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Smart e-Vehicle System

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Abstract

Many ways have been recommended in the course of recent years to diminish carbon outflow and to decarbonize the earth, thus, lessening an unnatural weather change. It has been generally accepted that a major contribution is required to form the transportation sector in the fight for decarburization but it is very hard to do it with conventional means. The making of e- vehicles accompanies numerous difficulties like little battery limit, charging the battery, absence of frameworks as charging focuses, etc. considering all the current challenges there should be a system in place which would take out the need of large infrastructures, the long line of vehicles waiting to charge their batteries and we also have to consider the lack of battery storage capacity. The smart e-vehicle system concept is effective from an economic and environmental point of view, it will help in reducing fuel consumption, reduce pollution, use renewable sources of energy and help create a greener environment. This system is such that it will allow us to charge the vehicle when in motion, so this will not only reduce delay for transportation it will also reduce traffic jams. The aim of this paper is to make long haul transportation more environment-friendly, faster, and more economic.

Keywords— *e-vehicles; decarburization; long haul transportation; conservation of natural resources.*

1. Introduction

Highways are a necessary part of our society. They're important to quality of life and to native and national economies. At a similar time, by engrossing the most recent technological advances in computing and networking, highways are undergoing a change to an oversized system of systems, whose management and management have become orders of magnitude a lot of advanced. During this project, we tend to put forth some ideas to make this sector more environment friendly and more efficient.

The fact that irreversible climate changes taking place, the government has to look for innovative ideas and programs of decarburization. Potential ways are being thought of from the previous years. It cannot be denied that decarburization road freight sector will prove to be a crucial change to fight global warming. Because road freight vehicles are harder to decarbonize than private vehicles, decarburization strategies show that the amount of greenhouse gas will rise in the future. Generous advancement is made to create increasingly manageable vehicle but they will need a change in working from vehicle segment.

In this project we worked towards looking for new ways to reduces pollution emission that is created by the transportation vehicles, electrification of road transport sector seems like the best route to take. We have elaborated a new innovative idea that can prove

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helpful in our road to decarbonization, instead of using nonrenewable sources of energy like petrol diesel we can use renewable sources like sun, wind etc. We further cover how the vehicles can be charged while it is still in motion.

2. Related Works

In the paper on Electrification of transport sector by Doros Nicola ides, [1] there were four case studies made to check whether the idea of electrification can be used in fright sector. The paper likewise goes forward and says that there can be a noteworthy 75% abatement in CO2 outflow when contrasted and customary alarm

Vehicles thill 2030. Energy Infrastructure Package (EIP) [2] by European Commission (2010, November) have also done considerable research in building more sustainable and secure energy systems. Dept. Energy and weather Changes, "UK greenhouse gas emissions," 2013.[3] also stated in its research papers that it cannot be denied that decarburization of transport vehicles is a significant development to calm the effect of natural change. We also have referred to a study done by UPS, "Sustainability report," 2015[4] on reducing greenhouse gas emission. Northwest Electricity [5] is in the energy delivery business with a strong track record in reliability and safety, already delivering energy to 5 million people. Electricity northwest owns 13000 km of overhead lines. UK Power Network [6] is one of the most minimal value power appropriation gathering. The Business plan (2015 to 2023) [6] depicts the procedure of advancement and arranging that they experienced. ENSG, "Our electricity transmission network: A vision for 2020," 2012.[7] sets an updated view on how the electricity networks need to the reinforced, they also have done extensive research on developing electricity infrastructure and decarbonizing electricity generation. Dept. of Transport, "Guidance on road classification and the primary route network," 2012.[8] provided guidance and laid out how important it is to classify local highways. ENTSO-E, as worked towards building a electricity highway in Europe by 2050. [9] Main road 2050 endeavor involves the subjects: power supply scenario, power stream problem solving, power age and utilization passageway and engineering mapping and investigation of usage. European Commission, tips for vitality foundation, 2011. [10] Had place for rules to modernize and grow European vitality framework.

3. Problem statement

- Batteries are costly so the cost of the vehicle will go up
- The batteries will have a limited supply and will run out eventually, to recharge them we will face a new problem of building infrastructure.
- The vehicle will have a high power and force requirement
- Providing electricity to the vehicles while they are in motion to reduce transportation delay and traffic.

