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Design and Manufacturing of Electric Car

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ABSTRACT

This study explores drivers' charging preferences in the Western Australia Electric Vehicle trial. Drivers in this trial have experience of planning trips using plug in electric vehicles (EV). There are trade-offs between charging options in terms of cost and time. In this study each driver was given a set of four stated choice experiments; they picked their best and worst options for charging EV from each experiment. Labeled experiments contained mainly three choices: work, home and public with different values of charging cost, duration, and time of day. Drivers were given assumptions before doing the experiments, for example: that they are planning a trip for their next working day. Electric vehicles are believed to be an effective solution for reducing greenhouse gas emissions. Despite extensive study on the attributes and characteristics of electric vehicles and their charging infrastructure design, the development and network modeling of electric vehicles are still evolving and limited. This article provides a comprehensive review of electric vehicle studies and identifies existing research gaps in the aspects of theories, modeling approaches, solution algorithms and applications. Describe current uses of battery technology for internal combustion engine vehicles and newer hybrid electric vehicle and battery electric vehicle alternatives. As battery technology and charging infrastructure continue to advance, and drivers become more informed about these technologies, adoption rates for alternative vehicles have the potential to increase dramatically, leading to a dramatic transformation of the auto and petroleum industries.

Key words: - electric vehicles (EV), Battery, Motor, Wheel, Pipe

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I. INTRODUCTION

A major operation with plug in electric vehicles (EV) is battery charging. Potential benefits include green impact on the environment, home-charging and low travel cost. An electric vehicle battery can be recharged by plugging into a battery charging station or unit, this battery charging operation can be done at home, which is convenient as it can be recharged overnight. Battery charging can also be done at public charging stations or specific bays provided at workplaces. Depending on battery status, requirement for a trip, or charging cost, it might be more convenient to charge at work or at a public charging station. Charging at work may not be free and usually the number of bays with charging facilities is limited. Public charging stations are provided only at certain locations and using them may require careful planning. Nevertheless, the public stations provide quick charging and are located in places of wide interest (shopping centers, hotels, transport hubs), offering additionally the privilege of a reserved/free parking bay.

Electric Vehicle Battery Charging

Home charging differs from charging at work or at a public charging station both in terms of charging duration and cost. People with solar panels at home can use solar energy for EV charging during the daylight hours. Considering these variations in charging options, respondents were given a set of assumptions before starting the experiment – as presented in next section.

Battery Charging Levels: Time and Cost

Battery charging cost depends on the charging station Level (fast and expensive or slow and inexpensive), the time of the day, and the place. Level II and Level III are fast charging stations, while Level I represents a slow charging station. Accordingly, the cost of Level I charging is less than the cost of Level II, which in turn is cheaper than Level III. A Level I charging unit (usually installed at home) recharges a battery from empty to full in 6-8 hours.

Level I is ideal for home use as it uses 120 V circuits providing AC power to the vehicle (National Research Council, 2013). A Level II charging station provides faster charging by using 240 V AC power, reducing charging time to 2-4 hours. Level III is also called a DC charging station because it converts AC voltage power to DC (National Research Council, 2013) and charges the EV battery at a fast speed of 10-30 mins for a full recharge. This DC charging station is ideal for public charging because of its speed. The price of electricity is based on the time of day: peak rate (morning/late afternoon and evening) is most expensive, while off-peak (usually during the night) has the lowest rate. The price also differs between home and business (work/public).

Home charging with solar panels

Solar energy systems allow their owners to generate surplus electricity during the day, thus offering zero cost daytime charging for EV at home. The photovoltaic power generation systems with benign impact on the environment can be ideal for EV charging, when compared to conventional energy generation sources. The cost of EV charging depends on the type of solar panel and the electricity supplier. Synergy offers a buyback price for surplus energy during the day at a fixed rate of 8.4 cents/kWh, but during night hours households have to buy at the standard rates the buyback rate by Horizon Power varies across different rural areas in WA from 10 cents/kWh to 50 cents/kWh

II. LITERATURE SURVEY

[1] Prof. Ambeprasad Kushwaha et.al this research paper concluded That the Manufacturing of electric go kart is done successfully, according to planned schedule. According to calculations, it is able to sustain weight and speed achieved around 40-45 kmph. It was successfully built in less than Rs.35, 000 as expected, without compromising in its strength or other components quality.

