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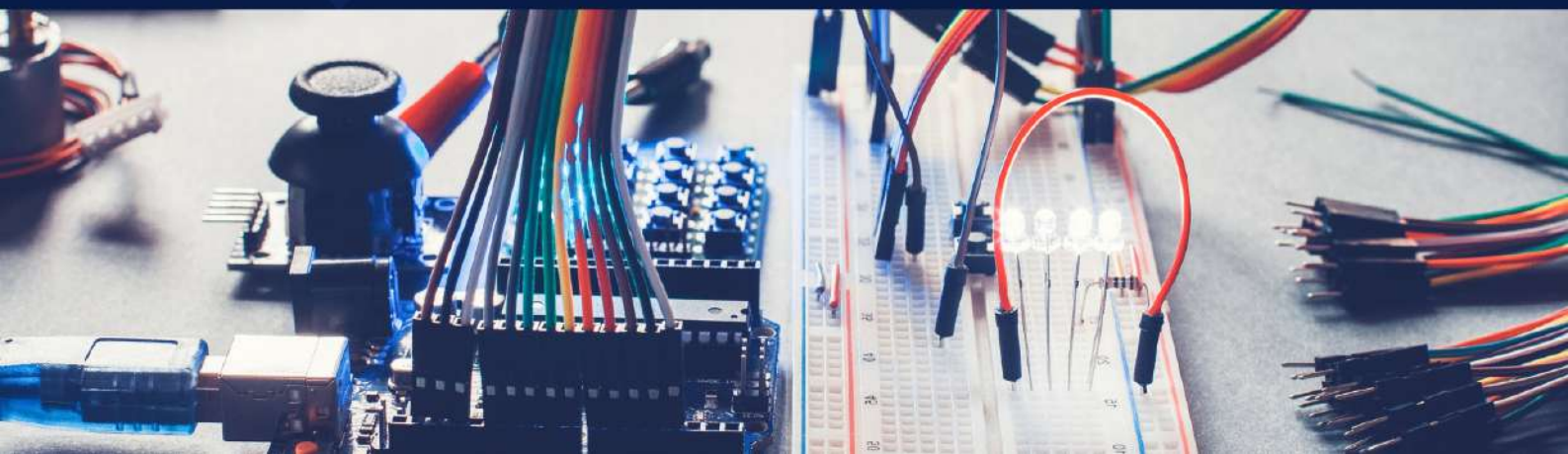

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Contents

DESIGN OF AN ON-LINE ELECTRIC VEHICLE HIGH-POWER TRANSFER PICKUP

Abinaya G, Muthu Priya M, Sutha R, Thangasakthi T

Abstract: Recent electric vehicle technology with battery has faced many problems: high cost, weight, driving distance, long charging time and danger of electric shock. An inductive power transfer pickup for electric vehicles such as pickup of traditional transformer enables electric vehicles to overcome these problems by using contactless power transfer. Also, inductive power transfer pickup has many advantages including high efficiency, high power, a large air gap and lightweight. In this paper, proposed inductive power pickup was developed using series capacitor with ferrite cores and multi-windings and was tested for its ability to transfer electricity wirelessly. When tested for output power and efficiency of pickup, output power of 20kW and efficiency of 86.7% were achieved at 20 kHz and 250mm air gap.

DC RAPID AND BIDIRECTIONAL CHARGER FOR ELECTRIC VEHICLES

Sakthi Ganesh R V, Govindhan K, Ashok R, Ponselvan V

Abstract: Increase in electric vehicle mobility has encouraged the growth of vehicle to grid technology. Vehicle to grid technology allows bidirectional power flow between the battery of electric vehicle and the power grid. This allows peak load shaving, load leveling, voltage regulation and improvements of power system stability. Implementation of the vehicle to grid technology requires dedicated electric vehicle battery charger, which allows bidirectional power flow between power grid and electric vehicle battery. In this paper, a new control strategy for bidirectional battery charger is proposed. The proposed control strategy can charge and discharge an electric vehicle battery in both slow and fast mode. The performance of the bidirectional controller is verified by simulation in PSCAD/EMTDC software under different operating modes, which include fast charging, fast discharging, slow charging and slow discharging. The results show that the proposed control strategy performs well in all four modes.

FULL-PERFORMANCE PLUG-IN HYBRID ELECTRIC VEHICLES

Pravin B, Prathees P, Naveen Prabhakar, Gopakumar S

Abstract: With increasing concern over the environment and ever-stringent emissions regulations, the electric vehicle has been investigated as an alternative form of transportation. However, the electric vehicle suffers from relatively short range and long charging times and consequently has not become an acceptable solution to the automotive consumer. The addition of an internal combustion engine to extend the range of the electric vehicle is one method of exploiting the high efficiency and lack of emissions of the electric vehicle while retaining the range and convenient refueling times of a conventional gasoline powered vehicle. The term that describes this type of vehicle is a hybrid electric vehicle. Many configurations of hybrid

electric vehicles have been designed and implemented, namely the series, parallel and power-split configurations. This paper describes parallel hybrid electric vehicles that are battery dominant and have the ability to externally recharge from the wall socket. Both component selection and control strategy is discussed. Additionally, a definition of the degree of hybridization, or a description of the relative size of the electric motor to the internal combustion engine is presented. Finally the discussion will illustrate that an increasing degree of hybridization leads to higher overall vehicle efficiency, namely fuel and energy economy.

