



e-ISSN: 2278-8875
p-ISSN: 2320-3765

International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

Volume 10, Issue 8, August 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.282

9940 572 462

6381 907 438

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www.ijareeie.com



Self-Rechargeable Electric Vehicle

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ABSTRACT: Electric Vehicles (EVs) are gaining momentum due to several factors, including the price reduction as well as the climate and environmental awareness. This project of EVs regarding battery technology trends, charging methods.

Today's Automobile world is influenced by invent of modern electric cars. Generally, these types of cars are driven by a battery powered electric motor. But these batteries can be charged only during the static condition and the process is more time consuming. So there is a need to create a sustainable means of energy source for these cars.

This project aims at developing a self-charging electric vehicle which generates the electric power required to drive the vehicle during the running condition by the means of two power battery bank. One battery will get charge and one will be used for utilizing. These power sources are managed by the means of a switching unit for charging the battery and utilization of battery. Power source we are using solar and kinetic energy. The source switching will be automatic, based on vehicle is moving or standing condition.

KEYWORDS:Eco-Friendly, Efficient battery usage, less time consumption.

LINTRODUCTION

An Electric Vehicle (EV) can be referred to as an electric drive vehicle, uses one or more electric motors ortraction motors for propulsion. A few electric vehicles will emerge on the market that it can be powered by arechargeable battery. The Battery Electric Vehicle (BEV) is mostly dependent on the battery technology. It provides a level of comfort and ease of operation that could not be achieved by the gasoline cars of the time. However, in recent years, increased concern over the environmental impact of gasoline cars, higher gasoline prices, improvements in battery technology, and the prospect of peak oil, have brought about renewed interest in electric vehicle, which are reported to be more environmentally friendly and cheaper to maintain and run. Electric vehicles are becoming popular and more prevalent due to increased energy costs and concern regarding the reduction of greenhouse gas emissions.

ILLITERATURE SURVEY

1. M. Sathya Prakash, Design And Fabrication Of Self Charging Electric Vehicle International Journal of Power Control Signal and Computation(IJPCSC)
 - This paper describes the charging arrangement on the e-bike. The motor uses the electric energy from battery and battery can receive electric energy from dynamo, this energy is stored in battery.
 - Today available e-bike are use 3-4 no' s of 12v batteries. But in this paper we use only one 12v battery, so battery cost is reduced. Thus, running cost is very low, when compare to other sources of energy.
2. Piyush Kapila, Electric car charging system by alternator, International Journal of Engineering Research in Electrical and Electronic Engineering (IJEREEE) Vol 3, Issue 11, November 2017.
 - This research paper relates to the functioning of an electric car with self-charging from the alternator to the battery.



- The alternator produces the electricity while the wheel is moving, allowing the alternator to move with the wheel friction. Alternator gets the drive from friction.
 - Here the alternator has the ability to generate the 14V DC, which is directly connected to the DC-DC converter throughout the battery.
3. Karthikeyan P1, Suresh M2, Smartself recharging batteries in electric vehicles, International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 06 Issue: 03 | Mar 2019.
- The proposed work deals with a design of a battery electric vehicle with self-charging system for one passenger and for weight up to 50 kg.
 - In order to work with more efficient, the solar panel can also be implemented on the top of the car.
 - This method has been made to fabricate a self-charging battery electric vehicle which utilizes the rotational energy of wheels to charge the batteries, thereby introducing a system which makes the vehicle pollution free.

III.OBJECTIVES

This objective is to develop a self-charging electric vehicle which generates the electric power required to drive the vehicle during the running condition. Our task is to make self-charging system automatic with help of relays and microcontroller. This system will select the battery for charging and utilization based on current charging level of battery. Another task is to select source automatically from two different sources solar and kinetic energy in standstill and moving position respectively.

