Review on Development of Self Charging Electric Vehicles

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Abstract— Electricity is generated by regenerative motors which are installed on the wheels of car as the car starts moving from one place to another by a main motor which is connected to the rear axle as the main motor rotates, the rear wheels rotate and the car moves from one place to another by this movement and rolling friction the regenerative motors rotates and produces electricity. But according to the thermodynamics law and many other laws we cannot achieve 100% of energy from one source to another and it is theoretically impossible, so all we can improve is efficiency and that's the main point of this project. As we all aware of today's condition about the pollution created by the vehicles this is an effective way to improve our technology for our future. This project is aimed to develop a prototype of a self-charging Electric Vehicle.

Keywords— Self charge, Electric Vehicles, DC generator, Power measurement etc.

I. INTRODUCTION

Today we are generating electricity from fossil fuels, they are not environmental friendly. It causes global warming, therefore we need Non-Conventional sources of energy. A great part of the oil consumption is recently allocated to the transportation sector and a large portion of that is used by road vehicles. According to the international energy overview report, the transportation sector is going to increase its share in world's total oil consumption by up to 55% by 2030. In order to increase the energy a revolution in the transportation sector occurs. To reduce use of energy from fossil fuels in transportation usage and make environment clean and green, we have designed electric vehicle that uses solar energy and electricity to run[7]. The Photovoltaic cells used to harness solar energy to generate voltage to charge the battery.

An Electric Vehicle (EV) can be referred to as an electric drive vehicle, uses one or more electric motors or traction motors for propulsion. A few electric vehicles will emerge on the market that it can be powered by a rechargeable battery. The Battery Electric Vehicle (BEV) is mostly dependent on the battery technology[9]. 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 concerns 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. Electric vehicles are powered by batteries that are contained with the vehicle and usually provide a sufficient charge for the propulsion of the vehicle through city traffic. The batteries are mounted along with the vehicle and are used to run the vehicle. In addition to the solar, we can also use alternator to recharge the batteries. The alternator is connected at the midpoint of the back wheel. The rotational energy of the wheel can be converted into electrical energy by using generator and by which supply is fed to the batteries.

In this era conservation of energy is the most necessary part of the society and as automobile is an important part of society in day to day life, hence the conservation of energy as well as pollution due to the use of Bio-fuels in automobile sector is a challenging job. So energy conservation and pollution free vehicle became most important factor.

To solve this issue the concept of Electric Vehicle (EV) (electricity powered automobile) system was introduced, this can be used in all type of automobiles such as cars, bus; truck etc. But once the battery of EV is charged it travels a limited distance, again we have to charge the battery of vehicle, which is a time consuming process.

If one self charging EV is assembled using some kind of alternators with other circuitries, which can charge the battery simultaneously when it is moving, then the problem can be solved. We can use a single powerful battery or two batteries for this case.

II. PROBLEM IDENTIFICATION

In a current scenario, the fossil fuels are depleting rapidly due to the over usage of conventional vehicles. Generally conventional vehicles use petrol and diesel as a main fuel. It

causes heavy damage to our environment by emitting the harmful gases such as HC (hydrocarbon), CO (carbon monoxide), and Nox emissions which leads to ozone depletion and global warming. Also more number of alternative fuels such alcohol (methyl alcohol and ethyl alcohol), biogas, bio-diesel, natural gas and vegetable such as peanut oil, linseed oil, rapeseed oil, sunflower oil, etc can be used in order to replace the existing fossil fuel. But a proper cause and effects has not yet identified. Here the electric vehicle plays a vital role to boom the automobile to the next generation. The most of the electric vehicle uses battery as a major source of power. But main problem we identified is that the battery should be charged for a long period of time in a static condition only. It leads to consume more conventional power and so it increase the cost of the electricity used. And also recharging fuel stations are not sufficient as the process of recharging consumes more time. As the battery is continuously used to run the vehicle, deep discharge of battery is frequently occurring. So that the life cycle of battery is decreased. Due to this the replace cost of battery is high.

III. OBJECTIVES

The primary objectives are:

- To study various component and rating of component used in the project
- To design prototype model of power generation by using EV wheel.
- Programing for controlling and monitoring parameter voltage and current.
- Enhance range through self-charging mechanisms.
- Implement autonomous charging capabilities.
- Develop advanced energy storage solutions.
- Minimize environmental impact.

IV. LITERATURE SURVEY

Kusekar S.K., Bandgar P.M, Andhale P.S, Adlinge G.H, Gaikawad V.V, Dhekale S.P. (2015) has conducted an experiment in Design and development of electrical car to illustrate an implementation of electric vehicle technology on a small scale. Here we observed how to design an electric car with less cost and have studied about various components that is required to design an electric car. It shows that electrical battery operated vehicle is more suitable than other vehicle because the cost of the electricity is low and also maintenance cost is less. Also we got an idea about how to calculate the torque required to move the vehicle. In this study we understand the basic principles of chassis designing, steering system, caster, camber, drift, acceleration, top speed and performance tuning of the vehicle.

