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VNC - 2020 TASU

VIDYAVARDHINI'S NATIONAL CONFERENCE ON TECHNICAL ADVANCEMENTS FOR SOCIAL UPLIFTMENT

VNC - 2020 TASU

4TH APRIL, 2020

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142_Design and development of harmony wind turbine

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Vidyavardhini's College of Engineering and Technology, Vasai is located on the sprawling campus of Vidyavardhini, spread over an area of 12.27 acres. It is a short, two minutes walk from Vasai Road (W) Railway Station. The college is also accessible by road from Mumbai.

Vidyavardhini Society received approval from AICTE to start the new college of Engineering & Technology with effect from July, 1994. The college is affiliated to the University of Mumbai for the four year degree program leading to the degree of Bachelor of Engineering in six branches.

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Important Dates:

Submission of full length paper
15TH Feb 2020
Paper Acceptance Notification
22ND Feb 2020
Submission of Final Version of Paper
29TH Feb 2020
Registration Deadline
5TH March 2020
PPT Submission
20TH March 2020
Conference
4TH April 2020

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DESIGN AND DEVELOPMENT OF HARMONY WIND TURBINE

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Abstract

Harmony Wind Turbine is type of Vertical Axis Wind Turbine (VAWT), in which its blades are arranged (in harmonic manner) in helix shape. Angle between two adjacent blades in adjacent layers is 60°. Due to such arrangement of blades, irrespective of wind direction, wind turbine starts spinning. At high wind speed or turbulent wind conditions which are different for different size of wind turbines; to prevent burning of generator the blades of turbine can furl into circle to maintain its speed. Due to use of furling mechanism we can eliminate use of disk brakes which turns hot, causing fire in turbine. Aim of this project is to prove that during cut off speed condition instead of braking system furling system activates which causes closing of blades due to which speed of turbine gets maintained and power curve is stabilized instead of drastic drop of power curve as in case of conventional wind turbines due to braking. The main objective is to replace breaking system by furling system effectively. The furling mechanism is implemented using RPM sensor, Arduino UNO, servo motor and furling gears. This proposed idea does not required heavy towers, Protects against the breakage of blades and active protection against burning of generator or fire in turbine, works effectively irrespective of wind directions. The new type of blades which are called as scoop along with other components such as joining strip, furling gears (spur gear and sector) and shafts are designed and assembled in solidworks 2016. The proposed prototype have 320 mm height and 412 mm rotor diameter and it can produce 17W power theoretically. Solidworks Flow Simulation Wizard is used to carry out Flow simulation to generate flow trajectories and cut plots.

Keywords: Harmony Wind Turbine, VAWT, Furling system, Simulation,

1 Introduction

This project is about Design and Analysis of Harmony Wind Turbine. Harmony Wind Turbine can catch wind from any direction and start spinning and due to this kinetic energy of wind gets converted into electrical energy. The wind is clean free and readily available renewable energy source. The main advantage of wind energy is one can generate energy from wind for 24 hours throughout the year unlike solar energy which can only use when there is sunlight. The aim of the project is to study wind energy and its conversion to useful power and implementing this knowledge for designing of small scale harmony wind turbine. Main objectives are as listed below-To minimize the chances of burning of wind turbine and its breakdown. To replace breaking system in conventional wind turbine by furling mechanism. To implement furling mechanism in harmony wind turbine and activation of furling mechanism at cut off speed. To identify the possible application of harmony wind turbine. Christopher Moore came up with an idea of Harmony Wind Turbine. Firstly he made a prototype of harmony wind turbine. Harmony wind turbine is a vertical axis wind turbine as he came up with new shape model. Thus his main idea was to implement furling mechanism which activates at high speed condition. Furling mechanism is activate during high speed condition According to the author model consisting of pairs of blades each blade is equally aligned with 45°. Thus final shape is like helix shape (DNA). These turbine blade will be coupled by special generator design which will enable very high power output with low start up speed. In conventional wind turbine as velocity increases power also increases but at particular peak point the power gradually cuts down to zero. For this disc brakes are used but due to overheating of disc brake sometime turbine catches fire. To overcome this problem, furling

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This certificate is presented to

Vinay Dahyabhai Patel

of Vidyavardhini's College of Engineering and Technology, Vasai

for presenting paper titled

Design, Development of Harmony Wind Turbine

in the Vidyavardhini's National conference 2020 "Technical Advancements for Social upliftments" organised by Vidyavardhini's College of Engineering and Technology, Vasai held on 27th June, 2020

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