 to pin 28 is connected to LCD16*2 pin 11 to pin 14. Pin 25 to pin 28 is called datelines. Now we have discussed to port C in this port divided into pin 11 to pin 18. Only pin 18 and pin 17 can be using in this port and pin 11 to pin 16 is not using in the micro controller. Pin 17 pin 18 using to universal synchronous asynchronous receiver to transmitter (USART). Pin 17 is also connected to radio transmission circuit.

Now we explained Liquid crystal display LCD16*2. The main working of LCD is show the RPM speed of servo motor. In the LCD 16 pin can be using in the project. Pin 1 is connected to ground. Pin 2 is connected 5 volt supply. Pin 3 is connected to contrast. Pin 5 can be using read and write to ground. But in the LCD write programming can be used. Pin 15 and pin 16 can be denoted by B+ and B-. Pin 15 and pin 16 can be using for adding both generating lights. Pin 4 and pin 6 can be connected to control line and pin 11 to pin 14 can be using datelines.

Now we have explained the micro controller PIC16F73. In the microcontroller 28 pin can be used. In the micro controller 5volt supply can be used. Pin 20 can be used for power supply.pin 1 can be used memory clear active for reset. Pin 9 and pin 10 can be used for connected to oscillator. Capacitor is also connected to oscillator. Pin 18 can be using for the receiver to receive data form USART. PIN 17 can be using to connect MAX232. In this micro controller only 8 pin can be used. Mainly working of this micro controller is receiving data and gives to string.

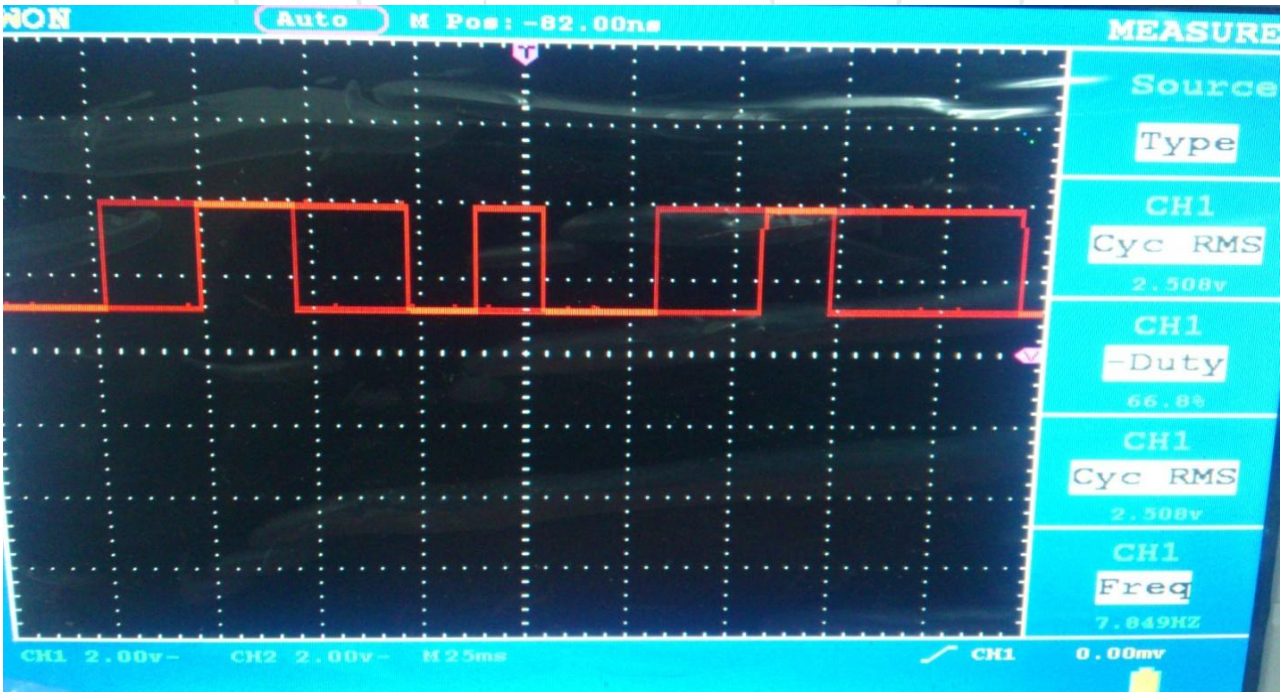
4. Wave form and Discussion

This chapter provides the waveform and discussion of output waveform pitch control of horizontal axis wind turbine with PWM technology and also provides the duty cycle graph which was taken from the CRO with pulse- with-modulation PWM technique.

