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Advance Flow Control for High Efficiency Renewable System Using Arm Processor

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Abstract:
The Segmented Energy Storage management (SES) is the proposed solution of smoothing renewable power generation fluctuations. A SES based hybrid renewable power management system requires a suitable control strategy that can be effectively utilize the maximum power output and Battery State of
Charge (SOC). The proposed system represents an efficiency of a renewable hybrid power system simulation analysis undertaken to improve the smoothing performance of BESS. The hybrid power generation and then smart grid proposes the effectiveness of the battery SOC control. The power control method is a reducing the hybrid output power fluctuations and regulating the battery SOC under the typical conditions is proposed. A real time based SES power allocation method and ARM controller also has proposed. The Proposed hardware result is verified by the Hardware result

Keywords: SES, SOC, BESS

I.INTRODUCTION

In Current situation, electricity generation by photovoltaic (PV) power has received considerable attention worldwide. The battery energy storage system can provide flexible energy management solutions that can improve the power quality of renewable-energy hybrid power generation systems. To that the direction, several control strategies and configurations for hybrid storage energy systems, such as a battery energy storage system, superconducting magnetic energy system (SMES), a flywheel energy system (FES), an energy capacitor system (ECS) hybrid system have been proposed to smooth power fluctuations or enhance power quality.

The rapid development of batteries and the battery energy storage systems recently have begin to be utilized for multiple applications such as frequency regulation
should be maintained and grid stabilized, transmission loss reduced, congestion reduced and reliability increased, smoothing the solar energy, peak load shaving and load leveling maintain constant, uninterruptible power sources for grid services, electric vehicle (EV) charging stations, and others. A battery power or plug in hybrid vehicle which uses its excess rechargeable battery capacity to provide power to the electric grid in response to peak load demands. In that the vehicles can be recharged during off peak hours at cheaper rates while helping to absorb excess night time generation. Thus the vehicles serve as a distributed battery storage system to the buffer power.

Hence the present study, under the assumptions that the capacities of the PV generation system (PVGS) and BESS had already been determined and that we do not have ability to adjust the PV Power and a large-scale BESS was used to smooth the PVGS output power fluctuations. This was accomplished by modifying smoothed target outputs adaptively and making flexible use of feedback adjustments of Battery State of Charge in real-time.

II.SES METHODS

Thus the block diagram Fig 2.1 shows that to connect renewable energy source of solar and the battery connected with the help of ARM processor. The input source will take out from the solar. Thus the solar power consist variations and also it will reduce the stability so to maintain the stability purpose the Battery to be used. Hence the DC-DC converters are used to convert the voltage from low level to high level. The ARM processor used as to verify the output power of solar and battery respectively. Hence the solar and battery voltage & current ratings are checked simultaneously by the help of Processor. Thus the variations due to occurs at solar panel

means it takes the Alternate source from Battery.

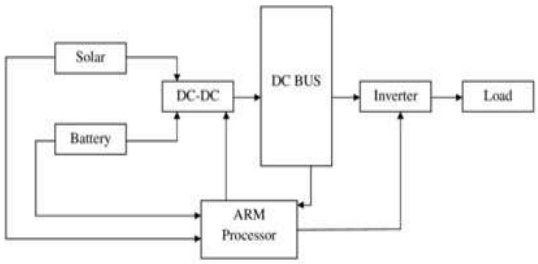

Fig 2.1 Functional Block Diagram

Thus the battery and Photovoltaic Panels are maintained constant outputs and the inverters are used to deliver the output for Direct Current to Alternative Current and the low voltage Dc Outputs are effectively used for a small scale industry based loads.

III HARDWARE DESCRIPTION

In this project has the following hardware requirements so that all the devices are connected to the DC grid threw the help of ARM PROCESSSOR and the PV, Battery connected to the DC to DC converter in order to maintain the constant voltage levels. The relays are used to switch ON and OFF the devices that shown in fir 3.1.

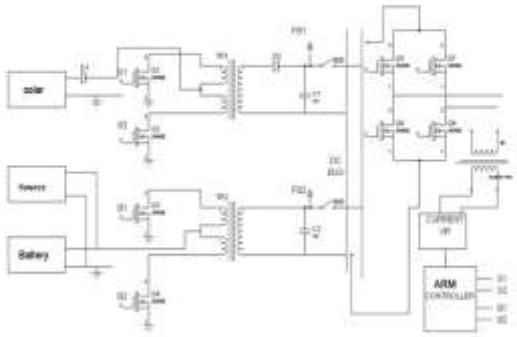

Fig 3.1 Hardware Circuit Diagram

The power source will be driven out from Solar & battery respectively. The power that coming out will not get reversed so that diodes solar D_1, battery D_1 are used here. Here DC to DC converters are used to regulate the output voltage. The positive supply from solar power and is connected to couple inductor. While inducing voltage purpose. The coupled inductors are used. Then the positive supply will be connected to MOSFET named as Q_1&Q_2. The main purpose of MOSFET is used to amplifying the control signals. The positive supply from solar power and is connected to couple inductor. The positive supply will be connected to MOSFET named as Q_1&Q_2. The positive supply from Battery power and is connected to coupled inductor .The positive supply will be connected to MOSFET named as Q_1&Q_2.These are all comes under the primary circuits.

