

International Multidisciplinary
Research Journal

Golden Research
Thoughts

Chief Editor
Dr.Tukaram Narayan Shinde

Publisher
Mrs.Laxmi Ashok Yakkaldevi

Associate Editor
Dr.Rajani Dalvi

Honorary
Mr.Ashok Yakkaldevi

Welcome to GRT

RNI MAHMUL/2011/38595

ISSN No.2231-5063

Golden Research Thoughts Journal is a multidisciplinary research journal, published monthly in English, Hindi & Marathi Language. All research papers submitted to the journal will be double - blind peer reviewed referred by members of the editorial board. Readers will include investigator in universities, research institutes government and industry with research interest in the general subjects.

International Advisory Board

Flávio de São Pedro Filho
Federal University of Rondonia, Brazil

Kamani Perera
Regional Center For Strategic Studies, Sri Lanka

Janaki Sinnasamy
Librarian, University of Malaya

Romona Mihaila
Spiru Haret University, Romania

Delia Serbescu
Spiru Haret University, Bucharest, Romania

Anurag Misra
DBS College, Kanpur

Titus PopPhD, Partium Christian
University, Oradea, Romania

Mohammad Hailat
Dept. of Mathematical Sciences,
University of South Carolina Aiken

Abdullah Sabbagh
Engineering Studies, Sydney

Ecaterina Patrascu
Spiru Haret University, Bucharest

Loredana Bosca
Spiru Haret University, Romania

Fabricio Moraes de Almeida
Federal University of Rondonia, Brazil

George - Calin SERITAN
Faculty of Philosophy and Socio-Political
Sciences Al. I. Cuza University, Iasi

Hasan Baktir
English Language and Literature
Department, Kayseri

Ghayoor Abbas Chotana
Dept of Chemistry, Lahore University of
Management Sciences[PK]

Anna Maria Constantinovici
AL. I. Cuza University, Romania

Ilie Pinteau,
Spiru Haret University, Romania

Xiaohua Yang
PhD, USA

.....More

Editorial Board

Pratap Vyamktrao Naikwade
ASP College Devrukh, Ratnagiri, MS India Ex - VC. Solapur University, Solapur

R. R. Patil
Head Geology Department Solapur
University, Solapur

Rama Bhosale
Prin. and Jt. Director Higher Education,
Panvel

Salve R. N.
Department of Sociology, Shivaji
University, Kolhapur

Govind P. Shinde
Bharati Vidyapeeth School of Distance
Education Center, Navi Mumbai

Chakane Sanjay Dnyaneshwar
Arts, Science & Commerce College,
Indapur, Pune

Awadhesh Kumar Shirotriya
Secretary, Play India Play, Meerut (U.P.)

Iresh Swami
Ex - VC. Solapur University, Solapur

N.S. Dhaygude
Ex. Prin. Dayanand College, Solapur

Narendra Kadu
Jt. Director Higher Education, Pune

K. M. Bhandarkar
Praful Patel College of Education, Gondia

Sonal Singh
Vikram University, Ujjain

G. P. Patankar
S. D. M. Degree College, Honavar, Karnataka

Maj. S. Bakhtiar Choudhary
Director, Hyderabad AP India.

S. Parvathi Devi
Ph.D.-University of Allahabad

Sonal Singh,
Vikram University, Ujjain

Rajendra Shendge
Director, B.C.U.D. Solapur University,
Solapur

R. R. Yallickar
Director Management Institute, Solapur

Umesh Rajderkar
Head Humanities & Social Science
YCMOU, Nashik

S. R. Pandya
Head Education Dept. Mumbai University,
Mumbai

Alka Darshan Shrivastava
Shaskiya Snatkottar Mahavidyalaya, Dhar

Rahul Shriram Sudke
Devi Ahilya Vishwavidyalaya, Indore

S.KANNAN
Annamalai University, TN

Satish Kumar Kalhotra
Maulana Azad National Urdu University

" DC NANOGRID: NOW AND THEN "



Joseph.P.P

Dept of Electronics , Prajyoti Niketan College , Pudukad,Thrissur,Kerala,India.