First, we have taken graph between the voltages vs. time in seconds from PWM technology with duty cycle switching device to different conditions.

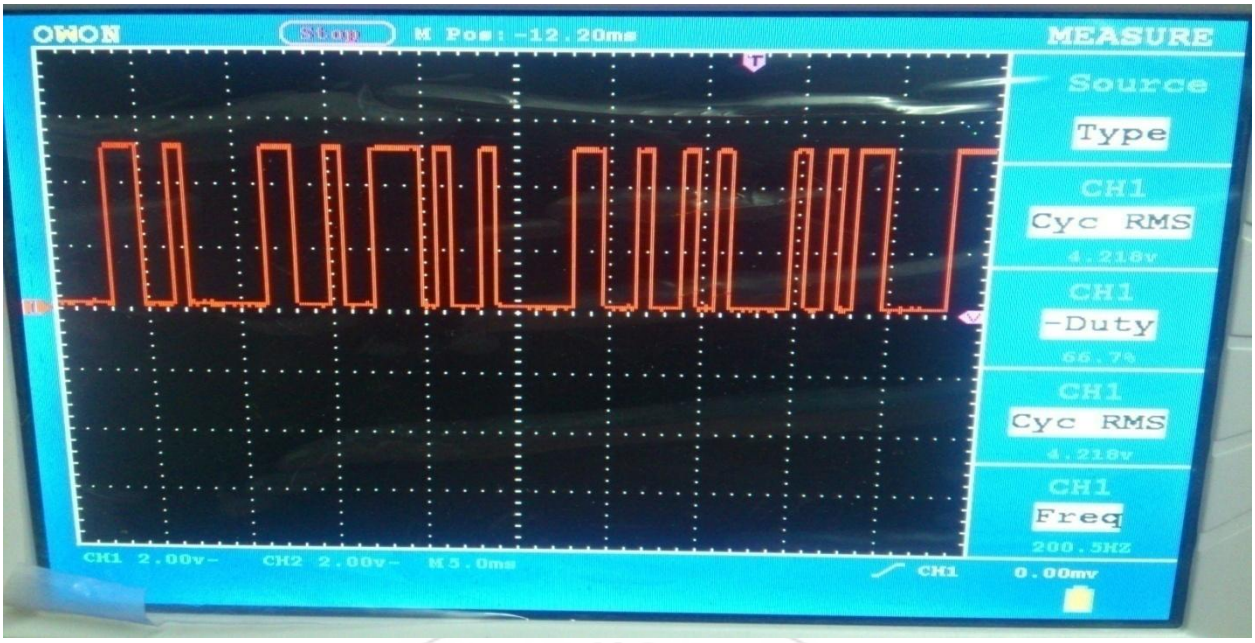
Conditions 1

In this condition we have taken the waveform of rpm of this system which can be varied with the help of variable resistors and rpm show the rotation of wind turbine with pitch.This waveform between servo motor. This waveform show speed variation in wind mill. The waveform of this rpm wind turbine shown in below



Condition 2

In this condition we have taken the microcontroller's waveform of this system which is shown the 5.168v on screen and this waveform show tilt angle between wind mill pitch. In this different wind speed have different tilt angle waveform. The waveform of this condition shown in below



5. Conclusion

We have successfully designed the prototype model.We have successfully studied of pitch control of windmill in horizontal wind turbine. In this model we can control the pitch of wind mill with help of servo motor. We can also measure speed of wind mill. In this model we can use the communication technology between base unit and fan units. In the prototype model control the pitch control.

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Author Profile

Rajeev Rampuriya is pursuing Dual Degree (B.Tech + M.Tech). He has done B.Tech in Electrical Engineering and Pursuing M.Tech in Energy Engineering Suresh Gyan Vihar University, Jaipur, Rajasthan, India. He has done this thesis under the guidance of Professor Neha Tiwari, Assistant Professor at Suresh Gyan Vihar University, Jaipur, Rajasthan, India.