Reduction of Current Harmonics by Cascaded Multilevel Inverter based Shunt Active Power Filters

R. Sheba Rani, C. Srinivasa Rao, M. Vijaya Kumar

Abstract*: Majority of loads in use today are power electronics based non-linear devices. Despite being compact and providing low energy consumption these loads generate inherent harmonics. Harmonics have several adverse effects such as interference with the communication lines, incorrect meter readings, increased losses, increased heating of electrical and sensitive electronic equipment. Sophisticated power electronic converter based filters named as Shunt Active Power Filters (SAPF) are widely being employed that provide superior harmonic filtering capabilities. Basic objective of SAPF is to generate or absorb currents that compensate harmonic currents produced by non- linear loads. These currents should be opposite in phase but have equivalent magnitude as that of harmonic currents. As compared to Diode-Clamped and Flying capacitor multilevel inverters, Cascaded multilevel configuration is employed for many applications due to ease of control and simple structure.

In this research paper, power quality in a three-phase three-wire system is improved by reducing source side current harmonics produced by a non-linear load. Initially a three-level Cascaded multilevel inverter based SAPF is developed and its performance is analyzed by using advanced Adaptive Neuro Fuzzy Inference System (ANFIS) controller. DC link capacitor voltage and percentage Total Harmonic Distortion (%THD) in source currents is measured at PCC for balanced loading conditions and results are compared. In this paper, it is also proposed to incorporate multilevel inverter topology concepts by employing Five-Level and Seven-Level Cascaded Multilevel Inverters as VSI circuit for SAPF. Performance of these multilevel Shunt Active power filters is analyzed by ANFIS controller. Instantaneous Active-Reactive power theory is implemented to compute reference compensating currents for all Shunt Active power filter models. Phase Disposition type Pulse Width modulation is chosen for generating gate pulses for VSI circuits of all Cascaded multilevel inverter configurations. Three-level, Five-level and Seven-level Shunt active power filter models are developed and simulated using MATLAB/ Simulink and results are presented.

Keywords* : Adaptive Neuro Fuzzy Inference System (ANFIS), Cascaded Multilevel Inverter (CMLI), Fuzzy inference system (FIS), Level Shifted Pulse Width Modulation (LSPWM), Percentage Total Harmonic Distortion (%THD), Phase Disposition PWM (PDPWM), Point of Common Coupling (PCC), Shunt Active Power Filter (SAPF).

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I. INTRODUCTION

Harmonics are referred to as voltages or currents that have frequencies (usually integer multiples) higher than the standard 50 Hertz design frequency of an electrical system. Harmonics when left unidentified may cause severe consequences such as total damage to consumer equipment.

Passive filters are a traditional approach to eliminate harmonics. Shunt passive filter also referred to as notch filter is the most economical type of all passive filters [1]. Usage of series passive filters is limited as they are tuned to eliminate harmonics of only one particular frequency. Hence separate series filters need to be designed for each harmonic to be filtered out. Other configurations such as First-order, second-order and third-order high pass filters were also developed. These filters are not widely used due to high cost and low reliability. Application of passive filters is restricted in varying load conditions due to their incapability to provide necessary compensation. In spite of extensive research, usage of passive filters has become obsolete due to their shortcomings. Passive filers cause resonance with the line impedance in the system where they are placed. Thus stability of the system is reduced. Computation of tuning frequency is difficult and any small discrepancy may result in inaccurate tuning frequency value [2]. Owing to limitations of passive filters, active filtering technique was introduced and widely implemented.

The concept of active filtering has been subjected to extensive research for past three decades. The idea of active power filtering for mitigating current harmonics was proposed by Sasaki and Machida in 1971 [3]. For effective harmonic filtering by an active power filter, choice of a suitable control technique, inverter configuration and relevant pulse width modulation technique plays a significant role. Harmonic extraction methods are broadly classified into Frequency domain and Time domain methods. Several time domain methods were proposed for estimating reference currents such that instantaneous compensation may be provided for current or voltage harmonics present in a system. Time domain methods are advantageous for online applications where compensation should be provided very quickly.

PQ theory was first proposed by Akagi, Nabae and Kanazawa. This method is also named as Instantaneous Reactive Power theory (IRP). This technique was employed for control of APFs and power line conditioners for the purpose of instantaneous harmonic mitigation. This method is quite simple as it involves simple calculations and hence is easy to implement [4].

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Current Harmonics Mitigation by Cascaded Multilevel Inverterbased SAPF during Unbalanced loading conditions

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Abstract

Most of the non- linear loads in use today generate harmonics which have several detrimental effects on the power system. Shunt Active Power Filter(SAPF) is widely being employed due to its superior harmonic filtering capabilities. SAPF generates compensating currents that cancel or mitigate the harmonic currents produced by non- linear loads. In this research paper, a three-level Cascaded multilevel inverter based SAPF is presented and its performance is analyzed by using advanced Adaptive Neuro Fuzzy Inference System (ANFIS) controller. DC link capacitor voltages and percentage Total Harmonic Distortion (%THD) in source currents are measured at PCC for unbalanced loading conditions and results are presented.In this research, it is also proposed to employFive-Level and Seven-Level Cascaded Multilevel Inverters as VSI circuit for SAPF. Performance of these multilevel Shunt Active power filters is analyzed by ANFIS controller. Percentage Total Harmonic Distortion (%THD) in source currents measured at PCC and regulation of DC link voltage are observed. Instantaneous Active-Reactive power theory is implemented to compute reference compensating currents for all Shunt Active power filter models. Phase Disposition type Pulse Width modulation is chosen for generating gate pulses for VSI circuits of all Cascaded multilevel inverter configurations. Three-level, Five-level and Seven-level Shunt active power filter models are developed and simulated using MATLAB/ Simulink and results are compared.

Keywords: *Adaptive Neuro Fuzzy Inference System (ANFIS), Cascaded Multilevel Inverter (CMLI), Fuzzy inference system (FIS), Level Shifted Pulse Width Modulation (LSPWM), Percentage Total Harmonic Distortion (%THD), Phase Disposition PWM (PDPWM), Point of Common Coupling (PCC), Shunt Active Power Filter (SAPF).*

1. Introduction

Harmonics may cause interference with communication lines, incorrect meter readings, increased lossesand heating of electrical and sensitive electronic equipment. Harmonics areusually referred to as voltages or currents that have frequencies (usually integer multiples) higher than standard 50 Hertz design frequency of an electrical system. Harmonics when left unidentified may cause severe consequences such as total damage to consumer equipment.

Passive filters are a traditional approach to eliminate harmonics. These filters cause resonance with line impedance which results in reduced system stability. Computation of tuning frequency is difficult and any small discrepancy may result in inaccurate tuning frequency value [1, 2]. Owing to limitations of passive filters, active filtering technique was introduced and widely implemented.

Active power filtering technique for mitigating current harmonics was proposed by Sasaki and Machida in 1971 [3]. For effective harmonic filtering by an active power filter, choice of a suitable control technique, inverter configuration and relevant pulse width modulation technique plays a significant role. Harmonic extraction methods are broadly classified into Frequency domain and Time domain methods. PQ theory was first proposed by Akagi, Nabae and Kanazawa.This technique was employed for control of APFs and power line conditioners for the purpose of instantaneous harmonic mitigation. This method is quite simple as it involves simple calculations and hence is easy to implement [4].

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GENETIC ALGORITHM BASED MULTISTAGE FUZZY DC VOLTAGE REGULATOR FOR UPFC FOR DYNAMIC STABILITY ENHANCEMENT OF SMIB SYSTEM

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Abstract

This paper proposes Genetic algorithm based multistage fuzzy DC voltage regulator (GAMSFDCVR) for unified power flow controller (UPFC) for damping low frequency oscillations. The DC voltage regulator is combination of two single stage fuzzy controllers and performing like PID fuzzy. Genetic algorithm is an optimization algorithm and used for tuning of fuzzy bounds of multistage fuzzy voltage regulator based on the error minimization. The error used for optimization of fuzzy bounds is an integral time area error caused by the deviations of capacitor voltage of UPFC. This method is tested on single machine infinite bus system (SMIB) and the performance is compared with conventional controllers. Results demonstrated that the proposed controller is effectively improving the dynamic stability compared with conventional controllers.

Keywords : Unified power flow controller (UPFC), genetic algorithm based multistage fuzzy DC voltage regulator (GAMSFDCVR), Conventional controllers (CC.)

I. Introduction

The presence of varying loads on inter connected power system, the system frequency is continually changing with different magnitudes with respect to reference frequency based on the load variations. Low frequencies oscillations are regularly appear in power system, the mitigation of these oscillations are very important. Generally conventional power system stabilizers used for stability

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Solid State Technology

Dynamic Stability Enhancement Of Smib System With Gapod Controller Based Upfc

Amrutha P, Srinivasa RaoC, Vijaya Kumar M

Abstract

This paper proposes a combination of Genetic Algorithm based Power Oscillation Damping (GAPOD) and DC Voltage Regulator (DCVR) controllers are proposed for Unified Power Flow Controller (UPFC) for the enhancement of dynamic stability of single machine infinity bus (SMIB). The difference between mechanical power and electrical power is the input to the GAPOD, and the output of GAPOD is connected to UPFC. GA tunes the parameters of POD ana DCVR by minimizing the error; this error is the difference between mechanical and electrical power. The proposed method is applied to SMIB in MATLAB/Simulink environment, and results compared with Particle Swarm Optimization based multi stage DC voltage controller (PSOMSFDCVR) at different loading conditions.

PDF

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Section

Articles

Comparison of Decoupled and Coupled PWM Techniques for Open-End Induction Motor Drives

M. Rama Prasad Reddy, Karanam Deepak and M. Venkateswaralu

Abstract In this paper, multilevel inverter configuration called dual-inverter (DI) topology is presented in favor of asynchronous motor drive. The topology is easy in constriction as well as easy to operate when compared with other multilevel inverter configurations. Two special kinds of PWM methods are presented in favor of DI topology to recover the excellence of production voltage as well as decrease the common-mode voltage value. To test the concert of the PWM methods in favor of DI topology, first theoretical studies are carried and next model analysis is carried; here, MATLAB simulation model as well as outcome is presented.

Keywords Induction motor drives · Pulse-width modulation (PWM) · Multilevel inverter · DI topology

1 Introduction

Through the advancement during power electronic tools, electrical drive is gaining significance into hybrid electric vehicles (HEVs) and industrial applications. Among the electrical drives, VSI-fed induction motor drives are popular. Different PWM methods are worn for the controlling of production voltage source as well as frequency of inverters [1–6]. At high switching frequencies sharp edges of common mode voltage (potential across neutral point of induction motor and DC link) causes common mode currents. Which reduce the life of motors and bearings [7–9].

To reduce the general method voltage as well as improve the feature of production voltage sources, multilevel inverter (MLI)-fed drives are gaining importance. Various MLI methods like diode-clamped MLI (DC MLI), capacitor clamp, H-bridge MLI and dual-inverter methods are discussed in related work [10–15]. Among this dual-based inverter OEWIM drives (DI-fed open-end winding induction motor drive) are gaining importance [15]. Two two-level inverters can be controlled either independently or dependently. Based on this, PWM methods are divided into decoupled and coupled PWM methods [16–19]. The comparisons of both these PWM methods

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Wireless Power Transfer For Electric Vehicle Applications

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ABSTRACT: Wireless power transfer (WPT) using magnetic resonance is the technology which could set human free from the annoying wires. In fact, the WPT adopts the same basic theory which has already been developed for at least 30 years with the term inductive power transfer.WPT technology is developing rapidly in recent years .At kilowatts power level, the transfer distance increases from several millimeters to several hundred millimeters with a grid to load efficiency above 90%. The advances make the WPT very attractive to the electric vehicle (EV) charging applications in both stationary and dynamic charging scenarios. This paper reviewed the technologies in the WPT area applicable to EV wireless charging. By introducing WPT in EVs, the obstacles of charging time, range, and cost can be easily mitigated. Battery technology is no longer relevant in the mass market penetration of EVs. It is hoped that researchers could be encouraged by the state-of-the-art achievements, and push forward the further development of WPT as well as the expansion of EV..

Keywords: Dynamic charging, electric vehicle (EV), inductive power transfer (IPT), safety guidelines, stationary charging, wireless power transfer (WPT).

I.INTRODUCTION

FOR energy, environment, and many other reasons, the electrification for transportation has been carrying out for many years. In railway systems, the electric locomotives have already been well developed for many years. A train runs on a fixed track. It is easy to get electric power from a conductor rail using pantograph sliders. However, for electric vehicles (EVs), the high flexibility makes it not easy to get power in a similar way. Instead, a high power and large capacity battery pack is usually equipped as an energy storage unit to make an EV to operate for a satisfactory distance.

Until now, the EVs are not so attractive to consumers even with many government incentive programs. Government subsidy and tax incentives are one key to increase the market share of EV today. The problem for an electric vehicle is nothing else but the electricity storage technology, which requires a battery which is the bottleneck today due to its unsatisfactory energy density, limited life time and high cost.

In an EV, the battery is not so easy to design because of the following requirements: high energy density, high power density, affordable cost, long cycle life time, good safety, and reliability, should be met simultaneously. Lithium-ion batteries are recognized as the most competitive solution to be used in electric vehicles [1]. However, the energy density of the commercialized lithium-ion battery in EVs is only 90–100 Wh/kg for a finished pack [2].This number is so poor compared with gasoline, which has an energy density about 12 000 Wh/kg. To challenge the 300-mile range of an internal combustion engine power vehicle, a pure EV needs a large amount of batteries which are too heavy and too expensive. The lithium-ion battery cost is about 500$/kWh at the present time. Considering the vehicle initial investment, maintenance, and energy cost, the owning of a battery electric vehicle will make the consumer spend an extra 1000$/year on average compared with a gasoline-powered vehicle [1]. Besides the cost issue, the long charging time of EV batteries also makes the EV not acceptable to many drivers. For a single charge, it takes about one half-hour to several hours depending on the power level of the attached charger, which is many times longer than the gasoline refueling process. The EVs cannot get ready immediately if they have run out of battery energy. To overcome this, what the owners would most likely do is to find any possible opportunity to plug-in and charge the battery. It really brings some trouble as people may forget to plug-in and find themselves out of battery energy later on. The charging cables on the floor may bring tripping hazards. Leakage from cracked old cable, in particular in cold zones, can bring

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A Fuzzy Controller based D-STATCOM for Induction Motor Drive Applications to Power Quality Improvement

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Abstract

In this article represent the development of fuzzy controller based DSTATCOM and placed at the load side in the EDS (Electrical distribution system), so in the load side which can be eliminate the power quality problems of input side (like voltage sags, swells and etc...). So improvement of power quality fuzzy controller based DSTATCOM will absorb along with supply reactive power to eliminate the voltage sags, swells and get better power factor in different circumstances. The main advantages of D-STATCOM designed for resolve power quality issues due to voltage sags, swells etc., have be recommended. The principle of fuzzy based D-STATCOM is to supply the better voltage regulation through the short period of the induction motor appliances starting as well as hence avoid the large voltage dips. So in this paper simulates a fuzzy based D-STATCOM for industrial induction applications and also check the performances of induction motor drives like speed, torque and stator currents by using MATLAB /SIMULINK software.

Keywords; *Fuzzy based D-STATCOM; EDS (Electrical distribution system) Induction Motor Drives, Power quality.*

I. INTRODUCTION

The FACTS (flexible AC transmission Systems) technology is an innovative explore region in Electrical engineering. It initiates the recent power electronic technology keen on conventional AC power transmission systems as well as extensively improves the power quality and relocate boundary. Flexible AC transmission Systems equipments are supply an improved variation to unreliable operational circumstances and get better the practice of previous mechanism. They include essential appliance such as power flow control, rising of transmission capacity, voltage control, reactive power compensation, stability development and power quality improvement. The fuzzy based DSTATCOM-F is equipment of the flexible AC transmission Systems with it is stand on a VSI (voltage-source inverter) [5].

Improvement of the quality Power (flexible AC transmission) is the main important in the present world. It has turned into significant, frequently, through the preface of FACTS devices, whose presentation is extremely susceptible to the power quality supply. The quality of power issues is an incidence manifests as a voltage fluctuations levels, current or frequency those consequences in a breakdown of last part of the equipment. The main troubles deal at this point is the voltage sags,

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Automatic Car Parking Management System using IR Sensors

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ABSTRACT

In busy traffic areas parking vehicles by searching for empty spaces is major problem. Nowadays parking system are equipped with sensors and microcontroller to automatically count the cars

.This parking system may not indicate any empty space and very expensive, long processing time and large energy consumption. The existing system aren't completely automated and need some level of human interference. The proposed system is fitting for multi-floor building and send a message to vehicle about the status of parking slot. The difference between proposed and existing system is that aim to construct our system as less human dependent as possible by automating the cars .This proposed system that helps users automatically find empty parking space.

Keywords: ARDUINO Microcontroller, IR sensor, Bluetooth, smart phone, DC motors, java.

I. INTRODUCTION

The development of traffic management system, an advanced parking system was created to hiring people and optimal use of resources. General method of finding a parking space is physical. This method takestime and effort and lead worst case of failing to find parking space. A wireless personal area network mean on the way to span. The solution for parking problem, which take in the fuel consumption and pollution ,itminimized by carry out the system using mobile. In this project we implement the system with smartphone,IRsensor,ARDUINO microcontroller, Bluetooth, DC motor. This system check the parking availability in multi-floor using IR sensor the decision may be made by ARDUINO microcontrollers. Aim of project is to automate the car park for allowing the cars into the parking slot. The status of parking slot send to the LCD display. Several automobileresearchinstitutesand fabricationareincreasing automatic parkingsystem.

Two basic modules are required for implementation of thissystem

1.Parking availability prediction system
2.Automatic carparking

The following software are used in this project

1. ArduinoIDE
2. Android StudioIDE
3. VirtualTerminal

The aim of this project is to provide an efficient car parking system with minimal human intervention.

II. LITERATURESURVEY

Several methods are established for improvement of independent or intelligent parking system. Study of these system shows that these system need a little or more human involvement for the working.

