

Performance Evaluation of Active Power Correction Using BAS-PLC Controller for Solar Photovoltaic System

Meganathan Padmanaban

Department of Electrical and Electronics Engineering
Sri Venkateshwaraa College of Engineering & Technology
Ariyur, Puducherry, India
megaisagem@gmail.com

Pugazhendiran Parthasarathy

Department of Electrical and Electronics Engineering
IFET College of Engineering
Villupuram, Tamilnadu, India
pugazhendiran@gmail.com

Sasi Chinnathambi

Department of Electrical, FEAT
Annamalai University
Chidambaram, Tamilnadu, India
saasi_ceed@yahoo.co.in

Nammalvar Pachaivannan

Department of Electrical and Electronics Engineering
Krishnasamy College of Engineering and Technology
Cuddalore, Tamilnadu, India
alvar1976@gmail.com

Abstract—The solar photovoltaic system is extensively increased in grid integration as an alternative power generation due to its benefits. But still, the power grid withstands a notable challenge as overloading during the high penetration of photovoltaic power. These issues concern and give way out for an active power regulation by controlling the maximal photovoltaic power to the limited level. In this paper, a simple way of power-limiting control is proposed along with the maximal power point tracking for active power limit to the main grid. Howsoever, the proposed and conventional system is chosen with and without the active power control for the solar photovoltaic systems respectively. The performance of the proposed hybrid controller *i.e* maximum power point tracking controller along with power-limiting controller has been evaluated using MATLAB/Simulink environment. The Meta-heuristic beetle antenna search algorithm is employed for maximum power tracking with an active power controller. The control scheme provides the smooth operation between the maximum power tracking and power-limiting during fast varying irradiation conditions; also it has exposed the better performance of the proposed system than the conventional system. The trapezoidal profile simulation result differentiates the superior achievements of the hybrid controller and the illustration validates the ability of active power limit of the proposed system during the high power penetrations to the grid.

Keywords—Active power control, Solar photovoltaic, Hybrid MPPT, grid integration, BAS algorithms

I. INTRODUCTION

As a result of population growth and the development in the power electronics industry, there is a rise in electrical power demand. The carbon dioxide emission and increasing fossil fuel cost give way to renewable energy sources. Solar Photovoltaic Systems (SPVS) have a fast growth rate among renewable energy worldwide. The spectacular benefits of SPVS are feasible solar energy, less maintenance, absence of fuel cost, noiseless generation, and an unpolluted environment

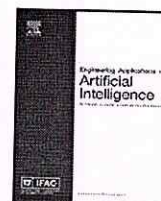
[1]. The solar installed capacity in India was 44.3 GW in August 2021. As per the International Renewable Energy Agency (IREA), the SPVS capacity reaches 580.1 GW along with 3.4 GW of off-grid in 2019. As a result of increasing, solar installed capacity gives way to the interconnection of SPVS to the grid in present years. Anyhow, the vast capacity of SPVS with grid integration plays a vital role in power systems. Among the benefits of SPVS, still it has grueling cases like overloading of grid power during maximal power harvesting of SPVS and the grid voltage fluctuations between SPVS energy during the interconnection of SPVS into the power grid [2].

To maximize the energy from SPVS, maximal power point tracking (MPPT) is essential for main grid interconnection systems. The Power-Limiting Control (PLC) is included in the MPPT controller to maximize the active power generation of SPVS which is obligatory to a definite set-point during the operation. In [3] the high photovoltaic penetration causes voltage fluctuations which are reduced by active power delivered by SPVS. It is achieved by a relevant MPPT controller / Active Power Controller (APC) with a constructive performance towards the detection of high photovoltaic penetration and synchronization of grid voltage. It also consists of an additional device to detect the high photovoltaic penetration between MPPT and APC controller. Whereas [4] suggests the PLC techniques along with MPPT algorithms to control the output current of inverter based on the instruction given in the PLC. The effectiveness of the suggested technique is synchronization of inverter current to grid voltage and the power response of PLC is 0.2 s.

Advanced control techniques are implemented in [5] by controlling the maximal power feed-in SPVS. The control strategy assures a fast and smooth change between Perturbation and Observation (P&O) MPPT and Constant Power Generation (CPG) by regulating the yield power of SPVS to any set-point without any stability issues. The




PRINCIPAL
SRI VENKATESHWARAA COLLEGE OF
ENGINEERING & TECHNOLOGY
ARIYUR, PUDUCHERRY - 605 102.