[2] Dr. D. Ravikanth et.al this research paper Concluded that the 98cc, 2 stroke, 4 wheeled racing car, Go-Kart, we finally made one under 25K which is a big truth. But we made just a proto type of that performance machine. The materials we used are not up to the mark of automotive standard. Big companies will design one go-kart at a minimum of 2 years. But we made this from within two months. We do not recommend driving this go-kart at a speed of 80 km/hour but it is best suited in 30-40 km/hour speed. An old men aged about 50+ and women can also drive this go-kart. The report is prepared in such a manner that every layman can understand the details pertaining to the project. The report is prepared in simple language and described well. The report give adequate idea and design guide lines for making suitable report is expected to prove valuable to the successor students of mechanical engineering to know the essentials of a project and project report.

[3] Arun Subramanian S et.al this research paper concluded that The Go-Kart Fabricated by us is of a self-designed, self-assembled type with least expenses and decent power.

[4] Varun. M et.al this research paper concluded that The Recharge free electric vehicles are also a better option for the alterative way of road transportation in India. Survey states that India has the highest petrol price in whole world, so as of now Indians should concentrate for alternative sources of power for road transportation and implement it as soon as possible. Recharge free electric vehicles concept will run successfully like domestic gas companies and its agencies in India. Electric vehicles in India are booming up and in future electric vehicle or hybrid vehicles with electricity as option will take over in India. Switch over to electric vehicles will be the best solution for all the people in India because of continues increasing prices of petrol and diesel.

[5] Sebastien Jacques et.al this research paper concluded that The first positive results of an intensive, collaborative and multidisciplinary PBL implemented in a French graduate school of engineering (Polytech Tours, Electrical and Electronic Engineering Specialty) during 2 successive academic years. A case study on electric go-kart conception was proposed. The project's originality lies in the fact that several groups of approximately 10 4th-year university students had to design, develop, and validate the operation of this kind of system within 3 weeks on a full-time basis (56 hours of teaching only). In that case, no other pedagogical activity was planned in their schedules. The electric go-kart, which is currently supported by a French start up named Kart Masters, represents a multidisciplinary and friendly product reflecting current industrial preoccupations in the transport sector. This kind of industrial product greatly contributes to maintain students' motivation and commitment throughout the project.

III. PROBLEM STATEMENT

Therefore, the topic has to be relevant, both to the curriculum as to present technology problems. Seeking the design topic in the student's environment stimulates motivation too. Electric vehicles (EV) represent an emerging and high-tech market in which electrical installation and drive technology are main topics. Electric car are an example of vehicles students are familiar with.

These days most electric car are still gasoline powered, mostly due to the extremely high energy density of fossil fuel. However, the exhaust gases of such electric car are intolerable for indoor karting. Electric car offer a solution to this problem.

IV. METHODOLOGY

1. Modeling of electric car.
2. Selection of Material.
3. Design Calculations.
4. Selection of Standard parts from manufactures catalogue.
5. Details & assembly drawing of the electric car.
6. Manufacturing and assemble of electric car.

V. MODEL DESIGN

Chassis

The chassis of a go-kart or also known as the go-kart frame is like a foundation that attached to the axles and

holds the engine of the go-kart. It is crucial to have a good design of chassis that will it gives the go-kart better traction for the driver to manoeuvre especially diving in corners at high speeds.

Transmission system

Similar to any other transmission systems, by using gear ratios, it is important in order the conversion of power from engine to prop shaft. It consists of drive train, prop shaft, final drive shafts and whit or without gearbox and clutch, depending on the type of go-kart. However, there is no differential in a go-kart's transmission system compare to conventional transmission especially.