MAKING AN 'ALL-PURPOSE' ELECTRIC VEHICLE

Vijitha E, Santhiya S, Subithra C, Nithya S

Abstract: Electric vehicles (EVs) are a promising technology for achieving a sustainable transport sector in the future, due to their very low to zero carbon emissions, low noise, high efficiency, and flexibility in grid operation and integration. This chapter includes an overview of electric vehicle technologies as well as associated energy storage systems and charging mechanisms. Different types of electric-drive vehicles are presented. These include battery electric vehicles, plug-in hybrid electric vehicles, hybrid electric vehicles and fuel cell electric vehicles. The topologies for each category and the enabling technologies are discussed. Various power train configurations, new battery technologies, and different charger converter topologies are introduced. Electrifying transportation not only facilitates a clean energy transition, but also enables the diversification of transportation's sector fuel mix and addresses energy security concerns. In addition, this can be also seen as a viable solution, in order to alleviate issues associated with climate change. Furthermore, charging standards and mechanisms and relative impacts to the grid from charging vehicles are also presented.

CALCULATING COOLING LOAD FOR AN ELECTRIC VEHICLE WITH A COMPOSITE BODY USING THE CLTD/SCL/CLF METHOD

Nanthini N, Nanthini B, Pavithra A, Nabisha A

Abstract: This paper presents cooling load calculation for SmarT EV.2 electric vehicle using CLTD/SCL/CLF method. SmarT EV.2 is National Electric Vehicle using electric motor as power and composite materials as the body developed by Sebelas Maret University. Steady state cooling load includes as major contributors, conduction, radiation, metabolic, ventilation, and air conditioning load. The result indicates that peak cooling load can be occured when vehicle runs to west direction, which total amount 2080.53 watts.

BRUSHLESS PERMANENT-MAGNET DRIVES FOR ELECTRIC AND HYBRID ELECTRIC VEHICLES

Esai Sangeetha T, Monisha M, Sadhana S, Amutha Priya N

ABSTRACT: With ever-increasing concerns on our environment, there is a fast growing interest in electric vehicles (EVs) and hybrid EVs (HEVs) from automakers, governments, and customers. As electric drives are the core of both EVs and HEVs, it is a pressing need for researchers to develop advanced electric-drive systems. In this paper, an overview of permanent-magnet (PM) brushless (BL) drives for EVs and HEVs is presented, with emphasis on machine topologies, drive operations, and control strategies. Then, three major research directions of the PM BL drive systems are elaborated, namely, the magnetic-geared outer-rotor PM BL drive system, the PM BL integrated starter-generator system, and the PM BL electric variable-transmission system.

VEHICLE CONCEPT TRENDS AND KEY TECHNOLOGY ADVANCEMENTS FOR HYBRID AND BATTERY ELECTRIC VEHICLES

Sangeetha U, Sindhu H, Shyni R, Jabash Samuel G K

Abstract:
This paper examines the state-of-the-art and trends in vehicle concept as well as key technology development in the context of electric mobility in a time frame from 2002 until 2012. Thus, an extensive vehicle concept database was designed, covering detailed technical specifications of more than 200 electrified vehicles in 3 different world regions, also considering different stages in vehicle development. By analyzing and comparing over 75 different market- and technology-oriented parameters per vehicle, sophisticated statements for the state-of-the-art and development trends of Hybrid and Battery Electric Vehicles are identified. Results in this paper illustrate trends for Hybrid and Battery Electric Vehicle concept development with a focus on vehicle development stages, vehicle segments and powertrain architectures. On the other hand, state-of-the-art and trends for the development of two electric mobility key technologies are pointed out: Batteries and electric machines. Statements here are made for developments in terms of battery and electric machine technology, installation place, as well as technical parameters like energy capacity and power density. Key results illustrate e.g. a trend towards the use of front and rear axle motors, a more than doubled average electric machine power density with over 1,0kW/kg and an average BEV battery capacity of 19Wh per kg vehicle mass in 2012.

A METHOD FOR ANALYSING DRIVER INFLUENCE ON ELECTRIC VEHICLE ENERGY CONSUMPTION AND POWER REQUIREMENTS.

Rahul Baluji R, Rajan M, Manoj Khanna K, Basker C

Abstract: The energy consumption and power needs of electric vehicles are evaluated on roller test benches according to test procedures defined by legal standards and by vehicle manufacturers. These test procedures are mainly defined by driving cycles and include tolerances to compensate for the human error during these tests. These tolerances may seem to make the tests easier but they can have a big effect on the appropriate dimensioning of the components, and also on the performance of the vehicle. Within this paper, a method is presented, which enables the quantification of these effects depending on the type of the test procedure, and the way the driving cycle is driven. The developed method has been tested in a simulation environment and several standard test procedures were analyzed.