Identification of cyber harassment and intention of target users on social media platforms

S. Abarna^{a,*}, J.I. Sheeba^a, S. Jayasrilakshmi^a, S. Pradeep Devaneyan^b

^a Department of Computer Science and Engineering, Puducherry Technological University, India

^b Department of Mechanical Engineering, Sri Venkateshwaraa College of Engineering and Technology, Puducherry, India



ARTICLE INFO

Keywords:

Cyberbullying
Fast text
Word2vec
Natural language processing
Insulting vocabulary
Intention detection
Buzzwords

ABSTRACT

Due to Coronavirus diseases in 2020, all the countries departed into lockdown to combat the spread of the pandemic situation. Schools and institutions remain closed and students' screen time surged. The classes for the students are moved to the digital platform which leads to an increase in social media usage. Many children had become sufferers of cyber harassment which includes threatening comments on young students, sexual torture through a digital platform, people insulting one another, and the use of fake accounts to harass others. The rising effort on automated cyber harassment detection utilizes many AI-related components Natural language processing techniques and machine learning approaches. Though machine learning models using different processes and efficient classifiers to detect cyberbullying comments on social media. In this proposed work, the lexical meaning of the text is analysed by the conventional scheme and the word order of the text is performed by the Fast Text model to improve the computational efficacy of the model. The intention of the text is analysed by various feature extraction methods. The score for intention detection is calculated using the frequency of words with a bully-victim participation score. Finally, the proposed model's performance is measured by different evaluation metrics which illustrate that the accuracy of the model is higher than many other existing classification methods. The error rate is lesser for the detection model.

1. Introduction

With the rapid growth in the usage of social media platforms, Cyberharassment has become one of the major important issues in our society. Online Harassment causes many negative consequences that highly affect the victims due to the high frequency provided by Information and Communication Technologies (ICT) (López-Vizcaino and Nóvoa, 2021). The percentage of people who experienced cyberharassment during their lifetime has increased to 36% in 2019 from 18% in 2007, due to the high use of mobile devices and social networks by children and teenagers. According to the research conducted by Bozyigit et al. (2021a) around three billion people use social platforms for communication. It is indistinct that social media platforms afford various advantages and also some malicious activities such as cyberharassment. It is a cybercrime where a harasser can share negative posts, personal information, false content, or messages about the victim to humiliate or threaten the victim repeatedly overtime on the digital platform. The early detection and termination of cyberharassment in social networks help to reduce its adverse effects on the victims and to identify the harasser.

The study of the cyber-harassment field comes under Psychology, Information Technology (IT), Education, and Behavioural Science (BS) (Elsafoury et al., 2021). Over the past decade, the automated detection of cyberharassment specifically on the subject of detective work on cyberharassment from social media networks like Twitter, YouTube, and Instagram using predictable Machine-learning models, deep learning models, and rule-based models. Based on the national Pew research centre survey in 2020, the percentage of online harassment takes place on different social media platforms such as Instagram (63%), Twitter (24%), WhatsApp (34%), Facebook (46%), Telegram (18%), and Snapchat (39%). Among all, Instagram ranked high in the occurrence of cyber harassment where people can post images and videos followed by comments. The survey (García-Díaz and Cánovas-García, 2020) exposed that women folk were about double as possible as men to state that they had been targeted as a result of their gender. Young women, usually undergo sexualized forms of harassment. In Jain et al. (2020) explains that expressive and social difficulties occur not only among victims but correspondingly among harasser victims also.

A study by the Pew Research Centre presented that around 59% of U.S. teens have generally familiar with at least one of six types of

* Corresponding author.

E-mail addresses: abarna@pec.edu (S. Abarna), sheeba@pec.edu (J.I. Sheeba), jayasrilakshmi97@pec.edu (S. Jayasrilakshmi), pr.signs@gmail.com (S.P. Devaneyan).

<https://doi.org/10.1016/j.engappai.2022.105283>

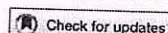
Received 9 May 2022; Received in revised form 10 June 2022; Accepted 27 July 2022

Available online 10 August 2022

0952-1976/© 2022 Elsevier Ltd. All rights reserved.



PRINCIPAL
SRI VENKATESHWARA COLLEGE OF
ENGINEERING & TECHNOLOGY
ARIYUR, PUDUCHERRY - 605 102.



Fuzzy tuned real and reactive power regulation in GC-VSI for PV systems

Nammalvar Pachaivannan^a, Ramkumar Subburam^b, Umadevi Ramkumar^b
and Meganathan Padmanaban^c

^aDepartment of Electrical and Electronics Engineering, Krishnasamy College of Engineering and Technology, Cuddalore, India; ^bDepartment of Electrical and Electronics Engineering, United Institute of Technology, Coimbatore, India; ^cDepartment of Electrical and Electronics Engineering, Sri Venkateshwaraa College of Engineering and Technology, Puducherry, India