- The aim of our project is to reduce the waiting time required for recharging the battery in the charging station by the introducing the recharging concept for electric vehicles.
- Here the kinetic energy of the vehicle is used to recharge the battery and in addition to this solar energy is also be used to recharge the battery. Hence there is no loss of energy and it is pollution free.

IV.PROBLEM STATEMENT

- Usually a vehicle consists of four wheels and it will be powered by an internal engine.
- Automobiles generally use gasoline to fuel the internal engine, but technological advances have led to the design of cars that run on electricity. This electricity we will store in form of charge inside the battery. After duration the battery will get discharge and we have to charge it.
- In order to overcome this problem we are making use of a self-charging system and also the solar energy based charging is employed.

V. PROPOSED SYSTEM

- The design and the fabrication work of self-charging electric vehicle starts with the collection of data regarding the need for a self-charge to be operated while car is in running condition.
- We are using two battery and relay switching section to select the battery for charging and utilization.
- The system will automatically select the battery based on battery charging level.
- Power source we are using is solar and kinetic energy.
- The source switching will be automatic, based on vehicle is in moving or stop condition.



VI. CIRCUIT DIAGRAM

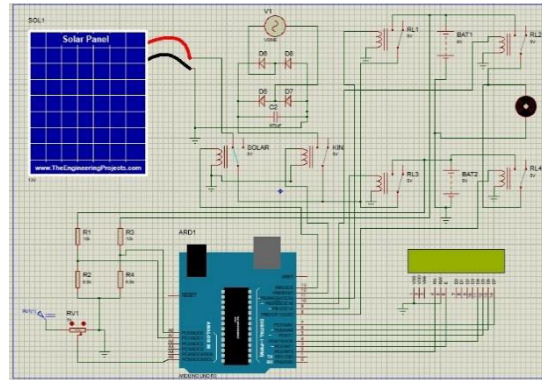


Fig A. Circuit Diagram

- In the above model before starting the vehicle by default one battery will be used for utilising and other battery will be for charging purpose
- The solar panel is connected and the relay connected to solar panel decides which source should be used by the battery to charge based on movement of the vehicle
- The circuit is switched on and the vehicle starts moving the relay shifts to generator source and solar panel will be disconnected
- The output of the generator is provided to the bridge rectifier with RC filter , to convert AC output to DC
- The output is boosted as the generated output is not sufficient to charge the batteries
- The boosting process is done by Buck Boost Converter , the voltage is boosted and given to charge the battery
- The voltage level of the batteries is sensed by the voltage sensor circuit and given as input to the Arduino
- The Arduino sends the signal to the relay as to which battery is to be charged and which battery is to be discharged based on the input values
- The voltage levels of the batteries is indicated in the LCD display
- When the battery starts draining the other battery is utilised by the circuit to run the vehicle.

VII. SYSTEM COMPONENTS

1. ARDUINO

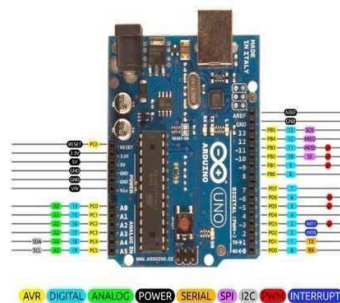


Fig 1: Arduino UNO

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analogue inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC to DC adapter or battery to get started.



2.RELAY

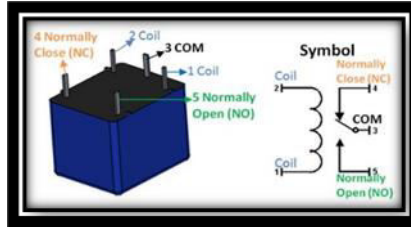


Fig 2: Relay

Relays are most commonly used switching device in electronics. There are two important parameters of relay, first is the Trigger Voltage, this is the voltage required to turn on the relay that is to change the contact from Common → NC to Common → NO. The other parameter is your Load Voltage & Current, this is the amount of voltage or current that the NC, NO or Common terminal of the relay could withstand, in our case for DC it is maximum of 30V and 10A.

