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Self-Rechargeable Battery Vehicle

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Abstract*: Widespread adoption of electric vehicles will relieve us from problems such as environmental pollution, global warming and oil dependency. However, theusage of EV is relatively low in spite of many governments implementing strong promotion policies. This paper presents a understandable review of studies on consumer preferences for EV, aiming to better inform policy-makers and give direction to further research. First, we compare the psychological and economic approach towards this topic, followed by a conceptual work of EV preferences which is then implemented to organise our review. We also consider the modelling techniques applied in the selected studies. Estimates of consumer preferences for financial, technical, infrastructure and policy attributes are then considered. A categorisation of main factors for consumer preferences into groups such as socio-economic variables, psychological factors, mobility condition, social influence, etc. is then made and their impacts are briefly explained. Finally, we discuss a research agenda to improve EV consumer preference studies and give suggestions for further research.

***Keywords*: Electric vehicles, Comprehensive, Infrastructure, Psychological factors, Mobility condition.**

I. INTRODUCTION

A battery electric vehicle (BEV) is a type of vehicle which uses chemical energy stored in rechargeable battery packs as energy source. They utilize all power from battery packs and thus have no internal combustion engine, fuel tank or fuel cell. Battery electric vehicles use electricity, which is stored in a battery pack to run the electric motor and hence the wheel rotates. When exhausted, the batteries are recharged using electricity from a allocated charging unit .The amount of pollution produced depends on how the electricity is produced. This unit consists of two 12-24 DC motors, one 8-12v DC motor and with pulleys and belt arrangement for power transmission. The concept of battery electric vehicles is to use charged batteries onboard vehicles for transportation. Battery electric cars are becoming more and more attractive compared to higher oil prices and the development of new battery technology such as Lithium Ion batteries that have higher power and energy density compared to older battery types such as lead-acid batteries. Electric cars can outstandingly reduce city pollution by having zero tail pipe emissions. Vehicle greenhouse gas savings depend on how the electricity is produced. Using an electric car would result in reduction of carbon dioxide emissions Up to 30 percent.

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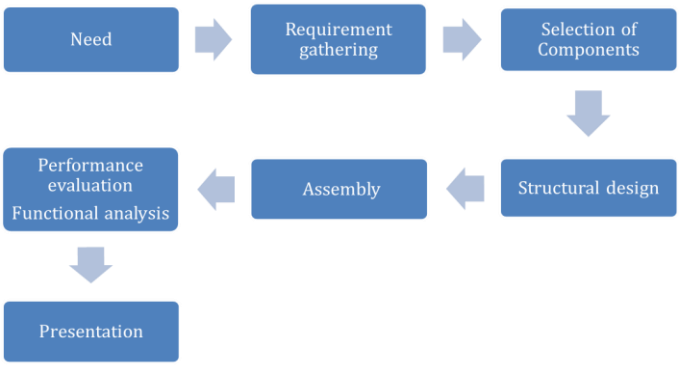
Electric cars are having a major impact in the automobiles industry given advantages in city pollution, less dependence on oil and combustion and scarcity and expected rise in gasoline prices.

II. METHODOLOGY



III. BLOCK DIAGRAM

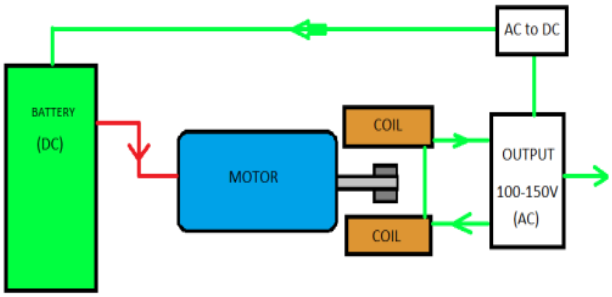


Fig 1: Block diagram of battery vehicle

In this block diagram the operation is carried out as follows. The motor runs by the power generated by the battery. The motor spindle consists of magnets and there are coils present at both sides of the magnets. When the magnet starts to rotate some amount of current is generated in the coils and the current is used to charge the battery. The components used in the construction are a 12v DC motor, a rechargeable battery, pulley and a V- belt. In this construction the DC motor is get electrical supply from the battery. The first motor shaft is connected with 60 teeth pulley to transmit power. This is called driver motor. The second motor shaft is connected with 20teeth pulley to get transmitted power from first motor. This motor is called driven motor. The V- belt is used to transmit power from driver motor to driven motor. The second motor is electrically connected to battery and the external load.

The power or electrical energy will be stored in the battery packs. This battery packs acts as primary power source of the system.

The power is supplied to driver motor using suitable electrical connections. When the power is the motor shaft starts rotates. Since shaft transmits motion to second motor with belt transmission, rotation of driver motor starts. As we know the driver motor have 60 teeth pulley and driven motor have 20 teeth pulley. The rotation of driven motor shat will be three times more compared to driver motor shaft rotation speed. The when second motor is supplied with kinetic energy or rotational energy, it starts acting as dynamo, hence it produces electrical energy. The electrical energy produced will be of more current and voltage than electrical energy supplied to driver motor due to more speed rotation of driven motor compared to driver motor.

This high power electrical energy is used as power supply to recharge the battery with provides power supply to driver motor. The excess electrical supply is used as power supply for external load.