K.Vignesh, P.Sakthi, A.Pugazhenthi, V.Karthikeyan, C.Vinothkumar (2015) performed an experiment in the Design and fabrication of Free Energy Bicycle which would produce a cheaper and effective result than the existing system. In this, they have fitted a dynamo in the bicycle which is in contact with the rear wheel. The motor is also connected with a rear wheel via main shaft to transmit power to the wheel and other end of dynamo is connected with the two terminals of the battery for the recharging purpose. It is working on the principle that when the wheel rotates, dynamo is functioning and from this the battery is charged by means of battery. The connections from the battery is given to the motor in such a way that when the motor energies through the current, the stator field coil get magnetized and induces the rotor shaft to rotate in the counter clockwise direction.

Awash Tekle (2014) performed an experiment on the topic Renewable Energy Use for Continuous electric vehicles Battery charging capacity in mobile. This paper presents and studies on renewable energy use, by integrating solar and wind energy for continuous electric vehicle battery charging capacity in mobility. Here, the power for electric vehicle is generated from solar cells and wind turbine and it is fed to the battery for charging the inverter. This is fed to the electric motor for rotational power development to the differential shaft. Here we mainly observed the charging and discharging rate of the battery and we came to know that it fully depends on the battery design. In this paper we studied about how to calculate the power generated by the wind turbine and the blade tip ratio for the various speeds.

Patel Vijaykumar, R.I.Patel (2012) conducted an experiment on the topic Structural Analysis of Automotive Chassis frame Design Modification for Weight Reduction for the work performed towards the optimization of the automotive chassis with constraints of maximum shear stress, equivalent stress and deflection of chassis under maximum load. Here we observed that how the chassis serve as a frame work for supporting the body and different parts of the automobiles. Here we analysed how to design a chassis, its load withstanding capability and the calculations required for the chassis frame. This paper also gives idea about, how to modify the design for the required weight of vehicle.

S.M.Ferdous, Walid Bin Khaled, Benozir Ahmed, Sayedus Salehin, Eniyat Ghani (2011) conducted an experiment on Electric vehicle which is based on the concept of charging the batteries of an electric vehicle when it is in motion. In general the energy storage capacity of the battery used in electric vehicle is very low compare to the conventional fuels used in modern automobiles. Hence they have found out a method to recharge the battery using renewable resource. This can be achieved by using the wind energy which is caused by the relative motion between the vehicle and the wind surrounding it. In this paper, we have study about the use of Renewable energy i.e. wind energy to generate electricity and to charge the battery by using the developed power. Here we referred how to calculate the energy produced by the wind using wind turbine, here we also get an idea about the aerodynamic analysis of the structure of vehicle along with the flow pattern.

Haw wang and Arish Balasubramani in the year 2018, published the paper titled as “Optimal Planning of Renewable Generations for Electric vehicle charging Station”. This paper has reviewed that electric vehicles (EVs) have grown rapidly and are widely deployed to enable a sustainable transportation

system. One of the key challenges is how to optimize the sizing and operation of the charging stations to meet the ever-increasing EV demands. Renewable energy resources from solar and wind can provide clean power to meet the EV charging demand. The proposed framework can determine the optimal capacity of renewable energy generation, and the optimal scheduling for power supply, in two stages. The arrival patterns and demand profiles of EVs using real-world data to facilitate a practical EV request model. Numerical results demonstrate the optimal planning for a renewable-powered EV charging station.

V. PROPOSED SYSTEM

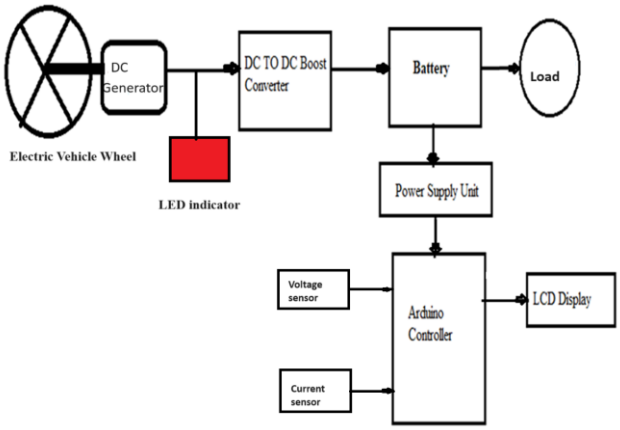

Fig. 1. Block Diagram of system

The idea of the Proposed work is to make the entire operation to be automatic , without having the need for any manual/manpower contributions .The requirement is to generate energy or power ,not from any external source but internally.