3.VOLTAGE SENSOR

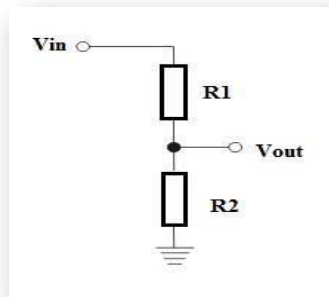


Fig 3: Voltage Sensor

A voltage sensor is a sensor is used to calculate and monitor the amount of voltage in an object.Voltage sensors can determine both the AC voltage and DC voltage level. The input of this sensor can be the voltage whereas the output is the switches, analog voltage signal, a current signal, an audible signal, etc.

4. DC MOTOR



Fig 4: DC Motor

A device used to convert the electrical energy into mechanical energy.
 Rated speed-500rpm, Operating voltage-12V, Rated torque-0.7kg-cm



5.SOLAR PANEL



Fig 5 : Solar Panel

A Solar panel, or photo-voltaic module, is an assembly of photo-voltaic cells mounted in a framework for installation. Solar panels use sunlight as a source of energy and generate direct current electricity. Most solar panels are made up using crystalline silicon solar cells. Installation of solar panels in homes helps in combating the harmful emissions of greenhouse gases and thus helps reduce global warming.

6. GENERATOR



Fig 6: Generator

The generator is used to convert the kinetic energy of the vehicle to the electrical energy. Rated speed-30rpm, Operating voltage-12Vdc, Rated torque-0.7kg-cm

7.BRIDGE RECTIFIER

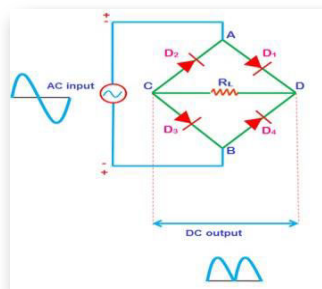


Fig7:Bridge Rectifier

The input AC signal is applied across two terminals A and B and the output DC signal is obtained across the load resistor R_L which is connected between the terminals C and D.

The four diodes D_1, D_2, D_3, D_4 are arranged in series with only two diodes allowing electric current during each half cycle. For example, diodes D_1 and D_3 are considered as one pair which allows electric current during the positive half cycle whereas diodes D_2 and D_4 are considered as another pair which allows electric current during the negative half cycle of the input AC signal.



8. BATTERY

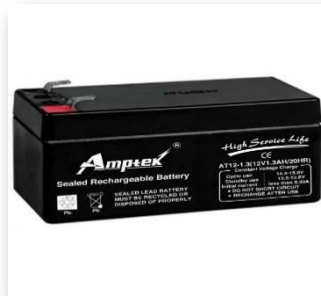
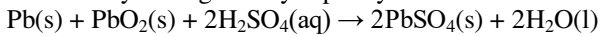


Fig 8: Battery

The recharge-able battery is used for charging and discharging purpose to run the vehicle. We are using a rechargeable 12V battery having battery capacity of 1.3Ah



