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PV ARRAY - BASED OFF-BOARD ELECTRIC VEHICLE BATTERY CHARGER

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ABSTRACT

During the recent decade, the automobile industry is booming with the evolution of electric vehicle (EV). Battery charging system plays a major role in the development of EVs. Charging of EV battery from the grid increases its load demand. This leads to propose a photovoltaic (PV) array-fuzzy logic controller based off-board EV battery charging system in this study. Irrespective of solar irradiations, the EV battery is to be charged constantly which is achieved by employing a backup battery bank in addition to the PV array. Using the sepic converter and three-phase bidirectional DC–DC converter, the proposed system is capable of charging the EV battery during both sunshine hours and non-sunshine hours. During peak sunshine hours, the backup battery gets charged along with the EV battery and during non-sunshine hours, the backup battery supports the charging of EV battery. The proposed charging system is simulated using Simulink in the MATLAB software and the results are furnished.

I.INTRODUCTION

Ever increasing effects of greenhouse gases from the conventional IC engines lead to environmental concerns. This paved to the booming of pollution free electric vehicles (EVs) in the automobile industry [1–3]. However, EV battery charging from the utility grid increases the load demand on the grid and eventually increases the electricity bills to the EV owners which necessitate the use of alternate energy sources [4, 5]. Due to inexhaustible and pollution free nature of renewable energy sources (RESs), it can be used to charge the EV battery. Thus, RES driven EV can be termed as ‘green transportation’ [6]. Solar is one of the promising RESs which can be easily tapped to utilise its energy to charge EV battery [7, 8]. Hence, PV array power is used to charge the EV battery in the proposed system with the help of power converter topologies. Lithium ion batteries are widely used in the EV due to its high power density, high efficiency, light weight and compact size [9, 10]. Also, these batteries have the capacity of fast charging and long lifecycle with low self-discharge rate. They also have low risk of explosion if it is over charged or short circuited. During charging, these batteries require precise voltage control. Hence, various power electronic converters with voltage controller are used for charging EV battery. Due to the intermittent nature of the PV array, there is a need for power converters to charge the EV battery. Among different converters, multiport converters (MPCs) are preferred in the on board chargers of hybrid EVs due to its capability of interfacing power sources and energy storage elements like PV array, ultracapacitors, super capacitors, fuel cells and batteries with the loads in EV like motor, lights, power windows and doors, radios, amplifiers and mobile phone charger. The MPCs have the drawback of increase in weight, cost and maintenance of the EV as all the sources are placed in the EV itself. Also, the complexity of controller implementation increases in these converter-based EV battery charging system [11–13]. Hence, an off-board charger is proposed in this paper in which the EV battery is located inside the vehicle unit and PV array and backup battery bank are located in the charging station or parking station. Various converter topologies for off-board charging system are presented in the literature [14–16].

Among different converter topology, the sepic converter is preferred due to its capability of working in both boost and buck modes. It also has the advantage of the same input and output voltage polarity, low input current ripple and low EMI [17, 18]. However, during low solar irradiation and non-sunshine hours, there is a need for an additional storage battery bank to charge the EV battery. This backup battery bank has to be charged in the forward direction and discharged in a reverse direction depending on the solar irradiation. Hence, a bidirectional converter with power flow in either direction is required [19]. The bidirectional converters are classified into non-isolated and isolated converters. Transformer in the isolated converters provides isolation which increases the

ALARM SYSTEM FOR ANTI-POACHING OF TREES IN FORESTS AND FARM LANDS USING IOT

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ABSTRACT

Theobjective ofthispaperistodesignasystemtoconservethe forestterritoriesandfarmlands. A notable cause for concern was theft of trees such as Teak, Sandal - wood and Sagwan. This is also a snap in the plants and animals of the woods. As people, we acknowledge that by adopting the latest measure, we are combating these stealth activities. These forests on the earth are excessive and less available. It may be used in treatment and beauty products as well. With the gigantic aspect of the money involved with the provision of such woods, stacks of occurrences are being cut and sneaked. Several strategic measures should be made to access these allocations to safeguard the woods area. We end up with such a framework that can be used to hold thelead.

KEY-WORDS: Tilt sensor, Temperature sensor, Arduino UNO, ZIG BEE, RFID

I INTRODUCTION

For centuries we were troubled by unlawful acts like poaching precious trees from the guarded wooded areas along with Sandal-wood, Teakwood, or Sagwan woods from such trees are quite costly and have huge demand in present wood market. The forests usually are regarded to be safeguarded by manually identifying such tags because they can be impaired by anybody. Even periodically caused disasters could well harm forests.