KEY ISSUES IN THE LIFE CYCLE ASSESSMENT OF ELECTRIC VEHICLES — INTERNATIONAL ENERGY AGENCY (IEA) FINDINGS ON HYBRID AND ELECTRIC VEHICLES (HEV)

Paul Daniel A, Karthik R, Karthikeyan M, Murugan G

Abstract: Electric vehicles have the potential to substitute for conventional vehicles and to contribute to the sustainable development of the transportation sector worldwide, e.g. reduction of greenhouse gas and particle emissions. There is an international consensus that the improvement of the sustainability of electric vehicles can only be analysed on the basis of life cycle assessment (LCA) including the production, operation and the end of life of the vehicles. Based on LCA activities in the 17 member countries, the International Energy Agency (IEA) Implementing Agreement on Hybrid and Electric Vehicles (IA-HEV) works in a Task on the LCA of electric vehicles. In this Task 19 “Life Cycle Assessment of Electric Vehicles — From raw material resources to waste management of vehicles with an electric drivetrain” the key issues of applying LCA to EVs&HEVs are identified and applied in various case studies. The following seven categories of key issues were identified, analysed and applied in “best practice” applications: 1) General issues, 2) Life cycle modelling, 3) Vehicle cycle (production — use — end of life), 4) Fuel cycle (electricity production), 5) Inventory analyses, 6) Impact assessment and 7) Reference system. For these seven key issues the main relevant factors were identified, reviewed and verified in international “best practice” applications.

COMBUSTION-ENGINED AUTORICKSHAWS REPLACED BY ELECTRIC 3-WHEELERS

Vaibhav S, Vijay B, Suresh Kumar N, Sam Harison D

Abstract: Retrofitting is nowadays a buzz word, it means the addition of new technology or customization and features of older systems. Retrofitting is considered in most of the vehicles because in upcoming years all the transportation of vehicles will be electrically driven. Due to currently use of fossil fuels based on IC engines cannot be thrown out of the system. In a country like India, Auto rickshaw is mostly used as public transportation which can be retrofitted electrically. This retrofitted Auto rickshaw will have similar seating capacity and design as the conventional Auto rickshaw. The dynamics of auto rickshaw, e rickshaw, and retrofitted auto rickshaw has been studied out. Hence, the retrofitted vehicle can be light weighted and automized further. Due to this concept of reducing, recycling, and reusing can be implemented in this sector and that will be a huge benefit to the environment. This paper presents the feasibility study of retrofitting of auto rickshaw to e-rickshaw

DC-DC CONVERTERS FOR USE IN ELECTRIC VEHICLES

Run J. Balaji S, Sherin Raj Thangappa D, Padma Kumar R

Abstract: An integral part of any modern day electric vehicle is power electronic circuits (PECs) comprising of DC-AC inverters and DC-DC converters. A DC-AC inverter supplies the high power electric motor and utility loads such as air-conditioning system, whereas a DC-DC converter supplies conventional low-power, low-voltage loads. However, the need for high power bidirectional DC- DC converters in future electric vehicles has led to the development of many new topologies of DC-DC converters. This paper presents an overview of state-of-the-art DC-DC converters used in battery electric vehicles (BEVs), hybrid electric vehicles (HEVs), and fuel cell vehicles (FCVs). Several DC-DC converters such as isolated, nonisolated, half-bridge, full-bridge, unidirectional and bidirectional topologies, and their applications in electric vehicles are presented.

HYBRID ELECTRIC VEHICLE CHARGER MODELING

Vetha Jebarson R, Vignesh P, Abeesh R, Jibin M

Abstract: The Plug in Hybrid Electric Vehicles are driven by the energy stored in the battery. Through conductive AC charging method, Electric vehicle supply equipment (EVSE) is connected to Electric vehicle(EV) for charging the battery. Apart from charging it can also help in creating trustworthy equipment ground track and exchange control data among EV and EVSE. This paper discusses electrical and physical interface between EV and EVSE to

facilitate conductive charging and design of an on-board charger for fast charging of the hybrid electric vehicle. The aim of this project is to design interfacing system between EV and EVSE as per automotive industry standard and to design prototype of 3.45 kw on-board charger using Matlab software. By modelling the charger, charging of Li-ion battery can be done which is used for providing propulsion torque and through various stages of charger voltage and current level is controlled and make them desired for charging.

AGAINST NON-OPTIMAL V2X COMMUNICATION, INTEGRATED VEHICLE-FOLLOWING CONTROL FOR FOUR-WHEEL-INDEPENDENT-DRIVE ELECTRIC VEHICLES

Aromal S, Aromal B V, Athiram S, Sanju S

Abstract: Connected and automated vehicles (CAVs) have attracted tremendous interests worldwide. Four-Wheel-Independent-Drive Electric Vehicles (FWID EVs) have the potential of improving vehicle handling performance and energy consumption. In this paper, an integrated vehicle-following control scheme for FWID EVs with Vehicle-to-Everything (V2X) communication capability is proposed to account for nonideal communication such as time-varying delays and packet dropouts. A packet dropout compensator is put forward to compensate for V2X information loss. A longitudinal controller with a delay compensator is then synthesized and integrated with a lateral model predictive controller to enable vehicle-following control. The stability of the proposed controller is validated theoretically and experimentally under comprehensive driving scenarios through Hardware-In-the-Loop tests. The results demonstrate that the proposed controller has good vehicle-following performance against nonideal V2X communication. This attests to its competency for being used in vehicle platoon control.