ABSTRACT

Operating solar Photovoltaic (PV) under fluctuating irradiation and load with variable profiles is a challenging job. Besides, reactive power demand in grid-connected solar PV system makes it more challenging because of its limitations in reactive power capability. As per Indian electricity grid codes, reactive power compensation comes under ancillary services and it is mandatory nowadays. On PV source side, DC/DC boost converter, and on grid side, traditional three-phase Grid-Connected-Voltage Source Inverter (GC-VSI) are taken for research study. If real power delivered to the grid by GC-VSI is less than the capacity, the surplus capacity is used to provide reactive power. Normally, shunt capacitors or Flexible Alternating Current Transmission System (FACTS) devices are used at Point of Common Coupling (PCC) as compensation devices. In this work, the DC-link capacitor employed in front end of GC-VSI is utilised to serve reactive power control to the grid. An effective fuzzy-tuned direct current vector control is implemented to enrich reactive power control. Simulation studies carried with extensive MATLAB/Simulink platform illustrate the efficacy of suggested system and reveal that proposed approach is capable of effective reactive power support by the DC-link capacitor and extraction of maximum possible power from PV arrays.

ARTICLE HISTORY

Received 17 February 2021
Accepted 31 December 2021

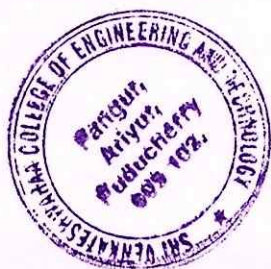
KEYWORDS

Voltage source inverter; solar PV system; fuzzy logic; real power; reactive power; direct current vector control

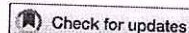
1. Introduction

The pollutant emissions from conventional power plants, recent energy paucity and increasing concern of global climate changes make us to travel towards the maximum possible usage of renewable energy sources. Amongst other renewable energy sources, grid-integrated solar PV system become popular nowadays because of the safe and clean nature. The Indian Electricity Grid Code (IEGC) passed regulation regarding reactive power compensation in power system comes under the ancillary service and it is mandatory nowadays. Only few restricted economic strategies are available for gaining the reactive power. Conventionally, generators which are connected in transmission line are considered as the

CONTACT Nammalvar Pachaivannan ✉ alvar1976@gmail.com Department of Electrical and Electronics Engineering, Krishnasamy College of Engineering and Technology, Cuddalore, Tamilnadu, India
© 2022 Informa UK Limited, trading as Taylor & Francis Group




PRINCIPAL
SRI VENKATESHWARAA COLLEGE OF
ENGINEERING & TECHNOLOGY
ARIYUR, PUDUCHERRY - 605 102.



Performance evaluation of improved ANOVA-tuned MPPT controlled DC–DC boost converter for SPV system

Meganathan Padmanaban^a, Sasi Chinnathambi^b, Pugazhendiran Parthasarathy^c and Nammalvar Pachaivannan^d

^aDepartment of Electrical and Electronics Engineering, Sri Venkateshwaraa College of Engineering and Technology, Puducherry, India; ^bDepartment of Electrical, FEAT, Annamalai University, Chidambaram, India;

^cDepartment of Electrical and Electronics Engineering, IFET College of Engineering, Villupuram, India;

^dDepartment of Electrical and Electronics Engineering, Krishnasamy College of Engineering and Technology, Cuddalore, India

ABSTRACT

This article visualises the growth of harvesting solar energy by a solar photovoltaic (SPV) system and techniques for tracking the maximal power point. An active maximal power point tracking controller is put forward to harvest the solar power named an improved analysis of variance (ANOVA)-tuned algorithm. In this configuration of the SPV system, maximal power yield is obtained from the multi photovoltaic (PV) string through the DC–DC boost converter. To obtain the maximal power from the PV string, the optimal duty cycle has to be maintained in a DC–DC boost converter. To achieve a sustained duty cycle, an improved ANOVA-tuned maximum power point tracking (MPPT) controller is proposed as an optimal controller. The performance of the proposed controller was compared with that of a conventional perturb and observe controller for steady-state and dynamic conditions. The result of the proposed MPPT scheme has maximal power and obviously a better tracking path. The simulation is carried out in the MATLAB/Simulink environment, and the experimental result shows the benefits of the proposed MPPT techniques. The supremacies of the proposed controller are a preferable tracking response, less training data time, effective steady state and dynamic performances.

ARTICLE HISTORY

Received 5 July 2021



Accepted 12 March 2022

KEYWORDS

photovoltaic; MPPT; Analysis of Variance; ANOVA; DC–DC boost converter

1. Introduction

The electricity demand in all the countries has increased due to the population growth and expansion of industries. The enlargement of greenhouse gas emissions and fall-off of fossil fuels with price increment give way out for power generation (Farzaneh, 2020). The power demand and generation are boomed by renewable energy sources like solar, wind, biomass, geothermal, hydropower, etc. Additionally, non-appearances of fuel cost, free availability of solar energy, rare maintenance and clean and noise-free generation are put together in favour of solar photovoltaic (SPV) systems (Dixit et al., 2019).