One of the smart system for car parking has been proposed by creating use of Image processing.In this model , a brown smooth-edged image on the parking slot is captured using camera and see to detect the free parking

INDUSTRIAL APPLICATIONS OF PLC

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ABSTRACT: The most recent development of digital technology is rapidly growing having a strong impact in daily activities. Automation is a trend in society to make those activities become easier. Moreover, efficiency has played the main role in the automation concept.

In this project mainly we are study the basic structure of PLC machine and its applications. Here we are considering the DELTA based DVP – 14SS2 PLC kit for investigation. DVP – 14SS2 PLC kit. It consists of Switched Mode Power Supply(SMPS), Potentiometer, Variable Frequency Drive, Human machine Interface (HMI) , Input switches and Output coils. This project will gives the brief review of each and every component, applications and basic programs of the PLC.

(I) INTRODUCTION

Car parking systems have been around almost since the time cars were invented. In any area where there is a significant amount of traffic, there are car parking systems. Car Parking systems were developed in the early 20th century in response to the need for storage space for vehicles.
With the rapid proliferation of vehicle availability and usage in recent years, finding a vacant car parking space has become more and more difficult, resulting in a number of practical conflicts. Parking problems are becoming ubiquitous and ever growing at an alarming rate in every major city. Wide usage of wireless technologies with the recent advances in wireless applications for parking manifests that digital data dissemination could be the key to solve emerging parking problems [1].

There are several advantages of employing a car park system for urban planners, business owners and vehicle drivers. They offer convenience for vehicle users and efficient usage of space for urban-based companies. Automated car park systems save time, money, space and simplify the often tedious task of parking. There are two types of car parking systems: traditional and automated. In the long term, automated car parking systems are likely to be more cost effective when compared to traditional parking garages. Automatic multi-storing automated car park systems are less expensive per parking slot, since they tend to require less building volume and less ground area than a conventional facility with the same capacity. Both automated car parking systems and automated parking garage systems reduce pollution as cars are not running or circling around while drivers look for parking spaces. Quickly finding a vacant space in a multilevel parking lot is difficult if not impossible, especially on weekends or public holidays. Finding spaces during weekends or public holidays can take more than 10 minutes for about 66% of visitors. Stadiums or shopping malls are crowded at peak periods, and difficulty in finding vacant slots at these places is a major problem for customers. Insufficient car park spaces lead to traffic congestion and driver frustration. If a car is parked in such a way that it occupies two parking slots rather than one, this is called improper parking. Improper parking can happen when a driver is not careful about another driver's rights [2].

Problem faced by people due to lack to car parking management. To solve these entire problems we came to a conclusion of having an automatic intelligent car parking system that ensures the safety of the driver as well as saves time and parking spaces. Some of the benefits of automatic intelligent car parking system are, it can accommodate maximum number of cars in minimum spaces, customized parking solutions, low maintenance and operation cost, safety for both car and the driver, faster parking and retrieval and eco-friendliness.

(II) RELATED WORK

1. SMART HELMET FOR MOTORCYCLES

A smart helmet is a special idea which makes motorcycle driving safer than before. It is a way to stop starting of vehicles without wearing helmet or even if the driver is boozed. In addition, it has a great feature of detecting accidents and informs specific people via SMS with location and speed of the bike before the accident occurs with the help of GPS GSM based tracking system, thus aiding ambulance to reach the correct location. We want to implement all the sensors within the helmet, which will send the information to the module connected with the bike engine wirelessly.

Smart Helmet For Two Wheeler Riders

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ABSTRACT: The idea of developing this project comes from the social responsibility to save the people using two wheeler motor vehicles from road accidents. The purpose of the project is to encourage the people to wear helmet and make use of it. This aims the safety and security of the bike rider.

Keywords: Frequency tuning, Mutual induction.

(I) INTRODUCTION

According to a survey of India there are around 698 accidents occurring due to bike crashes per year. In countries like India where bikes are more prevalent many people die due to carelessness caused in wearing motorcycle helmets. So, to overcome from this problem this smart helmet is being introduced which helps to reduce number of accidents that takes every day and also helps to reduce death ratio. The proposed project work presents the smart helmet that ensures that the rider cannot start the bike without wearing it. This helmet uses simple cable replacement for wirelessly switching on a bike, so that the bike would not start without both the key and the helmet.

The Smart helmet has two modules of operation i.e. one receiver part and one is transmitter part. The transmitter part is embedded in the helmet itself whereas receiver part can be installed in any particular bike. Thus, wireless communication takes place between two modules. In the transmitter module, pressure signal is sensed by limit switch which is situated inside the helmet. A comparator converts analog signal to digital signal and feeds as logic level 1 to the input of transmitter whereas limit switch gives the output. When the user takes off the helmet then the output of limit switch becomes zero and the input of the transmitter will get 0 as logic level, it prevents from the ignition of the bike under this case. Radio frequency is a frequency or rate of oscillation within the range of about 3Hz to 300 GHz. This range corresponds to frequency of alternating current electrical signals used to produce and detect radio waves. Since most of this range is beyond the vibration rate the most mechanical systems can respond to, RF usually refers to oscillations in electrical circuits. RF is widely used because it does not require any line of sight, less distortions and no interference. Examples include, Cordless and cellular telephone, radio and television broadcast stations, satellite communications systems, and two-way radio services all operate in the RF spectrum.

RF refers to radio frequency, the mode of communication for wireless technologies of all kinds, including robots, cordless phones, radar, ham radio, GPS and radio and television broadcasts. RF technology is so much a part of our lives we scarcely notice it for its ubiquity. From baby monitors to cell phones, Bluetooth to remote control toys, RF waves are all around us. RF waves are electromagnetic waves which propagate at the speed of light, or 186,000 miles per second (300,000 km/s).

The frequencies of RF waves, however, are slower than those of visible light, making RF waves invisible to the human eye. RF Controlled smart helmet is an exclusive project where the ignition of the engine can be controlled using wireless technologies. The smart helmet will be placed different from that of from where it is controlled.

This project can also be carried out using wiring processes. But the main disadvantage when we go for wiring is that, data transmission and reception may not be perfect and the data may be lost if the wiring is not done properly. Thus, the smart helmet is controlled using wireless concept in this project.

In this project, the controlling of the engine is done from the transmitter and this information will be passed to the engine in a wireless fashion. There are several wireless technologies to accomplish this task. The protocol used in this project is RF Technology. To control the ignition of bike engine, predefined switches has to given as commands from the transmitter section.

The data from the transmitter section is transmitted and will be received by at the receiver section. The data, while before being transmitted, will be converted into a format suitable for transmission. In the receiver module, a high level digital output will obtained by the output pin till the rider wears the helmet and the ignition unit circuit of the bike will be completed when this signal actuates the relay. When the rider takes off the helmet the relay opens and the connections of the circuit will get terminated.

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POWER QUALITY IMPROVEMENT IN DFIG BASED WECS CONNECTED TO THE GRID USING UPQC CONTROLLED BY FRACTIONAL ORDER PID AND ANFIS CONTROLLERS

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Abstract

This paper discusses power quality improvement in a DFIG based WECS connected to a distribution system. A WECS is usually affected by issues such as high frequency oscillations, harmonics, transients, voltage sags, swells, voltage unbalance etc., These result in malfunction or damage to the electrical equipment in the system and lead to financial losses. So in order to mitigate the power quality events a UPQC device is employed which integrates series and shunt active filters that provide satisfactory compensation for power quality problems. The performance of UPQC is compared by using Fractional-Order PID controller and Adaptive Neuro Fuzzy Logic Controller. Modeling of DFIG and WECS systems is discussed with relevant equations. Design of UPQC and controllers is also discussed in detail. The proposed DFIG based WECS employing UPQC is simulated on MATLAB/ Simulink platform. The compensation capabilities of UPQC are assessed for both controllers for the proposed system and simulation results are presented.

Keywords : DFIG (Double Fed Induction Generator), Grid, Power Quality, Voltage sag, Voltage Swell, reactive power compensation, Wind Turbine, UPQC (Unified Power Quality Conditioner).

I. Introduction

Depletion of fossil fuels, need to decrease pollution and necessity to meet the ever increasing demand of electrical energy has led the mankind to explore the effectiveness of renewable energy sources. Generation of electrical energy by using sustainable alternative energy sources has gained much importance over the past few decades. Among all the renewable energy sources used for production of electrical energy, wind energy has gained much importance due to its ability is providing pollution free, clean and unlimited power at low production price [XIV]. Wind sector

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Comparison of Decoupled and Coupled PWM Techniques for Open-End Induction Motor Drives

M. Rama Prasad Reddy, Karanam Deepak and M. Venkateswaralu

Abstract In this paper, multilevel inverter configuration called dual-inverter (DI) topology is presented in favor of asynchronous motor drive. The topology is easy in constriction as well as easy to operate when compared with other multilevel inverter configurations. Two special kinds of PWM methods are presented in favor of DI topology to recover the excellence of production voltage as well as decrease the common-mode voltage value. To test the concert of the PWM methods in favor of DI topology, first theoretical studies are carried and next model analysis is carried; here, MATLAB simulation model as well as outcome is presented.

Keywords Induction motor drives · Pulse-width modulation (PWM) · Multilevel inverter · DI topology

1 Introduction

Through the advancement during power electronic tools, electrical drive is gaining significance into hybrid electric vehicles (HEVs) and industrial applications. Among the electrical drives, VSI-fed induction motor drives are popular. Different PWM methods are worn for the controlling of production voltage source as well as frequency of inverters [1–6]. At high switching frequencies sharp edges of common mode voltage (potential across neutral point of induction motor and DC link) causes common mode currents. Which reduce the life of motors and bearings [7–9].

To reduce the general method voltage as well as improve the feature of production voltage sources, multilevel inverter (MLI)-fed drives are gaining importance. Various MLI methods like diode-clamped MLI (DC MLI), capacitor clamp, H-bridge MLI and dual-inverter methods are discussed in related work [10–15]. Among this dual-based inverter OEWIM drives (DI-fed open-end winding induction motor drive) are gaining importance [15]. Two two-level inverters can be controlled either independently or dependently. Based on this, PWM methods are divided into decoupled and coupled PWM methods [16–19]. The comparisons of both these PWM methods

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Reduction of Current Harmonics by Cascaded Multilevel Inverter based Shunt Active Power Filters

R. Sheba Rani, C. Srinivasa Rao, M. Vijaya Kumar

Abstract*: Majority of loads in use today are power electronics based non-linear devices. Despite being compact and providing low energy consumption these loads generate inherent harmonics. Harmonics have several adverse effects such as interference with the communication lines, incorrect meter readings, increased losses, increased heating of electrical and sensitive electronic equipment. Sophisticated power electronic converter based filters named as Shunt Active Power Filters (SAPF) are widely being employed that provide superior harmonic filtering capabilities. Basic objective of SAPF is to generate or absorb currents that compensate harmonic currents produced by non- linear loads. These currents should be opposite in phase but have equivalent magnitude as that of harmonic currents. As compared to Diode-Clamped and Flying capacitor multilevel inverters, Cascaded multilevel configuration is employed for many applications due to ease of control and simple structure.

In this research paper, power quality in a three-phase three-wire system is improved by reducing source side current harmonics produced by a non-linear load. Initially a three-level Cascaded multilevel inverter based SAPF is developed and its performance is analyzed by using advanced Adaptive Neuro Fuzzy Inference System (ANFIS) controller. DC link capacitor voltage and percentage Total Harmonic Distortion (%THD) in source currents is measured at PCC for balanced loading conditions and results are compared. In this paper, it is also proposed to incorporate multilevel inverter topology concepts by employing Five-Level and Seven-Level Cascaded Multilevel Inverters as VSI circuit for SAPF. Performance of these multilevel Shunt Active power filters is analyzed by ANFIS controller. Instantaneous Active-Reactive power theory is implemented to compute reference compensating currents for all Shunt Active power filter models. Phase Disposition type Pulse Width modulation is chosen for generating gate pulses for VSI circuits of all Cascaded multilevel inverter configurations. Three-level, Five-level and Seven-level Shunt active power filter models are developed and simulated using MATLAB/ Simulink and results are presented.

Keywords* : Adaptive Neuro Fuzzy Inference System (ANFIS), Cascaded Multilevel Inverter (CMLI), Fuzzy inference system (FIS), Level Shifted Pulse Width Modulation (LSPWM), Percentage Total Harmonic Distortion (%THD), Phase Disposition PWM (PDPWM), Point of Common Coupling (PCC), Shunt Active Power Filter (SAPF).

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I. INTRODUCTION

Harmonics are referred to as voltages or currents that have frequencies (usually integer multiples) higher than the standard 50 Hertz design frequency of an electrical system. Harmonics when left unidentified may cause severe consequences such as total damage to consumer equipment.

Passive filters are a traditional approach to eliminate harmonics. Shunt passive filter also referred to as notch filter is the most economical type of all passive filters [1]. Usage of series passive filters is limited as they are tuned to eliminate harmonics of only one particular frequency. Hence separate series filters need to be designed for each harmonic to be filtered out. Other configurations such as First-order, second-order and third-order high pass filters were also developed. These filters are not widely used due to high cost and low reliability. Application of passive filters is restricted in varying load conditions due to their incapability to provide necessary compensation. In spite of extensive research, usage of passive filters has become obsolete due to their shortcomings. Passive filers cause resonance with the line impedance in the system where they are placed. Thus stability of the system is reduced. Computation of tuning frequency is difficult and any small discrepancy may result in inaccurate tuning frequency value [2]. Owing to limitations of passive filters, active filtering technique was introduced and widely implemented.

The concept of active filtering has been subjected to extensive research for past three decades. The idea of active power filtering for mitigating current harmonics was proposed by Sasaki and Machida in 1971 [3]. For effective harmonic filtering by an active power filter, choice of a suitable control technique, inverter configuration and relevant pulse width modulation technique plays a significant role. Harmonic extraction methods are broadly classified into Frequency domain and Time domain methods. Several time domain methods were proposed for estimating reference currents such that instantaneous compensation may be provided for current or voltage harmonics present in a system. Time domain methods are advantageous for online applications where compensation should be provided very quickly.

PQ theory was first proposed by Akagi, Nabae and Kanazawa. This method is also named as Instantaneous Reactive Power theory (IRP). This technique was employed for control of APFs and power line conditioners for the purpose of instantaneous harmonic mitigation. This method is quite simple as it involves simple calculations and hence is easy to implement [4].

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Current Harmonics Mitigation by Cascaded Multilevel Inverterbased SAPF during Unbalanced loading conditions

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Abstract

Most of the non- linear loads in use today generate harmonics which have several detrimental effects on the power system. Shunt Active Power Filter(SAPF) is widely being employed due to its superior harmonic filtering capabilities. SAPF generates compensating currents that cancel or mitigate the harmonic currents produced by non- linear loads. In this research paper, a three-level Cascaded multilevel inverter based SAPF is presented and its performance is analyzed by using advanced Adaptive Neuro Fuzzy Inference System (ANFIS) controller. DC link capacitor voltages and percentage Total Harmonic Distortion (%THD) in source currents are measured at PCC for unbalanced loading conditions and results are presented.In this research, it is also proposed to employFive-Level and Seven-Level Cascaded Multilevel Inverters as VSI circuit for SAPF. Performance of these multilevel Shunt Active power filters is analyzed by ANFIS controller. Percentage Total Harmonic Distortion (%THD) in source currents measured at PCC and regulation of DC link voltage are observed. Instantaneous Active-Reactive power theory is implemented to compute reference compensating currents for all Shunt Active power filter models. Phase Disposition type Pulse Width modulation is chosen for generating gate pulses for VSI circuits of all Cascaded multilevel inverter configurations. Three-level, Five-level and Seven-level Shunt active power filter models are developed and simulated using MATLAB/ Simulink and results are compared.

Keywords: *Adaptive Neuro Fuzzy Inference System (ANFIS), Cascaded Multilevel Inverter (CMLI), Fuzzy inference system (FIS), Level Shifted Pulse Width Modulation (LSPWM), Percentage Total Harmonic Distortion (%THD), Phase Disposition PWM (PDPWM), Point of Common Coupling (PCC), Shunt Active Power Filter (SAPF).*

1. Introduction

Harmonics may cause interference with communication lines, incorrect meter readings, increased lossesand heating of electrical and sensitive electronic equipment. Harmonics areusually referred to as voltages or currents that have frequencies (usually integer multiples) higher than standard 50 Hertz design frequency of an electrical system. Harmonics when left unidentified may cause severe consequences such as total damage to consumer equipment.

Passive filters are a traditional approach to eliminate harmonics. These filters cause resonance with line impedance which results in reduced system stability. Computation of tuning frequency is difficult and any small discrepancy may result in inaccurate tuning frequency value [1, 2]. Owing to limitations of passive filters, active filtering technique was introduced and widely implemented.

Active power filtering technique for mitigating current harmonics was proposed by Sasaki and Machida in 1971 [3]. For effective harmonic filtering by an active power filter, choice of a suitable control technique, inverter configuration and relevant pulse width modulation technique plays a significant role. Harmonic extraction methods are broadly classified into Frequency domain and Time domain methods. PQ theory was first proposed by Akagi, Nabae and Kanazawa.This technique was employed for control of APFs and power line conditioners for the purpose of instantaneous harmonic mitigation. This method is quite simple as it involves simple calculations and hence is easy to implement [4].

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A Fuzzy Controller based D-STATCOM for Induction Motor Drive Applications to Power Quality Improvement

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Abstract

In this article represent the development of fuzzy controller based DSTATCOM and placed at the load side in the EDS (Electrical distribution system), so in the load side which can be eliminate the power quality problems of input side (like voltage sags, swells and etc...). So improvement of power quality fuzzy controller based DSTATCOM will absorb along with supply reactive power to eliminate the voltage sags, swells and get better power factor in different circumstances. The main advantages of D-STATCOM designed for resolve power quality issues due to voltage sags, swells etc., have be recommended. The principle of fuzzy based D-STATCOM is to supply the better voltage regulation through the short period of the induction motor appliances starting as well as hence avoid the large voltage dips. So in this paper simulates a fuzzy based D-STATCOM for industrial induction applications and also check the performances of induction motor drives like speed, torque and stator currents by using MATLAB /SIMULINK software.

