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Vehicle Battery Charger Booth Using Hybrid Power System

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Abstract - *This paper describes vehicle battery charger booth using hybrid power system. Vehicle battery charger becomes a major source of business/personal communication; the vehicle battery charger business is currently worth billions of dollars, and supports millions of vehicle The need to provide a public charging service is essential. Many critics argued that a public charging service is not a lucrative business because most users can charge their vehicle at home, or in their office. Vehicle battery charger booth using hybrid power system is new business milestone because many are attending business convex service. Recommended locations include: Hotels, Health clubs, Training centers, Golf clubs, Retail outlets, Shopping malls, Internet cafes, Universities, Colleges road, Airports, Train terminals, etc., so that the vehicle can reactivate a low or dead battery by simply plugging in and charging This is designed based on arduino a micro controller that does the countdown timings for a period of 60 minutes with LCD displays showing the actual time left. During the timing period a relay output is latched and finishing timing in progress.*

Key Words*: *LCD Display, hybrid (grid power, Solar Panel), Microcontroller, battery management system, RF ID unit

1. INTRODUCTION

The vehicle battery charger booth using hybrid power system developed in this work providing a unique service to the traveler where people travel for a long distance by using electric vehicle for them in between over the highways there should be a electric charging booth to charge their vehicle. The vehicle battery charger booth can be quickly and easily installed outside any business premises.Gasoline- and diesel-powered Internal Combustion Engine (ICE) vehicles ended up dominating transportation in the 20th century. However, concerns about the environmental impacts of ICE vehicles sparked a PEV renaissance at the end of the 20th century. First, advances in electric-drive technologies enabled commercialization of hybrid electric vehicles (HEVs), which integrate an ICE or other type of propulsion source with batteries, regenerative braking, and an electric motor to boost fuel economy. Continued technological advances have spawned PHEVs, which integrate small ICEs (or other types of propulsion sources) and large, grid-chargeable batteries that enable 10- to 40-mile all electric driving ranges. Advanced technologies have also created a new breed of EVs that don't use an ICE at all. New models of generation PEVs are available today. The market penetration and availability are growing quickly due to its benefits. PEVs are better than conventional vehicles in most performance categories. They are safe and convenient, and they can save money while slashing emissions and increasing the nation's energy security. PHEVs and PEVs have received increased attention because of their low pollution emissions and high fuel economy. Ultimately, PHEVs/PEVs will transfer energy demands from crude oil to electricity for the personal transportation sector. This shift would reduce pollution and alleviate security issues related to oil extraction, importation, and combustion. Along with the use of grid power, PHEVs/PEVs also have the potential to transfer power to the grid, which alleviates peak power demand and provides ancillary services to the grid. Many automotive OEMs have made their plans to introduce PHEVs and EVs worldwide during the next few years

2. BASIC ASSUMPTIONS

The design of RF ID based universal vehicle battery charger is based on the following assumptions:
Maximum solar energy is used for charging the lead acid battery inside the vehicle battery charger to keep it charged fully all the time The charging current is up to s2 amp @ 12vDC A single solar panel of size 635x550x38 mm, 37WP capable of supplying up to 2.0 amp is used.
Provision to charge maximum 2 different types of vehicle is provided. Using more solar panel .

Mainly it has two functions:

1. Hybrid power supply system
2. RF ID card detecting and charging system

It consists the following section:

1. Hybrid (Solar, grid power) charging system
2. Micro controller controlling system
3. Time display section
4. Various power connectors