Short Profile

Joseph.P.P is a Department of Electronics at Prajyoti Niketan College , Pudukad, Thrissur, Kerala,India.



ABSTRACT:

We are using solar power largely where heat is to generated like solar heater where the quality of the power generated is not relevant if heat is to be provided ,but for other applications where quality of power matters like sophisticated appliances (mobiles ,laptops etc) DC production from Inverters through filters consists of lots of harmonics due to improper and inefficient way of filtering out the harmonics practically. So researcher propose a system that uses DC power directly from PhotoVoltaics, condition them to obtain more quality power, which will be easier because now we are filtering a DC waveform.

KEYWORDS

DC Nanogrid , sophisticated appliances , harmonics practically , DC waveform.

Article Indexed in :

DOAJ
BASE

Google Scholar
EBSCO

DRJI
Open J-Gate

INTRODUCTION

Fossil fuels and coal are the main sources of energy used in the world today. Burning of the fuels produces GHG (green house gases) and the world is looking towards new sources of energy. Renewable sources are being explored like wind and solar power. Wind power can only be generated in places where there is sufficient wind. So the governments across the world are concentrating in solar power. It is present everywhere and easy to be tapped.

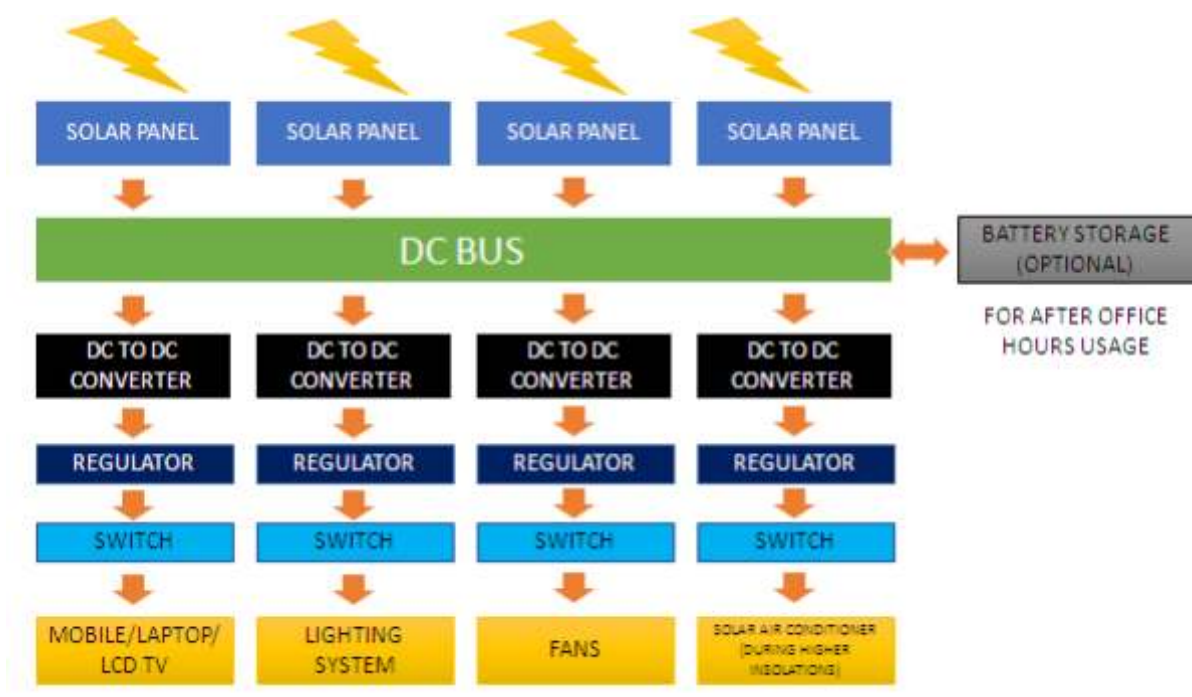
The areas having low insolation depends on hydro power which is almost saturated now. The cost of electricity is sky rocketing with passing years. The Government is promoting solar energy with dedicated schemes like ANERT (Agency for Non Conventional Energy and Rural Technology). This scheme provides solar electrification in houses and buildings by converting solar energy into AC current using photo voltaic effect and is stored in batteries. This stored energy is in DC form. An inverter is used to convert this DC to AC which equates the power to grid utility.