SWITCHED ROBUST CONTROL OF ELECTRIC VEHICLE REGENERATIVE BRAKING

Arumugam E, Ankith Anil, Akhil S Nair, Jeyakumar P

Abstract: The robust control of regenerative braking of electric vehicles is presented based on the switched system theory in this paper. The continuous state variables and discrete-event state variables included in the regenerative braking system are determined by analyzing the vehicle braking process. And after considering a certain parameter perturbation of electrical components, input voltage or current and also the impact of automotive load variation, mechanical size error and usage wear, the regenerative braking is described as a class of parameter uncertain switched system with external disturbance. Then the model of regenerative braking is constructed. Its stability is analyzed and the switching control law is researched by using the Lyapunov function method. Simulation results show that the switching control of regenerative braking is stable, robust and with $H\infty$ disturbance attenuation level γ.

RECREATIONAL VEHICLE MODELLING AND SIMULATION FOR ELECTRIC AND HYBRID CARS

Amsha Devi S C, Anushiya P, Rekha R, Amutha Priya N

Abstract: This paper presents a modeling and simulation of three different vehicles topologies (electric vehicle, series hybrid electric vehicle and parallel hybrid electric vehicle) using the ADVISOR (ADvanced VehIcle SimulatOR). An accurate evaluation of the performance of a hybrid electric vehicle, as well as of its consumption and pollution level, requires a dynamic analysis of its behavior. Two kinds of simulation tools for electric and hybrid electric vehicles exist: steady state and dynamic tools. Tools using steady-state models are appropriate for system-level analysis, whereas tools that use dynamic models allow for information about the sublevel components behavior. An accurate evaluation of the vehicle performance requires a dynamic model that includes many components such as its electric motor, its batteries, its generator, and its combustion engine. In a first step, the vehicle components are sized, using a power flow analysis, to meet the requirements of energy and power of a typical "recreational vehicle". In a second step, simulation results are presented and discussed to evaluate complexity, emission and consumption.

CHARACTERISTICS OF ELECTRIC VEHICLE CHARGING NETWORK DEVELOPMENT

Muthulakshmi M, Muthulakshmi S, Sivaranjani E, Nithya S

Abstract: In recent years, the number of electric vehicles in China has continued to rise, and the charging network for electric vehicles has developed rapidly. This paper studies the development characteristics of the electric vehicle charging network business market and forms a charging network policy environment that includes national and local policies. Then, use policy tools and divide policy tools into supply, environment and demand. Finally, based on the policy influence from the perspective of policy tools, the corresponding development suggestions are put forward.

An Enhanced Motion Control for Distributed Drive Electric Vehicle with Cyber-Physical Uncertainty Tolerance

Siva M, Siva Balan T, Santhosh K, Thangasakthi T

Abstract:A lateral motion control scheme for a distributed drive electric vehicle is presented in this paper, which takes into account both in-car network and movement-parameter uncertainty in a synthetic manner. Distributed drive vehicles have obvious advantages in terms of safety and comfort at high speeds due to the well-known E/E architecture, which includes an in-vehicle network, advanced vehicle motion control, and Advanced Driver Assistance

System (ADAS) technologies. This is a fundamentally cyber-physical system. However, on the other hand, the application/insertion of in-vehicle network and the dynamic of wide-range varying speeds introduce additional system uncertainties, such as time-varying network induced delays and inevitable system perturbation, making controller design a difficult problem and even making the system unstable. This paper develops a cyber-physical control scheme and under which a two-process perturbation analysis is proposed to illustrate the system uncertainties. A hierarchical control strategy is also devised, with an upper-level gain-scheduling controller dealing with speed perturbation uncertainties and a lower-level H∞ - LQR controller dealing with in-vehicle network uncertainty. Using real-time hardware in loop testing, the suggested control technique was found to be effective in dealing with both in-vehicle network and system perturbation problems while also ensuring reliable vehicle stability in all three scenarios.

VEHICLE-TO-HOME, VEHICLE-TO-VEHICLE, AND VEHICLE-TO-GRID TECHNOLOGIES: OPPORTUNITIES AND CHALLENGES

Sharan Jeba Malar I, Valarmathi M, Sabeena S, Nabisha A

Abstract: Electric vehicles (EVs) are regarded as one of the most effective tools to reduce the oil demands and gas emissions. And they are welcome in the near future for general road transportation. When EVs are connected to the power grid for charging and/or discharging, they become gridable EVs (GEVs). These GEVs will bring a great impact to our society and thus human life. This paper investigates and discusses the opportunities and challenges of GEVs connecting with the grid, namely, the vehicle-to-home (V2H), vehicle-to-vehicle (V2V), and vehicle-to-grid (V2G) technologies. The key is to provide the methodologies, approaches, and foresights for the emerging technologies of V2H, V2V, and V2G.