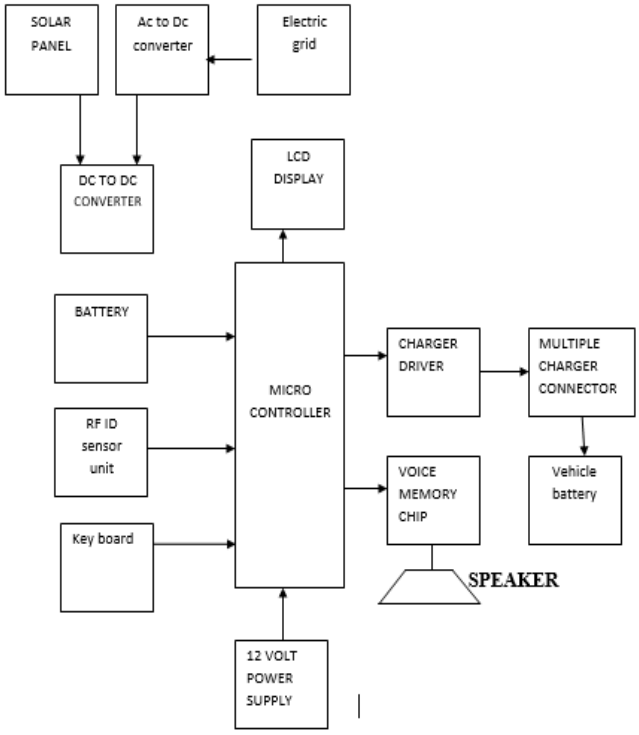

Fig -1: Purposed Block Diagram of Vehicle Battery Charger

3. HARDWARE DETAILS

3.1 Solar Panel

Solar panels absorb sunlight as a source of energy to generate electricity. A photovoltaic (PV Photovoltaic) module is a packaged, connected assembly of typically 6x10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. Photovoltaic modules use light energy (photons) from the Sun to generate electricity through the photovoltaic effect. The majority of modules use wafer-based crystalline silicon cells or thin-film cells. The structural (load carrying) member of a module can either be the top layer or the back layer. Cells must also be protected from mechanical damage and moisture. Most modules are rigid, but semi-flexible ones based on thin-film cells are also available. The cells must be connected electrically in series, one to another.

Fig -2: Solar Panel

3.2 AC To DC Converter

AC-DC converters are electrical circuits that transform alternating current (AC) input into direct current (DC) output. They are used in power electronic applications where the power input a 50 Hz or 60 Hz sine-wave AC voltage that requires power conversion for a DC output.AC to DC converters use rectifiers to turn AC input into DC output, regulators to adjust the voltage level, and reservoir capacitors to smooth the pulsating DC. This video explains how AC is converted into DC.

3.3 Electrical Grid

Electrical grid or power grid is defined as the network which interconnects the generation, transmission and distribution unit. It supplies the electrical power from generating unit to the distribution unit. A large amount of power is transmitted from the generating station to load center at 220kV or higher. The network form by these high voltage lines is called the super grid. The super grid feeds the sub-transmission network operating at 132kV or less.

3.4 DC To DC Converter

DC-DC converters accept DC input and provide regulated and/or isolated DC output in various applications including computer flashmemory, telecommunications eq uipment, and process control systems. DC-DC converters are frequently used on vehicle-mounted systems computer flash memory, telecommunication equipment and process control systems.

3.5 LCD Display

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement.