4. Proposed system with working principle

The proposed system has two units: -

1. Road side unit
2. Vehicle unit

1. <u>Road side unit: -</u>

The road side unit consists of four elements a solar panel, a battery, mains supply and

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overhead lines. It will be stationary positioned on the road side.
The unit makes use of solar panels to charge the battery and the battery is directly connected to the overhead lines. This design is not limited to solar panels any other devices which can create sufficient electricity can be used. The mains supply is there as backup power in case there is an issue with the solar panels.

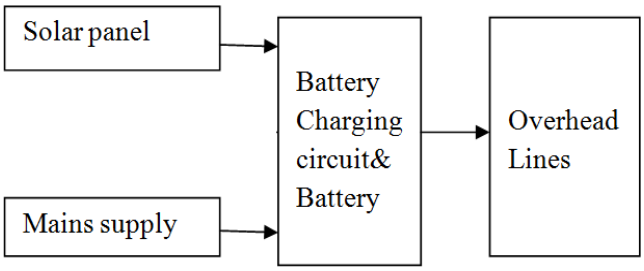

Figure 1. Road Side Unit

2. Vehicle unit : -

All the components of the vehicle unit are interfaced with ATmega328p microcontroller, the vehicle unit is a vehicle containing a pantograph on top of it, a battery and a motor.

When the vehicle and the overhead lines are in alignment the height sensor measures the height and according to that the height of pantograph rising is decided, The pantograph acts as a conductor between the overhead lines and the vehicle, the
battery gets charged and the vehicle is set in motion with the help of motor.

When the activation key is presses or auto initiated the pantograph starts to rise up towards the overhead lines. This height of the pantograph is determined by the ultrasonic sensor which is also displayed ton the LCD display. The battery is charged by the pantograph as long as it is In contact with the overhead lines.

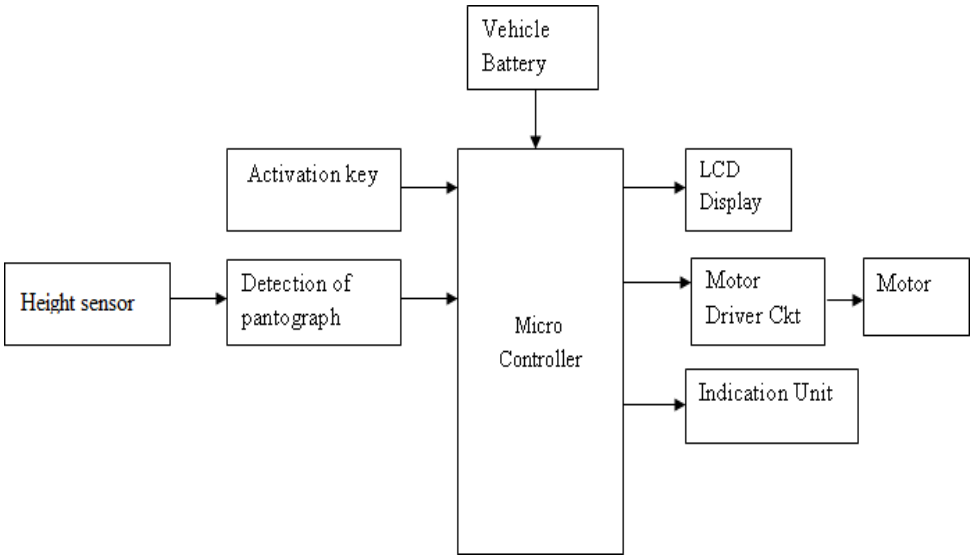

Figure 2. Vehicle Unit

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5. Specifications of Hardware

Following are the important elements in the proposed system: -

1*) M*ICROCONTROLLER

The microcontroller used is atmega3289

Figure 3

2) HEIGHT SENSOR

An ultrasonic sensor is used as a height sensor, it works on the principle of sonar. The ultrasonic sensor will be attached on the pantograph to detect the height of the overhead lines and estimate how up the pantograph should rise.

Figure 4

3) LCD DISPLAY

It is used to display information. LCD are often used in battery-powered device, such as digital because they use very little electricity.

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Figure 5

4) MOTOR DRIVER

The IC L 293 D is used that it helps to motor to work in both directions. It means two DC motors can be controlled with one IC. Twin H-bridge Motor Driver microcircuit (IC).