Keywords; *Fuzzy based D-STATCOM; EDS (Electrical distribution system) Induction Motor Drives, Power quality.*

I. INTRODUCTION

The FACTS (flexible AC transmission Systems) technology is an innovative explore region in Electrical engineering. It initiates the recent power electronic technology keen on conventional AC power transmission systems as well as extensively improves the power quality and relocate boundary. Flexible AC transmission Systems equipments are supply an improved variation to unreliable operational circumstances and get better the practice of previous mechanism. They include essential appliance such as power flow control, rising of transmission capacity, voltage control, reactive power compensation, stability development and power quality improvement. The fuzzy based DSTATCOM-F is equipment of the flexible AC transmission Systems with it is stand on a VSI (voltage-source inverter) [5].

Improvement of the quality Power (flexible AC transmission) is the main important in the present world. It has turned into significant, frequently, through the preface of FACTS devices, whose presentation is extremely susceptible to the power quality supply. The quality of power issues is an incidence manifests as a voltage fluctuations levels, current or frequency those consequences in a breakdown of last part of the equipment. The main troubles deal at this point is the voltage sags,

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Improvement of power Quality by using Dynamic Voltage Restorer Based Super capacitor for Industrial Applications

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Abstract: In modern power distribution systems power quality is considered as a major factor. For the fulfillment of industrial goals, modern industries are looking forward for new innovative technologies. The key requirement in any utility work is a disturbance free continuous power supply. The high quality power generated at the power stations are not delivered in the same form at the utility centers. This is mainly because of the widespread use of power electronic devices which introduced harmonics and other nonlinearities to the systems. The paper describes the application of super capacitor energy storage system for induction traction drive test bench that replaces a real electric public transport for performing testing and researches. The suitability and usage of such bench for research purposes is explained and the importance of the development of software mathematical model for performing simulations to be done before physical implementation measures is reasoned. The working principle of the bench and applied components are described. A virtual model of the bench was built and simulations were performed using Matlab/Simulink software. This concept results shows the superiority of the developed topology in voltage compensation capability and reliability. The proposed DVR has provided a regulated and sinusoidal voltage across the sensitive load.

I INTRODUCTION

Power Quality issues within the current distribution system area unit addressed within the literature [1], due to the hyperbolic use of sensitive and important items such as communication network, method industries and precise manufacturing process. In [1], the authors propose the usage of the DVR with reversible energy storage at the dc-terminal to meet the active power needs of the grid during power injection into the grid, authors also mention voltage disturbances. So as to avoid and minimize the active power injection into the grid, authors also mention an alternate solution that is to compensate for the voltage sag by inserting a lagging voltage.

The DVR can regulate the load voltage from the problem such as sag-swell, harmonics in the load voltages. Hence, it can protect the critical consumer loads from tripping and consequent losses. The custom power devices area unit developed and put in at consumer point to meet the power quality standards like IEEE [1]. Renewable energy generation is growing quick and ideas like smart grid are trying to change the role of consumer from being a passive consumer to an active contributor who can supply stored excess power in various DERs such as wind, solar, hybrid electric vehicles (HEVs) and plug- in hybrid vehicle (PHEVs) back to the distribution grid or the micro grid. Of all the energy storage technologies, SCAPs have low energy density, high power density and fast charge/discharge characteristics. They even have additional charge/discharge cycles and higher terminal voltage per module when put next to batteries, of these characteristic make SCAPs ideal choice for providing support to events on the distribution grid that require high power for brief spans of your time. SCAPs have historically been restricted to regenerative braking and alternative energy smoothing applications.

The major contribution of this treatise is in integration SCAP for a broader range of application like active/reactive power support, , renewable intermittence smoothing, voltage sag/swell compensation and power quality conditioning to the distribution grid. Renewable intermittence smoothing is associate degree application which needs to bidirectional transfer of power from the grid to the SCAPs and vice-versa by charging and discharging the SCAP. This application needs high active power support within the 10s-3min continuance which may be achieved by integrating SCAPs through a shunt active power support in the 3s-1min time scale which can be provided integrating SCAP into the grid through series dynamic voltage restorer (DVR). All the on top of functional- ties can also be provided by integrating the SCAP into an influence conditioner topology.

Energy storage integration to a DVR into the distribution grid is planned and the following application areas are addressed.

DVR is basically a voltage source inverter which is connected in series between the supply and a critical

SIMULATION OF SOLAR BASED FIVE LEVEL INVERTER FED WITH INDUCTION MOTOR DRIVE

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Abstract: This concept describes the Simulation and analysis of hybrid energy system consisting of wind and solar PV system. The wind and solar PV system are connected to the common load through DC/DC Boost converter. Generally, in low radiation PV array system inverter gives the lower voltage than the rated voltage which affects the power quality. It is overcome by using Battery Energy Storage System. In the stand-alone mode the converter needs to maintain constant voltage and frequency regardless of load imbalance or the quality of the current, which can be highly distorted, if the load is nonlinear. Simulation results show that the proposed hybrid system has the potential to meet the electricity demand of an isolated system. This concept has described a hybrid energy system with variable speed wind generation, photovoltaic system with power electronic interface under stand-alone mode. In the stand-alone mode the performance of the system is evaluated for various wind speeds and various irradiation levels and the performance was analyzed. Due to variations in wind speed and solar irradiation AC voltage varies. Battery system is used to maintain the balance between the source and load. This can be extended for Induction Motor drive Application i.e, Modeling and Simulation of Solar PV Wind Hybrid System for Induction Motor Drive Application.

Keywords-- Renewable energy, photovoltaic, Wind energy conversion system, hybrid energy system, inverter

I INTRODUCTION

Due to the critical condition of industrial fuels which include oil, gas and others, the development of renewable energy sources is continuously improving. This is the reason why renewable energy sources have become more important these days. Few other reasons include advantages like abundant availability in nature, eco-friendly and recyclable. Many renewable energy sources like solar, wind, hydrel and tidal are there. Among these renewable sources solar and wind energy are the world's fastest growing energy resources. With no emission of pollutants, energy conversion is done through wind and PV cells. Day by day, the demand for electricity is rapidly increasing. But the available base load plants are not able to supply electricity as per demand. So these energy sources can be used to bridge the gap between supply and demand during peak loads. This kind of small scale stand-alone power generating systems can also be used in remote areas where conventional power generation is impractical. In this paper, a wind-photovoltaic hybrid power generation system model is studied and simulated. A hybrid system is more advantageous as individual power generation system is not completely reliable. When any one of the system is shutdown the other can supply power [1]. The entire hybrid system comprises of PV and the wind systems. The PV system is powered by the solar energy which is abundantly available in nature. PV modules, maximum power point tracing systems make the PV energy system. The light incident on the PV cells is converted into electrical energy by solar energy harvesting means. The maximum power point tracking system is used, which extracts the maximum possible power from the PV modules. The Wind turbine, gear box, generator and an AC – DC converter are included in the wind energy system. The wind turbine is used to convert wind energy to rotational mechanical energy and this mechanical energy available at the turbine shaft is converted to electrical energy using a generator. To coerce the maximum power from wind system we used a maximum power point tracing system. [2]

Photovoltaic cell is the building block of the PV system and semiconductor material such as silicon and germanium are the building block of PV cell. Silicon is used for photovoltaic cell due to its advantages over germanium. When photons hit the surface of solar cell, the electrons and holes are generated by breaking the covalent bond inside the atom of semiconductor material and in response electric field is generated by creating positive and negative terminals. When these terminals are connected by a conductor an electric current will start flowing. This electricity is used to power a load. A single cell generates very low voltage (around 0.4), so more than one PV cells can be connected either in serial or in parallel or as a grid (both serial and parallel) to form a PV module. A photovoltaic array is simply an interconnection of several PV modules in serial and/or parallel. The power generated by individual modules may not be sufficient to meet the requirement of trading applications, so the modules are secured in a grid form or as an array to gratify the load demand.

Generally a wind turbine consists of a set of rotor blades rotating around a hub, a gearbox-generator set placed inside the nacelle. Based on axes the wind turbines are categorized into two kinds: the

LINE TO LINE AND LINE TO GROUND FAULT DETECTION USING ARDUINO

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ABSTRACT: This Paper represents a smart technology-based fault detection and location system was used toadequately and accurately indicate and locate the exact spot where fault had occurred. This will ensure a shorter response time fortechnical crew to rectify these faults and thus help save transformers and other electrical equipment from damage and disasters.The fault is displayed on Liquid Crystal Display (LCD) interfaced to Arduino. Foroverhead cables (OC) fault detection, when the open circuit and short circuit fault occur, our sensing device i.e. relay sense thefault and send information to the microcontroller.The microcontroller senses that command and display on Liquid CrystalDisplay (LCD).

Keywords: Underground Cables (UC); Overhead Cables (OC); Liquid Crystal Display (LCD)

(I) INTRODUCTION

Electric power transmission lines are the veins which pump which life into the modern-day world, delivering electricity toconsumers at their homes, offices and industries. It is important to ensure a smooth operation of transmission lines to deliver a minimally interrupted power supply making necessary for reliable operation of electrical power lines. This need has given rise tofault location detection techniques so that the economic impact of the fault situations can be mitigated and their correction can be rendered simpler and precise.

Underground and overhead cables have been widely implemented due to their reliability andlimited environmental concerns. To improve the reliability of a distribution system, accurate identification of a faulted segment isrequired in order to reduce the interruption time during fault. Therefore, a rapid and accurate fault detection method is required toaccelerate system restoration, reduce outage time, minimize financial losses and significantly improve the system reliability.

For underground cables (UC) fault detection, we use the concept of ohm's law. UC has many types and it has different resistance that depends upon the length of the cable. The low DC voltage is applied at the feeder end through series resistor (cable lines), the current would be vary depending upon the location of fault in the cable. When, there is short circuit (Line to ground), the voltage across series resistor change accordingly, which is the fed to the inbuilt ADC of Arduino to develop precise digital data for display in meters. In this paper the set of resistors representing cable length (in meters) and fault is created by the set of suitable at every instant in meters, to verify the accuracy.

When fault occurs on transmission lines, detecting fault is necessary for power system in order to clear fault before it increases thedamage to the power system. When any fault occurs in cable, then it is difficult to locate fault. So, we will move to find the exactlocation of fault.

The system uses an Arduino board, Liquid Crystal Display (LCD), Relay, Resistors, voltage supply etc. Arduino system detects the faults, analyses and classifies these faults and then, determines the fault distance. Then, the fault information is transmitted to the control room.

(A) Objective of the paper

The motivation of the paper is to detect and determine the location of various types of fault of a transmission line model, while considering both accuracy and speed. The main objectives of the paper are: -

(i) To design an efficient and robust automatic fault detection and location system for overhead and underground power transmission lines.

(ii) To reduce response time needed to rectify and save expensive transformers from damage or theft which usually occurs during longer power outages.

(iii) To increase productivity of technical crews since the time needed to locate faults will be minimized.

(iv) To ensure stability and reliability of the

FAULT DIAGNOSIS AND SMALL WIND TURBINE MONITORING USING ARDUNIO

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***Abstract*: The wind turbine method is the future of power generation in the world. In this project, different sensors like temperature sensor, vibration sensor and IR sensor are added in a wind turbine, which measures the climatic conditions of wind turbine. If anyone is abnormal means the alert message will send an authorized person of the wind turbine. For this project, Arduino Uno and Nodemcu esp8266 is used. As Arduino Uno is a collecting sensor value from the wind turbine and Nodemcu esp8266 will send the data to IOT cloud of Thingspeak.In this project, a real-time non-destructive Health monitoring technique for wind turbine is proposed based on multi sensor data fusion.This project uses Temperature sensor, vibration sensor, IR sensor, LCD display, GSM module, and IoT cloud. If anyone sensor value is abnormal it triggers an message through GSM and CLOUD.**

***Index Terms*— Arduino UNO, GSM, Nodemcu esp8266, Thingspeak app, IoT cloud**

I. INTRODUCTION

In front of the huge increase demand in energy over the world, and in order to search a substitutional kind of energy against the prices rise of the energy fossil fuel resources and then its exhaustion reverse in the long term [1]. The development of this alternative is encouraged because it offersnatural,economic,cleanandsaferesource.Monitoring and diagnosis become essential to reduce maintenance costs and ensure continuity of production,stoppage ofwind turbineinstallation for unexpected failures could lead to expensive repair and to lost production[2-3].Stopping this operating system becomes critical and causes very significant losses, for this reason there is an increasing need to implement a lot efficientmaintenance. Surveillanceallowsan early regulardetection ofmechanicalandelectricalfaults;itmustableto prevent major component failures of the wind turbine becomes an important topic in scientific research and industries[4-5]. The main objective of this project is to study the design of a real time monitoring and controlling system for state supervision of wind turbine.

II.RELATED WORK

An IoTfault diagnosis system is based on UART:

The fault identification is done and the parameters are measured and the monitored data is analyzed and send to PC through UART. The location and the type of faults are transmitted from wind turbine to control through IoT.

The effect of harsh condition and the nature of large electromechanical system are the causes of fault to be occurring in the wind turbine. It is very important to perform the monitoring and fault diagnosis of wind turbine parameters. The UART which is used for serial communication which provides high data transmission rate and reliability.Thus, the design of a remote monitoring and fault diagnosis system based on the UART. Finally,the system performs efficiently.

Our future work in this project is to intimate the abnormal status to the user by automatic voice call.

III.EXISTING SYSTEM

“Energy can neither be created nor be destroyed”

Today because of an increase in human resources the need for energy resources is also increasing. The surplus amount of resources has been decreasing. Hence there is anurgetofindanyalternateresources.Energycanberenewable and nonrenewable[6]. The use of nonrenewable energy resources reached a particular extent. It is better to use any renewable form of energy resources. Among the renewable energy resources wind energy is widely used. It has its own advantagessuchasavailability,non polluting,nogreenhouse gasemissionetc[7].Windenergycanbeconvertedtoauseful formofelectricalenergyusingwindturbines.Foranyprocess to get theperfectresultstheprocessshouldbecontrolledand monitored at regular interval of times[8]. The importance of instrumentationsystemlieshere.Thevariousparameterslike windspeed,temperature,directionaremeasuredperiodically and monitored to check if any deviationsoccur.

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Simulation and Analysis of DFIG System with Wind Turbine Implementing Fuzzy Logic Control

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Abstract: ***A doubly-fed induction generator (DFIG) applied to wind power generation driven by wind turbine is under study for low voltage ride-through application during system unbalance. Use of DFIG in wind turbine is widely spreading due to its control over DC voltage and active and reactive power. Conventional dq axis current control using voltage source converters for both the grid side and the rotor side of the DFIG are analyzed and simulated. An improved control and operation of DFIG system under unbalanced grid voltage conditions by coordinating the control of both the rotor side converter (RSC) and the grid side converter (GSC) is done in this thesis. Simulation and analysis of DFIG system with wind turbine using Fuzzy logic controller for RSC and GSC under unbalanced condition is presented in the positive synchronous reference frame. The common DC-link voltage is controlled by grid side converter and control of DFIG's stator output active and reactive power is controlled by rotor side converter. The steady-state operation of the DFIG and its dynamic response to voltage sag resulting from a remote fault on the 120-kV system is shown in this thesis using controllers. Modeling of DFIG system under Fuzzy logic controller to control voltage and active-reactive powers is done using MATLAB/SIMULINK.***

Keywords: ***doubly-fed induction generator (DFIG), rotor side converter (RSC), grid side converter (GSC).***

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I. INTRODUCTION

Wind imperativeness is one of the maximum open and exploitable types of value-effective power source. Wind blows from a location of better air weight to one of the decrease herbal weight. The qualification in weight is performed by using:

(A) How international's surface isn't reliably warmed via the sun and

(B) The arena's insurgency.

The worldwide electric powered essentialness is growing and there may be a reliable growing of the passion on electricity age, transmission, scattering and use. The most exquisite extractable essentialness from the zero-100m layer of air has been assessed to be the solicitation for 1012 KWh/annum, that is of a similar solicitation as hydroelectric capacity. Because of the fact most dependable recorded facts, wind power has been used to move ships, weigh down grain and siphon water. This is the affirmation that breeze essentialness become used to stress barges along the Nile River as mid 5000 B.C. Interior multiple masses of years earlier than Christ; direct windmills were used in china to siphon water. In the u.S., endless windmills have been raised as the American West turned into made throughout the late 19th century. Maximum of them had been used to siphon water for houses and ranches. By way of 1900, minimum electric powered powered breeze structures have been made to create motion, yet a huge section of those gadgets crash and burn into push aside as realistic system power modified into prolonged to not unusual domains throughout the nineteen Thirties. Via 1910, wind turbine mills were conveying power in numerous ecu nations. Wind generators are to be had in an expansion of duration, and thusly manipulate exams. The greatest machine, as an example, the best understood Hawaii, has propellers that range the extra than the period of a soccer challenge and stands 20 constructing memories immoderate, and conveys sufficient potential to control 1400 houses. A little home-sized breeze machine has rotors some location inside the scope of 8 and 25 ft in separation crosswise over and stands upwards of 30 feet and may deliver the electricity desires of an all-electric powered domestic or privately owned organisation. All electric powered powered-making wind turbines, paying little appreciate to what period, are contained or three essential portions: (the part that honestly turns inside the breeze), the electric generator, a speed manage form, and an apex. A few wind device have guard shutdown shape in order that if part of the device crashes and burns,

SOLAR INVERTER USING SUPER CAPACITOR

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ABSTRACT: - This paper aims at developing a solar inverter, which helps farmers to control devices like irrigation water pump, fencing etc. Solar energy is a renewable form of energy and it is a very efficient method of saving electricity. Solar energy is used to power up the battery. The system has a provision for ON/OFF the solar battery charging according to farmers wish.

A Solar inverter is a type of electrical converter which converts the variable direct current (DC) output of PV solar panel into a utility frequency alternating current (AC) that can be used to fulfill many domestic purpose. Also we use here a new technology, the super capacitor has emerged with the potential to enable major advance in energy storage.