VEHICLE-TO-VEHICLE (V2V) CONCEPT FOR CHARGING MANAGEMENT SYSTEM FOR ELECTRIC VEHICLES

Saravanan N K, Subin Raj D, Vinil M, Gopakumar S

Abstract - People's desire to buy pure battery electric vehicles is hindered by the delayed development of energy storage technology, combined with the limited number of plug-in charging points. Due to the limited number of charging stations available, this technology can be used to expand charging options through vehicle-to-vehicle (V2V) charging. The vehicle-to-vehicle (V2V) wireless charging system offers a flexible and fast energy exchange method for charging electric vehicles (EVs) without the need for charging stations. A new framework for vehicle-to-vehicle wireless charging technology is introduced that can work with or without plug-in electric cars. V2V charging requires overcoming various technological hurdles, including the angular displacement of the resonant coils of wireless power transfer. The mutual inductance of the two resonant coils is an important characteristic for high performance and efficient power transfer.

PERFORMANCE OF LOAD CURVES USING ARTIFICAL NEURAL NETWORKS IN SMART GRID

P.Jeyakumar

Abstract:Load forecasting plays an essential role in effective energy planning and distribution in a smart grid. However, due to the unpredictable and non-linear structure of smart grids and large datasets' complex nature, accurate load forecasting is still challenging. Statistical techniques are being used for a long time for load forecasting, but it is inefficient. This paper tries to resolve challenges imposed by conventional methods like mean and mode by suggesting an ANN model for accurate load forecasting. Specifically, the LSTM and random forest approach has been used here. We compared our model to other models that use similar parameters and found that ours is more reliable and can be used for long-term forecasting. Our model has achieved an average overall accuracy of 96% and an average MSE of 4.486 with average CPU time consumption of 904.47 s, 872.43 s, and 908.32 s, respectively. Hence, the present model outperforms other existing methods.

POWER TRANSMISSION FOR HYBRID WIND AND SOLAR SYSTEM

Mr.G.Murugan

Abstract: Hybrid Wind Solar Energy Both Solar and wind energy sources are intermittent, as days might be cloudy, and wind can be weak, but combining both of them in a hybrid system in addition to battery storage to store excess energy produced to be used at times of higher demand, gives us a reliable system. Solar and wind energy are fluctuating renewable energy sources, and the task of stably supplying electricity in response to the demand of variable loads avoiding outage is a big responsibility. Irradiance levels differ a lot throughout one day, so as wind speed does, so dynamic control and automation is needed in order for the system to run smoothly over time. Though China, Turkey, USA and other countries depend on renewable energy as a major source of electricity production, in the Middle East numbers are about 2%, moreover the retired fossil electricity network is 90% of the time out. There is a lot to learn from these countries, and if their experience is applied it will nourish the economy. Hybrid wind photovoltaic standalone towers, but able to connect to the grid, are considered. The design of the tower and its type depends on the area it would be installed, so as on its topography and climate. The wind turbine uses a non-permanent magnet asynchronous 3 phase alternator with electric power magnifying ignition coil. Non-permanent magnet is used to minimize the alternator start motion resistance, motion resistance gets lower with time as alternator gets magnetized and the fan blades start rotating. The clutch of the alternator engages after reaching the minimum speed and disengages when over maximum speed is reached. Photovoltaic panels to be rugged for outdoor usage. The same tower could be used for street lighting, lighting, communication and navigation systems. The tower will be connected to the micro grid 24/7, for safety and monitoring purposes, wirelessly, or wired if there would be capability. Efficiency

of these towers producing electricity has risen, while their price because cheaper. Their 35 years warranty excluding battery, and their affordable price made them sustainable. A reliable control system for this renewable energy tower must be embedded for the tower to work automatically, and so that it will not make faults causing it to burn.

DETECTION OF PATIENT VITAL SIGNS WITH WEARABLE SENSORS USING IOT

G K Jabash Samuel

Abstract: Technology plays a major role in healthcare. It is made easy to monitor the medical parameters through Healthcare communication method using Internet of Things. IOT serve as the catalyst for the healthcare and plays a vital role in wide range of healthcare applications. In this paper the ATMEGA328 is used as a gateway to communicate to the sensors. The microcontroller picks up the sensor data and sends it to the network through Wi-Fi and hence provides real time monitoring of patients. The data can be accessed only by the authorized user (doctor) through password protected Wi-Fi module. Keywords: ATMEGA328, Wi-Fi, Sensor, IOT

DESIGN OF HYBRID CHARGE CONTROLLER FOR HYBRID SOLAR &WIND POWER SYSTEM

Mr.S.Gopa Kumar

Abstract: Renewable energy resources are the most important & expected field to find new energy sources to meet up the large demand in power all over the world especially in a developing countries. Within the renewable resources, wind & solar being they are most popular ones because abundant, ease of accessibility and the possibility of conversion to the electricity.This document presents the design and analysis of a hybrid solar-wind system domestic purpose in the remote areas of country where continuous power supply from central grid is problem and sometimes for some remote places it's economically not applicable absolutely.We suggest in this hybrid system which is expected to work effectively under the controller to take advantage the maximum possible solar & wind resources to limited from the demands on national grid for on-grid region so to supply power to those areas where there is no grid line.