VIII.WORKING

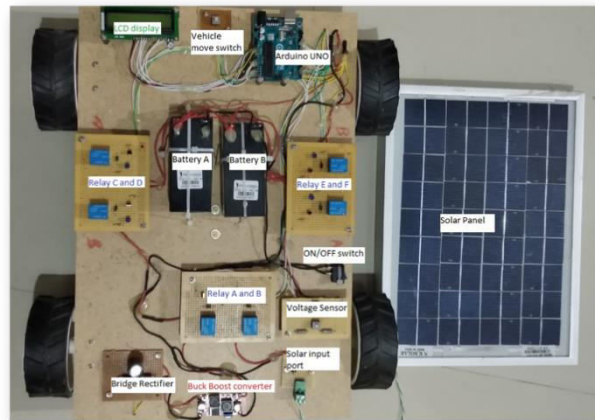


Fig : Top View of Model

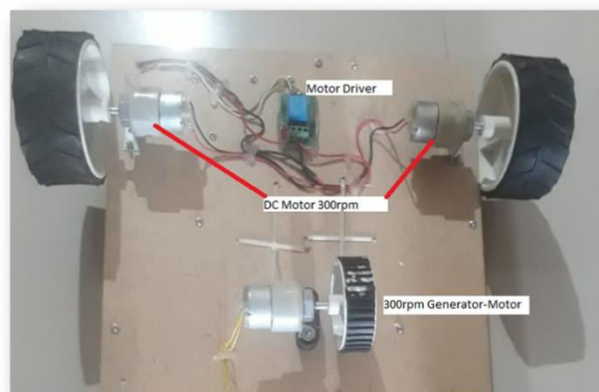


Fig : Bottom view of Model



This is the Hardware Model which consists of several components

- Solar Panel of 10W, 12V is connected through solar input port.
- Buck Boost converter of boosting capacity 94%, frequency of 400kHz boosts the output of Generator-Motor set.
- The Bridge rectifier with RC filter converts the AC output from boost converter to DC.
- The Relay A and B is used to select the source for the vehicle to move either solar or Kinetic energy from the Generator-motor set, which is decided by either Vehicle is moving or stand still.
- There are two batteries present which are Battery A and B.
- Relay C and D is used to select the battery to charging condition either Battery A or B.
- Relay E and F is used to select the battery for utilization either Battery A or B.
- The voltage Sensor plays a major role which senses the voltage difference between the two Batteries and sends this information to Arduino UNO.
- Arduino UNO decides which battery to be charged and which battery to be utilized and sends the command to the relays.
- There is a LCD display connected to the Arduino which displays the battery voltage status.
- ON/OFF switch is for allowing all components to start.
- Vehicle move switch is used to start or stop of the Vehicle.
- Coming to the Motors part there are two DC motor which are geared motors of 300rpm and one Generator-Motor set of 300rpm.
- And there are two Movement Wheels.
- There is a Motor Driver which distributes the voltage between the two motors
- When the ON/OFF switch is turned on all the components are started.
- By Default, Battery A is in charging condition and Battery B is in utilizing Condition.
- As you can see Battery A has more voltage than Battery B so battery A is in charging mode and Battery B is in Utilization mode.
- When we on the vehicle move switch, the vehicle moves by selecting the battery chosen for utilization and parallelly charges the other battery.
- And if the utilizing Battery drains up it puts it to charging mode and chooses other battery which was charging earlier parallelly is selected for utilizing.
- Coming to the Kinetic energy part the generator-motor generates up to 3.8V which will be the input for buck boost converter, which is the converted to DC and used to charge the battery.