This paper makes use of a solar plate. The solar energy obtained is stored to a battery. The battery supply is fed to pulse generator and in turn to a MOSFET which is capable of generating ON/OFF pulses of different frequencies. This is fed to a step up transformer to generate a low voltage AC. This AC is fed to loads like water pump, devices. The system also uses super capacitor to increase the battery life.

Key words: direct current (DC), Alternating current (AC), Solar inverter.

(I) INTRODUCTION

The purpose of this paper "Solar Inverter Using Super Capacitor" is to make a solar inverter for using microcontroller based switching with voltage measurement and display on LCD display. We are making use of solar power to store energy into rechargeable battery. This battery power is fed with inverter (MOSFET based) which turn is given to a step-up transformer. We are using Super capacitors to safeguard the battery and improve battery life.

Power plays a great role wherever man lives and works. The living standard and prosperity of a nation vary directly with the increase in the use of power. The electricity requirement of the world is increasing at an alarming rate due to industrial growth, increased and extensive use of electrical gadgets. According to world energy report, we get around 80% of our energy from conventional fossil fuels like oil (36%), natural gas (21%) and coal (23%). It is well known that the time is not so far when all these sources will be completely exhausted. So, alternative sources should be used to avoid energy crisis in the nearby future. The best alternative source is solar energy.

In this paper Solar panel is used to charge the battery. This battery power is used to operate microcontroller and the same battery power is used to input the power to Inverter. Inverter converts 12v DC to 230v AC. We are connecting small AC load like lamp or small AC motor. The microcontroller is loaded with an intelligent program written using embedded 'C' language.

(II) Related Work

Reepika Gurung et al. The solar energy can be used to generate power for many purposes such as a battery charging and also charging our mobiles. And hence the battery is also used for lighting purposes. This system can be also assessed in houses. The solar energy from the sun is trapped by the solar panel and then it is processed by the circuit and converted to the electrical energy which is then consumed by electrical applicances.

Rajkumar et al.
The solar energy is very efficient way of producing electricity . The combination of supercapacitor and battery in solar cabin is clearly positive with many significant improvements. The battery voltage is able to maintained ata high level as a supercapacitor supplies the majority of power when solar power is available. The battery current fluctuations are also greatly reduced as the supercapacitors are able to supply the peak demands . other significant results are that the average battery power and average battery current are significantly reduced when supercapaciors are used. The supercapacitors will improve the system efficiency and increase the battery life

Rahul Kaithwas et al.
This paper design of solar based inverter such that inverter was designed and from solar plate generates solar energy and utilizing this energy for load. The super capacitor will be replace batteries as general solution for power storage. Thus, super

SIMULATION OF DYNAMIC VOLTAGE RESTORER FOR POWER QUALITY IMPROVEMENT WITH HYSTERESIS VOLTAGE CONTROLLER

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Abstract- Power Quality problems in the present-day distribution systems are more in these days due to the increased use of sensitive and critical equipment pieces such as communication network, process industries, and precise manufacturing processes Power quality problems such as transients, sags, swells, and other distortions to the sinusoidal waveform of the supply voltage affect the performance of these equipment pieces. Technologies such as custom power devices are emerged to provide protection against power quality problems. Out of which the series connected type known as DVR can regulate the load voltage from the problems such as sag, swell, and harmonics in the supply voltages in an efficient manner. DVR is controlled by duly employed d-q reference frame strategy. The direct and quadrature axis parameters are set to a standard reference values so as to find if at all there exist any voltage change that may lead to consequences of power quality failure. Unlike the conventional control strategy, a lucid design of direct-quadrature control strategy is used. Hence, it can protect the critical consumer loads from tripping and consequent losses

Keywords: Dynamic voltage restorer (DVR), power quality, unit vector, voltage harmonics, voltage sag, voltage swell, Hysteresis Voltage Controller.

I. INTRODUCTION

Power distribution systems, ideally, must give their customers with an uninterrupted flow of power at smooth sinusoidal voltage at the constant magnitude and frequency. However, in practice, power systems, particularly the distribution systems, have different nonlinear loads, which widely modify the quality of power supplies. As a result of the nonlinear loads, the purity of the sine waveform is lost. This will produces the several power quality issues. Power quality disturbance can be defined as the deviation of the voltage and the current from its ideal waveform. Faults at either the transmission or distribution level may cause voltage sag or swell in the whole power system and also, under heavy load conditions, a significant voltage drop could occur in the system. Voltage sag and swell can cause sensitive equipment to fail, blackout and produce a large current unbalance. These effects can acquire a lot of expensive from the customer and cause equipment damage. The voltage sag is defined as an decrease in rms voltage from 10% to 90% of nominal voltage with duration from half a cycle to 1 minute and voltage swell is defined as an increase in rms voltage or current from 90% to 110% of the nominal voltage at the power frequency for durations from 0.5 cycles to 1 minute. Typical magnitudes are between 1.1 and 1.8 p.u. There are several different methods to compensate voltage sags and voltage swells, but the use of a custom power device is considered to be the most efficient method, e.g. FACTS for transmission systems which improve the power transfer capabilities and stability margins. To improve power quality problems in electrical system, different types of custom power devices are used. Depending upon the type of connection made the custom power devices are classified. Each of the devices has its own advantages and limitations.

The SVC pre-dates the DVR, but the DVR is still preferred because the SVC has no ability to control active power flow. Furthermore, the advantageous facts are that the DVR is smaller in size and cost is less compared to the DSTATCOM and other custom power devices. Based on these reasons, DVR is widely considered as an effective custom power device to mitigate voltage sags. In addition to voltage sags and swells compensation, DVR can also reduces the harmonics and improves the Power Factor. DVR is clearly considered to be one of the best economic solutions for its size and capabilities when compared to the other devices. Many solutions and their problems using DVRs are reported, such as the voltages in a three-phase system are balanced and an energy-optimized control of DVR is discussed in [10]. Industrial examples of DVRs are given in [11], and different control methods are analyzed for different types of voltage sags in [12]–[15]. A comparison of different topologies and control methods is presented for a DVR in [17]. The design of a capacitor-supported DVR that protects
sag, swell, distortion, or unbalance in the supply voltages is discussed in [19]. The performance of a DVR with the high frequency-link transformer is discussed in [20]. In this paper, the control and performance of a DVR are demonstrated with a lucid control technique using d-q parameters as the main criteria for the control of the DVR.

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Simulation and Analysis of DFIG System with Wind Turbine Implementing Fuzzy Logic Control

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Abstract: ***A doubly-fed induction generator (DFIG) applied to wind power generation driven by wind turbine is under study for low voltage ride-through application during system unbalance. Use of DFIG in wind turbine is widely spreading due to its control over DC voltage and active and reactive power. Conventional dq axis current control using voltage source converters for both the grid side and the rotor side of the DFIG are analyzed and simulated. An improved control and operation of DFIG system under unbalanced grid voltage conditions by coordinating the control of both the rotor side converter (RSC) and the grid side converter (GSC) is done in this thesis. Simulation and analysis of DFIG system with wind turbine using Fuzzy logic controller for RSC and GSC under unbalanced condition is presented in the positive synchronous reference frame. The common DC-link voltage is controlled by grid side converter and control of DFIG's stator output active and reactive power is controlled by rotor side converter. The steady-state operation of the DFIG and its dynamic response to voltage sag resulting from a remote fault on the 120-kV system is shown in this thesis using controllers. Modeling of DFIG system under Fuzzy logic controller to control voltage and active-reactive powers is done using MATLAB/SIMULINK.***

Keywords: ***doubly-fed induction generator (DFIG), rotor side converter (RSC), grid side converter (GSC).***

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I. INTRODUCTION

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(A) How international's surface isn't reliably warmed via the sun and

(B) The arena's insurgency.

The worldwide electric powered essentialness is growing and there may be a reliable growing of the passion on electricity age, transmission, scattering and use. The most exquisite extractable essentialness from the zero-100m layer of air has been assessed to be the solicitation for 1012 KWh/annum, that is of a similar solicitation as hydroelectric capacity. Because of the fact most dependable recorded facts, wind power has been used to move ships, weigh down grain and siphon water. This is the affirmation that breeze essentialness become used to stress barges along the Nile River as mid 5000 B.C. Interior multiple masses of years earlier than Christ; direct windmills were used in china to siphon water. In the u.S., endless windmills have been raised as the American West turned into made throughout the late 19th century. Maximum of them had been used to siphon water for houses and ranches. By way of 1900, minimum electric powered powered breeze structures have been made to create motion, yet a huge section of those gadgets crash and burn into push aside as realistic system power modified into prolonged to not unusual domains throughout the nineteen Thirties. Via 1910, wind turbine mills were conveying power in numerous ecu nations. Wind generators are to be had in an expansion of duration, and thusly manipulate exams. The greatest machine, as an example, the best understood Hawaii, has propellers that range the extra than the period of a soccer challenge and stands 20 constructing memories immoderate, and conveys sufficient potential to control 1400 houses. A little home-sized breeze machine has rotors some location inside the scope of 8 and 25 ft in separation crosswise over and stands upwards of 30 feet and may deliver the electricity desires of an all-electric powered domestic or privately owned organisation. All electric powered powered-making wind turbines, paying little appreciate to what period, are contained or three essential portions: (the part that honestly turns inside the breeze), the electric generator, a speed manage form, and an apex. A few wind device have guard shutdown shape in order that if part of the device crashes and burns,

Detection of Power Grid Synchronization Failure by Using GSM Technology

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ABSTRACT: -The project is designed to develop a system to detect the synchronization failure of any external supply source to the power grid on sensing the abnormalities in frequency and voltage. In this project we included GSM technology whenever grid synchronization failure occur GSM module sends the message to concerned person to bring grid into normal operation. Due to this the operator no need to moniter the synchronization continuously. There are several power generation units connected to the grid such as hydel, thermal, solar etc. to supply power to the load. These generating units need to supply power according to the rules of the grid. As per central electricity authority of india regulations 2010, variation of the system voltage should be of +- 5 % and make all efforts to operate at a frequency close to 50 Hz and shall not allow it to go beyond the range 49.2 to 50.3 Hz. These rules involve maintaining a voltage variation within limits and also the frequency. If any deviation from the acceptable limit of the grid it is mandatory that the same feeder should automatically get disconnected from the grid which by effect is termed as islanding. This prevents in large scale brown out or black out of the grid power. So it is preferable to have a system which can warn the grid in advance so that alternate arrangements are kept on standby to avoid complete grid failure.This system is based on a microcontroller of 8051 family. The microcontroller monitors the under/over voltage being derived from a set of comparators. As the frequency of the mains supply cannot be changed, the project uses a variable frequency generator (555-timer) for changing the frequency, while a standard variac is used to vary the input voltage to test the functioning of the project. A lamp load (indicating a predictable blackout, brownout) being driven from the microcontroller in case of voltage/frequency going out of acceptable range.

(I) INTRODUCTION

An Embedded System is a combination of computer hardware and software, and perhaps additional mechanical or other parts, designed to perform a specific function. A good example is the microwave oven. Almost every household has one, and tens of millions of them are used every day, but very few people realize that a processor and software are involved in the preparation of their lunch or dinner.

This is in direct contrast to the personal computer in the family room. It too is comprised of computer hardware and software and mechanical components (disk drives, for example). However, a personal computer is not designed to perform a specific function rather; it is able to do many different things. Many people use the term general-purpose computer to make this distinction clear. As shipped, a general-purpose computer is a blank slate; the manufacturer does not know what the customer will do wish it. One customer may use it for a network file server another may use it exclusively for playing games, and a third may use it to write the next great American novel.

Frequently, an embedded system is a component within some larger system. For example, modern cars and trucks contain many embedded systems. One embedded system controls the anti-lock brakes, other monitors and controls the vehicle's emissions, and a third displays information on the dashboard. In some cases, these embedded systems are connected by some sort of a communication network, but that is certainly not a requirement.

At the possible risk of confusing you, it is important to point out that a general-purpose computer is itself made up of numerous embedded systems. For example, my computer consists of a keyboard, mouse, video card, modem, hard drive, floppy drive, and sound card-each of which is an embedded system. Each of these devices contains a processor and software and is designed to perform a specific function. For example, the modem is designed to send and receive digital data over analog telephone line. That's it and all of the other devices can be summarized in a single sentence as well.

If an embedded system is designed well, the existence of the processor and software could be completely unnoticed by the user of the device. Such is the case for a microwave oven, VCR, or

Energy Tampering Identification in distribution lines using Power Line Carrier Communication (PLCC)

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Abstract—The project aims in designing an instrument for identifying the energy tapping directly from the grid system using Power Line Carrier Communication (PLCC). Energy stealing directly from the main line is the major problem in our country, especially in rural areas lot of energy is tampered and our Electricity department doesn't have any appropriate instrument to detect exactly where the energy is looted. Therefore this project work is taken up for the benefit of state Electricity Department.

Power-line communication (PLC) carries data on a conductor that is also used simultaneously for AC electric power transmission or electric power distribution to consumers. It is also known as power-line carrier, power-line digital subscriber line (PDSL), mains communication, power-line telecommunications, or power-line networking (PLN).

Two CT'S are arranged at both sides of the sensitive area. The current flowing through this unit Ct is transmitted in digital form. The master unit receives this data and displayed in LCD, the remote data acquired through PLCC communication network is compared with master CT output and difference is displayed in separated row. The current flowing through both the CT's is almost equal, line loss is considered, whenever the energy is tapped between the two CT's, more current is passed through first CT, and the system is programmed such that when the difference is more than3-4% approximately, system Energies the alarm automatically.

The main objectives of the project are:

1.Automatic identification of energy tapping.
2.Usage of wireless PLCC COMMUNICATION technology.
3.Alerting through Buzzer
4.Display of operations on LCD.

(I) INTRODUCTION

In the 21st century, power is the like the essence of the world and is related to the electricity and "electricity" is the word which now regulates the world. Hence, the appropriate consumption of this service is of significance to us. It is necessary to measure power consumption, monitor slippage and regulated various associated variables. In general, large scale industries consist of various units like production, storage, package, administration, transportation situated away from each other. For such organization, it is necessary to maintain record of daily power consumed by every unit to keep check on the overall unessential consumption. Various losses have been a concern for the power sector, these losses have been very high when compared with other developed countries. The present transmission and distribution (T&D) losses including unaccounted energy are about 30% and there is need to reduce these losses through efficient management and maintenance practice of the transmission and distribution network through the grid. When we talk about T&D losses, it also includes the theft of electricity, although it is the part of commercial loss but there is no way to segregate theft from the T&D losses. Apart from T&D losses, aggregate technical & commercial (AT&C) losses contribute a major segment. Electricity theft is at the epicenter of worries for developing economies worldwide, but electricity theft in India has substantial consequence onto the Indian economy. The loss on amount of theft is reflected in average rate of return of the electricity company. Thus, these costs are routinely passed on to the customers in the form of the higher energy charges. Electricity power theft takes place in a variety of forms and thrives with the support of people from different walks of life: utility staff, consumers, union leader, political leaders, bureaucrats and high level utility officials. The problem challenging power utilities worldwide is the electricity, in other words using electricity from utility company without the company's consent. Significantly, it is enough to destroy the entire power sector of country. This paper discusses the problem of electricity theft as well as proposes method for preventive actions and seal the loopholes of electricity stealing.

sensors and a controller that can handle the necessary calculations. Hence, increase the system cost and reduce its reliability. Similar balancing techniques based on the modified modulation are also introduced in [17] and [18], which also suffers from the same drawback by adding more isolated voltage sensors and control loops.

Types of Electricity Theft:

- Direct hooking from line,
- Injecting foreign materials into the meter,
- Drilling holes into electromechanical energy meter
- Inserting film
- Depositing a highly viscous fluid
- Using strong magnets like neodymium magnets

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Title **A NOVEL METHOD OF NEW MULTI INPUT TWO AND THREE-LEVEL DC-DC CONVERTER FOR HYBRID ELECTRIC VEHICLES**

Volume 08, Issue 10, Pages: 49–62.

Paper Authors

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A NOVEL METHOD OF NEW MULTI INPUT TWO AND THREE-LEVEL DC-DC CONVERTER FOR HYBRID ELECTRIC VEHICLES

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Abstract: This paper proposes a new multi-input isolated DC-DC converter for hybrid electric vehicles application. In this work, fuel cell and energy storage system are utilized as the input sources for the proposed system. Fuel is considered as the main power supply. Utilized to charge the battery, increase the efficiency, reduce fuel economy and supplying the output load, charging and discharging the battery can be made by the FC and pv sources simultaneously or individually. The main advantage of proposed converter is that, the proposed multi input converter has a capability of providing the demanded power by load in absence of one or two resources. The three Level DC-DC converter proposed circuit carries a boost converter and capacitor cellular get a extra DC gain, the traded capacitor converters is probably the right plan. The main advantage of proposed converter is that, the proposed multi input converter has a capability of providing the demanded power by load in absence of one or two resources.

KEY WORDS: DC-DC proposed converter, FC (Fuel Cell), Photovoltaic cell(PV)

I. INTRODUCTION

One of the principle favourable circumstances of the HEV drive is to improve theefficiency of the engine drive. The key parts of the footing frameworks in crossover electric vehicles are the multi inputbidirectional DC-DC converters.Multi input bidirectional converters have consolidate the distinctive sources, such asbatteries, ultra capacitors due to expanding tirelessness on vitality emergency and ecological insurance, the Hybrid Electric Vehicles (HEVS) arereceived parcel of consideration as of late. Oil is utilized worldwide at a higher rate because of the more extensive necessity oftransport. It assumes a noteworthy job in demonstrating the vehicles with least and without utilization of petroleum.Andtherefore the other drive innovation have been progressively connected by the car ventures and thishas prompted the expanded capacitor, photovoltaic cells, fuel cells, along with former sustainable power sources, through different voltage characteristics. Multi input converters offer a financially savvy arrangement in applications which requires various info sources such has power module vehicles and sustainable power source frameworks [1]– [12].The essential thought is to coordinate various converters in eitherinput dc/dc change organize or in disconnection arrange, in additionto normally shared yield arrange. There are different multiinput topologies proposed in the writing dependent on non isolated [13] –[18] and disconnected models [19]– [22]. In [13], a non isolated multi input buck/boost converter having the equivalent switchhas be planned. Similar ideas have been connected towards four switch bi directional converter of buck, somewhere the input sourcesare associated in

Power Theft Detection and Intimation Energy Meter Information on through SMS with Auto Power Cutoff

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ABSTRACT: - Electricity buyer deceptive nature is an issue looked by all force substances. Pointless and inefficient present techniques for recognizing and disallowing Power burglary cause a benefit misfortune alongside damage to individual and open property.The present propensity of due assortment experiences useless arrangement of charging and accumulation in the method for holding up of valuable manpower[2]. One of the requests in completing force robbery is the intricacy in distinguishing power burglary. So our point is to defeated these issues by power theft and sign to vitality board in regards to pointer data during SMS and remove the position loads while authority burglary is identify. Specifically it is perplexing to locate the exact area where power burglary is going on. Estimation of parameters like power form present and authority shape voltage have not be open in aacceptable manner to overhaul control framework association. Anyway appropriate to progress in current innovation we tin give improved outcome to distinguish the power theft.