STABILITY ANALYSIS OF DROOP CONTROLLED INVERTER BASED MICROGRIDS

Mr.V.Ponselvan, Mr.G.Murugan

Abstract:A structure-preserving small-signal model is developed for the analysis of voltage stability in droop controlled microgrids. Several structural results are developed for the asymptotic stability of the voltage response, for both lossless and lossy network. These results indicate microgrid structures where stability is maintained regardless of droop and filtering parameters, and allow comparison of voltage and angle stability. Simulations are presented that support the theoretical results.

PERFORMANCE ANALYSIS OF A HYBRID RENEWABLE MICRO GENERATION SYSTEM

Mr.C.Basker, Mrs.T.Thangasakthi

Abstract: This paper discusses the performance of a hybrid renewable generation system (HRGS). Dynamic voltage restorer (DVR) enhances the voltage profile of the grid. HRGS consists of Photovoltaic (PV), Battery storage unit (BSU) and an auxiliary unit (AU). AU is a backup generation consists of Diesel Generator (DG) and fuel cell. In stand-alone mode, HRGS supply power to remote residents, while the remainder is supplied to the grid. If the load demand exceeds the capacity of the PV generation and the State of Charge (SOC) is less than 0.2, AU is used to generate power otherwise excess power stored in the BSU and supply to the grid. The performance of HRGS has been improved using modified Perturb and Observe (P&O) algorithm of PV, control strategy of BSU & AU. The validation of different shunt fault and power quality issues are also tested to check the effectiveness and stability of the system.

WIRELESS SMART ENERGY METER

C Raja , T Yamin, C Basker

Abstract: Electricity is one of the fundamental necessities of human beings, which is commonly used for domestic, industrial and agricultural purposes. Power theft is the biggest problem in recent days which causes lot of loss to electricity boards. In countries like India, these situations are more often. If we can prevent these thefts we can save lot of power. This is done using Smart Energy Meter (SEM). SEM is an electric device having energy meter chip for measuring the electric energy consumed and a wireless protocol for data communication. This paper presents a smart energy meter for an automatic metering and billing system. In this meter energy utilized and the corresponding amount will be displayed on the LCD continuously and communicated to the controlling base station. The feedback from the user helps in identifying the usages between authorized and unauthorized users which helps in controlling the power theft. Communication between user/household and substation is done using Zigbee.

GSM network is used for sending SMS to the local authorities regarding the theft cases. This meter can work as either prepaid or post-paid meter. The proposed system replaces traditional meter reading methods and enables remote access of existing energy meter by the energy provider. Also they can monitor the meter readings regularly without the person visiting each house.

SMART WIRELESS ENERGY METER

C Christal Kijin C Basker

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HYBRID ENERGY STORAGE SYSTEM INTEGRATE PV WIND BATTERY FOR INDUSTRIAL APPLICATIONS

Nadarajan, G Murugan

Abstract: In island countries, microgrid systems have the ability to provide reliable and improved power quality especially in the vast country with low population density in remote regions. There are two major types of smart grid design in the absence of central grid, namely DC microgrid and AC microgrid. When microgrids are enabled with renewable energy sources, energy storage units increase the reliability in power supply for the load demand on consumer end. The optimized means of extracting power from renewable energy resources like wind, solar, and fuel cell is difficult in islanding mode of operation. Due to occurrence of power imbalance, energy storage units are required which support the energy requirement when power generation cannot meet the load demand. A microgrid is controlled by a supervisory controller that decides which energy storage units are connected to satisfy the load demand. Though the

task is simple, appropriate control strategies are required by the microgrid to cope up with disturbances such as sudden changes in environmental and load conditions. An energy storage unit should be designed to fulfill the requirement of fast and dynamic transition of power consumed by loads connected with microgrid. In AC microgrid, the presence of local energy sources and the ability to regulate voltage and frequency can alleviate the burden for conventional generating unit. In DC microgrid, such a problem does not exist; however, the issue of voltage handling is needed to be dealt with. This chapter deals with the integration of energy storage system (ESS) with DC and/or AC microgrid and related energy management control algorithms. It also addresses the research challenges and solutions towards smooth operational behavior of ESS by integrating microgrid enabled with renewable energy sources. The detailed design specifications of ESS for 500 kW microgrid enabled with solar-wind hybrid renewable energy system (RES) is discussed. Validation through simulation studies is performed to understand the operation of effective and efficient integration of ESS with microgrid operating under islanded conditions.