An unmanned intelligent device had been developed so as to solve this kind of problems. These modules are offered by the pairing of the latest devices as well as integrated alternatives such as embedded IoT systems. The unit is designed to function in a given area, and it will be composed of dual units: 1) Server-unit 2) Tree Unit.One small device unit with Embedded IoTsystem such as GPRS, Sensors, Solar-power panel and a micro -controller has to be mounted for each tree. The proximity between side's trees will be transmitted to the present tree status through the IoTand GPRS to the access point. GPRS transmits the information through the internet as a data string, hereby it is shaped by IoT to organize. The application at the access point decrypts the details and outlines. The access point installed with the repository that maintains each and every tree's data. The communications to build between stations is based on Amazon Web Services, which is the latest innovation. Dot Net is the server product used to analyze the information about the trees in thewoods.The only allowed party reaches the repository on the dedicated server. The data base is examined for the protection tree and notifies the removal of tree.

Design And Implementation Of Five-Level One-Capacitor Boost Multilevel Inverter

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Abstract: Multilevel inverter configurations are a suitable candidate for medium and high power applications. This study presents a new one-capacitor-based five-level (2Vdc, Vdc, 0, −Vdc, − 2Vdc) boost multilevel inverter. The single-phase version of the proposed formation has one dc-source, eight switches and one capacitor. To provide boosting ability, the inverter is operating based on charge-pump theory, where the capacitor is charging in parallel and discharging in series connections to provide a higher output voltage. The proposed configuration requires simple control tasks, and for this purpose, level-shift pulse width modulation strategy, where the reference signal is compared with four carriers, is implemented to drive the switches and generates the required pulses pattern. The developed inverter has some distinct features like the usage of only one dc-source and one-capacitor, compact size, simple control requirements and boosting ability. The system is simulated with MATLAB/ Simulink and a hardware prototype is developed to verify the performance of the developed five-level configuration. The results show that the developed five-level multilevel inverter reaches the expected performance.

I.INTRODUCTION

In renewable energy systems, dc to ac conversion is typically required to generate the ac output with certain amplitude, frequency and small harmonic profile. Pulse width modulation (PWM) inverters with two-level or multilevel configurations are the mainstream ac/dc power electronic interfaces. They enable controlled amplitude, frequency and harmonics of the output voltage. Multilevel inverter configurations generate the ac output with reduced harmonic components. Hence, multilevel inverter topologies were covered extensively in the literature due to their merits such as small filter size and improved output waveform [1– 9]. In a multilevel inverter, multiple dc levels are used to synthesise a staircase waveform utilising power semiconductors. In comparison with two-level conventional inverters, multilevel inverters have improved harmonic profile and reduced semiconductor voltage stresses [10]. The power quality of multilevel inverter improves with the increase in levels. On the opposite side, increasing the levels leads to a large number of power semiconductors and associated driving circuitries. Hence, system cost and complexity are high. This affects system reliability and efficiency [10, 11]. Various multilevel inverter configurations were developed. Those configurations include neutral point clamped (NPC), cascaded H-bridge (CHB), flying capacitor (FC) and modular multilevel converters [12–15]. Those multilevel schemes can be configured to generate 3, 5, 7, or n-level output voltage [16]. NPC inverter was introduced by Akira Nabae and Akagi [17], as a three-level diode clamped form for motor drive. Stability and balancing of the dc-capacitors are a big concern of this topology, although it has only one dc-source. As the dc-capacitors are fed by the dc-source, capacitor voltage and current are controlled to keep the stability and balance of the two stacks [18]. Instead of clamping diode, Stillwell and Pilawa-Podgurski [19] used a FC to clamp the voltage of one capacitor voltage-level, which is a FC multilevel converter. FC multilevel inverter owns some distinct feature over the NPC counterpart, which is the phase redundancies. Such feature gives the FC flexibility in charging or discharging, and overcome voltage unbalance or faults.

Moreover, redundancy improves voltage stresses across the power switches and harmonic profile. Meanwhile FC multilevel inverter suffers from different drawbacks such as control complexity to manoeuvre voltage of all capacitors and poor switching efficiency [15, 18]. Another formation of multilevel inverter is the CHB multilevel converter, which is built by series-connected h-bridge inverters. Each bridge has its dc-source. The modularity of this formation gives it an obvious advantage over neutral point and FC configurations, it gives the inverter high flexibility in fault tolerance and low power level operation after cell failure [20]. Scalable technology or modular multilevel inverter is another power configuration of multilevel inverters. Where submodules with independent control systems are connected in cascade formation to generate any number of levels required. However, current circulation within the converter increases the overall conduction losses of the system and balancing the submodule capacitor is the main issue in controlling the modular multilevel topologies. This manuscript presents a new five-level boost inverter. Different five-level configurations are presented in the literature. Five-level formation presented in [21], can generate five-level output with six switches, two diodes and two capacitors. Although it has less number of switches, it requires a complex control algorithm for balancing the capacitors and diodes, deteriorating overall system efficiency.