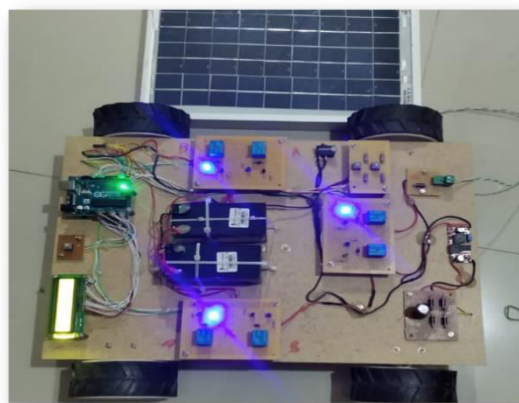


Fig :Working Model

IX.CONCLUSION

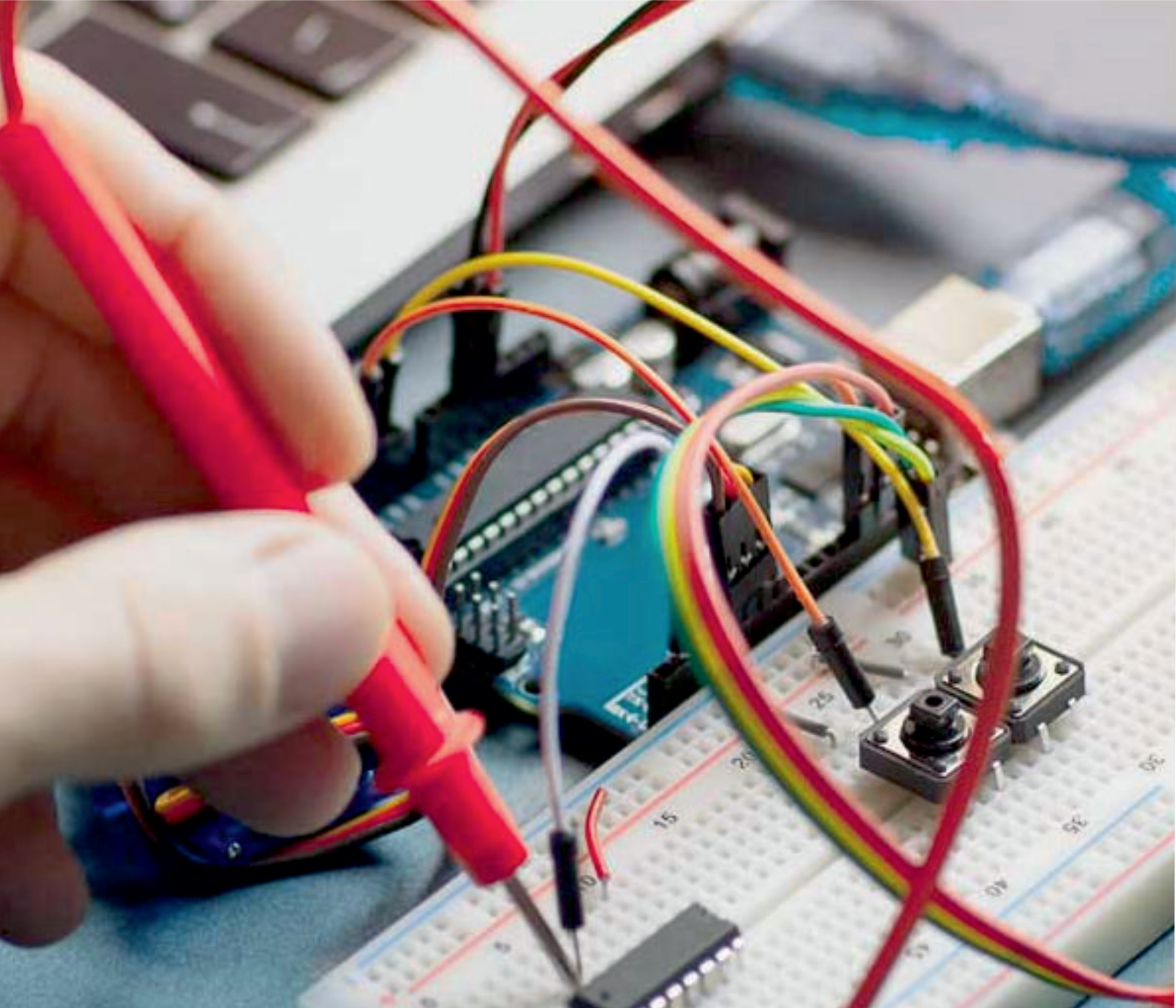
Thus it allows each node with message to decide whether to copy the message to a path node by optimizing its transmission effort in order to provide a sufficient level of message delay. Using a channel selection scheme provides spectrum utilization while it minimizes the interference level to primary system. Using trustworthy algorithm,



It improves the trustworthiness of the Spectrum sensing in CR-Networks. It enables network nodes to adaptively regulate their communication strategies according to dynamically changing network environment.

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