Figure 6

5) MOTOR

A stepper engine or step engine or stepper is additionally a Brushless DC electron engine that partitions a full revolution into type of equivalent advances. The motor's position will then be commanded to maneuver and hold at one amongst these steps with none feedback detector (an open loop controller), as long because the motor is rigorously sized to the applying in reference to torsion and speed.

Figure 7

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6) BATTERY

Batteries store energy being created by given generating supply and once this supply is out of stock this energy is often utilized by masses. The inclusion of storage in any energy generating system can increase the supply of the energy.

Figure 8

7) SOLAR PANEL

Solar panel used in this project has 12 v voltage with current rating 150 mA.

Figure 9

8) OVERHEAD LINES

Overhead lines are basically conducting wires that have electricity running through them. Trains and trams take power from the overhead lines for proper functioning.

Figure 10

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6. Design Flow

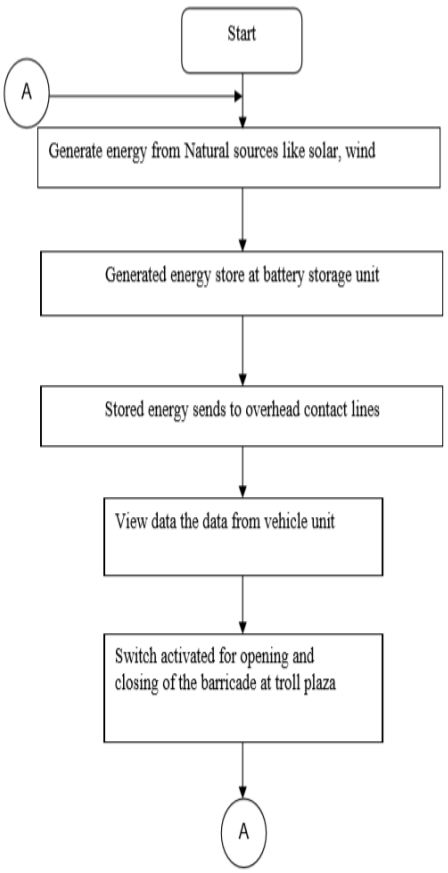

Chart 1: - Road Side Unit

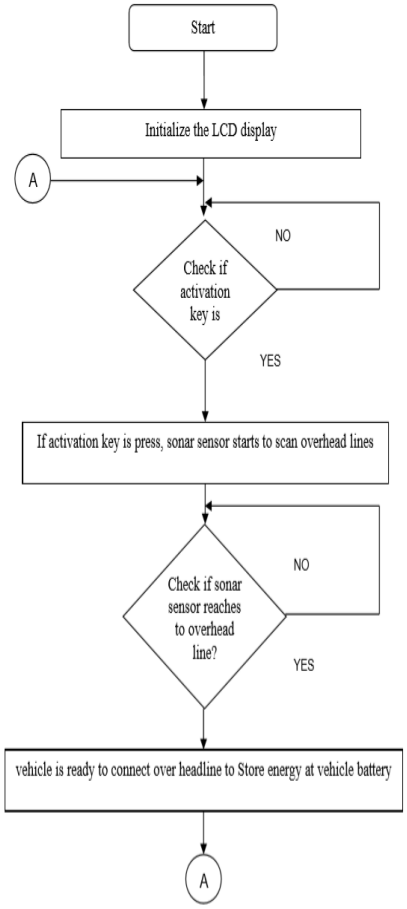

Chart 2: - Vehicle Unit

7. Implementation

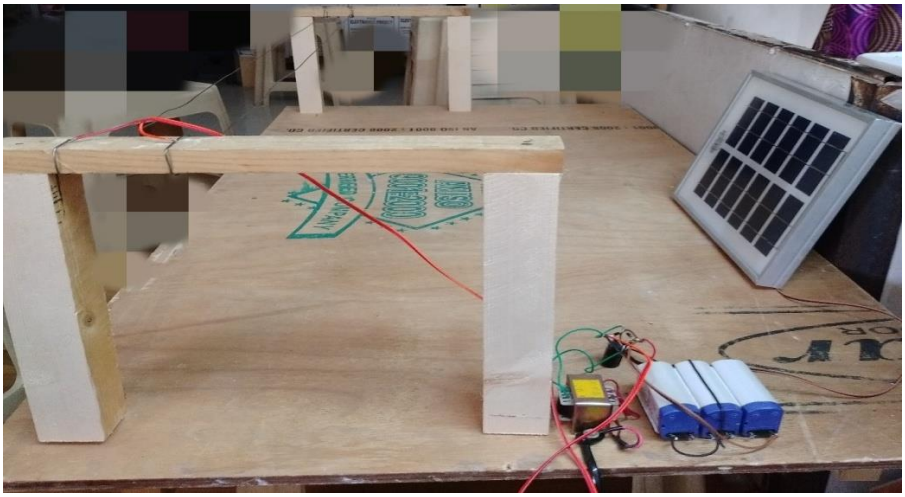

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Figure.11

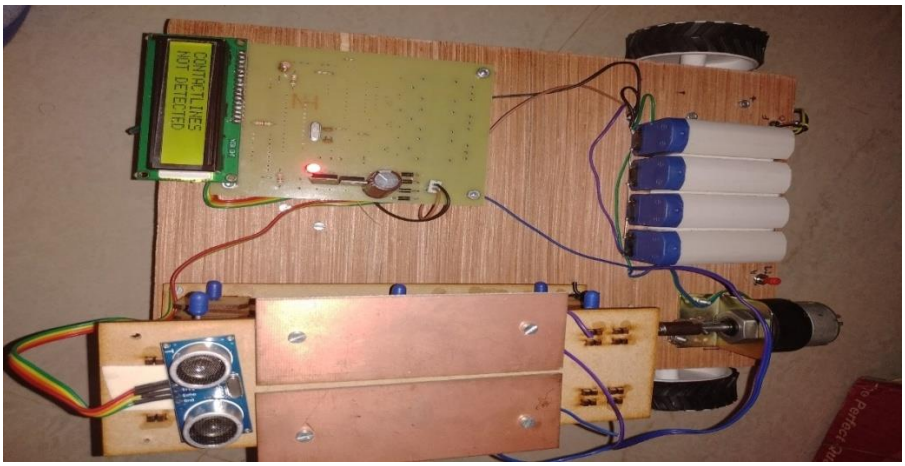

Figure 12

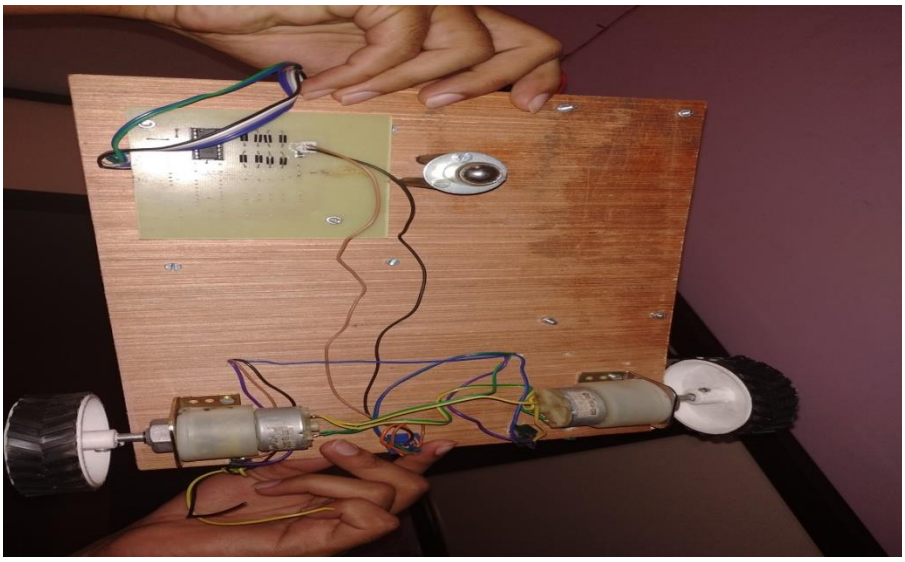

Figure 13

8. Conclusion

This paper provides some important points; it talks about the importance of electrification of long-haul vehicles for decarbonization. It also talks about using renewable sources of energy for electricity generation like wind, sunlight, sound, etc. while implementing solar panels in a project. This project main focus was providing electricity from a renewable source to an e-vehicle while it is in motion so that it does not cause a delay in transportation, traffic and will help avoid frequent stops of the vehicle. The over-headlines do solve the issue of short battery storage capacity of e-vehicles and hybrid vehicles to some extent.

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