FIVE LEVEL CASCAD H-BRIDGE INVERTER DESIGN FOR RENEWABLE ENERGY APPLICATION

S Ajilin, P Jeyakumar

Abstract: In this paper cascaded H-bridge multilevel inverter (CHBMLI) has been investigated for the application of renewable energy generation. Energy sources like solar, wind, hydro, biomass or combination of these can be manipulated to obtain alternative sources for renewable energy generation. These renewable energy sources have different electrical characteristics like DC or AC level so it is challenging to use generated power by connecting to grid or load directly. The renewable energy source require specific power electronics converter as an interface for conditioning generated power .The multilevel inverter can be utilized for renewable energy sources in two different modes, the power generation mode (stand-alone mode), and compensator mode (statcom). The performance of the multilevel inverter has been compared with two level inverter. In power generation mode CHBMLI supplies the active and reactive power required by the different loads. For operation in compensator mode the indirect current control based on synchronous reference frame theory (SRFT) ensures the grid operating in unity power factor and compensate harmonics and reactive power.

WIND FARM CONTROL AND MONITORING BASED ON SCADA BY USING FIBRE OPTIC CABLE

P Abinaya, P Jeyakumar

Abstract: The objective of this chapter is to introduce the state of the art technology in wind power plant control and automation. This chapter starts with a historical background about supervisory control and automation evolution in the last decades. Several remarks are made regarding the use of SCADA Systems in wind turbine power plants. The Supervisory Control

and Data Acquisition (SCADA) systems are responsible for controlling and monitoring many of the processes that make life in the industrial world possible, such as power distribution, oil flow, communications, and many more. In this chapter, an overview of SCADA at the wind power plant is presented, and operational concerns are addressed and examined. Notes on future trends will be provided. Finally, recommendations are provided regarding SCADA systems and their application in the wind power plant environment. One of the most significant aspects of SCADA is its ability to evolve with the ever-changing face of Information Technology (IT) systems.

SCADA-BASED WIND FARM CONTROL AND MONITORING VIA FIBER OPTIC CABLE

L Selvi, P Sneha P Jeyakumar

Abstract: The objective of this chapter is to introduce the state of the art technology in wind power plant control and automation. This chapter starts with a historical background about supervisory control and automation evolution in the last decades. Several remarks are made regarding the use of SCADA Systems in wind turbine power plants. The Supervisory Control and Data Acquisition (SCADA) systems are responsible for controlling and monitoring many of the processes that make life in the industrial world possible, such as power distribution, oil flow, communications, and many more. In this chapter, an overview of SCADA at the wind power plant is presented, and operational concerns are addressed and examined. Notes on future trends will be provided. Finally, recommendations are provided regarding SCADA systems and their application in the wind power plant environment. One of the most significant aspects of SCADA is its ability to evolve with the ever-changing face of Information Technology (IT) systems.

ZETA CONVERTER BASED MPPT ALGORITHM FOR PV APPLICATIONS

B G Sree Sankar, C Ramji D Periyasamy

ABSTRACT: This paper presents the design of a zeta converter with Maximum Power Point Tracking (MPPT) algorithm for solar Photovoltaic (PV) application integrated with battery. As the power produced from PV system is stochastic in nature due to the variation of solar irradiation and cell temperature throughout the day, a DC-DC converter with MPPT algorithm has been recognized as the primary solution. Zeta converter is chosen in this work due to its significantly lower output voltage ripple. The full model was designed using Matlab Simulink software where the performance of the zeta converter and PV module with MPPT algorithm will be analysed. Perturb and Observe (P&O) MPPT algorithm is used in this work due to its easiness of implementation with outstanding performance. From the simulation results, the designed zeta converter with P&O MPPT algorithm able to maintain the maximum efficiency to supply the load under constant and variable irradiance levels by modulating the zeta converter's duty cycle.

MPPT ALGORITHM BASED ON A ZETA CONVERTER FOR PV APPLICATIONS

Robin Thomas, Nijas Khan D Periyasamy

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DESIGN AND IMPLEMENTATION OF DRIVER CIRCUIT FOR BLDC MOTOR IN HYBRID ELECTRIC VEHICLE

Ankith Anil, G Murugan

Abstract: The paper designs a high power brushless DC motor (BLDC) closed-loop control system, mainly including design of IR2130 drive circuit, H bridge drive circuit, Control of rotation direction for motor and speed detection circuit. in order to improve the performance of motor running, one adopts PID algorithm, through the tuning of parameters, the control exhibits very good performance. Experiments show that both hardware and software control algorithms are reliable, stable. The running performance of the system is robust before or after adding load. (C) 2011 Published by Elsevier Ltd. Selection and/or peer-review under responsibility of Harbin University of Science and Technology