Keywords:
ArduinoUnowithATmega328PMicrocont,Digital vitality meter, Microcontroller

(I) INTRODUCTION

Power extortion can be characterized as a deceptive or illicit utilization of power gear or administration with the goal to maintain a strategic distance from billing. Electric utilities lose a lot of cash every year because of misrepresentation by power shoppers. Subsequent to charging this framework it empowers the power division to look at the meter readings as often as possible without the individual visiting each house[1].The reason of this framework is to out of reach checking and control of the family unit vitality meter. This can be finish up by the utilization of AT89S52 microcontroller gadget that as often as possible screens and report the vitality meter readings in its ceaseless (nonvolatile) memory area. These whole framework likewise utilizes a GSM modem for remote checking and oversee of vitality meter .In our framework, AT89S52 microcontroller is join with a present detecting circuit , GSM modem ,vitality metering circuit and a contactor to make or split position line.

In typical condition, microcontroller peruses vitality beats and current demonstrate. In the event that current is sketch energy beats are ordinary, there is no force burglary is being complete& the o/p is related. In any case, if have current is sketch& vitality beats are not up and coming, and next demonstrate authority burglary. At whatever point power burglary is identified, at that point small scale controller segment will impart this meter data sign to selectivity board with meters perpetual number, proprietors area data and position by which previously introduced through SMS. What's more, this controller area likewise disassociates capacity to the payload to avoid vitality (power) taking. This framework helps in the improvement of intensity and it is imagined that power robbery marker would have the option to control the occurrences of burglary of power which is an essential requirement for the advancement of intensity division in the nation. Right now need to put two LDR sensors in vitality meter. At whatever point they are going to robbery the vitality then LDR sensors are actuated and naturally it sends a Sms through GSM Modem.

(II) LITERATURE REVIEW

In et al [1] Nilesh Mohite, [2016] structured such a framework which will attempt to decrease the illicit utilization of power and furthermore lessen the odds of robbery. That will consequently gather the perusing and furthermore identify the burglary this

Smart Energy Meter With Reading Indication Using GSM

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ABSTRACT: In this project the smart energy meter with reading indication using GSM it developed to decrease the electricity consumption bill by providing the energy meter reading to the user with an alert message before increasing of unit charge. The reading from Utility administration as SMS is being received by smart energy meter programmable interface and the action is performed by the meter according to provided information Microcontroller can be used to monitor and record the meter readings. In case of a customer defaulter, no need to send a person to utility cut-off the Utility can cut off and reconnect the customer connection by short message service. APC with a GSM receiver at the other end, which contains the database acts as the billing point. Live meter reading from the GSM enabled energy meter is sent back to this billing point periodically and these details are updated in a central database. Furthermore, the customer can check the status of electricity from anywhere. It provides ease in taking the meter readings, accuracy.

Keywords: ARM7 controller, energy meter, GSM, Voltage sensor, visual studio.

(I) INTRODUCTION

The Electrical metering instrument technology has come a long way from what it was more than 100 years ago. From the original bulky meters with heavy magnets and coils, there have been many innovations that have resulted in size & weight reduction in addition to improvement in features and specifications. Resolution and accuracy of the meter have seen substantial improvements over the years. Introduction of the digital meter in the later part of last century has completely changed the way Electrical parameters are measured. Starting with Voltmeters & Ammeters, the digital meter has conquered the entire spectrum of measuring instruments due to their advantages like ease of reading, better resolution and rugged construction. Of particular significance is the introduction of the Electronic Energy Meter in the mid eighties. Now a days, the energy consumption and energy distribution has became a big subject for discussion because of huge difference in energy production and consumption. In this regard, energy consumers are facing so many problems due to the frequent power failures; another important reason for power cuts is due to the un-limited energy consumption of rich people. In this aspect, to minimize the power cuts and to distribute the energy equally to all areas, some restriction should have over the power consumption of each and every energy consumer, and according to that the Government should implement a policy, by introducing Autonomous Energy Meters everywhere in domestic sector. Hence, the need has come to think on this line and a solution has to be emerged out.

(II) RELATED WORK

Existing Meter reading techniques are managed, invigilator and evaluated an extensive study and different energy measuring instruments in India. In existing system either electronic energy meter or electro-mechanical meter is fixed in the zone for measuring the energy usage by the users. Now a day's energy meter is recording energy in terms of KWh units. The energy KWh units are still have a recorded by meter readers monthly in feet. The recorded data are recorded by the electricity company and processing it. Company needs to firstly collect each recorded data to an account holder and determine the amount owed by means specific tariff in use. Many systems collect the total electricity consumption data as well as data from main electric appliances. In this paper they use the collected data to evaluate the two methods. And the two methods are:
1) 0-1 sparse coding method,
2) The short-interval data were collected by the smart metering system [1].

There are two types of AMR (Automatic Meter Reading) systems:
1) Wire-based AMR system,
2) Wireless AMR system. Power Line Carrier (PLC) and Telephone Line Network (Optical/cable) are wire-based AMR system and several related works are available. Many metering systems have now been proposed Zigbee, Bluetooth, GSM, GPRS as explained in [2], [3], [4].For long distance data or information transfer through GPRS which is proposed in [3].Remote control and monitoring the

FEEDER PROTECTION USING GPS MODULE

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ABSTRACT: In this project bus bar can be protected from the over current condition. Industrial instruments failures have many causes and one of the main causes is over load. The primary of the distribution transformer or any other transformer is designed to operate at certain specific current, if that current flowing through that instrument is more than the rated current, then immediately the System may burn because of over load, taking this problem in account we are aiming to protect the bus bar from over load condition. In this project work for generating high current more loads are applied to the circuit; so that the current will be increased. Whenever the over current occurred the circuit will be tripped. To trip the circuit, we are using one relay which will control through our microcontroller. When over load is occurred relay will trip the total circuit and buzzer will on to indicate over load. In this module we are using GSM and GPS techniques to identify the exact fault location and can clear the fault easily with in less time.

Keywords: Arduino UNO, Current Sensor, Earth Fault Relay, Load.

(I) INTRODUCTION

In electric power distribution, an automatic overload protection system is a circuit breaker equipped mechanism that can be automatically closed after an event occurred on the line. Automatic overload protection system is used in coordinated protection schemes for overhead line power distribution circuits. This project consists of a digitalized voltmeter and a phase sequence relay, earth-leakage circuit breaker, three phase overload relay and a contactor used for over-current, overload and earth fault protection. In this project, the main aim is to protect bus bar from the over current condition. The primary of the distribution transformer or any other transformer is designed to operate at certain specific current if that current flowing through that instrument is more than the rated current, then immediately the system burns because of overload. Through this Project we are going to protect bus bar from such over load condition.

(II) EXISTING METHOD

In Existing system, the load current is increasing in nature so it will directly affect to the consumers equipment and utility side consumers. The equipment connected in consumer side will be collapse due to over current flows in the circuit. There is no specific controller is installed in a power lines for fault detection purpose. The existing system was not be able to detect the faults like feeder overloading, short circuit of feeders and earth faults because of chances of collapsing the equipment due to large over load current.

(III) PROPOSED METHOD

To overcome the situations like overloading of feeders or short circuit in feeders which will discussed in last paragraph, we have designed a simple prototype model of Feeder Protection from Overload and Earth Fault Relay to prove the concept in details. In this project we are using the current sensors in series with feeders to detect the fault like overload condition or short circuit condition. After sensing the fault, the microcontroller has sent signal to overload unit to trip the relay immediately. Also sends SMS through IOT modules by tracing the location by using GPS module when overload or earth fault detected.

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Title **A NOVEL METHOD OF NEW MULTI INPUT TWO AND THREE-LEVEL DC-DC CONVERTER FOR HYBRID ELECTRIC VEHICLES**

Volume 08, Issue 10, Pages: 49–62.

Paper Authors

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A NOVEL METHOD OF NEW MULTI INPUT TWO AND THREE-LEVEL DC-DC CONVERTER FOR HYBRID ELECTRIC VEHICLES

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Abstract: This paper proposes a new multi-input isolated DC-DC converter for hybrid electric vehicles application. In this work, fuel cell and energy storage system are utilized as the input sources for the proposed system. Fuel is considered as the main power supply. Utilized to charge the battery, increase the efficiency, reduce fuel economy and supplying the output load, charging and discharging the battery can be made by the FC and pv sources simultaneously or individually. The main advantage of proposed converter is that, the proposed multi input converter has a capability of providing the demanded power by load in absence of one or two resources. The three Level DC-DC converter proposed circuit carries a boost converter and capacitor cellular get a extra DC gain, the traded capacitor converters is probably the right plan. The main advantage of proposed converter is that, the proposed multi input converter has a capability of providing the demanded power by load in absence of one or two resources.

KEY WORDS: DC-DC proposed converter, FC (Fuel Cell), Photovoltaic cell(PV)

I. INTRODUCTION

One of the principle favourable circumstances of the HEV drive is to improve theefficiency of the engine drive. The key parts of the footing frameworks in crossover electric vehicles are the multi inputbidirectional DC-DC converters.Multi input bidirectional converters have consolidate the distinctive sources, such asbatteries, ultra capacitors due to expanding tirelessness on vitality emergency and ecological insurance, the Hybrid Electric Vehicles (HEVS) arereceived parcel of consideration as of late. Oil is utilized worldwide at a higher rate because of the more extensive necessity oftransport. It assumes a noteworthy job in demonstrating the vehicles with least and without utilization of petroleum.Andtherefore the other drive innovation have been progressively connected by the car ventures and thishas prompted the expanded capacitor, photovoltaic cells, fuel cells, along with former sustainable power sources, through different voltage characteristics. Multi input converters offer a financially savvy arrangement in applications which requires various info sources such has power module vehicles and sustainable power source frameworks [1]– [12].The essential thought is to coordinate various converters in eitherinput dc/dc change organize or in disconnection arrange, in additionto normally shared yield arrange. There are different multiinput topologies proposed in the writing dependent on non isolated [13] –[18] and disconnected models [19]– [22]. In [13], a non isolated multi input buck/boost converter having the equivalent switchhas be planned. Similar ideas have been connected towards four switch bi directional converter of buck, somewhere the input sourcesare associated in

Automatic Power Factor Control for Switch Mode Power Converter

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ABSTRACT: This project provides continuous power factor correction without manual capacitive bank loading. A PFC controller provides power factor correction and peak current limiting for a switch-mode power converter of any topology without having to directly sense inductor current. The PFC control technique involves power-factor control and peak-current-linking using as inputs current representations of line input voltage (VLN),load output voltage (VLD) and long-term current demand (VCD).A conduction cycle is initiated by sensing when the rate of change in the inductor current reaches to zero using an auxiliary winding on the current storage inductor and terminated after the computed on-time to implement either power-factor control or peak-current-limiting.

The Reactive Power charge on your electricity bill is directly targeted against those companies who do not demonstrate clear energy efficiency use. You will find this charge itemized on electricity bill. Reactive power charges can be made significantly smaller by the introduction of Power Factor Correction Capacitors which is a widely recognized method of reducing an electrical load and minimizing wasted energy , improving the efficiency of a plant and reducing the electricity bill.It is not always necessary to reach a power factor of 1.A cost effective solution can be achieved by increasing your power factor to greater than 0.95.

Keywords: RLC,Thyristers,CT & PT

(I) INTRODUCTION:

The significance of power factor correction (PFC) has long been visualized as a technology requirement for improving the efficiency of a power system network by compensating for the fundamental reactive power generated or consumed by simple inductive or capacitive loads. With the Information Age in full swing, the growth of high reliability, low cost electronic products have led utilities to escalate their power quality concerns created by the increase of such "switching loads." These products include:
entertainment devices such as Digital TVs, DVDs, and audio equipment; entertainment devices such as Digital TVs, DVDs, and audio equipment; X variable speed motor drives for HVAC and white goods appliances; food preparation and cooking products such as microwaves and cook tops;and lighting products, which include electronic ballasts, LED and fluorescent lamps, and other power conversion devices that operate a variety of lamps. The drivers that have resulted in this proliferation are a direct result of the availability of low-cost switch-mode devices and control circuitry in all major end-use segments: residential, commercial, and industrial. In order to keep power quality under the limits proposed by standards, it is required to incorporate some sort of compensation. There are two basic types of PFC circuits: active and passive. The simplest power factor correctors can be implemented using a passive filter to suppress the harmonics in conjunction with capacitors or inductors to generate or consume the fundamental reactive power, respectively. Active power factor correction circuits have proven to be more effective, generally integrated with the switch-mode circuitry, and actively control the input current of the load. This enables the most efficient delivery of electrical power from the power grid to the load. The demand for new smart, green products has set the stage for a worldwide migration from antiquated passive circuits to active correctors as well as from traditional analog technology to digital techniques. New digital active power factor correction delivers better full- and light-load power efficiency while lowering system costs, enabling smaller designs and providing a clear path for further feature enhancements and improved competitive positioning for a whole host of consumer and industrial products. Cirrus Logic's novel advances in digital active PFC vi technology signify a major enabling element in the development of the newest generation of low cost, energy-efficient switch mode products.

Research on Harmonics and Ripple Content in Vector Control Schemes for Induction Motor

M.Rama Prasad Reddy, T.Sudhakar Babu, A.Suresh Kumar,U.Chaitanya

Abstract*— on this paper 3 considered one in every of a type vicinity based totally vector manage plans are enlisted for the assessment of the track and swell substance texture inside the engine flows and reliable kingdom torque waveforms. the interest in those vector oversee plans is, the reference flows are produced is as on the subject of ordinary vector control and selection of the voltage vectors is as almost about coordinate torque oversee. So the ones vector manipulate plans be part of the requirements of both conventional vector oversee and direct torque manage. the ones plans are confirmed within the MATLAB/Simulink scenario and the consequences are as concept approximately amongst them.

Watchwords*—FOC, DTC, Induction engine, exchanging table, vector manage

I. INTRODUCTION

The gifted one within the cutting-edge pressure engine is popularity engine because it were. that is because of its much less assist and low weight volume share. From the preceding four many years many variety of controlling methods were proposed for the enlistment engine manipulate sports. among those the scalar manipulate method is giving the sluggish reaction, to conquer those complexities associated with the scalar control ordinary FOC become proposed in [1]. The FOC gives quick and dynamic transient response because of the decoupled control of transition and torque. Be that as it may, there is a downside on this FOC likewise that is the reference define modifications. To decrease the unpredictability engaged with the FOC the DTC was proposed in [2]. further, to build the adequacy of these manipulate systems staggered sustained acceptance engines are applied. A correlation amongst DTC and FOC of stage strengthened enlistment engine drive changed into talked about in [3]. Later couple of control strategies that are applied for the misfortune advancement methods of FOC of IM force [4]. some other manner with brief and dynamic calculation is proposed in [5] with LabVIEW. The ever calculation technique SVM based totally inverter interest with 8 switches is proposed in [6] with the traditional FOC method simply, yet the replacing of the inverter activates complicated calculation. In [7], a close to file on various adjustment strategies for the FOC changed into proposed. each this kind of strategies applied the fast and dynamic calculation frameworks.

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To overcome the downsides of ordinary vector control calculation and to lessen the calculation problem at the processors, in this paper, in this paper three notable territory fundamentally primarily based vector control plans are applied for the examination of the tune and swell substance in the engine flows and normal kingdom torque waveforms. the freshness in

The ones vector oversee plans is, the reference flows are produced is as in understanding to everyday vector manipulate and desire of the voltage vectors is as in undertaking with direct torque oversee. So the ones vector manipulate plans consolidate the fashions of every customary vector control and direct torque oversee.

II. CLASSICAL QUARTER ORIENTATED MANAGE

Within the Classical hassle oriented manage strategy the decoupling manipulate a massive quantity of the torque and motion is gotten with the precious asset of moving most people of the quantities to a synchronous reference frame. so the torque trouble iqs* and the transition fabricating aspect ids* is created with the manual of stator front line vector is*. anyway in mild of the decoupled manage the appealing influenza brought on the whole with q-pivot is zero. by techniques for method for this the electromagnetic torque condition is modified as

$$T_e = \frac{3}{2}\frac{P}{2}\frac{L_m}{L_r}\left(\psi_{dr} i_{qs}\right) \tag{1}$$

In this paper the main attention is focused on rotor flux angle calculation. This rotor flux angle calculated from (2).

$$\theta_s = \theta_r + \theta_{sl} = \int (\omega_r + \omega_{sl})dt \tag{2}$$

Where $\omega_{sl} = \frac{L_m R_r}{L_r \lambda_r} i_{qs}^{*}$.