Power can be generated internally from wheel rotation which contributes mechanical power. The Principle of a DC power Generator is to convert mechanical energy to electrical energy. Hence the output of DC generator is Electrical energy. (DC power), which is stored in a 12 volt DC battery. The stored electricity has the output above the ground, so that whenever there is need of the electricity, the stored power can be directly transferred to any place in very short period of time.

Dynamo generates electricity it sends to dc boost converter. Boost converter is used to regulate the dc power. Electricity is stored in Battery. DC power is used to glow LED light. Voltage sensor and current sensor are used to measure the voltage an current value in battery. This data will show on LCD display. Arduino is used to process the all function. LCD display attached to arduino to display voltage status of power generation.

VI. SCEHMATIC DIAGRAM

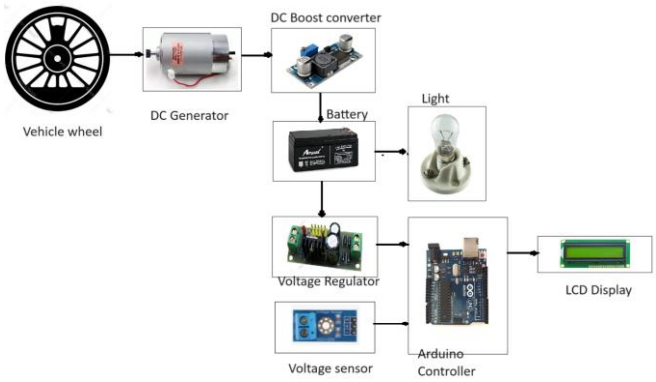

Fig. 2. Schematic Diagram

- The generation of electrical power mainly basis on the principle of rotational energy. The rotational energy is firstly converted into mechanical energy and then mechanical energy is converted into electrical energy by means of Dynamo. Rotational energy is the simplest form of energy, which can be converted into electrical energy. Most of the electrical energy is mainly generated from rotational energy. All the energy resources can be converted into electrical energy from rotational energy since the alternator used for electrical generation is the rotational machine except solar energy. Consider the two rollers, one is rotating, and another is at rest. Once the rotating roller touches the static roller, some amount of rotational energy is transferred to the static roller. Then the static roller rotates. We can assume that the rotating roller as the train wheel. The working principle of generating electrical power mainly basis on the principle of rotational energy. Rotational energy is converted into mechanical energy and again electrical energy is converted into electrical energy.

VII. ADVANTAGES

- There are several advantages to a self-charging vehicle system utilizing a 12V generator attached to the wheels of vehicles and a 12V, 5Ah battery:
- Sustainable Energy Generation: By harnessing the rotational energy of the vehicle's wheels, the generator can produce electricity without relying on external power sources. This sustainable energy generation reduces the vehicle's dependence on fossil fuels and contributes to a greener transportation solution.
- Continuous Power Generation: The generator operates whenever the vehicle is in motion, providing a continuous source of power to charge the battery. This ensures that the battery remains charged or maintains a high level of charge, allowing for uninterrupted operation of the vehicle's electrical systems.
- Extended Driving Range: With a self-charging system in place, the vehicle can potentially extend its driving range without the need for frequent recharging stops. This is especially advantageous for electric vehicles (EVs) or

hybrid vehicles, which may otherwise be limited by battery range.

- Increased Efficiency: By capturing and converting kinetic energy into electrical energy, the self-charging system improves the overall efficiency of the vehicle. It maximizes the use of available energy resources and minimizes energy wastage during vehicle operation.
- Reduced Environmental Impact: Self-charging vehicles produce fewer emissions and pollutants compared to traditional combustion engine vehicles. By promoting cleaner energy generation and consumption, these vehicles contribute to lower air pollution levels and mitigate climate change impacts.
- Lower Operating Costs: With the ability to generate electricity on-the-go, self-charging vehicles can reduce the need for external charging infrastructure and associated costs. This can lead to lower operating expenses for vehicle owners and operators over the vehicle's lifetime.
- Enhanced Reliability: The self-charging system provides a redundant power source for the vehicle's electrical systems, enhancing overall reliability and resilience. In case of battery depletion or failure, the generator can continue to supply power, ensuring uninterrupted operation of critical vehicle functions.

VIII. CONCLUSION

The self-charging electric car was fabricated. This car is very feasible for day-to-day travel similar to motorbike. The car is much comfortable which supports the driver for easy riding. It is very less weight compared to a small car and provides better safety than a two-wheeler. This project provides flexibility in operation and noiseless operation. The scope of this project lies in fully determining and understanding the functioning of car. This project gives solution to the old problems, where the most common problem arising from existing electric car is the recharging system. The conventional system leads to consume more conventional power and time. Hence our project reduces the problem called recharging time and makes our car the most economical one.

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