SOLAR AND GRID INPUT WIRED CHARGING FOR TWO ELECTRIC VEHICLES

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Abstract - Due to a mixture of benefits, wired charging for electrical vehicles (EV's) with RES will co-exist in manifold places. A hybrid system that gives wired charging mode is projected in this paper. The hybrid system gives the workplaces and the power devices to save costs drastically. The price of DC power module accounts for a huge proportion of the total cost of the wired charging system and is directly correlated to its rated power. To diminish the rated power necessity of the DC module of the hybrid charging system, An EV hybrid charging system prototype is designed, built, and tested. Experiments showed that the proposed hybrid charging system has good flexibility for either charging method. In addition, the proposed parameter design procedure can diminish the rated power necessity of the DC power module.

Key Words: Converter, Controller, Electric Car, PV Cell, Solar Energy, Solar Panel, Storage Battery, Solar Irradiance.

1. INTRODUCTION:

Electric vehicles (EVs) can be a promising alternative since they alleviate the fossil fuel shortage and air pollution crisis [1]. The popularization of electric vehicles is greatly influenced by essential charging facilities [2]. Although wired charging is popular at present. Consequently, wired charging EVs will coexist for some time to come. Hence, a charging facility providing wired mode for different types of EVs is necessary. However, the manufacturing and installation of both charging systems separately would be cost-prohibitive. Considering the civil infrastructure and device investment, sharing some components for both charging models, including workplaces, electrical and electronic devices are cost-saving rather than constructing wired and wireless charging facilities separately.

A wired hybrid charging system is proposed in this paper. The hybrid system provides wired charging mode for different type of EVs regarding the charging method. Considering only one car can be parked in one parking space, the system doesn't provide wired and wireless charging at the same time. Many components, including communication protocol between the power feeding side and the receiving side, charging power control strategy and the DC power module, are shared by both charging modes to save significantly the cost. A DC power module, which consists of the front-end AC–DC power conversion stage and the isolated DC–DC conversion stage, is the key component of the wired charging system.

EXISTING SYSTEM:

- As to the wired/wireless charging mode, the maximum voltage and current or directly decide by the battery charging profile.
- The hybrid system provides wired/wireless charging mode for different type of EV's.
- Many components, including communication protocol between the power feeding side and receiving side.

EXISTING SYSTEM - WORKING:

- The central control unit is mainly composed of the Universal asynchronous receiver-transmitter (UART) module, the DC voltage regulator, and the inverter.
- The UART module handles series communication affairs and extracts data from the Battery Management System (BMS).
- The aim of this paper is to design a wired/wireless hybrid charging system with lowest amount rated power necessity for DC module.

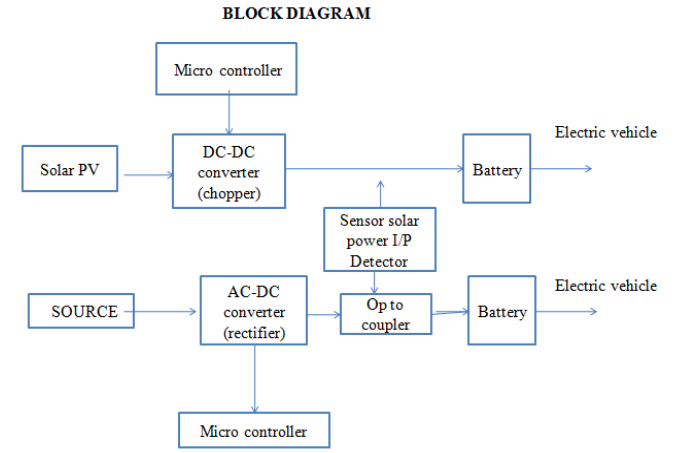
PROBLEM IDENTIFIED IN EXISTING SYSTEM:

- It's occupied more places and it will need more than four switches.
- Also, it has single input and output single power transmission is commonly used in portable devices.
- It will be charged only one device at a time.

PROPOSED SYSTEM:

- A wired hybrid charging systemis provides wired charging mode alone for different type of EV regarding the charging method.
- We will reduce the number of MOSFET switches.
- More over the proposed constraint design procedure can diminish the fuel consumption.
- Dual input and dual output power transmission systemwe are using in the portable devices.
- Compact in size, not occupy more places.