Proposed Vector control methods

The electromagnetic torque of an induction motor is expressed as

$$T_e = \frac{3}{2}\frac{P}{2}\frac{L_m}{L_r}\left|\bar{\lambda}_r\right|\left|\bar{i}_s\right|\sin\delta \tag{3}$$

Improvement of Power Quality by using Dynamic Voltage Restorer Performance for Induction Motor Drives

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Abstract- Electronic devices function properly as long as the voltage of the supply system feeding the device stays within a consistent range. There are different types of voltage fluctuations that can cause Power quality problems, including, sags, harmonic distortions, surges and spikes and momentary disruptions, nonstandard voltage, current or frequency that results in a failure or miss operation of end user equipment. The steady-state PQ characteristics of the supply voltage include surges and spikes. Voltage sags and swells are the common events on the electric power network. Voltage sags and swells are the common events on the electric power system. The common causes of voltage sag are short circuit or faults in power system, at starting of large loads and faulty conductor. These problems can be mitigated with voltage injection method using custom power device, Dynamic Voltage Restorer (DVR). A DVR is connected in series with the linear load to compensate for the harmonics and unbalance in the source voltages and improve the power factor on the source side A series connected converter based mitigation device, the Dynamic Voltage Restorer(DVR), is the most economical and technically advanced mitigation device proposed to protect sensitive loads from voltage sags. In this paper, DVR which consists of injection transformer, filter unit, Pulse Width Modulation (PWM) inverter, energy storage and control system is used to mitigate the voltage flickers in the power distribution system. Here we propose two control techniques which are the Proportional Integral (PI) Controller and Fuzzy Logic (FL) Controller. In this Project we are design a Dynamic Voltage Restorer (DVR) with Proportional Integral (PI) Controller and Fuzzy Logic (FL) Controller, to improve power quality in power system by using. In extension proposed DVR is subjected to operate under hybrid fuzzy logic controller and Induction Motor drive is using Matlab/Simulink software.

Keywords— Dynamic Voltage Restorer, Energy storage System, Total Harmonic Distortion, Fuzzy Logic Controller.

I. INTRODUCTION

Both customers and electric organizations are worried about the electric power quality. Power quality term is one of the most plentiful slang in the electrical companies since 1980s. It is a concept of particular types of power system disorders. These problems falls under this idea are not new. New is that engineers are now system approach instead of handling them as independent issues. New generation load apparatus are main concerns. Power electronic and microprocessor based devices are more sensitive to power quality variations than the equipment's which were used in past. Rise in application of devices such as shunt capacitors are used for power factor correction so that losses reduce and hence high efficiency in adjustable speed motor drives. This results rise in harmonics on power systems. So any power issues exhibit in voltage, frequency, or current deviations that result in breakdown or disoperation of the consumer apparatus can be classified into power quality problem[1].In order to deliver pure and clean power i.e. pure sinusoidal voltage waveform,

FACTS devices are used. Many FACTS devices are being used in electrical network, some of them are, Static Synchronous Series Compensator (SSSC), Static Synchronous Compensator (STATCOM), Unified Power Flow Controller (UPFC), Interline Power Flow Controller (IPFC) etc. In actual process FACTS apparatus were designed for the transmission system and it can be used in distribution system also, named as Custom Power Devices. Some commonly used Custom Power Devices are: Dynamic Voltage Restorer (DVR), Distribution Static Synchronous Compensator (DSTATCOM), and Active Filter (AF) etc. With the help of these devices the quality problems are improved to great extents. Due to its fast response, DVR is considered as one of the most effective and efficient power custom devices [2].distribution systems has lots of power quality issues e.g. swell, sag, transients, etc. but voltage sag is the serious disorder which is mainly due to transients.

In order to check voltage sag and voltage swell in distribution system DVR is one of the effective and efficient custom power devices [9]. DVR is connected in series with the line in order to compensate the voltage sag or swell in the load side.

In this section, the enhancement of three phase voltage and reactive power is carried out with DVR when a non-linear and unbalanced load conditions are connected in the simulink block-set. A five-level inverter is used to trigger the operation of DVR for the different load disturbance assessment by PWM technique.

Reducing Number of Switches in Multilevel Inverter Using Diode Clamped and H-Bridge Inverters

Karanam Deepak, M. Rama Prasad Reddy, K. Jaya Sree and P. Partha Saradhi Reddy

Abstract The multilevel inverters (MLI) are having more features to usage. In existing methods like diode clamped MLI and H-Bridge MLI, more number of switches are using compared to proposed MLI. So, a new method of 35-level MLI topology is a combination of diode clamped and cascaded multilevel inverters. In this method using the less number of switches and their pulse generating circuit. So, thereby ensuring the switching loss, reducing size and installation cost also less. So, the new proposed technology is well designed for renewable applications (RA) like PV cell and wind energy systems. Comparing to the other existing inverters, the switch count is very less. The results are validating by using MATLAB/Simulink design.

Keywords Multilevel inverters (MLI) · H-Bridge MLII (HMLI) · Diode clamped MLI (DCMLI) · Photovoltaic cell (PV) cell · Renewable applications (RA)

1 Introduction

Power electronics' switches play a vital responsibility in the electrical power conversions. Another advantage of MLI is control of the output power and uses in take out power commencing renewable energy applications like PV cell as well as wind power generation systems [1]. The conversion of DC to AC is possible to need inverter. In an electrical power, inverter is basic circuit that converts DC into AC. This conversion is important because AC is more useful in our daily applications. Conventional diode clamped and H-Bridge inverters having more switches compared to proposed system [2].

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GSM Based Patient Healthcare Monitoring System

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Abstract **- In this module we used advanced technology for patient monitoring those who are suffered from heart diseases & physical disorder. Therefore heart rate sensor and temperature sensor are used for patient monitoring. Sensors gives accurate output therefore it rules out the use of traditional medical instruments such as thermometer and other devices. For continuously sending message from patient's location to medical advisory GSM modem used. This module provides relief to medical advisory for patient monitoring and also to patients for freedom of movement.**

Keywords **– GSM Modem, Heart rate, LCD, PIC controller, Temperature.**

I. INTRODUCTION

Now days, heart diseases are exceeds up to dangerous level which leads to death of human being. Monitoring of patient constantly is difficult or doctors are also unable to monitor particular patient for total working hours. In many critical conditions such as patient is located far away from hospital or also in case of old patient who suffering with heart disease and physical disorders, continuous monitoring of patient is not possible. This module deals with solving above problems. Module consist of heart rate sensor and temperature sensor which measures the heart rate and body temperature and sends SMS through GSM module to the medical advisory for the preliminary precautions so that patient can be prevented from serious situation Before reaching to the hospital. For temporary storage of the data, PIC16F877A controller device used. For display the measured values of heart beat and body temperature, LCD issued. Health monitoring systems are gaining their significance as the Fast-growing universal elderly population increases demands for caretaking. In ICU there is needed to continuous monitoring there health conditions. In so many cases patients released from the hospital still they are strongly advised to be under rest and observation some period time then these cases the system is very much helpful.

Generally in critical case patients are supposed to be monitored continuously for their health condition, Heart Rate as well as temperature. In the earlier methods, the doctors need to be present physically or in several cases SMS will be sent using GSM. In the earlier case the history of the patient cannot be displayed, only current data is displayed.

In the current paper, we are using a novel idea for continuous monitoring patient's health conditions. The health care scheme is focus on the measurement and monitoring various biological parameters of patient's body like heart rate, oxygen saturation level in blood and temperature using a web server and android application, where doctor can continuously monitor the patient's condition on his smart phone using an Android application. And also the patient history will be stored on the android application and doctor can access the information whenever needed from anywhere and need not physically present.

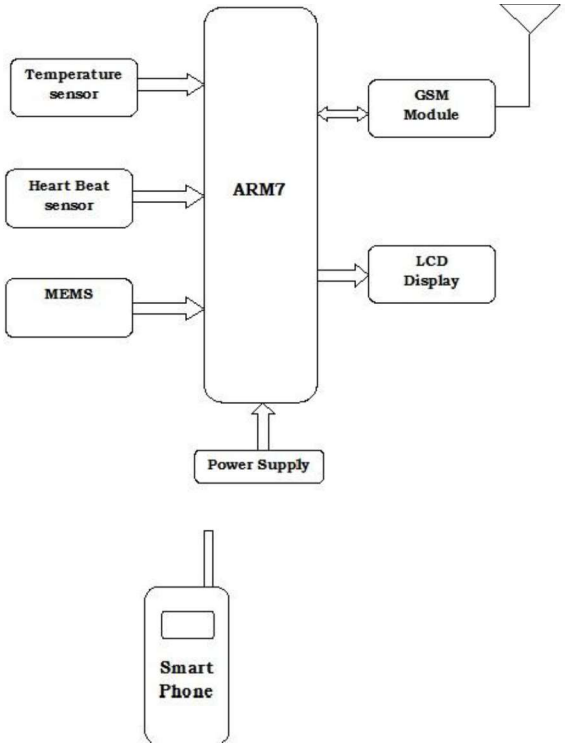

Fig:1-Block Diagram

Improvement of Power Quality by using Dynamic Voltage Restorer Performance for Induction Motor Drives

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Simulation and Analysis of DFIG System with Wind Turbine Implementing Fuzzy Logic Control

Karanam Deepak, Talari Aparna, A.Suresh Kumar, P Siva Deepthi, Y Hazarathaiah

Abstract: ***A doubly-fed induction generator (DFIG) applied to wind power generation driven by wind turbine is under study for low voltage ride-through application during system unbalance. Use of DFIG in wind turbine is widely spreading due to its control over DC voltage and active and reactive power. Conventional dq axis current control using voltage source converters for both the grid side and the rotor side of the DFIG are analyzed and simulated. An improved control and operation of DFIG system under unbalanced grid voltage conditions by coordinating the control of both the rotor side converter (RSC) and the grid side converter (GSC) is done in this thesis. Simulation and analysis of DFIG system with wind turbine using Fuzzy logic controller for RSC and GSC under unbalanced condition is presented in the positive synchronous reference frame. The common DC-link voltage is controlled by grid side converter and control of DFIG's stator output active and reactive power is controlled by rotor side converter. The steady-state operation of the DFIG and its dynamic response to voltage sag resulting from a remote fault on the 120-kV system is shown in this thesis using controllers. Modeling of DFIG system under Fuzzy logic controller to control voltage and active-reactive powers is done using MATLAB/SIMULINK.***

Keywords: ***doubly-fed induction generator (DFIG), rotor side converter (RSC), grid side converter (GSC).***

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I. INTRODUCTION

Wind imperativeness is one of the maximum open and exploitable types of value-effective power source. Wind blows from a location of better air weight to one of the decrease herbal weight. The qualification in weight is performed by using:

(A) How international's surface isn't reliably warmed via the sun and

(B) The arena's insurgency.

The worldwide electric powered essentialness is growing and there may be a reliable growing of the passion on electricity age, transmission, scattering and use. The most exquisite extractable essentialness from the zero-100m layer of air has been assessed to be the solicitation for 1012 KWh/annum, that is of a similar solicitation as hydroelectric capacity. Because of the fact most dependable recorded facts, wind power has been used to move ships, weigh down grain and siphon water. This is the affirmation that breeze essentialness become used to stress barges along the Nile River as mid 5000 B.C. Interior multiple masses of years earlier than Christ; direct windmills were used in china to siphon water. In the u.S., endless windmills have been raised as the American West turned into made throughout the late 19th century. Maximum of them had been used to siphon water for houses and ranches. By way of 1900, minimum electric powered powered breeze structures have been made to create motion, yet a huge section of those gadgets crash and burn into push aside as realistic system power modified into prolonged to not unusual domains throughout the nineteen Thirties. Via 1910, wind turbine mills were conveying power in numerous ecu nations. Wind generators are to be had in an expansion of duration, and thusly manipulate exams. The greatest machine, as an example, the best understood Hawaii, has propellers that range the extra than the period of a soccer challenge and stands 20 constructing memories immoderate, and conveys sufficient potential to control 1400 houses. A little home-sized breeze machine has rotors some location inside the scope of 8 and 25 ft in separation crosswise over and stands upwards of 30 feet and may deliver the electricity desires of an all-electric powered domestic or privately owned organisation. All electric powered powered-making wind turbines, paying little appreciate to what period, are contained or three essential portions: (the part that honestly turns inside the breeze), the electric generator, a speed manage form, and an apex. A few wind device have guard shutdown shape in order that if part of the device crashes and burns,

Comparison of Decoupled and Coupled PWM Techniques for Open-End Induction Motor Drives

M. Rama Prasad Reddy, Karanam Deepak and M. Venkateswaralu

Abstract In this paper, multilevel inverter configuration called dual-inverter (DI) topology is presented in favor of asynchronous motor drive. The topology is easy in constriction as well as easy to operate when compared with other multilevel inverter configurations. Two special kinds of PWM methods are presented in favor of DI topology to recover the excellence of production voltage as well as decrease the common-mode voltage value. To test the concert of the PWM methods in favor of DI topology, first theoretical studies are carried and next model analysis is carried; here, MATLAB simulation model as well as outcome is presented.

Keywords Induction motor drives · Pulse-width modulation (PWM) · Multilevel inverter · DI topology

1 Introduction

Through the advancement during power electronic tools, electrical drive is gaining significance into hybrid electric vehicles (HEVs) and industrial applications. Among the electrical drives, VSI-fed induction motor drives are popular. Different PWM methods are worn for the controlling of production voltage source as well as frequency of inverters [1–6]. At high switching frequencies sharp edges of common mode voltage (potential across neutral point of induction motor and DC link) causes common mode currents. Which reduce the life of motors and bearings [7–9].

To reduce the general method voltage as well as improve the feature of production voltage sources, multilevel inverter (MLI)-fed drives are gaining importance. Various MLI methods like diode-clamped MLI (DC MLI), capacitor clamp, H-bridge MLI and dual-inverter methods are discussed in related work [10–15]. Among this dual-based inverter OEWIM drives (DI-fed open-end winding induction motor drive) are gaining importance [15]. Two two-level inverters can be controlled either independently or dependently. Based on this, PWM methods are divided into decoupled and coupled PWM methods [16–19]. The comparisons of both these PWM methods

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Reducing Number of Switches in Multilevel Inverter Using Diode Clamped and H-Bridge Inverters

Karanam Deepak, M. Rama Prasad Reddy, K. Jaya Sree and P. Partha Saradhi Reddy

Abstract The multilevel inverters (MLI) are having more features to usage. In existing methods like diode clamped MLI and H-Bridge MLI, more number of switches are using compared to proposed MLI. So, a new method of 35-level MLI topology is a combination of diode clamped and cascaded multilevel inverters. In this method using the less number of switches and their pulse generating circuit. So, thereby ensuring the switching loss, reducing size and installation cost also less. So, the new proposed technology is well designed for renewable applications (RA) like PV cell and wind energy systems. Comparing to the other existing inverters, the switch count is very less. The results are validating by using MATLAB/Simulink design.

Keywords Multilevel inverters (MLI) · H-Bridge MLII (HMLI) · Diode clamped MLI (DCMLI) · Photovoltaic cell (PV) cell · Renewable applications (RA)

1 Introduction

Power electronics' switches play a vital responsibility in the electrical power conversions. Another advantage of MLI is control of the output power and uses in take out power commencing renewable energy applications like PV cell as well as wind power generation systems [1]. The conversion of DC to AC is possible to need inverter. In an electrical power, inverter is basic circuit that converts DC into AC. This conversion is important because AC is more useful in our daily applications. Conventional diode clamped and H-Bridge inverters having more switches compared to proposed system [2].

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A Fuzzy Controller based D-STATCOM for Induction Motor Drive Applications to Power Quality Improvement

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Abstract

In this article represent the development of fuzzy controller based DSTATCOM and placed at the load side in the EDS (Electrical distribution system), so in the load side which can be eliminate the power quality problems of input side (like voltage sags, swells and etc...). So improvement of power quality fuzzy controller based DSTATCOM will absorb along with supply reactive power to eliminate the voltage sags, swells and get better power factor in different circumstances. The main advantages of D-STATCOM designed for resolve power quality issues due to voltage sags, swells etc., have be recommended. The principle of fuzzy based D-STATCOM is to supply the better voltage regulation through the short period of the induction motor appliances starting as well as hence avoid the large voltage dips. So in this paper simulates a fuzzy based D-STATCOM for industrial induction applications and also check the performances of induction motor drives like speed, torque and stator currents by using MATLAB /SIMULINK software.

Keywords; *Fuzzy based D-STATCOM; EDS (Electrical distribution system) Induction Motor Drives, Power quality.*

I. INTRODUCTION

The FACTS (flexible AC transmission Systems) technology is an innovative explore region in Electrical engineering. It initiates the recent power electronic technology keen on conventional AC power transmission systems as well as extensively improves the power quality and relocate boundary. Flexible AC transmission Systems equipments are supply an improved variation to unreliable operational circumstances and get better the practice of previous mechanism. They include essential appliance such as power flow control, rising of transmission capacity, voltage control, reactive power compensation, stability development and power quality improvement. The fuzzy based DSTATCOM-F is equipment of the flexible AC transmission Systems with it is stand on a VSI (voltage-source inverter) [5].

Improvement of the quality Power (flexible AC transmission) is the main important in the present world. It has turned into significant, frequently, through the preface of FACTS devices, whose presentation is extremely susceptible to the power quality supply. The quality of power issues is an incidence manifests as a voltage fluctuations levels, current or frequency those consequences in a breakdown of last part of the equipment. The main troubles deal at this point is the voltage sags,

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SIMULATION OF DYNAMIC VOLTAGE RESTORER FOR POWER QUALITY IMPROVEMENT WITH HYSTERESIS VOLTAGE CONTROLLER

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Abstract- Power Quality problems in the present-day distribution systems are more in these days due to the increased use of sensitive and critical equipment pieces such as communication network, process industries, and precise manufacturing processes Power quality problems such as transients, sags, swells, and other distortions to the sinusoidal waveform of the supply voltage affect the performance of these equipment pieces. Technologies such as custom power devices are emerged to provide protection against power quality problems. Out of which the series connected type known as DVR can regulate the load voltage from the problems such as sag, swell, and harmonics in the supply voltages in an efficient manner. DVR is controlled by duly employed d-q reference frame strategy. The direct and quadrature axis parameters are set to a standard reference values so as to find if at all there exist any voltage change that may lead to consequences of power quality failure. Unlike the conventional control strategy, a lucid design of direct-quadrature control strategy is used. Hence, it can protect the critical consumer loads from tripping and consequent losses

Keywords: Dynamic voltage restorer (DVR), power quality, unit vector, voltage harmonics, voltage sag, voltage swell, Hysteresis Voltage Controller.