CONTACT Meganathan Padmanaban  megaisagem@gmail.com  Department of Electrical and Electronics Engineering, Sri Venkateshwaraa College of Engineering and Technology, Ariyur, Puducherry, India

© 2022 Informa UK Limited, trading as Taylor & Francis Group




PRINCIPAL
SRI VENKATESHWARAA COLLEGE OF
ENGINEERING & TECHNOLOGY
ARIYUR, PUDUCHERRY - 605 102.

Received December 9, 2021, accepted December 22, 2021, date of publication December 30, 2021, date of current version January 11, 2022.

Digital Object Identifier 10.1109/ACCESS.2021.3139663

Scheduled Access Strategy for Improving Sensor Node Battery Life Time and Delay Analysis of Wireless Body Area Network

S. EZHIL PRADHA¹, A. MOSHIKA², BALAJI NATARAJAN², K. ANDAL², G. SAMBASIVAM³, (Member, IEEE), AND M. SHANMUGAM⁴

¹Department of Computer Science and Engineering, Pondicherry Engineering College, Pondicherry 605014, India

²Department of Computer Science and Engineering, Sri Venkateshwarra College of Engineering and Technology, Pondicherry 605102, India

³Faculty of Information and Communication Technology, ISBAT University, Kampala, Uganda

⁴Department of Computer Science and Engineering, Vignan's Foundation for Science, Technology & Research, Guntur, Andhra Pradesh 522213, India

Corresponding author: G. Sambasivam (gsambu@gmail.com)

ABSTRACT In WBAN, energy efficiency is a major concern. The sensor nodes attached to the human body are battery-powered devices with a finite lifespan. These sensor nodes assist in gathering biological data from the human body and transmitting it to a control device. In WBAN, the MAC protocol is critical in evaluating a protocol's energy efficiency. Traditional MAC protocols aim to boost throughput and bandwidth efficiency. The most critical aspect is that they lack in energy conserving mechanism. By employing correct control techniques that aid in the efficient use of energy resources, the useful network life time can be extended. Several MAC protocols for WBAN have been devised to reduce energy consumption, and packet collision, idle listening, overhearing, and control packet overhead are the main causes of energy waste in wireless networks. Idle listening, packet overhead, overhearing, and collision rate are all addressed by the energy-saving technique. In WBAN, we introduced a novel energy-efficient MAC protocol called Scheduled Access MAC (SAMAC) to extend the network life time without sacrificing QoS. Using the Castalia simulator, we analyze and compare the performance of our proposed SAMAC to that of the BaselineMAC (IEEE 802.15.6) and ZigBeeMAC (IEEE 802.15.4) in terms of energy consumption, packet delivery ratio, and end-to-end delay. In terms of both energy conversion and WBAN Quality of Service, our simulation results suggest that our proposed SAMAC is more efficient than Baseline MAC and ZigBeeMAC.

INDEX TERMS Wireless body area network (WBAN), medium access control (MAC) layer, IEEE 802.15.6, scheduled access medium access control (SAMAC), energy efficiency, quality of service (QoS).

I. INTRODUCTION

With the rapid development in the wireless technology, the Wireless Body Area Network (WBAN) has a great impact in health care patient monitoring applications [1]. The WBAN comprised of medical sensor nodes which operates autonomously and these sensor nodes measures the physiological parameters of the human body like heartbeat, temperature, glucose level, blood pressure etc. The basic components of WBAN are personnel device, Actuator and sensor nodes. The personnel device acts as a gateway for the sensor nodes which collects the information from the sensor nodes and transmit that information to the doctor's database via access point. Based on the information gathered from the human

body the doctor will take a corrective action to the patient. The applications of WBAN are huge in many fields.

The WBAN [2] supports low-cost and spontaneous health monitoring with real-time updates of medical records for patients, fire fighters, military personnel through the Internet with the help of sensors. Health monitoring signals can be detected from patients and sent to receivers via wireless mode and then communicated to the remote locations so that they can be analyzed and required measures can be taken at right time. It covers three major areas for a complete transfer of signal. The communication architecture in the WBAN is divided into three tier as mentioned in figure 1.

A. TIER-1: INTRA-WBAN COMMUNICATION

In this level, the interaction of the sensors is confined around the body of the patient. The communication signals within

The associate editor coordinating the review of this manuscript and approving it for publication was Giovanni...
VOLUME 10, 2022

This work is licensed under a Creative Commons Attribution 4.0 License. For more information, see <https://creativecommons.org/licenses/by/4.0/>



PRINCIPAL
SRI VENKATESHWARRA COLLEGE OF
ENGINEERING & TECHNOLOGY
ARIYUR, PUDUCHERRY - 605 102.