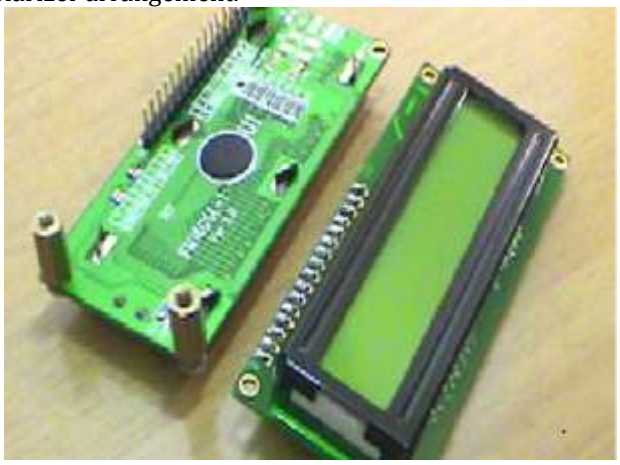

Fig -3: LCD Display

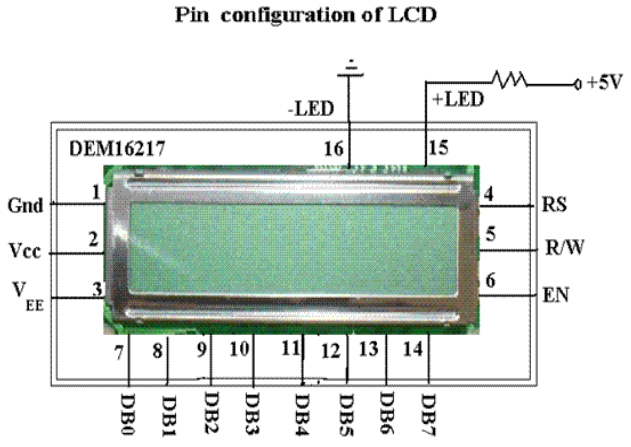

Fig -4: Pin Configuration Of LCD

3.6 Battery

A battery is a device that produces electrons through electrochemical reactions, and contains positive (+) and negative (-) terminals. A battery consists of one or more electrochemical cells, which transform stored chemical energy directly into electrical energy. When an external load connects to a battery, electrons cross from the negative to the positive terminal, creating an electrical current. This current may power a motor, a light bulb, a clock, a computer, a cellphone, and other electronic devices or equipment. Battery flow speed is determined by the battery's internal resistance and outside load.

3.7 Radio-Frequency Identification (RFID)

Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. Active tags have a local power source (such as a battery) and may operate hundreds of meters from the RFID reader. Unlike a barcode, the tag need not be within the line of sight of the reader, so it may be embedded in the tracked object. RFID is one method of automatic identification and data capture (AIDC).

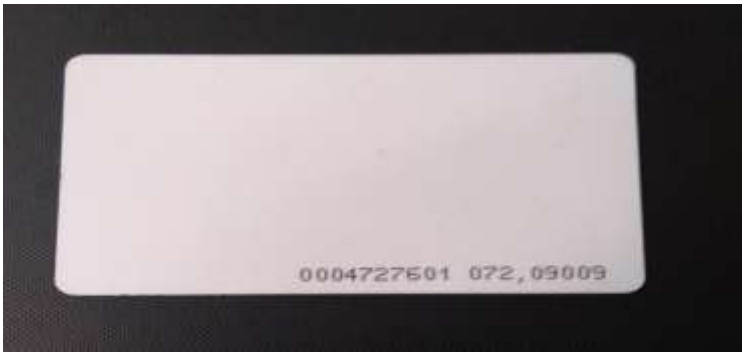

Fig -5: RFID

3.8 Keyboard

The keyboard is the piece of computer hardware used to input text, characters, and other commands into a computer or similar device.Even though the keyboard is an external peripheral device in a desktop system (it sits outside the main computer housing), or is "virtual" in a tablet PC, it is an essential part of the complete computer system.

3.9 Ardino

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED.

The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics.

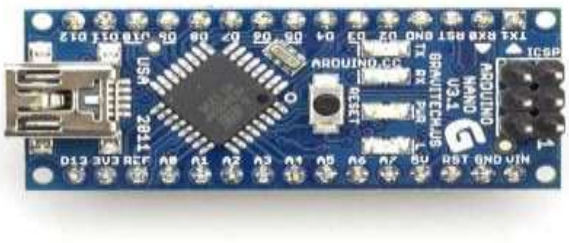

Fig -6: Ardino

3.10 Power Supply

A power supply is an electrical device that supplies electric power to an electrical load. The primary function of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load. As a result, power supplies are sometimes referred to as electric power converters. Some power supplies are separate standalone pieces of equipment, while others are built into the load appliances that they power.

