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Solar Electric Vehicle Charging

N. Surya[1], M. Manikandan[2], B. Muthamil Arasan[3], R. Prakash[4], S. Saravanan[5]

UG Students, Department of Electrical and Electronics Engineering, Muthayammal Engineering College, Tamil Nadu, India[1,2,3]

Professor, Department of Electrical and Electronics Engineering, Muthayammal Engineering College, Tamil Nadu, India[4,5]

ABSTRACT: Nowadays electric vehicle are growing in numbers because of high rates of fuel Electric vehicle has now hit the road worldwide and are slowly growing in numbers. This project proposed with dynamic electric vehicle charging system from solar. It reduces fuel and pollution. Also it is proven that electric vehicle helpful in reducing cost of travel and which is cheaper than fuel. So we have developed an electric charging system with unique ideas for solving charging system problem. In this electric vehicle no need of any wire, no need of external power supply, no need to stop vehicle for charging, we can charge EV in moving condition. In this system we use, battery, transformer, Atmega controller, LCD display, regulatory circuit, solar panel, coils of copper, AC to DC converters to develop the system more accurate. Battery storage forms the most important part of any electric vehicle (EV) as it stores the necessary energy for the operation of EV. So, in order to extract the maximum o/p of a battery & to ensure its Power transfer it is necessary that a efficient battery management system exist is the same .It monitors the Parameters, determine Hardware and software and provide necessary services to ensure safe operation of battery. The proposed system only monitors the battery and Power transfer but also protect it to help to battery burning accidents from occurring. The proposed model has following components controller, solar panel, power converter, battery, voltage measurement, liquid crystal display (LCD) etc. Electric vehicles (EVs) are automobiles powered by one or more electric motors, which draw energy from rechargeable batteries instead of relying solely on internal combustion engines (ICEs) that consume fossil fuels. The ensuring its optimal performance, safety, and longevity. It indicates how much charge is available in the battery at a given time, allowing users to estimate the remaining range or usage time before recharging is required.

KEYWORDS: EV(Electric Vehicle), (ICEs)internal combustion engines

I.INTRODUCTION

An EV is driven by motor. Modern EVs use mostly Induction Motors or Permanent Magnet Synchronous Motors. Such motors require Power Electronics for 2 reason, one being that these motors require 3-phase AC to run but the primary power source in an EV is battery pack which produces DC. Thus, a power electronics converter (DC to AC converter) is a primary requirement.

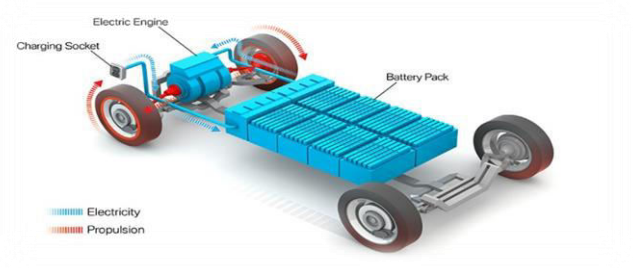

Figure.1. Vehicle Drivetrain

Second being that these motors require current and voltage to be controlled precisely for an efficient operation. Moreover, the power delivery to the motor must be as per the wishes of the driver's throttle. Thus, precise control is necessary. A 3-phase Voltage Source Inverter is used which is controlled by a Motor Control ECU. These inverters mostly use MOSFETS and IGBT as power switches. The switching can be controlled by the Motor Control ECU based on Field Oriented Control Algorithm or some other advanced control techniques.

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Vehicle Charging

Off-board chargers/On-board chargers, all are possible due to advances in Power Electronics. In crude terms, chargers are nothing but Rectifiers. Mostly Off-board chargers/fast chargers are 3 phase chargers and onboard chargers are single phase chargers. Fast chargers are 3-phase due to the reason that they consume a higher amount of power which can be supplied only through a 3-phase AC connection. Onboard chargers are generally single phase since they are low powered chargers and they can be used in user's residence.

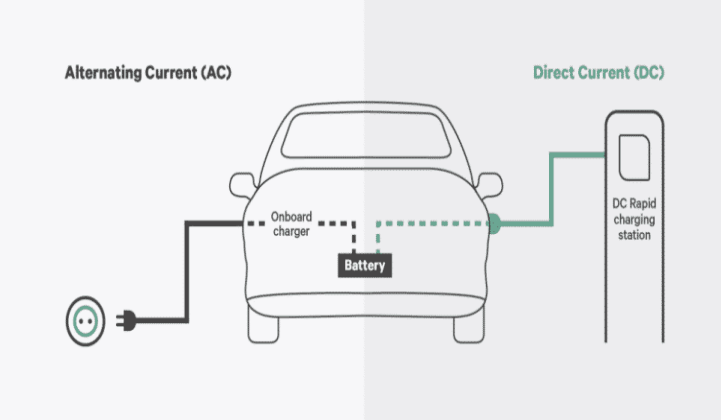

Figure.2. Vehicle Charging

However, modern chargers are more complicated than being a simple rectifier. Modern chargers mostly consist of a PF corrected rectifier at the input or stage 1 to reduce the harmonics injected into the grid from the load. This stage also ensures that AC is converted to DC. After 1st stage, the stage 2 consists of galvanically isolated DCDC converter to buck or boost the DC voltage as per the demands of battery.