The secondary units of coupled inductor connect with rectifier (Solar) units D_2, C1.The secondary unit of coupled inductor connect with rectifier (Battery) units D_2,C_1. From the DC output of coupled inductor the feedback is taken out and it's shown in the fig 5.1 The rectifier mainly to convert the Alternative current (AC) to Direct current (DC). Thus the feedback of Solar (FB_1) & Battery (FB_2) is connected to the arm processor as an input.

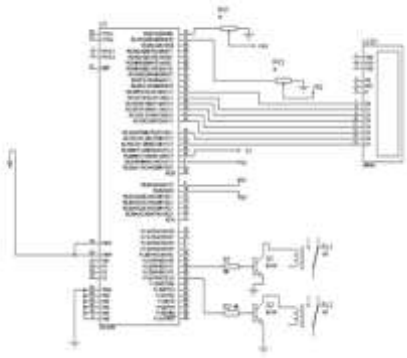

Fig 3.2 ARM Processor Pin

Then the DC bus input from the two converters that DC bus output is given as input to inverters then the DC Supply is converted to AC supply by the help of H-Bridge inverter. It is used to convert the Direct current (DC) to Alternative current (AC).Then the inverter supply is given to the load Thus the Fig shown in Fig 3.2.

A. SOLAR PANEL

Fig 3.3 Solar tech photovoltaic M-Series Modules are constructed with high efficient polycrystalline solar cells and produce higher output. Thus the reliability should Proven superior field performance and also tight power tolerance. It employs Maximum power (10w) and the maximum power voltage 17.3v and the maximum power current is 0.59A.

Fig 3.3 Solar panel

The following mechanical characteristics are used as this module it consist of Temperature glass and silicon cell and EVA (Encapsulated sheet for a solar cells) and Polyester with Tedlar then they each solar panel consist 36 cell (78mm×26mm) in a 4 ×9 matrix connected format in series and also its have high transmission front

cover with the range of 3.22mm(1.8'') Glass. The weight of the panel should be 3.3b(1.5kg) and the operating temperature of the panel is to be -40˚C~90˚C and the storage humidity of the panel is to be less than 90%.

B.BATTERY:

The lead acid battery contains the valves are regulated and spill proof construction of the power flow battery and it is a trouble free battery and also it provide safe operation and there is no need of additional electrolytes. The oxygen cycle should be unique. Easy to handle that shown in fig 3.4.

Fig3.4 Constructional block of lead acid battery

The constructional feature of the batteries may be used in series or parallel to obtain the choice of voltage and capacity. Due to the recent design breakthroughs, the same battery may be used in either cyclic or standby application.Over 40 models of battery available in industry as well as commercial usage purpose.

C.MOSFET

The metal oxide field effect transistor is a type of transistor is used for amplifying or switching the electronics signals. MOSFETs are designed for applications such as switching regulators, switching convertors, motor drivers, relay drivers, and drivers for high power bipolar switching transistors requiring high speed and low gate drive power and the type of mosfet is consist VD_{ss} -100v &ID-10A and RdS-0.055.

D.CAPACITOR

The capacitor is used to store the energy and it is used for general purpose. The RH type of series capacitor used and it is with stand up to 2000hours under the temperature of 105˚C. The working voltage range is 10-100vDc.Thus the nominal capacitance range 0.1 - 15,000 µF. Thus the fig shown in Fig 3.5.

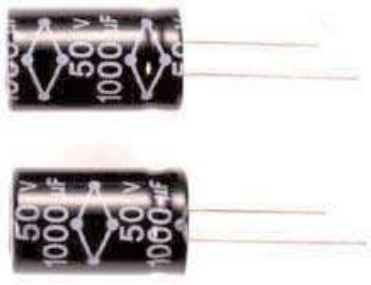

Fig 3.5 Capacitor

E.H BRIDGE INVERTER

A solar inverter, or PV inverter, converts the variable direct current (DC) output of a photovoltaic (PV) solar panel into a utility frequency alternating current (AC) that can be fed into a commercial electrical grid or used by a local, off-grid electrical network. It is a critical component in a photovoltaic system, allowing the use of ordinary AC-powered equipment. Solar inverters have special functions adapted for use with photovoltaic arrays, including maximum power point tracking and anti-is landing protection. Solar inverter use maximum power point tracking (MPPT) to get the maximum power from the PV array. Many solar inverters are designed to be connected to a utility grid and will not operate when they do not detect the presence of the grid. They contain special circuitry to precisely match the voltage and frequency of the grid.