IV. COMPONENTS SPECIFICATIONS

A. DC Motor

The motor that is used in this project is BLDC40S40A-12V Brushless DC motor. The dc motor is of 12v DC. This motor produces a continues torque of 2.65 In-lbs and also induces a current of 4.7 amps.

B. 20 Teeth GT2 Pulley

The pulley that is used in the project is a 20 teeth GT2 pulley. It consists of an inner and outer diameter of 8mm and 16mm respectively. The width of pulley is 16mm and the weight is 8 gm.

C. 60 Teeth GT2 Pulley

The other type of pulley that is used is 60 teeth GT2 pulley. This pulley consist of 60 teethes and material of the pulley is aluminum. The core diameter and the belt width of the pulley is 5mm and 6mm respectively.

D. Cogged V-Belt

The type of belt that is used in the project is cogged v-belt. This cogged v-belt is made up of Neoprene rubber and it is of 610 mm length. The pitch and the belt width of the belt is 2mm and 6mm respectively.

E. Mounting Brackets

The material of this mounting bracket is metal which has a weight of 35g. The hole sizes in the bracket are of size 27*13mm.

V. RESULTS AND DISCUSSION

Table-I: 3V DC Motor

Speed (RPM)	Voltage (V)	Current (A)	Power (W)
At 2500 rpm	3	0.15	0.45
At 5100 rpm	3	0.32	0.96
At 9000 rpm	3	0.4	1.2
At 17000 rpm	3	0.47	1.41

Table-II: 6V DC Motor

Speed (RPM)	Voltage (V)	Current (A)	Power (W)
At 2500 rpm	6	0.018	0.108
At 5100 rpm	6	0.037	0.222
At 9000 rpm	6	0.12	0.72
At 17000 rpm	6	0.23	1.38

Table-III: 9V DC Motor

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Speed (RPM)	Voltage (V)	Current (A)	Power (W)
At 2500 rpm	9	0.18	1.62
At 5100 rpm	9	0.22	1.98
At 9000 rpm	9	0.29	2.61
At 17000 rpm	9	0.48	4.32

Table-IV: 12V DC Motor

Speed (RPM)	Voltage (V)	Current (A)	Power (W)
At 2500 rpm	12	0.16	1.92
At 5100 rpm	12	0.25	3
At 9000 rpm	12	0.75	9
At 17000 rpm	12	1.9	11.2

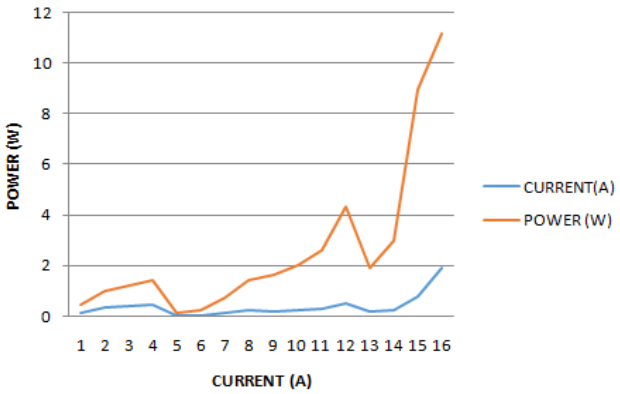

Fig. 1. Power vs Current.

In the power vs. current graph it is shown that there is increase in the power as the current of motor increases. It is also shown that between 4 to 5amp of current there is a drop of power and then increases till 12 amps at a power of 4w. After 12 amp to 13 amp there is also a drop in power and then the power increases at max current

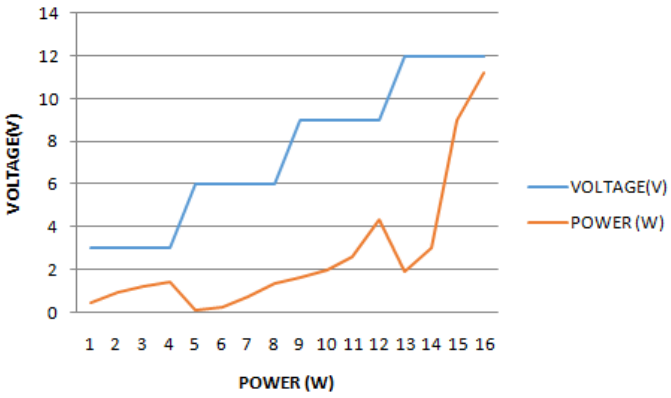

Fig. 2.Voltage vs Power

In the voltage vs. power graphical representation it is shown that at constant voltage the power increases and drops from 4w to 5w, and then from increase in voltage there is also increase in power up to 12w and then the power value drops and the gradually increases for the minimum current.

VI. CONCLUSION

Battery electric vehicles are definitely more eco-friendly compared to internal-combustion vehicles. Batteries are being engineered to have high durability. When the battery electric cars become more widespread, battery recycling will be economically possible. Research into other energy sources such as renewable fuels and fuel cells make the future look brighter for battery electric vehicles. Our project of more battery electric vehicles depends on motor specifications that are mentioned in the above tables. According to our experiment shown in the above table we have noticed that when rpm speed of the motors are increased by keeping the voltage of the motors constant there is a increase in the induced current of motors. The induced current increases proportional to increased rpm speed of the respective motors. And the total power in the experiment is calculated by the formula (P=I*A) which is by multiplying the voltage and the induced current.

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