II.EXISTING SYSTEM

Traditionally, safety monitoring and automation systems were typically designed to meet the requirements of a single monitoring application. The EV application has already gone beyond the interconnection of a few large back-end systems, and more and more underground physical devices make the state of objects and their surroundings seamlessly accessible to software systems. As a matter of fact, most works are based on monolithic system architectures, which are brittle and difficult to adapt. The persons who are working in the EV have to face various environmental parameters in their EV. So to overcome that problem we are using Zigbee based intelligent helmet for coal miners. EV incidents were unpredictable and it has many factors the event of an accident, not only causes huge economic losses, but a direct threat to the safety of miners. As an ICS is a cyber-physical system, the process of cybersecurity risk propagation in ICSs is different from that in general network systems. Most ICS attacks aim to vandalize ICS assets, which include humans, environment, and equipment. Traditionally, safety monitoring and automation systems were typically designed to meet the requirements of a single monitoring application. The application has already gone beyond the interconnection of a few large back-end systems.

III.PROPOSED SYSTEM

Information Technologies (IT) & Operational Technology (OT) include critical software and hardware systems for the control and monitoring of physical sensor field devices. IT and OT provide essential, inherent integration and visibility for supply chain details about logistics, assets, processes, and completion times. This provides remote control and management units with information, thus keeping the ICS efficient and competitive. Wireless charging is useful in eliminating the need of conductive wires and thus conduction losses which can takes place through wire can be completely cut out. Also, the human handling of wired during the charging process for plug in and plug out can sometimes be hazardous if not done correctly. For safety purpose, the human intervention can be avoided. Even through wireless charging seems to be time saving and effective, it comes with certain limitation. The development in infrastructure is the main aspect need to be done to suit the purpose. This will require a huge investment of capital during all stages of the work and hence it is costly affair. The first wireless electric vehicle charging technology to be developed was stationary, when the vehicle is not operating for an extended this system have been designed to charge any EVs at charging station or garages or public parking. Because a wire or any physical connection is not required, every person has major interest in the charging possibility of EVs while they are in transit. Dynamic EV Charging is charging EVs when they are in motion.

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BLOCK DIAGRAM OF PROPOSED SYSTEM

DWCS (dynamic wireless charging system) is the system in which EV is charged when they are in motion. The development in power and range is the main concern for charging the electric vehicle. It will be beneficial if we try to improve the range for wireless charging of an electric vehicle. “On road charging” is also termed as dynamic wireless electric vehicle charging. A large capacity of battery is not required, if the charging is done in proper interval and this make the vehicle more reliable, economical and lighter. DWCS provide a better option for the charging of electrical vehicle to improve its range. The base unit will be placed below the road on predefined route and the car will have the battery bank. When the car is in motion, the car will pass over the road and charging will be done.. This will require a lot of investment and infrastructure modification at the initial stage but slowly the system will help in gaining market for electric vehicle making better option over company conventional means of transport. It is the latest technique for charging and discharging the electric vehicle without any wire or any physical contact between load and source.

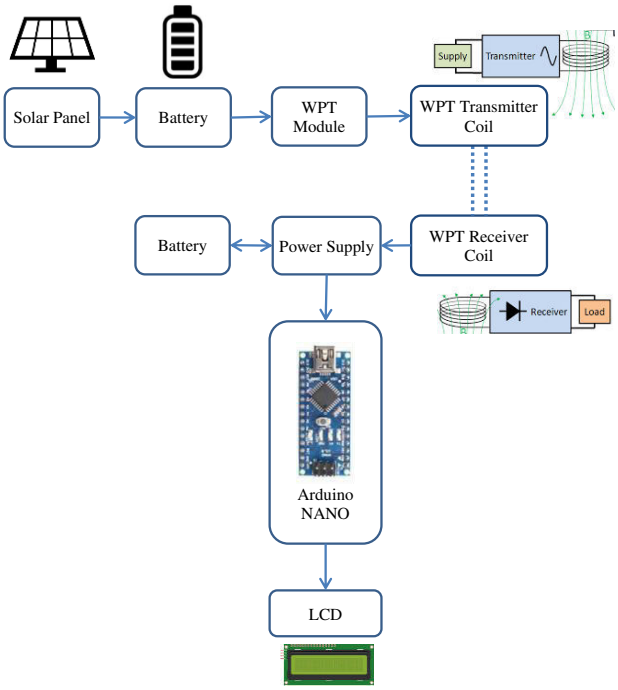

Figure.3. Proposed Block Diagram

In order to succeed with the energy transfer, an understanding of how the system shall be interconnected with the BLDC motor and the PV panels is required. For this interconnection, a design using a shared PCB for the bidirectional DC/DC converter and the BLDC-inverter is proposed to increase the energy density. Software shall also be implemented on an Arduino Due which controls the power transfer and supervises the batteries. This design will provide broader insight on the techniques that can be used to increase the days at sea without land charging with a dual battery setup and hopefully inspire others to convert their boat into a greener solution.