BLOCK DIAGRAM:



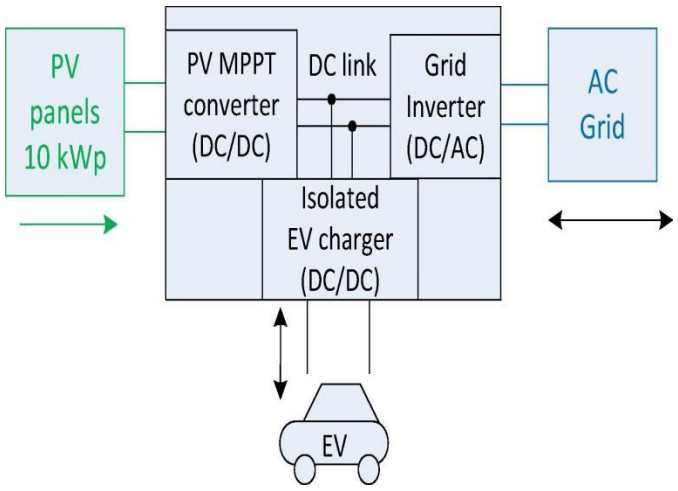


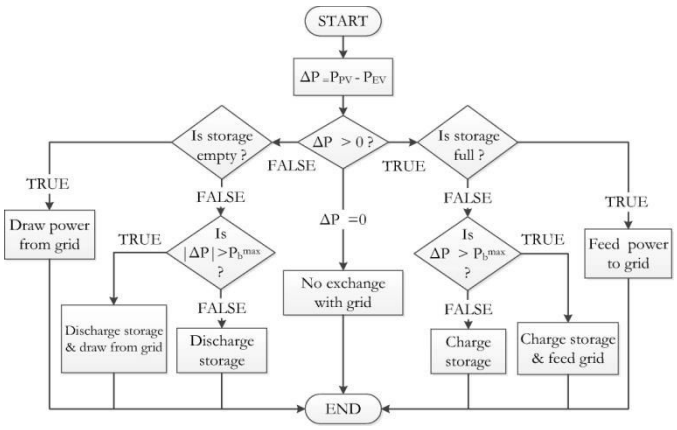
Figure 1.Block diagram of proposed system

BLOCK DIAGRAM DESCRIPTION:

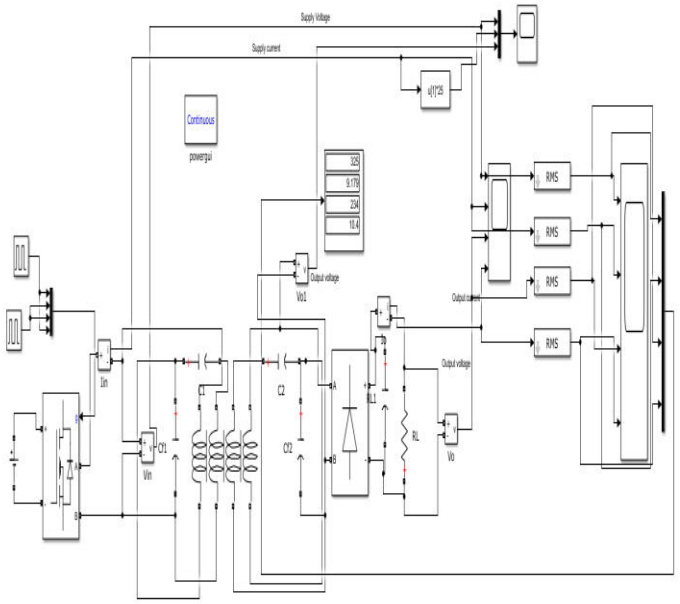
- Microcontroller
- AC –DC Converter
- DC-DC Converter
- Battery (12V)
- Solar PV Cell

SOFTWARE DIAGRAM AND OUTPUT:

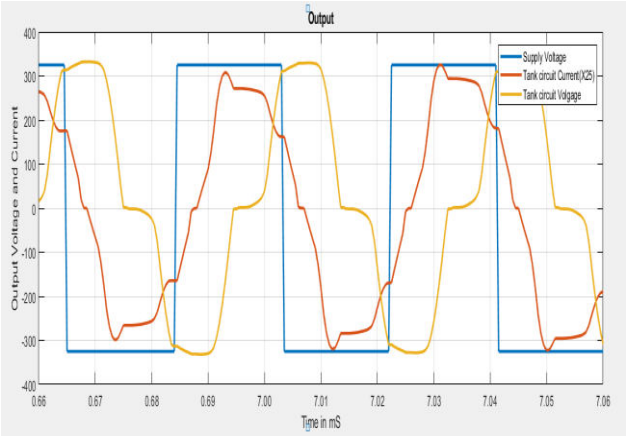
The Proposed systemcan only identify the type of wave form. MATLAB based image processing concepts will be used. The diagrams are follows:



SIMULATION DIAGRAM:



SIMULATION OUTPUT:



HARDWARE:

- Solar hardware consists a wide range of Technology from Individual Components of Solar.
- Panel or Concentrating Solar Power plant to inverters that allow solar panels to feed energy back in the electricity grid
- To the racking structures establish on rooftops.
- And utility scale solar installation.