3.11 Charger Driver

A battery charger, or recharger, is a device used to put energy into a secondary cell or rechargeable battery by forcing an electric current through it.The charging protocol (how much voltage or current for how long, and what to do when charging is complete, for instance) depends on the size and type of the battery being charged. Some battery types have high tolerance for overcharging (i.e., continued charging after the battery has been fully charged) and can be recharged by connection to a constant voltage source or a constant current source, depending on battery type. Simple chargers of this type must be manually disconnected at the end of the charge cycle, and some battery types absolutely require, or may use a timer, to cut off charging current at some fixed time, approximately when charging is complete.

3.12 Memory Chip

A memory chip is an integrated circuit made out of millions of capacitors and transistors that can store data or can be used to process code. Memory chips can hold memory either temporarily through random access memory (RAM), or permanently through read only memory (ROM). Read only memory contains permanently stored data that a processor can read but cannot modify. Memory chips comes in different sizes and shapes. Some can be connected directly while some need special drives. Memory chips are essential components in computer and electronic devices in which memory storage plays a key role.

3.13 Speaker

Speakers are transducers that convert electromagnetic waves into sound waves. The speakers receive audio input from a device such as a computer or an audio receiver. This input may be either in analog or digital form. Analog speakers simply amplify the analog electromagnetic waves into sound waves. Since sound waves are produced in analog form, digital speakers must first convert the digital input to an analog signal, then generate the sound waves.

4. OPERATIONS

4.1 Input Stage

The vehicle battery charger starts charging a vehicle connected to it, when a RF ID is inserted at the RF ID insertion slot at the input stage. IT will ask the user time of charging and the time will be displayed at the LCD display for the user, so as to ensure correct RF ID insertion. Any other RF ID, if inserted in the slot it will be not detect and sound will come through speaker. A mechanical slot is attached with electrical triggering in RF ID insertion slot, if the correct RF ID is inserted it sends a pulse to the control unit authorizing the start of charging the vehicle battery connected to the device. Then the RF ID insertion slot accepts the RF ID into the battery charging unit and start charging the vehicle battery for a specific period controlled by the software of the microcontroller.

4.2 Controller

This section acts according to the input signal from the sensor circuit. RF ID accepted or rejected is based on the sensor of the RF ID. This invokes microcontroller along with LCD interface displays the selection of vehicle option if particular vehicle is selected for charging the corresponding routine is activated and charge the vehicle for a particular duration of time .When the routine completes, it indicates charge complete message through LCD display. Similarly the same procedure is followed for charging more than four different vehicle's simultaneously.

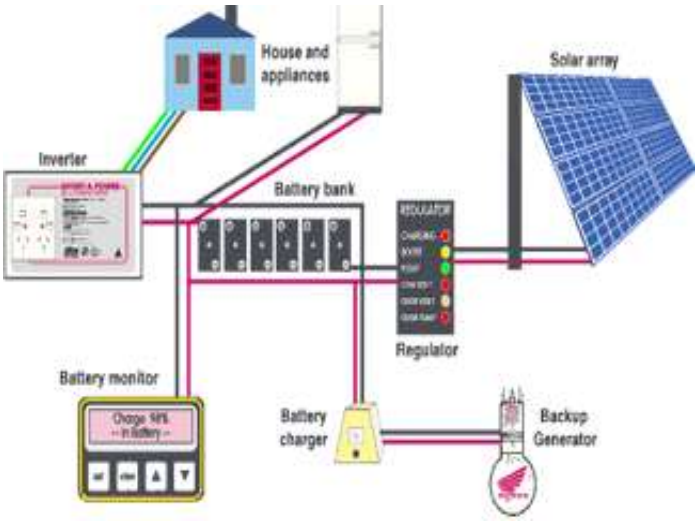

Fig -7: Working Operation of Vehicle Charger

4.3 Output And Display

The LCD displays all the information to the customer as and when required. When the vehicle battery is connected, it displays" Insert RF ID". While charging it displays "Charging" and at the end of charging cycle it displays "Charge completed". For charging continuously the RF ID has to be inserted when the display shows "Charge Completed" The output has 10 terminals for connecting different types of vehicle batteries