OBJECTIVES

The objective of this research is to propose a stand alone system which can be used as a utility power system in office buildings, specially in places with low insolation, which comes in the region of medium insolation. So to become independent of the utility grid we have to use the power available judiciously and in a controlled manner. This can only be done if we reduce the losses that occur due to switching elements used in Inverters. So here we obtain power from photovoltaics, provide DC power tapping points with the help of a supporting circuitry and associated wiring in various ranges or nodes of 3V, 5V, 12V, 24V etc and use them for the different purposes such as charging the mobile, laptop, emergency lamps, lighting, fans, solar air conditioners etc and all the other applications which require DC power.

HYPOTHESIS

Solar grid can be considered as a solution but not as a permanent one because the state obtains very less and inconsistent sunshine round the year. The climatic conditions cannot be changed so we have to make most of the sunshine. The solar energy is converted into electric energy by photovoltaics which stores the energy in batteries. This energy stored in the batteries is converted to AC by an inverter. Power Electronics prove that a large part of the energy is lost in switching which cannot be tolerated when the available power is so less and inconsistent. Adding to this is the losses due to reactive power due to nonlinear loads. The harmonics produced due to high speed switching produces poor quality power hence producing imperfect sine waveform.



FINDINGS

The incoming solar power is stored in batteries which is in DC form. This DC is then converted to AC which is then applied to the various appliances. The various appliances like mobile charger, laptop, refrigerator, led lights etc works on regulated DC supply. So the energy has to be reconverted into DC. All these conversions are resulted from excessive switching resulting in loss of power and generating of heat .all these conversions are associated with a transformer which also produces heat . In places where there is inconsistent radiation this system can be very discomforting because one cannot fully depend on the solar energy system. These places are also considered low on obtaining solar energy in the range of 10% of the total sunlight that reaches the earth , owing to clouds presence , rains, lots of trees, vegetation, forest and less land area . Low insolation areas ,the south Indian state is one such example.

Low insolation areas depends heavily on hydro power grid. State Electricity Board(SEB) proposes a grid connected solar power system in which excess power can be fed back to the grid after the household usage ,which will result in reduction in billing. 60% of the land in low insolation areas are residential and imagine all the households going solar, large storage capacity will be required by the grid to store the vast amount of power fed back which will need a large investment , support and logistics making it practically non viable.

Multilevel Inverters are used as a modern development in inverter technology which involves PWM(Pulse Width Modulation) techniques for high speed switching .More the switching , more the accuracy which insures more quality but results in more heat production and reduces the life of the inverter and is more prone to harmonics practically.

The use of transformers add to the weight of the component and add to the complexity of the system ,cost and heat production . Reactive power adds to the power loss due to non linear load.

RECOMMENDATIONS

Independent Solar Grid provides us a solution to some extent to this problem. At an initial stage this can be applied to isolated small building requirements. The inverter can be avoided (saving the available power from loss of switching) and depend on DC power which will result in usage of the solar energy with greater efficiency, low cost and hardware. We will also need batteries that can store power at larger capacity so that excess power can be stored. Presently we use the utility grid power of 240V, 50 Hertz.

Batteries can be used to store excess power resulting after day hours. The load only operates during sunlight hours, making these designs suitable for common applications such as ventilation fans, water pumps, and small circulation pumps for solar thermal water heating systems. Excess power can be used to operate LED bulbs for lighting and low end uses.

The AC world offers high cost, high loss and low efficiency. Not only this multiple conversions are required at different stages. Systems operating in DC operate with 20-40% less heat and reduces power of consumption upto 30%. DC systems also offers flexibility and simplicity to installations and decreases maintainance requirements. DC systems are not susceptible to harmonics.

