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PITCH ANGLE CONTROL OF WIND TURBINE

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ABSTRACT

In this paper, we mainly take a look on controlling pitch angle of a variable speed wind turbine. The variation in the speed of wind, which results in fluctuation or improper output power of the wind turbine. The main purpose of this paper is to overcome this fluctuation in power of wind turbine by using different controlled mechanism. Among this, pitch angle control mechanism is most common control technique. On the other hand, to test the control of wind turbine Proportional Integral Derivative (PID) controller is designed, when speed of the wind turbine goes to rated speed. This controller is designed in such a way to meet the maximum power of the turbine without any transition. The controller automatically selects the desired proportional and integral gain for smooth control of power with respect to change in speed of wind.

Keyword:- Wind turbine, Pitch control, PID controller, Power Control.

INTRODUCTION

Wind energy is the one of the cleanest and eco friendly sources of electricity .wind turbines uses kinetic energy power to generate electricity. The wind turbine mainly consists of two main generators with two different axis. i.e. vertical axis and horizontal axis with the help of this large amount of energy can be generate on both forms onshore & offshore. wind turbine face many problems in generating constant electricity because most of wind turbine are situated in sea coastal areas where variation in wind is major issue due to changes in speed & direction of wind the pitch angle also varies or changed which Causes larger fluctuation in generation of desired output power .Due to this variation in wind speed the wind turbine is shunt down to protects the turbine structure from being damaged .which also lead to large impact on electrical grid indoor to reduce damage & losses of wind turbine. a impact full and smooth running procedure is introduce in which different control strategy is

used to limit the looses by using special control strategy for controlling the pitch tracking of turbine. Due to this a new maximum power control strategy is investigated which proportional integral derivative controller is illustrated due to which optimal operating conditions are determined

BLOCK DIAGRAM

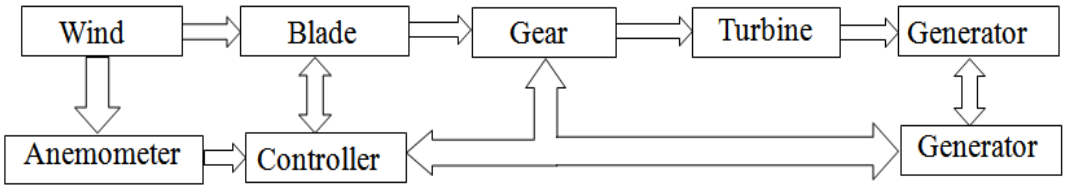

Fig 1.1:- Block Diagram

PROTOTYPE OF WIND TURBINE

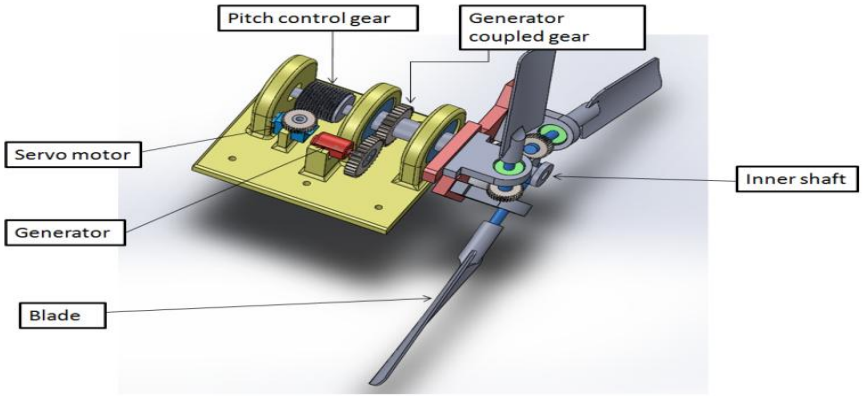

Fig 1.2:- Designed of wind turbine

A designed wind turbine is shown in figure 1.2. It consist of three blades, a gear mechanism servo motor a dc generator and other supporting components. This blades type is chosen with consideration of symmetrical and easiness of fabrication process. The blade has a length of 24 cm also it has a width of at 5.5 cm at bottom,4.5 cm at middle and 2.5 cm at top end, A thickness blade of 1 mm .It is made up of plastic material. A gear box a fabricated based on a specification of the motor servo.

In generation Shaft a single pitch angle control is also connected in it. Which are not connected to each other. When generation shaft rotates then pitch angle control shaft will rotates angularly to rotate with fine and it moves angularly when the angle of fins are required to change.

To change angle of fins the servo motor is connected to pitch angle control shaft which will move linearly. The movement of the motor depends upon the air pressure which is measured by anemometer and feedback signal is send to the Arduino. As the requirement of angle to be controlled.

RESULT

Wind turbine prototype testing is done by test of each component block and device and the table shows the relationship varied position blade angle and wind speed varied to produce wind turbine rotational speed is varied.

Table No-:1.1 *Pitch Angle and Wind speed Data*

Pitch Angle(Deg)	Wind Speed			
	3 m/s	4 m/s	5m/s	6m/s
0	0	0	0	0
6	0	92	142	202
17	20	135	202	282
28	0	106	146	195
39	0	81	99	123
50	0	38	63	93
62	0	2	27	57
78	0	0	0	1
90	0	0	0	0

CONCLUSION

A Prototype of the wind turbine blade head angle has been successfully designed and wind turbine can produce a maximum angle rotation when the wind speed is 6 m/s, & the blade angle position is 16.8^{o}

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