

# Emerging Trends in Engineering and Technology

Volume - 4

**Chief Editor**

**Mohit Bajpai**

Associate Professor, Electronics and Communication Engineering, Poornima  
Institute of Engineering & Technology, Jaipur, Rajasthan, India

**Co-Editor**

**Dr. A.V. Sudhakara Reddy**

Associate Professor, R&D Coordinator, Department of Electrical and  
Electronics Engineering, Malla Reddy Engineering College (Autonomous),  
Maisammaguda, Secunderabad, Telangana, India

**Dr. V. Lakshmi Devi**

Professor, Department of EEE, S.V. College of Engineering, Tirupati,  
Andhra Pradesh, India

**Integrated Publications  
New Delhi**

**Published By:** Integrated Publications

Integrated Publications

H. No. - 3 Pocket - H34, Sector - 3,

Rohini, Delhi-110085, India

**Chief Editor:** Mohit Bajpai

**Co-Editor:** Dr. A.V. Sudhakara Reddy and Dr. V. Lakshmi Devi

The author/publisher has attempted to trace and acknowledge the materials reproduced in this publication and apologize if permission and acknowledgements to publish in this form have not been given. If any material has not been acknowledged please write and let us know so that we may rectify it.

© **Integrated Publications**

**Publication Year:** 2021

**Pages:** 93

**ISBN:** 978-93-90471-11-9

**Book DOI:** <https://doi.org/10.22271/int.book.104>

**Price:** ₹ 796/-

# Contents

<b>S. No.</b>	<b>Chapters</b>	<b>Page No.</b>
1.	Field and Laboratory Investigations Carried out in the Underground Metro Rail Corridors <i>(Lilly R and Prabhakaran. S)</i>	01-12
2.	Comparative Analysis with Various Scheduling Techniques in Cloud Computing Environment <i>(B. Raja Rao and V. Jagadish Kumar)</i>	13-22
3.	Research Design and Methodology for Teaching English Language at Higher Education <i>(Sukanta Ghosh)</i>	23-36
4.	Photo Voltaic System fed DSTATCOM for Power Quality Improvement <i>(P. Sarala and M. Dilip Kumar)</i>	37-49
5.	Control and Operation of a DC Grid-Based Wind Power Generation System <i>(T. Obulesu, Raja Reddy Duvvuru and K. Vimal Kumar)</i>	51-60
6.	Implementation of Fuzzy Logic Controller for Multilevel Inverter Fed D-STATCOM <i>(P. Venkata Kishore and M. Kondalu)</i>	61-72
7.	A Study of Self-Reflexivity in Select Dalit Writings <i>Vemuganti Sreehari and Sukanta Ghosh</i>	73-83
8.	The Application of ICT Tools for Learning English and Communication Skills: A Case Study of Undergraduate Engineering Learners <i>(A. Shobha Rani)</i>	85-93

**Chapter - 5**  
**Control and Operation of a DC Grid-Based Wind  
Power Generation System**

**Authors**

**T. Obulesu**

Assistant Professor (Contract), Department of EEE,  
JNTUACEP, Pulivendula, Kadapa, Andhra Pradesh, India

**Raja Reddy Duvvuru**

Associate Professor, Department of EEE, Malla Reddy  
Engineering College, Hyderabad, Telangana, India

**K. Vimal Kumar**

Assistant Professor, Department of EEE, JNTUK Narasaraopet,  
Guntur, Andhra Pradesh, India



# Chapter - 5

## Control and Operation of a DC Grid-Based Wind Power Generation System

T. Obulesu, Raja Reddy Duvvuru and K. Vimal Kumar

### Abstract

This work presents the design of a dc grid-based wind power generation system in a poultry farm. The proposed system allows flexible operation of multiple parallel-connected wind generators by eliminating the need for voltage and frequency synchronization. A model predictive control algorithm that offers better transient response with respect to the changes in the operating conditions is proposed for the control of the inverters. The design concept is verified through various test scenarios to demonstrate the operational capability of the proposed microgrid when it operates connected to and islanded from the distribution grid.

**Keywords:** Wind system, DC, micro grid

### I. Introduction

Poultry farming is the raising of domesticated birds such as chickens and ducks for the purpose of farming meat or eggs for food. To ensure that the poultries remain productive, the poultry farms in Singapore are required to be maintained at a comfortable temperature. Cooling fans, with power ratings of tens of kilowatts, are usually installed to regulate the temperature in the farms<sup>[1-3]</sup>. Besides cooling the farms, the wind energy produced by the cooling fans can be harnessed using Wind turbines (WTs) to reduce the farms' demand on the grid. The Singapore government is actively promoting this new concept of harvesting wind energy from electric ventilation fans in poultry farms which has been implemented in many countries around the world<sup>[4]</sup>. The major difference between the situation in poultry farms and common wind farms is in the wind speed variability. The variability of wind speed in wind farms directly depends on the environmental and weather conditions while the wind speed in poultry farms is generally stable as it is generated by constant-speed ventilation fans. Thus, the generation intermittency issues that affect the reliability of electricity supply and power