4.4 Power

The salient feature of the universal vehicle battery charger is that it draws power from the solar energy during the day time for charging the internal battery of the controller. Only if additional power is required, then the grid power is used. A solar micro inverter has been designed for supplying 230v, 50Hz so that both grid power and the solar power are connected in parallel with a switch to changeover from one to the other.

5. MERITS

Merits of the system are: More useful to save energy from sun and intelligent tracking solar energy, Simple and efficient, Hybrid power system is used so cost will reduce, Reduced man power, Low power consumption.

6. APPLICATIONS

Applictions of the system are:The RF ID based vehicle battery charger is very useful to public for using RF ID to charge for the vehicle any where, Shopping malls, markets, colleges, etc, Highways, Company parking lots.

7. CONCLUSION

As batteries are the core energy sources in Electric Vehicles, their performance greatly impacts the salability of Electric Vehicles. Therefore, manufacturers are seeking for breakthroughs in both battery technology and Battery Management Systems. Chemical reactions in the battery are subject to operating conditions, and hence, the degradation of a battery may vary in different environments. Developing a comprehensive and mature BMS is critical for manufacturers who would like to increase the market share of their products. The major concerns of BMSs were discussed in this paper. They include battery state evaluation, modeling, and cell balancing, wherein the evaluation methodologies of battery status were viewed as the crucial issue. Thus, related work on the SOC, SOH, and SOL of batteries were reviewed with comparisons. A BMS framework was proposed to deal with the deficiencies of current BMSs in both research and commercial products. Based on previous work, specific challenges facing BMSs and their possible solutions were presented as a solid foundation for future research. Due to varying situations in real-world applications, a standard solution was not wanted. Based on the specific situation, different strategies should be applied to improve and optimize the performance of Battery Management Stations in future Electric Vehicles, and Hybrid Electric Vehicles

8. REFERENCES

[1] M.S.Varadarajan.,RF ID based Universal Vehicle Battery Charger, ISSN: 2250-3021 Volume 2, Issue 6 (June 2012), PP 1433- 1438.

[2] Pulvirenti, F. Milazzo, P. Ursino, R, Charger power switch for vehicle vehicle, Analog and Mixed IC Design, 1997. Proceedings 1997 2nd IEEE-CAS Region 8 Workshop, 12-13 Sep 1997, Pg 97 - 100.

[3] Pastre, M. Krummenacher, F. Robortella, R. Simon-Vermot, R. Kayal, M. Ecole Polytech. Fed. de Lausanne, A fully integrated solar battery charger Circuits and Systems and TAISA Conference, 2009. NEWCAS-TAISA '09. Joint IEEE North East Workshop.

[4] Weidong Xiao, William G. Dunford, Patrick r. Palmer and Antoine Capel, "Regulation of Photovoltaic voltage," IEEE Trans Industrial Electronics, vol. 54 no.3, pp. 1365-1373, June 2007.

[5] Rodriguez, Jose; et al. (August 2002). "Multilevel Inverters: A Survey of Topologies, Controls, and Applications". IEEE Transactions on Industrial Electronics (IEEE) **49** (4): 724–738.

[6] Barth, H. Schaeper, C. Schmidla, T. Nordmann, H. Kiel, M. van der Broeck, H. Yurdagel, Y. Wieczorek, C. Hecht, F. Sauer, D.U., Development of a universal adaptive battery charger as an educational project , Power Electronics Specialists Conference, 2008. PESC 2008. IEEE, 15-19 June 2008, Pg 1839 – 1845.