Tyres

Unlike vehicles tyres use on normal road to cater for different road conditions, go-kart has specific tyres for dry or wet track so that drivers can have maximum performances and grips from the tyres. Slick and wet tyres are two main types tyres used in karting. A slick tyre does not have grooves on the tyre.

Steering:

The steering spindle and steering are made as per the dimensions and bolted together. This is connected to the plate and link mechanism. This mechanism is connected to the 2 front wheels. Seat: First the seat is mounted on seat stand using bolts and the seat is bolted on the chassis.

Electric Start:

The battery is placed under the seat and connected to the starting motor using wires. And the switch is placed in the steering spindle stand.

Motor:

Motor is the heart of electric car system. It uses high duty load carrying capacity motor in electric car system, to drive chain bucket mechanism electric car system. All working is depending on the motor so it is main part of e-car system.

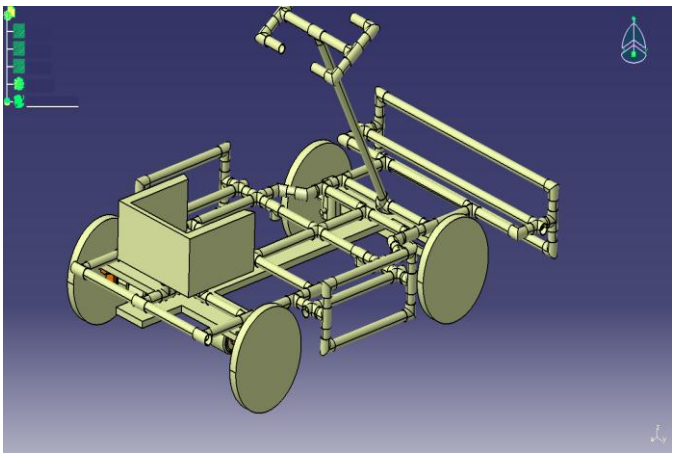

Fig 1. Actual design

VI. CONCLUSION

After going through the many research papers of different authors I came to know the major progress made in the electric vehicle. The most of the research work done was on developing the battery and battery pack design for the best use of the electric vehicle and also delivering the best of mileage and efficiency to the costumer. We saw the rapid increase in the sales of electric vehicle in last few years. Also in future the progress which has to be made will be going on to improve the lifetime of battery and also the waste management of the battery. So I conclude will saying "The Electric Vehicles will take on the future of Automobile".

REFERENCES

[1] Prof. Ambeprasad Kushwaha & Prof. Avinash Chavan, Tapeshwar A. Das, Shubham S. Kenjale, Jay A. Patel, Pradeep R. Prajapati," Design And Fabrication Of Cost Effective Electric Go Kart" , International Research Journal Of Engineering And Technology (IRJET) , Volume: 05 Issue: 04 | Apr-2018

[2] Dr.D.Ravikanth , Dr.K.Rajagopal , Dr. V.S.S. Murty , A. Harikrishna, "DESIGN OF A GO KART VEHICLE" , International Journal Of Science, Engineering And Technology Research (IJSETR) Volume 6, Issue 3, March 2017, ISSN: 2278 -7798

[3] Arun Subramanian S, Venkatesh, "Design And Fabrication Of GO-KART Vehicle Driven By Drilling Machine", International Journal For Research In Applied Science & Engineering Technology (IJRASET) , Volume 5 Issue XII December 2017

[4] Varun.M & Chaitra Kumar, "Problems In Electric Vehicles", International Journal Of Applied Research In Mechanical Engineering (IJARME) ISSN: 2231 –5950, Volume-2, Issue-1, 2012

[5] Sebastien Jacques, "A Pedagogical Intensive Collaborative Electric Go-Kart Project", University Of Tours, Tours, France Polytech Tours, Tours, France INSA Centre Val-De-Loire, France, ijep – Vol. 7, No. 4, 2017