MICROCONTROLLER BOARD

The master board is the main controller of the BMS which functions to process data, acquire data and display the results of process to users. Besides that it also serves to monitor and safety protection. This master board uses the ATMega328 based Arduino NANO microcontroller. This microcontroller is equipped with a real-time operation system that can be done with multi-tasking with a handing timer reaching 16 MHz In the master board, it consists of several module series includes controller Module, Current Sensor Module, Temperature Sensor Module, Voltage Regulator Module, Communication Module, Voltage Sensing Module, Main Contactor Control and Motor Control Module.

PV PANNEL

The 12v 5W mini Solar Panel has Polycrystalline solar cells which are encased and protected by a durable outer poly frame. These Small Epoxy Solar Panels are simple to install or add to your existing product and their construction

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requires no frame or special modifications. The solar panel can charge the battery only if it is exposed to bright sunlight. A converter was used to reduce the power fluctuations that occurred at the solar panel to ensure a controlled and efficient recharge of the battery.

WIRELESS POWER TRANSFER MODULE

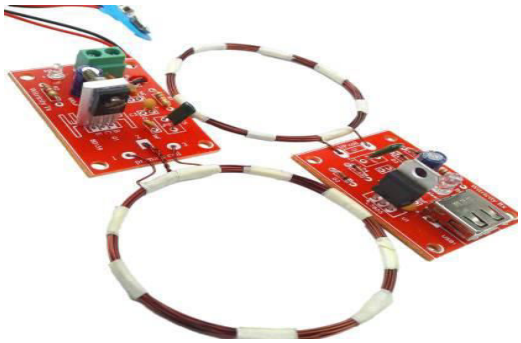

Figure.4. Wireless Power Transfer Module

The Wireless Power Transfer and Charging Module can be used in electronic equipment's in common use for close wireless charging or power supply. Consist of a Transmitter & Receiver and coil, it could serve as a replacement for the Wireless Power Supply with stable 5V output voltage and maximum 600mA output current. Its small size and insulation coil is more suitable for our solar based EV wireless charging project.

LCD DISPLAY

This is a white on green display having 16 characters and 2 rows with high brightness backlight.16 x 2 LCD is ready to use with micro-controllers as a digital input. LCD used to display the prototype sensors data display, and any data that requires a simple display.

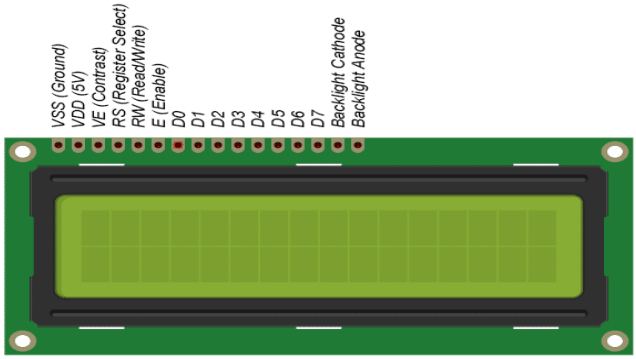

Figure.5. LCD Display

IV.RESULT AND DISCUSSION

The solar wireless electric vehicle charging system, in summary, is a promising innovation that has numerous advantages over conventional cable charging methods. It dependency on fossil fuels and enables quick and easy charging of electric vehicles without the use of bulky wires or connectors. A clean and renewable source of energy, the solar panel on the charging pad can generate electricity by using the sun's energy. The battery is charged securely and effectively thanks to the employment of an Arduino NANO microcontroller and other electronic components, which enables efficient and intelligent management of the charging process.

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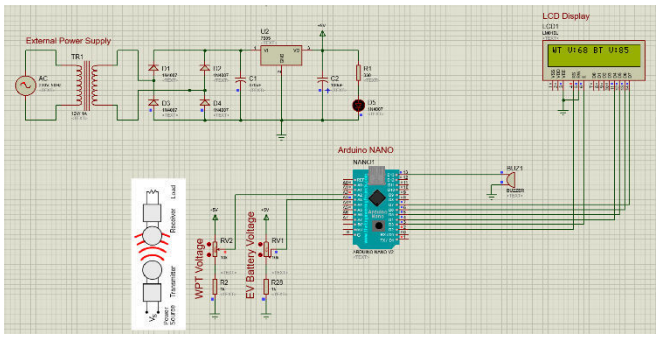

Figure.6. Simulation Results

V.CONCLUSION

The proposed multi-sensor interface can achieve the compactness and the flexibility of the sensor module by utilizing two reconfigurable methods for various sensor interfaces and also by migrating most of the burdens for signal calibration and analysis to hardware. The output effectively demonstrated about the construction of wireless electric vehicle charging system using solar panel. The electric vehicle charging wirelessly reduces the need of transmission wire and reduces the fuel consumption, making it a simple and more practical way. This method reduces the rid of hardware components wear and tear. This wireless charging system can be implementing through dynamic electrical vehicle charging system.

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