Real Time Implementation of Increasing Torque using Mechanical Gear in Bldc Motor

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Abstract: In present days, universally air contamination of the atmosphere is predominately increasing in the biosphere; due to toxic emission like CO, NOx and SO_2.Internal combustion engines is one of the major sources of air contamination, by this the properties of fossil fuel emissions and address environmental concerns (ECs) should be mitigated. Now a days, E-vehicles are emerging all over the globe and many nations encourage the people to use EVs. Previous studies show that the many of the consumers are anxiety, because of two reasons: one is due to cost of E-vehicle and other is charging stations are not available in India. The vision of the Indian Government in 2030, all the vehicles are replaced by 'Electric Vehicles' on Road. In this article, emphasis to increases the motor torque using gear. In this type of gear arrangement will helps to easy carrying the goods smoothly for all the conditions.

1. Introduction

Automobile industry are developing a transformation for more than 100 years. Owing to the emission on the atmosphere, by the spike of the petroleum product (fossil fuels), leads to the alternation of individual transportation habits. The area, impelled by inside ignition motors, is floating consistently towards electric vehicles (EVs). Electric engines impel the EVs and the battery-powered battery or further moveable energy stockpiling gadget keeps up force supply. These vehicles are energy compelling, creating less ozone harming substance (GHG) emanations and decreased commotion. The various gatherings of EVs are:

HEV (Hybrid electric vehicles): They consists of an engine and an electric motor. In this, electricity is generated when breaks are applied and it stores them in a battery. They are mainly powered by fuel and electricity.

PHEV (Plug-in half breed electric vehicles): They are same as the HEV, but consists of a small engine and a large battery. Their recharging process are by braking system or by plugging them into an external charging point.

BEV (Battery electric vehicle): They does not have engine, so they use the electric motor for propulsion with batteries. This process is similar to the energy storage device. Battery charging operation are done by the external power sources. Hence, they are known as Plug-in Vehicles.

Division of transportation pays one fourth of the GHG emission. In that, Automobiles are the major sources for the emission of GHG. All over the world the emission of GHG is: China Emitting of about 25.9%, the USA of about 13.87% and in India it is 7.45%. The slogan 'The EV30@30' was adopted by 8th Clean Energy Ministerial in 2016, and their main aim for the adoption is to achieve a total market share of 30% for EVs with 10% market share for the relating classifications, to be

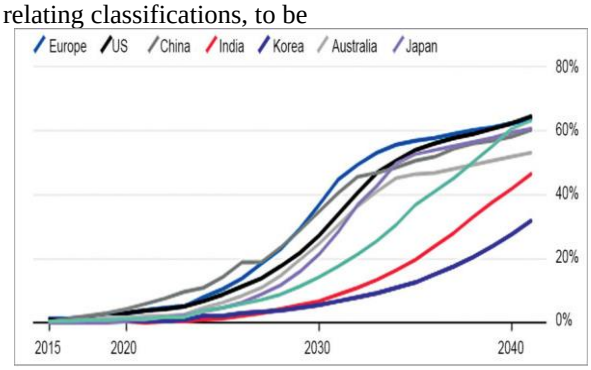

Fig. No :1 Computation of electric vehicles

specific traveler vehicles, light business vehicles, transports and trucks by 2030 (IEA, 2016). In India, they are planning to reduce carbon which pollutes the environment. Due to this commitment, the nation plans to move to EVs by 2030. For that, the government needs the car manufacturers to migrate their design to EV manufacturer

which will limit the oil by US$60 billion. They cut the emissions by 37% and decrease the dependence on the imports of fuel. It also acts as a safeguard from exposure against crude prices and currency variations. For further challenges in EV adoption, government are inspecting the battery swapping option model. This method was presented in Israel and china with halfway achievement. Main difficulties are battery size and power. They also vary by the producers/models (e.g., Maruthi Alto and Honda City). This troublesome circumstance of this model needs a comparative vehicle configuration to oblige a similar battery, which is trying to accomplish. Another option for this circumstance is battery renting that could decrease the ownership cost. There are some cases, in which simple accessibility of charging points across different places in a city stays a critical test yet certain. The shift towards EVs India is impressive in the near future, though not imminent. A few urban communities are casualties of spontaneous urbanization and high contamination. They suffer unqualified degradation, with Vehicular emission as the primary source. Here, Figure1 indicates the projection for EVs for a few of the leading nations. The Government of India has broadcast that all cars to be electric by 2030. So that, Society of Indian Automobile Manufacturer (SIAM, 2017) followed this with their white paper stating that EVs would make up 40% of new car sales by 2030 and 100% by 2047. This revolutionary coincides with 100 years of the country's independence with 100 years of the nation's independence.