DRIVER CIRCUIT DESIGN AND IMPLEMENTATION FOR BLDC MOTOR IN HYBRID ELECTRIC VEHICLE

Aromal S, D Periyasamy

ABSTRACT: In this paper proposes a simple but effective method of electric brake with energy regeneration for a brushless dc motor, of electric vehicle (EV). BLDC motor control utilizes the traditional proportional-integralderivative (PID) control and the distribution of braking force adopts fuzzy logic Conventionally, EVs use mechanical brake to increase the friction of wheel for the deceleration purpose. However, from the viewpoint of saving energy, the mechanical brake dissipates much energy since the EV's kinetic energy is converted into the thermal one. In view of this, this paper discusses how to convert the kinetic energy into the

electrical one that can be recharged to the battery. Thus, both the electric brake and energy regeneration are achieved. In comparison to other solutions, the new solution has better performance in regard to realization, robustness and efficiency. In this paper, we have chosen the three most important factors: SOC, speed and brake strength as the fuzzy control input variables. We have found that RBS can obtain appropriate brake current, which is used to produce brake torque. At the same time, we have adopted PID control to adjust the BLDC motor PWM duty to obtain the constant brake torque. PID control is faster than fuzzy control so the two methods combined together can realize the smooth transition since the braking kinetic energy is converted into the electrical energy and then returns to the battery, the energy regeneration could increase the driving range of an EV.

DESIGN OF MPPT CHARGE CONTROLLER USING ZETA CONVERTER FOR PHOTO VOLTAIC SYSTEM

Alpi Suneesh, S Gopakumar

Abstract: In this work, the advantage of using Maximum Power Point Tracking (MPPT) algorithm in solar Photovoltaic (PV) system was investigated. By simulation, the performance and efficiency of the system with and without the tracking algorithm was analyzed. By using MATLAB's SimPower System block set, a model compromised of KC130TM solar panel powering a Zeta converter controlled by MPPT algorithm driving a lead acid battery as a load was designed. The main objective was to track the Maximum Power Point (MPP) of the solar PV module by modulating the zeta converter's duty cycle, thereby, optimizing the power output of the panel. The Perturb and Observe (P&O) algorithm preformed with higher overall efficiency compared with the system without MPPT. Additionally, the tracking algorithm was able to track the MPP quickly. The analysis of the algorithm led to a greater understanding of where the inefficiencies of this type of system are located, allowing improvement in future work on this field.

MPPT CHARGE CONTROLLER DESIGN WITH ZETA CONVERTER FOR PHOTOVOLTAIC SYSTEM

N Nanthini, S Gopakumar

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where the inefficiencies of this type of system are located, allowing improvement in future work on this field.

DESIGN AND IMPLEMENTATION OF CHARGE CONTROLLER FOR SOLAR VEHICLE

Arumugam E, S Nithya

Abstract: Solar-energy utilization is growing in demand since the past decade due to the increase in energy needs and depletion of non-renewable sources. But the problem with solar energy is that it's not constant; it keeps on fluctuating depending upon the weather conditions such as, solar irradiation, temperature, thus a battery is always connected between the load and the solar panel so as to act as a secondary source. On bright sunlight the solar cells would produce more voltage and this excessive voltage could cause damage to the batteries. This necessitates protecting battery from overcharging. MPPT is one such method for extracting maximum power from PV module and also to protect the battery from overcharging. This project provides details of maximum power point tracking solar charge controller device. The design of this project says about the calculated value of converter with the help of MATLAB software.

DESIGN AND IMPLEMENTATION OF A SOLAR VEHICLE CHARGE CONTROLLER

Ganesh Moorthi P, S Nithya

Abstract: The growing interesting in charging electric vehicle (EV) using renewable resources such as solar photovoltaic (PV) offers several technical, environmental, and economic chances. The objective of this paper is to improve efficiency, reduce greenhouse emissions, and increase driving range for the EV. The designing and implementing of a supportive renewable energy source to charge the EV are presented in this manuscript. The metrological data are measured in Al Baha University at Saudi Arabia to determine the optimal design of PV panels to operate the EV. The topology and sizing of each component of the system are provided in this paper. The modelling and designing of the developed PV system involve several procedures such as evaluating the dynamic load demand, analysing the power performance, and optimizing the size of PV system. The simulation results show that the modified EV could decrease the environmental emissions of Co2 by 420 Kg per year. The developed PV system can increase the driving range by 15 % at the heavy load demand. The experimental results show that PV system covers more than 70% of the total load demand and the battery banks required a single day to be fully charged. The developed EV system provides more reliability, sustainability, and environmentally friendly.

DESIGN AND IMPLEMENTATION OF AC/DC CONVERTER FED HYBRID VEHICLE

S Shibani, S Nithya

Abstract: In order to enhance the power transformation stage's power transfer capabilities and efficiency, in this article, improved three-port two step-up single-ended primary-inductor converters (SEPIC) converter fed (Photovoltaic)PV- Hybrid Electric Vehicle was proposed. In comparison to the standard single-stage SEPIC, the proposed converter accepts a wider range of input voltages. The proposed three-port converter uses a multiple-winding high-frequency transformer (HFT) to integrate the dual sources and provide greater voltage gain with lesser elements. Furthermore, by predicting the drive torque need, the power management algorithm (PMA) included with the proposed PV-hybrid electric vehicle (HEV) minimizes the drive motor's power consumption. An experimental model with a power output of 6 kW and a voltage range of 12 to 600 volts has been created and tested. The designed model has 94.11% efficiency.