I. INTRODUCTION

Power distribution systems, ideally, must give their customers with an uninterrupted flow of power at smooth sinusoidal voltage at the constant magnitude and frequency. However, in practice, power systems, particularly the distribution systems, have different nonlinear loads, which widely modify the quality of power supplies. As a result of the nonlinear loads, the purity of the sine waveform is lost. This will produces the several power quality issues. Power quality disturbance can be defined as the deviation of the voltage and the current from its ideal waveform. Faults at either the transmission or distribution level may cause voltage sag or swell in the whole power system and also, under heavy load conditions, a significant voltage drop could occur in the system. Voltage sag and swell can cause sensitive equipment to fail, blackout and produce a large current unbalance. These effects can acquire a lot of expensive from the customer and cause equipment damage. The voltage sag is defined as an decrease in rms voltage from 10% to 90% of nominal voltage with duration from half a cycle to 1 minute and voltage swell is defined as an increase in rms voltage or current from 90% to 110% of the nominal voltage at the power frequency for durations from 0.5 cycles to 1 minute. Typical magnitudes are between 1.1 and 1.8 p.u. There are several different methods to compensate voltage sags and voltage swells, but the use of a custom power device is considered to be the most efficient method, e.g. FACTS for transmission systems which improve the power transfer capabilities and stability margins. To improve power quality problems in electrical system, different types of custom power devices are used. Depending upon the type of connection made the custom power devices are classified. Each of the devices has its own advantages and limitations.

The SVC pre-dates the DVR, but the DVR is still preferred because the SVC has no ability to control active power flow. Furthermore, the advantageous facts are that the DVR is smaller in size and cost is less compared to the DSTATCOM and other custom power devices. Based on these reasons, DVR is widely considered as an effective custom power device to mitigate voltage sags. In addition to voltage sags and swells compensation, DVR can also reduces the harmonics and improves the Power Factor. DVR is clearly considered to be one of the best economic solutions for its size and capabilities when compared to the other devices. Many solutions and their problems using DVRs are reported, such as the voltages in a three-phase system are balanced and an energy-optimized control of DVR is discussed in [10]. Industrial examples of DVRs are given in [11], and different control methods are analyzed for different types of voltage sags in [12]–[15]. A comparison of different topologies and control methods is presented for a DVR in [17]. The design of a capacitor-supported DVR that protects
sag, swell, distortion, or unbalance in the supply voltages is discussed in [19]. The performance of a DVR with the high frequency-link transformer is discussed in [20]. In this paper, the control and performance of a DVR are demonstrated with a lucid control technique using d-q parameters as the main criteria for the control of the DVR.

Fuel Cell Based DC Link Voltage Controlled Scheme for High Reliable Distributed Generation

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Abstract: ***With the increase in load demand, the Renewable Energy Sources (RES) are increasingly connected in the distribution systems which utilize power electronic Converters/Inverters. In this thesis, Photo Voltaic (PV) system is integrated to a three phase four wire distribution system. The Photo Voltaic (PV) Panel is modeled based on associated equations. The use of non-linear loads in the power system will lead to generation of current harmonics which in turn deteriorate the power quality. Active Power Filters (APF) are extensively used to compensate the current harmonics and load unbalance. In this work, the existing PV inverter acts as Shunt Active Power Filter (SAPF) that is capable of simultaneously compensating problems like current unbalance, current harmonics and also of injecting the energy generated by renewable energy source. The inverter is controlled on the basis of hysteresis control and thus it can be utilized as a power converter injecting power generated from RES to the grid and as a shunt APF to compensate the Load disturbances. It is proposed to investigate in this paper, the performance of PV inverter for various loads. This work is carried out using MATLAB/SIMULINK software..***

Keywords**: Wind power, Distribution Network, Induction Generator, STATCOM, Reactive Power, Harmonics, and Power Quality.**

I.INTRODUCTION

Due to increasing air pollution, global warming concerns, diminishing fossil fuels and their increasing cost have made it necessary to look towards Renewable Energy Sources (RES) as a future energy solution. In finding solutions to overcome a global energy crisis, the Photo Voltaic (PV) system has attracted significant attention in recent years. The government is providing incentives for further increasing the use of grid-connected PV systems. Renewable Energy Sources are increasingly integrated at the distribution level due to increase in load demand which utilize power electronic converters. Due to the extensive use of power electronic devices, disturbances occur in the electrical supply network. These disturbances are due to the use of non-linear devices. These will introduce harmonics in the power system thereby causing equipment overheating ,damage devices ,EMI related problems etc. Active Power Filters (APF) is extensively used to compensate the current harmonics and load unbalance. This will result in additional hardware requirements. So, in this paper, the existing PV inverter acts as Shunt Active Power Filter (SAPF) that is capable of simultaneously compensating problems like current unbalance, current harmonics and also of injecting the energy generated by RES. The shunt active filter is a voltage source inverter (VSI), which is connected in parallel with load. Shunt Active Power Filter has the ability to keep the mains current balanced and sinusoidal after compensation for various Load conditions.

II.SYSTEM DESCRIPTION

A. TOPOLOGY

Active power filters are power electronic devices that cancel out unwanted harmonic currents by injecting a compensation current which cancels harmonics in the line current. Shunt active power filters compensate load current harmonics by injecting equal-but opposite harmonic compensating current. Generally, APFs have been conceived using voltage source converters [5]. This topology has proved better controllability. In this paper, it is shown that using an adequate control strategy, even with a three phase four-wire system, The topology of the investigated APF and its interconnection with the grid is presented in Fig. 1. It consists of a three-leg three-wire voltage source inverter. In this type of applications, the VSI operates as a current controlled voltage source. The proposed system is Three Phase three wire which consists of Photovoltaic system and fuel cell connected to the dc-link of a grid-interfacing inverter as shown in Fig. 1. The voltage source inverter is a key element as it interfaces the renewable energy source to the grid and delivers the generated power. The RES is connected to grid with an inverter coupled to dc-link. The dc-capacitor decouples the Photovoltaic system from grid and also allows independent control of converters on either side of dc-link.

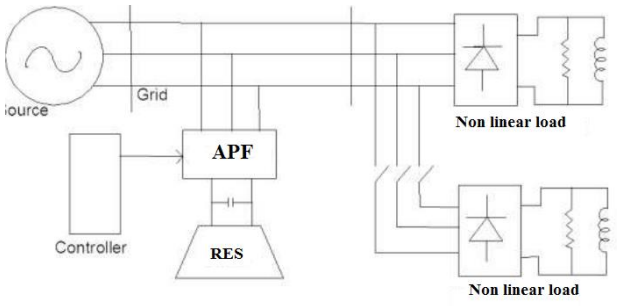

Fig 1.Schematic of the 3 phase grid system interface with renewable energy source using APF

B.VOLTAGE SOURCE CONVERTER (VSC)

A Voltage Source Converter (VSC) is a power electronic device that connected in shunt or parallel to the system.

Simulation of 3-phase Multi-Level Inverter with Reduced No of Switches

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Abstract— In this concept focused on the design of a single phase 27-level Hybrid Multi-level inverter by using twelve switches and three separate DC sources from the solar panel. To get the maximum power from the panel Perturb and Observer algorithm can be used in the Maximum Power Point Tracking. The main objective of this paper is to increases the number of levels with a lower number of switches at the output without adding any complexity to the power circuit. The main advantages of the proposed method are to reduce the lower Total Harmonic Distortion, lower electromagnetic interference and high output voltage. To minimize the total harmonic distortion Multi-carrier pulse width modulation techniques can be proposed and it can enhance the output voltages from proposed work. Hence the single phase 27-level Hybrid Multi-level inverter having better performance compared with the conventional method. In the proposed method Multi-Carrier Pulse Width Modulation Technique can be used to switching angle for Hybrid MLI. At the instant, Hybrid MLI can be used to reducing the number of switches, and reducing the lower THD. Here the THD decreases with increasing the number of levels, and developing the efficiency of the scheme. The simulation result of the proposed method having good THD compared with conventional method. The proposed method can be simulated .The proposed concept can be implemented to 3-phase multi level inverter by using mat lab/simulink software.

IndexTerms—**Multi-Carrier Pulse Width Modulation, Multilevel Inverter, Total Harmonic Distortion**

I INTRODUCTION

The massy usage of the fossil fuels, such as the coal, the gas and the oil, result in grave conservatory effect and pollute the surrounding, which has great effect the globe. Mean while, there is a big contradiction between the fossil fuels supply and the global energy claim, which leads to a high oil price in the world market recently. The major restrictions for the human development are energy deficiency and the atmosphere pollution. Photo Voltaic (PV) sources are one of the considerable players in the world's energy portfolio and will become the biggest contributions to the electricity generation among all renewable energy candidates by year 2040 because of it is clean, emission-free renewable energy technology with high reliability.

The task of a Maximum Power Point Tracker (MPPT) in a PV energy conversion system is to continuously tune the system so that it draws maximum power from the solar array regardless of weather or load conditions. while the solar array has a non idyllic voltage– current characteristic and the conditions such as ambient temperature, insulation and wind that change the output of the solar array are changeable, the tracker must contend with a nonlinear and time-varying scheme. A lot of tracking algorithms and techniques has been developed. The perturb and observer method [1] and the Incremental Conductance method as well as variants of those techniques [3, 4] are the most widely used. The Perturb and Observer method is known for its simple implementation.

However when weather rapidly changes the perturb and observer method fails to track the maximum power point successfully [4, 5].The MPP tracking method using the short circuit current of the PV module exploits the fact that the operating current at the MPP of the solar array is linearly proportional to its current of short circuit [7]. Thus, under rapidly varying atmospheric conditions. For tracking the MPP this method has a fast response time. However, the control circuit is motionless somewhat complicated and both the conduction loss and the cost of the MPPT converter are still relatively high [5].Furthermore, the assumption that the operating current at the MPP of the PV module is linearly proportional to the short circuit current of the PV module is only an approximation [13].Application of this technique always results in PV module operation below the maximum power point. Open circuit voltage of the PV module [5, 8] employs the information that the open circuit voltage of the solar array at the MPP is linearly proportional to its open circuit voltage [8].

Even though the method is cost efficient, its application results inconsiderable errors in MPP tracking and consequential energy losses. In addition, both the open circuit voltage and the short circuit current of PV module techniques fail to track the MPP effectively if solar array cells are partially shaded or if some cells in the array are damaged. In this paper limitations of the conventional boost

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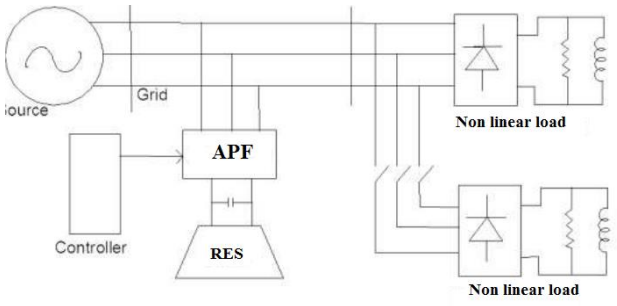

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The massy usage of the fossil fuels, such as the coal, the gas and the oil, result in grave conservatory effect and pollute the surrounding, which has great effect the globe. Mean while, there is a big contradiction between the fossil fuels supply and the global energy claim, which leads to a high oil price in the world market recently. The major restrictions for the human development are energy deficiency and the atmosphere pollution. Photo Voltaic (PV) sources are one of the considerable players in the world's energy portfolio and will become the biggest contributions to the electricity generation among all renewable energy candidates by year 2040 because of it is clean, emission-free renewable energy technology with high reliability.

The task of a Maximum Power Point Tracker (MPPT) in a PV energy conversion system is to continuously tune the system so that it draws maximum power from the solar array regardless of weather or load conditions. while the solar array has a non idyllic voltage– current characteristic and the conditions such as ambient temperature, insulation and wind that change the output of the solar array are changeable, the tracker must contend with a nonlinear and time-varying scheme. A lot of tracking algorithms and techniques has been developed. The perturb and observer method [1] and the Incremental Conductance method as well as variants of those techniques [3, 4] are the most widely used. The Perturb and Observer method is known for its simple implementation.

However when weather rapidly changes the perturb and observer method fails to track the maximum power point successfully [4, 5].The MPP tracking method using the short circuit current of the PV module exploits the fact that the operating current at the MPP of the solar array is linearly proportional to its current of short circuit [7]. Thus, under rapidly varying atmospheric conditions. For tracking the MPP this method has a fast response time. However, the control circuit is motionless somewhat complicated and both the conduction loss and the cost of the MPPT converter are still relatively high [5].Furthermore, the assumption that the operating current at the MPP of the PV module is linearly proportional to the short circuit current of the PV module is only an approximation [13].Application of this technique always results in PV module operation below the maximum power point. Open circuit voltage of the PV module [5, 8] employs the information that the open circuit voltage of the solar array at the MPP is linearly proportional to its open circuit voltage [8].

Even though the method is cost efficient, its application results inconsiderable errors in MPP tracking and consequential energy losses. In addition, both the open circuit voltage and the short circuit current of PV module techniques fail to track the MPP effectively if solar array cells are partially shaded or if some cells in the array are damaged. In this paper limitations of the conventional boost

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Simulation and Analysis of DFIG System with Wind Turbine Implementing Fuzzy Logic Control

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Abstract: ***A doubly-fed induction generator (DFIG) applied to wind power generation driven by wind turbine is under study for low voltage ride-through application during system unbalance. Use of DFIG in wind turbine is widely spreading due to its control over DC voltage and active and reactive power. Conventional dq axis current control using voltage source converters for both the grid side and the rotor side of the DFIG are analyzed and simulated. An improved control and operation of DFIG system under unbalanced grid voltage conditions by coordinating the control of both the rotor side converter (RSC) and the grid side converter (GSC) is done in this thesis. Simulation and analysis of DFIG system with wind turbine using Fuzzy logic controller for RSC and GSC under unbalanced condition is presented in the positive synchronous reference frame. The common DC-link voltage is controlled by grid side converter and control of DFIG's stator output active and reactive power is controlled by rotor side converter. The steady-state operation of the DFIG and its dynamic response to voltage sag resulting from a remote fault on the 120-kV system is shown in this thesis using controllers. Modeling of DFIG system under Fuzzy logic controller to control voltage and active-reactive powers is done using MATLAB/SIMULINK.***

Keywords: ***doubly-fed induction generator (DFIG), rotor side converter (RSC), grid side converter (GSC).***

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I. INTRODUCTION

Wind imperativeness is one of the maximum open and exploitable types of value-effective power source. Wind blows from a location of better air weight to one of the decrease herbal weight. The qualification in weight is performed by using:

(A) How international's surface isn't reliably warmed via the sun and

(B) The arena's insurgency.

The worldwide electric powered essentialness is growing and there may be a reliable growing of the passion on electricity age, transmission, scattering and use. The most exquisite extractable essentialness from the zero-100m layer of air has been assessed to be the solicitation for 1012 KWh/annum, that is of a similar solicitation as hydroelectric capacity. Because of the fact most dependable recorded facts, wind power has been used to move ships, weigh down grain and siphon water. This is the affirmation that breeze essentialness become used to stress barges along the Nile River as mid 5000 B.C. Interior multiple masses of years earlier than Christ; direct windmills were used in china to siphon water. In the u.S., endless windmills have been raised as the American West turned into made throughout the late 19th century. Maximum of them had been used to siphon water for houses and ranches. By way of 1900, minimum electric powered powered breeze structures have been made to create motion, yet a huge section of those gadgets crash and burn into push aside as realistic system power modified into prolonged to not unusual domains throughout the nineteen Thirties. Via 1910, wind turbine mills were conveying power in numerous ecu nations. Wind generators are to be had in an expansion of duration, and thusly manipulate exams. The greatest machine, as an example, the best understood Hawaii, has propellers that range the extra than the period of a soccer challenge and stands 20 constructing memories immoderate, and conveys sufficient potential to control 1400 houses. A little home-sized breeze machine has rotors some location inside the scope of 8 and 25 ft in separation crosswise over and stands upwards of 30 feet and may deliver the electricity desires of an all-electric powered domestic or privately owned organisation. All electric powered powered-making wind turbines, paying little appreciate to what period, are contained or three essential portions: (the part that honestly turns inside the breeze), the electric generator, a speed manage form, and an apex. A few wind device have guard shutdown shape in order that if part of the device crashes and burns,

Improvement of power Quality by using Dynamic Voltage Restorer Based Super capacitor for Industrial Applications

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Abstract: In modern power distribution systems power quality is considered as a major factor. For the fulfillment of industrial goals, modern industries are looking forward for new innovative technologies. The key requirement in any utility work is a disturbance free continuous power supply. The high quality power generated at the power stations are not delivered in the same form at the utility centers. This is mainly because of the widespread use of power electronic devices which introduced harmonics and other nonlinearities to the systems. The paper describes the application of super capacitor energy storage system for induction traction drive test bench that replaces a real electric public transport for performing testing and researches. The suitability and usage of such bench for research purposes is explained and the importance of the development of software mathematical model for performing simulations to be done before physical implementation measures is reasoned. The working principle of the bench and applied components are described. A virtual model of the bench was built and simulations were performed using Matlab/Simulink software. This concept results shows the superiority of the developed topology in voltage compensation capability and reliability. The proposed DVR has provided a regulated and sinusoidal voltage across the sensitive load.

I INTRODUCTION

Power Quality issues within the current distribution system area unit addressed within the literature [1], due to the hyperbolic use of sensitive and important items such as communication network, method industries and precise manufacturing process. In [1], the authors propose the usage of the DVR with reversible energy storage at the dc-terminal to meet the active power needs of the grid during power injection into the grid, authors also mention voltage disturbances. So as to avoid and minimize the active power injection into the grid, authors also mention an alternate solution that is to compensate for the voltage sag by inserting a lagging voltage.

The DVR can regulate the load voltage from the problem such as sag-swell, harmonics in the load voltages. Hence, it can protect the critical consumer loads from tripping and consequent losses. The custom power devices area unit developed and put in at consumer point to meet the power quality standards like IEEE [1]. Renewable energy generation is growing quick and ideas like smart grid are trying to change the role of consumer from being a passive consumer to an active contributor who can supply stored excess power in various DERs such as wind, solar, hybrid electric vehicles (HEVs) and plug- in hybrid vehicle (PHEVs) back to the distribution grid or the micro grid. Of all the energy storage technologies, SCAPs have low energy density, high power density and fast charge/discharge characteristics. They even have additional charge/discharge cycles and higher terminal voltage per module when put next to batteries, of these characteristic make SCAPs ideal choice for providing support to events on the distribution grid that require high power for brief spans of your time. SCAPs have historically been restricted to regenerative braking and alternative energy smoothing applications.