DC coupling of system inputs for small systems may have an advantage in simplicity and lower component cost were the power transmission distance is short and the system power is fairly low. The solar array and associated wiring operates in the extra low voltage class mode therefore it could be considered to have some safety advantages.

One of the disadvantage with the DC extra low voltage class typically means high electric currents need to flow in the solar array and sub array cables to obtain the same power as systems working at higher voltages. High currents often need to be carried by very heavy costly copper cables which can also be difficult to manage and very costly to install, but if we implement DC on a smaller scale, the system can be viable.

Thomas Alva Edison once said in 1889 “My personnel desire would be to prohibit entirely the use of Alternating Currents. They are as unnecessary as they are dangerous. I can therefore see no justification for the introduction of a system which has no element of permanency and every element of danger to life and property”.

The existing AC systems are not practical to be replaced with DC systems so researcher propose a system at individual level that is a DC Nano Off grid power system. This new system requires that each building should become energy efficient and to become energy independent the future building have to combine energy saving construction designs, energy saving applications with renewable power sources and highly Eco-friendly. Today photovoltaic solar power systems are the most prominent power source for these buildings. The solar cells of solar power systems generate DC current and interestingly lighting, energy efficient building heating, ventilation, air-condition and cooling are all already operating with an internal DC supply voltage today. So it would be just convenient to connect DC power sources with DC loads by means of an even more energy efficient DC power grid. Research would also like it to be called a Nano grid because it supplies power to individual buildings. This grid can also provide AC supply which can be used to feed back to the utility mains to reduce your electricity bills by using a solar inverter. The energy efficiency advantages of DC electricity distribution also contributes to the use of a DC Nano Grid. This is due to a higher RMS voltage in the DC grid on a level slightly above the amplitude of the maximum AC mains voltage. Power cables with resistive load recur

55% less loss in case of DC systems over their AC counterparts. The reactive component is absent in DC systems which also enhances the loss reduction. With nonlinear loads the loss reduction increases to 20% for DC systems.

Any electric system consists of 3 parts Generation Transmission and Distribution. In the initial part researcher will discuss about the requirements of an isolated building most probably an office that operates during day time, the power required by the building at least for five hours.

We are using solar power largely where heat is to generated like solar heater where the quality of the power generated is not relevant if heat is to be provided ,but for other applications where quality of power matters like sophisticated appliances (mobiles ,laptops etc) DC production from Inverters through filters consists of lots of harmonics due to improper and inefficient way of filtering out the harmonics practically. So researcher propose a system that uses DC power directly from PhotoVoltaics, condition them to obtain more quality power,which will be easier because now we are filtering a DC waveform.

BIBLIOGRAPHY

- 1.Decentralised solutions for developing economics. Springer proceddings in energy.2015.
- 2.Wiley: Multiterminals DC grid by Nilanjan, Balarko, RajatMajumdar, AmirnaserYazdani.IEEE press.
- 3.Photovoltaic Systems by James.P.Dunlop.

WEBLIOGRAPHY

- 1.www.ece.vt.edu
- 2.www.solarnanogrid.org
- 3.www.greentechleadership.org

Publish Research Article

International Level Multidisciplinary Research Journal For All Subjects

Dear Sir/Mam,

We invite unpublished Research Paper, Summary of Research Project, Theses, Books and Book Review for publication, you will be pleased to know that our journals are

Associated and Indexed, India

- ★ International Scientific Journal Consortium
- ★ OPEN J-GATE

Associated and Indexed, USA

- EBSCO
- Index Copernicus
- Publication Index
- Academic Journal Database
- Contemporary Research Index
- Academic Paper Database
- Digital Journals Database
- Current Index to Scholarly Journals
- Elite Scientific Journal Archive
- Directory Of Academic Resources
- Scholar Journal Index
- Recent Science Index
- Scientific Resources Database
- Directory Of Research Journal Indexing

Golden Research Thoughts
258/34 Raviwar Peth Solapur-413005, Maharashtra
Contact-9595359435
E-Mail-ayisrj@yahoo.in/ayisrj2011@gmail.com
Website : www.aygrt.isrj.org