HARDWARE OUTPUT:

- PV systems utilize photovoltaic cells for converting solar energy to electric energy.
- Hardware prototype of the grid connected PV systems with energy management system using batteries.
- DC-DC converter for controlled charging and discharging of batteries.
- Various modes of operating of the grid connected PV system are tested through the developed hardware prototype.

THE PV MODULES INSTALLATION:

Next, in order to decide the distance between each PV panels, we should know about solar elevation and solar azimuth.
First, hour angle $\tau = \omega t$.

It is defined as at noon when $\tau = 0$, every 1 hour plus 15°, morning is positive, afternoon is negative.
For example,
At 10:00, t=2, $\tau=30^\circ$
At 14:00, t=2, $\tau=-30^\circ$ etc.

STORAGE BATTERIES:

- For the impact of the solar energy to be felt, the storage batteries used in the respective solar applications and systems need to meet the demands of unstable grid energy.
- Thus, solar storage batteries are considered to be key components in stand-alone renewable energy systems so as to continuously store the supply energy harnessed during peak and low periods respectively.

WORKING PERFOMENCE OF BATTERIES:

As to the wired charging mode, the maximum voltage and current are directly decided by the battery charging profile because there is not any power converter between the DC module and the battery.

A. System Architecture:

A block diagram of the proposed wired hybrid charging system is depicted in Fig. 1. The DC power module and the central control unit make up the power supply side, which feeds either the wired charging EV or the wireless charging EV.

The DC power module mainly consists of the input power factor correction (PFC) and the DC/DC converter, which provides galvanic isolation between the input utility grid and the output. Hence, employing the commercial DC/DC power module instead of developing one integrated with the inverter is reasonable from a cost point of view.

B. Relationships Between DC Module and Battery Charging:

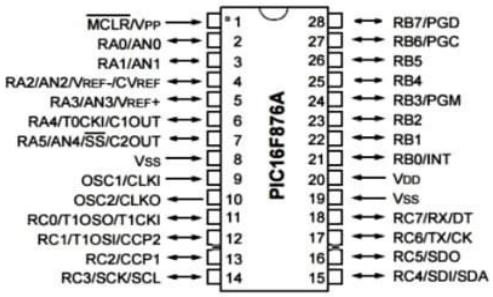
The circuit diagram of the hybrid charging system when the switch S1 is connected to the left, the hybrid system operates in the wired charging mode whiles the wireless mode when S1 is connected to the right. Because the battery charging voltage and current are the same with those outputs of the DC power module under the wired charging mode, only the case under the wireless charging model needs to be analyzed.

USES OF MOSFET SWICTHES:

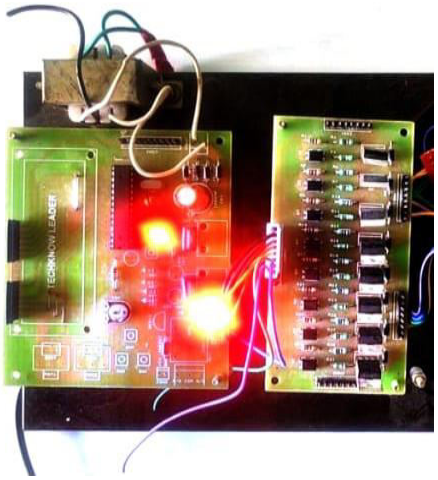
- The FPGA of the central control unit was kept suspended under wired charging mode while generating square-wave signals to drive MOSFETs of inverters under wireless charging mode. IPW65R041CFD MOSFETs were used for the inverter.
- Due to the maturity of DC power module technology, this paper did not develop it or consider its efficiency.
- Namely, the charging efficiency in the wired charging mode was not analyzed.

MICROCONTROLLER CHIP:

PIN DIAGRAM-MICROCONTROLLER:



HARDWARE PICTURE:



ADVANTAGES:

- Reduced energy demand on the grid as the EV charging.
- The use of locally produced PV energy for EV charging.
- Dc interconnection of EV and PV- is more efficient than.
- EV Battery doubles up as energy storage for the PV.

APPLICATIONS:

- Consumer electronics
- Electricity grid
- Renewable energy storage
- Wearable technology

CONCLUSION:

A hybrid charging system that can charge the EVs in a wired mode is proposed to meet different charging interfaces. As the process of the realistic battery charging is time consuming, the second group of experiments with a constant resistance load of RBT instead of a variable equivalent resistance of the battery pack were conducted. In this prospect, with battery prices reportedly declining 75% since 2011, electric cars are expected to be as cheap fuel powered concern cars in the predictable future.

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