The major contribution of this treatise is in integration SCAP for a broader range of application like active/reactive power support, , renewable intermittence smoothing, voltage sag/swell compensation and power quality conditioning to the distribution grid. Renewable intermittence smoothing is associate degree application which needs to bidirectional transfer of power from the grid to the SCAPs and vice-versa by charging and discharging the SCAP. This application needs high active power support within the 10s-3min continuance which may be achieved by integrating SCAPs through a shunt active power support in the 3s-1min time scale which can be provided integrating SCAP into the grid through series dynamic voltage restorer (DVR). All the on top of functional- ties can also be provided by integrating the SCAP into an influence conditioner topology.

Energy storage integration to a DVR into the distribution grid is planned and the following application areas are addressed.

DVR is basically a voltage source inverter which is connected in series between the supply and a critical

Electronic Soft Start of Three Phase Induction Motor

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ABSTRACT

The project is designed to provide a soft and smooth start to a 3-phase induction motor. The three-phase induction motor during the initial starting condition draws up much higher current than its capacity and the motor instantly reaches the full speed. This results in a mechanical jerk and high electrical stress on the windings of the motor. Sometimes the windings may get burnt. The induction motor should start smoothly and gradually catch up the speed for a safer operation. This project is designed to give a soft start to the induction motor based on the SCR firing triggered by heavily delayed firing angle during starting and then gradually reducing the delay till it reaches zero voltage triggering. This results in low voltage during start and then gradually to full voltage. Thus the motor starts slowly and then slowly picks up to fullspeed.

***Key Words*—SCR triggering; IGBT; Firing angle delay; opto isolators; opto couplers; zerovoltage triggering; motor current control**

1.INTRODUCTION

The project is designed to provide a soft and smooth start to a 3-phase induction motor. The three-phase induction motor during the initial starting condition draws up much higher current than itscapacity and the motor instantly reaches the full speed. This results in a mechanical jerk and high electrical stress on the windings of the motor. Sometimes the windingsmay get burnt. The induction motor should start smoothly and gradually catch up thespeed for a safer operation.

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This project consists of a six anti-parallel SCRs, two for each phase, the output of which is connected to a set of lamps representing the coils of a 3-phase induction motor.

he charging and discharging of capacitors is interfaced to comparators resulting in delayed firing pulses during start and then gradually reducing the delay till the motor runs at full speed. Output from the comparators is fed through opto-isolators to trigger the SCRs. Further the project can be enhanced by using IGBTs in place of SCRs with PWM control to reduce harmonic distortions encountered in SCR triggering mechanism.

2. EXISTING SYSTEM

soft starters of motors may offer a much variety of methods which are useful for controlling motor starting. Every soft starting method uses a different primary control parameter. Soft Start Method ParameterControlledPerformance ParameterInfluenced Time Voltage Ramp Voltage Start current, Start torque, Acceleration Constant Current Current Start current, Acceleration Torque Control Torque Start current, Acceleration Adaptive Acceleration Control Acceleration Start current, Acceleration Best results are obtained by selecting the soft

Railway Track Crack Detector Robot by Using LED-LDR

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Abstract— Transport is a key necessity for specialization that allows production and consumption of products to occur at different locations. Commercially, rail transport plays a vital role and it is one of the cheapest modes of transportation. India has the world's fourth largest railway network. Any problem in the railway network affects the economy at a greater pace and also leads to the loss of lives. One of the problems encountered is derailment due to the cracks in railway track. The principle problem has been the lack of cheap and efficient technology to detect the problems in rail tracks and lack of proper maintenance of rails which have resulted in the formation of cracks in the rails. When Ultrasonic sensor detected, robot off and GPS location send to authorized mobile via GSM. This project comprises of GPS, GSM, LED-LDR, Ultrasonic sensor and microcontroller based crack detection assembly which is cost effective and robust to facilitate better safety standards in railways. The system is designed to run along the centre of the track.

Index Terms--Railway cracks, ATMega328, GPS, GSM, LED-LDR Assembly, Ultrasonic sensor and Robot

(I) INTRODUCTION[1]

In general rail transport in India growing at a rapid pace, the associated safety infrastructure facilities have not kept up with the aforementioned proliferation. Our facilities are poor when compared to the international standards and as a result, we have been having frequent derailments that have resulted in severe loss of valuable human lives and also property. To demonstrate the gravity of the problem, statistics say that there have been 11 accidents in 2011 till the month of july alone, which leaves much to be desired regarding rail safety.

On further analysis of the factors that cause these rail accidents, recent statistics reveal that approximately 60% of all the rail accidents have derailments as their cause, of which about 90% is due to cracks on the rails either due to natural causes (like excessive expansion due to heat) or due to anti-social elements. These cracks and other problems with the rails generally go unnoticed due to improper maintenance and the currently irregular and manual track line monitoring that is being carried out in the current situation. The principal problem has been the lack of cheap and efficient technology to detect problems in the rail tracks and of course, the lack of proper maintenance of rails which have resulted in the formation of cracks in the rails and other similar problems caused by anti-social elements which past, this problem has lead to a number of derailments resulting in a heavy loss of life and property.

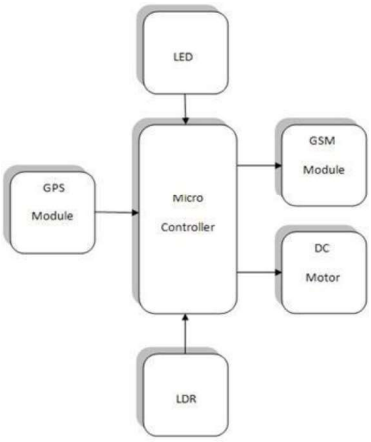

Figure 1. Block Diagram of Crack Detection System

Cracks in rails have been identified to be the main cause of derailments in the past, yet there have been no cheap automated solutions available for testing purposes. Hence, owing to the crucial repercussions of this problem, we have worked on implementing an efficient and cost effective solution suitable for large scale application. We hope that our idea can be implemented in the long run to facilitate better safety standards and provide effective testing infrastructure for achieving better results in the future.

(II) LITERATURE SURVEY

With the advent of powerful digital signal processors, Image Processing techniques [2] have been explored to formulate solutions to the problem of railway crack detection. Though it provides good accuracy, this method uses techniques like image segmentation,

SIMULATION OF SOLAR BASED FIVE LEVEL INVERTER FED WITH INDUCTION MOTOR DRIVE

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Abstract: This concept describes the Simulation and analysis of hybrid energy system consisting of wind and solar PV system. The wind and solar PV system are connected to the common load through DC/DC Boost converter. Generally, in low radiation PV array system inverter gives the lower voltage than the rated voltage which affects the power quality. It is overcome by using Battery Energy Storage System. In the stand-alone mode the converter needs to maintain constant voltage and frequency regardless of load imbalance or the quality of the current, which can be highly distorted, if the load is nonlinear. Simulation results show that the proposed hybrid system has the potential to meet the electricity demand of an isolated system. This concept has described a hybrid energy system with variable speed wind generation, photovoltaic system with power electronic interface under stand-alone mode. In the stand-alone mode the performance of the system is evaluated for various wind speeds and various irradiation levels and the performance was analyzed. Due to variations in wind speed and solar irradiation AC voltage varies. Battery system is used to maintain the balance between the source and load. This can be extended for Induction Motor drive Application i.e, Modeling and Simulation of Solar PV Wind Hybrid System for Induction Motor Drive Application.

Keywords-- Renewable energy, photovoltaic, Wind energy conversion system, hybrid energy system, inverter

I INTRODUCTION

Due to the critical condition of industrial fuels which include oil, gas and others, the development of renewable energy sources is continuously improving. This is the reason why renewable energy sources have become more important these days. Few other reasons include advantages like abundant availability in nature, eco-friendly and recyclable. Many renewable energy sources like solar, wind, hydrel and tidal are there. Among these renewable sources solar and wind energy are the world's fastest growing energy resources. With no emission of pollutants, energy conversion is done through wind and PV cells. Day by day, the demand for electricity is rapidly increasing. But the available base load plants are not able to supply electricity as per demand. So these energy sources can be used to bridge the gap between supply and demand during peak loads. This kind of small scale stand-alone power generating systems can also be used in remote areas where conventional power generation is impractical. In this paper, a wind-photovoltaic hybrid power generation system model is studied and simulated. A hybrid system is more advantageous as individual power generation system is not completely reliable. When any one of the system is shutdown the other can supply power [1]. The entire hybrid system comprises of PV and the wind systems. The PV system is powered by the solar energy which is abundantly available in nature. PV modules, maximum power point tracing systems make the PV energy system. The light incident on the PV cells is converted into electrical energy by solar energy harvesting means. The maximum power point tracking system is used, which extracts the maximum possible power from the PV modules. The Wind turbine, gear box, generator and an AC – DC converter are included in the wind energy system. The wind turbine is used to convert wind energy to rotational mechanical energy and this mechanical energy available at the turbine shaft is converted to electrical energy using a generator. To coerce the maximum power from wind system we used a maximum power point tracing system. [2]

Photovoltaic cell is the building block of the PV system and semiconductor material such as silicon and germanium are the building block of PV cell. Silicon is used for photovoltaic cell due to its advantages over germanium. When photons hit the surface of solar cell, the electrons and holes are generated by breaking the covalent bond inside the atom of semiconductor material and in response electric field is generated by creating positive and negative terminals. When these terminals are connected by a conductor an electric current will start flowing. This electricity is used to power a load. A single cell generates very low voltage (around 0.4), so more than one PV cells can be connected either in serial or in parallel or as a grid (both serial and parallel) to form a PV module. A photovoltaic array is simply an interconnection of several PV modules in serial and/or parallel. The power generated by individual modules may not be sufficient to meet the requirement of trading applications, so the modules are secured in a grid form or as an array to gratify the load demand.

Generally a wind turbine consists of a set of rotor blades rotating around a hub, a gearbox-generator set placed inside the nacelle. Based on axes the wind turbines are categorized into two kinds: the

Power Quality Improvement in Distribution System using D-STATCOM in Transmission Lines

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Abstract— A Power quality problem is an occurrence manifested as a nonstandard voltage, current or frequency that results in a failure or a mis-operation of end user equipments. Utility distribution networks, sensitive industrial loads and critical commercial operations suffer from various types of outages and service interruptions which can cost significant financial losses. With the restructuring of power systems and with shifting trend towards distributed and dispersed generation, the issue of power quality is going to take newer dimensions. In developing countries like India, where the variation of power frequency and many such other determinants of power quality are themselves a serious question, it is very vital to take positive steps in this direction. The present work is to identify the prominent concerns in this area and hence the measures that can enhance the quality of the power are recommended. This paper presents the enhancement of voltage sags/swell; harmonic distortion and low power factor using Distribution Static Compensator (D-STATCOM). The model is based on the Voltage Source Converter (VSC) principle. The D-STATCOM injects a current into the system to mitigate the voltage sags/swell to improve harmonic distortion and low power factor. The simulations were performed using MATLAB SIMULINK version R2009b.

Keywords: Transmission Lines, D-STATCOM

I. INTRODUCTION

An electric distribution system is part of an electric system between the bulk power source or sources and the consumer's service switches. The bulk power sources are located in or near the load area to be served by the distribution system and may be either generating stations or power substations supplied over transmission lines. Distribution systems can, in general, be divided into six parts, namely, sub transmission circuits, distribution substations, distribution or primary feeders, distribution transformers, secondary circuits or secondary's, and consumer's service connections and meters or consumer's services. One of the most common power quality problems today is voltage sag/swell. It is often set only by two parameters, depth/magnitude and duration. The voltage sag/swell magnitude is ranged from 10% to 90% of nominal voltage and with duration from half a cycle to 1 min. In a three phase system voltage sag is by nature a three-phase phenomenon, which affects both the phase-to-ground and phase-to-phase voltages. Voltage sag is caused by a fault in the utility system, a fault within the customer's facility or a large increase of the load current, like starting a motor or transformer energizing. Typical faults are single-phase or multiple-phase short circuits, which leads to high currents. The high current results in a voltage drop over the network impedance. At the fault location the voltage in the faulted phases drops close to zero, whereas in the non-faulted phases it remains more or less unchanged.

Voltage sags are one of the most occurring power quality problems. For an industry voltage sags occur more often and cause severe problems and economical losses. Utilities often focus on disturbances from end-user equipment as the main power quality problems. Harmonic currents in distribution system can cause harmonic distortion, low power factor and additional losses as well as heating in the electrical equipment. It also can cause vibration and noise in machines and malfunction of the sensitive equipment. There are different ways to enhance power quality problems in transmission and distribution systems. Among these, the D-STATCOM is one of the most effective devices. A new PWM-based control scheme has been implemented to control the electronic valves in the D-STATCOM. The D-STATCOM has additional capability to sustain reactive current at low voltage, and can be developed as a voltage and frequency support by replacing capacitors with batteries as energy storage. To enhance the power quality such as voltage sags/swell, harmonic distortion and low power factor in distribution system.

II. VOLTAGE SOURCE CONVERTER (VSC)

A voltage-source converter is a power electronic device, which can generate a sinusoidal voltage with any required magnitude, frequency and phase angle. Voltage source converters are widely used in adjustable-speed drives, but can also be used to mitigate voltage dips. The VSC is used to either completely replace the voltage or to inject the 'missing voltage'. The 'missing voltage' is the difference between the nominal voltage and the actual. The converter is normally based on some kind of energy storage, which will supply the converter with a DC voltage. The solid-state electronics in the converter is then switched to get the desired output voltage. Normally the VSC is not only used for voltage sag/swell mitigation, but also for other power quality issues, e.g. flicker and harmonics.

III. ENERGY STORAGE CIRCUIT

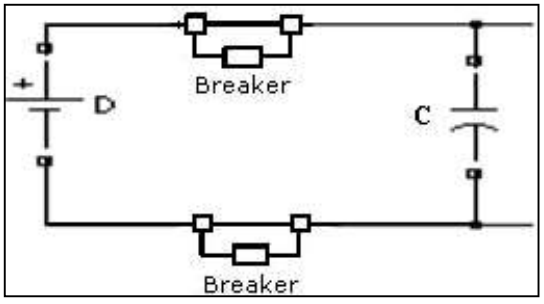

Fig. 3.1: Circuit Diagram of DC Storage

A DC Converter With Battery Energy Storage for Hybrid Electric Vehicle

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Abstract **–**Now a day's electric vehicles are becoming alternatives for sustainable and cleaner energy emissions in transportation. This project deals with the modeling and simulation of a basic dc converter is designed and the energy storage system. The electrical vehicles have become more important in the future. The proposed converter will be operating in an exceedingly buck mode and boost mode with two directional power flow control. Moreover the whole work is designed and simulated by using MATLAB/SIMULINK.

Key Words **–** Bidirectional dc/dc converter (BDC), dual battery storage, hybrid electric vehicle (HEV).

1. INTRODUCTION

The World progress technology, an increasing amount of energy is consumed. Increasing the efficiency of primary energy consumers provides a potential offset to the increasing in energy consumption. In the future the hybrid electric vehicles are the most important. In the conventional internal combustion as the source of energy for the driving purpose. Moreover, conventional IC engine vehicles emit carbon dioxide and various green house gases by making it harder to satisfy the environmental. EV does not emit pollutant like particulates, ozone, volatile organic compounds, carbon monoxide, hydrocarbons, lead and oxides of nitrogen which plays a vital role in air pollution and green house gas Moreover fossil fuel issue it can be minimized.

If the operating properties of the vehicle including HEV, FCV, and more electric vehicles. The hybrid electric vehicles are the most important and they are future for us.

The Energy consumption is growing every day as shown in the fig.1 if the energy is growing day to day then the efficiency is also increases. As per the diagram the energy is increased in Non-organized economic development corporation's countries but still the energy is improved in organized economic corporation's development countries. By using of the hybrid vehicle in the future we are increasing the energy and to increase the consumer products then automatically increase the efficiency.

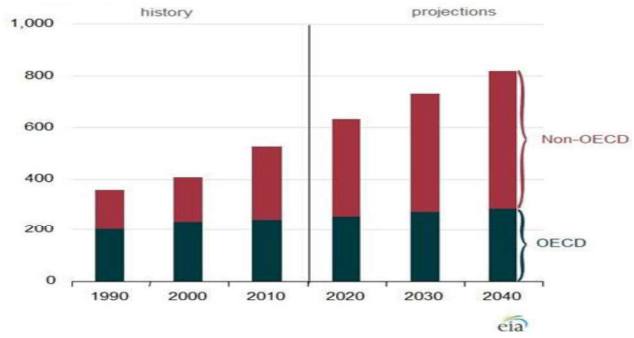

Fig1. World Energy Consumption

Each sector shows that how much energy we are consumed. If the energy is used in many purposes, most of the energy is used in transportation purposes. Some of the energy is used in petroleum, and natural gases are comes from conventional energy resources. Most of the energy is comes from the non-conventional energy resources which would decrease the petroleum consumption and fuel economy of the electric vehicles. By using the hybrid electric vehicle reduce the pollutants like co2 and toxic emissions and some of the dangerous gases. We have to increase the energy and overall efficiency is increased.

The diagram for a fuel cell/hybrid vehicle is as shown in fig. 2. We have to use two energy sources they are main energy sources and auxiliary energy sources. The fuel cell and super capacitor is connected to dc-dc converter, and it is connected in to the driving inverter to the motor. The fuel cell is used as the main energy source. The fuel cell is given to the dc converter and it is converted in to the sufficient dc voltage this will be given to the dc-bus to the driving inverter and this is converted into the required dc-voltage. This voltage is given to the motor this will run the vehicles. This will be managing the energy levels of the electric vehicles and hybrid electric vehicles. We have to reduce the pollution by using of the hybrid vehicle . In the future hybrid electric vehicle comes every one is use for the vehicle and we have to reduce the cost.