F.ARM Processor

The LPC 2138 microcontrollers are based on a 32/16 bit ARM7TDMI-S CPU with real time emulation and embedded trace support, that combines the microcontroller with 32 kB, 64 kB, 128 kB, 256 kB and 512 kB of embedded high speed Flash memory. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at maximum clock rate.

The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set is related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers. This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core.

Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory. The ARM7TDMI-S processor also employs a unique architectural strategy known as Thumb, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue.

This is possible because Thumb code Operates on the same 32-bit register set as ARM code. Thumb code is able to provide up to 65 % of the code size of ARM, and 160 % of the performance of an equivalent ARM processor connected to a 16-bit memory system.

IV HARDWARE IMPLEMENTATION

Thus the hardware Fig 6.1 shows that to connect renewable energy source of solar and the

battery connected with the help of ARM processor. The input source will take out from the solar. Thus the solar power consist variations and also it will reduce the stability so to maintain the stability purpose the Battery to be used and its shown in fig 4.1.

Fig 6.1 SES Model

Hence the DC-DC converters are used to convert the voltage from low level to high level. The ARM processor used as to verify the output power of solar and battery respectively. Hence the solar and battery voltage & current ratings are checked simultaneously by the help of Processor. Thus the variations due to occurs at solar panel means it takes the Alternate source from Battery From the DC output of coupled inductor the feedback is taken out then the feedback is connected to the ARM processor input. Hence it process 0.5 Amps of current rating from the Solar panel and Battery and the voltage level from the battery is 24 Voltage as well as from the panel as 11 voltage The output voltage is to be boosted up to 230Voltage Level. The load can be interfaced with output of the transformer and it's shown in fig 4.2.

Fig 4.2 Output with Load

CONCLUSION:

The solar power generating system is the main renewable power system and successful one. The major drawback of this system is that the solar power is not a constant level output. It depends on the environment. So the efficiency of this system is very low. To avoid this drawback the hybrid power system can be implemented.

A hybrid power system can be designed in this hardware design. This hybrid generating system contains battery and solar generating unit. The generated power in the solar and batter passed to the dc-dc converter for the gain of required level dc voltage. That generated dc voltage is converted to ac then, the load usage current sensed and relay tripping circuit can be done by the arm controller. By controlling this technique the power generation is maintains constant at any time. Thus the hybrid generating system can be implemented to avoid the improper voltage regulation.

References

1.Chad Abbey, Member, IEEE, Kai Strunz, and Geza Joos, Fellow, IEEE " Knowledge-Based Approach for Control of Two-Level Energy Storage for Wind Energy Systems" 2009

2.Fengquan Zhou, Geza Joos, Senior Member, IEEE, Chad Abbey, Student Member, IEEE, Lianwei Jiao, Member, IEEE, and Boon Teck Ooi, Fellow, IEEE "Use of Large Capacity SMES to Improve the Power Quality and Stability of Wind Farms" 2009

3.Katsuhisa Yoshimoto, Non-member, Toshiya. Nanahara, Member, IEEE, Gentaro Koshimizu, Nonmember,and Yoshihsa Uchida, Non-member "New Control Method for Regulating State-of-Charge of a Battery in Hybrid Wind Power/Battery Energy Storage System" 2006

4.Roberto Cárdenas, Member, IEEE, Rubén Pena, Member, IEEE, Greg Asher, Member, IEEE, and Jon Clare, Member, IEEE "Power Smoothing in Wind Generation Systems Using a Sensorless Vector Controlled Induction Machine Driving a Flywheel" 2004

5.Tatsuto Kinjo, Student Member, IEEE, Tomonobu Senjyu, Member, IEEE, Naomitsu Urasaki, Member, IEEE, and Hideki Fujita "Output Leveling of Renewable Energy by Electric Double-Layer Capacitor Applied for Energy Storage System" 2006

6. Xiangjun Li,Senior Member IEEE,Dong Hui and Xiaokan Lai "Battery Energy Storage Station (BESS)-Based Smoothing Control of Photovoltaic(PV) and Wind Power Generation Fluctuations" 2010

BIBILIO GRAPHY

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