Objectives

The main objectives are follow as:

- It reduces or eliminate the fuel costs.
- It reduces the car emissions to help the environment.
- They are energy independent.
- Less Care at a Lower Cost.
- Electric Rickshaw Tend to Be Quiet.
- Easy Driving.

2. Componenets

2.1 Bldc Motor

BLDC motor consist of a two parts. They are stationary (current carrying conductor) and a moving part (permanent magnet). When supply are given to the stator coils, it produces a uniform field in the air gap. By this process, they become electromagnet.

2.2 Converter

A dc to dc converter helps to supply voltage with respect to corresponding speed. either step up or stepdown based on the application.

2.3 Li-Ion Battery

They are rechargeable batteries. It has two operation: 1) charging and 2) discharging.

i. CHARGING: They consists of positive and negative electrode. Here positive electrode gives some lithium ions to the negative electrode through the electrolyte. In this reaction, Lithium Cobalt Oxide gives a lithium ion through the electrolyte.

ii. DISCHARGING: In discharging, Lithium ions move from negative electrode to positive electrode.

3. Block Diagram

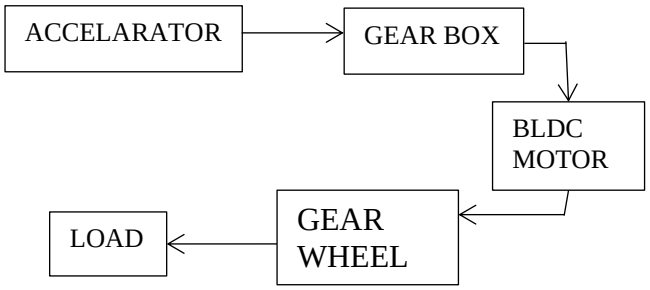

Fig.No:2 Block Diagram

In this, battery acts as a power source/fuel source and supplies energy to the electric motor and helps the mobility the vehicle. This helps the acceleration of the vehicle. To evade burn out in motor, the controller acts as a regulator and it controls the amount of power received from the batteries.

4. Methodology

BLDC motors have characteristics such as traction, high starting torque, and high efficiency of round 95-98%. By these outstanding features, they are apt for designing the high-power density. Traction characteristics are mostly preferred for the electric vehicle application.

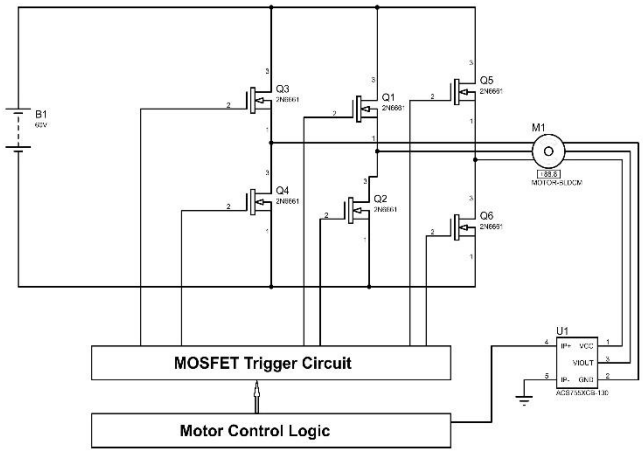

Fig.No:3 Schematic diagram of BLDC motor

The supply was given to the MOSFET bridge it converts the DC voltage to AC voltage and given to the BLDC motor. The hall sensor was connected to shaft in the BLDC motor. It also given the feedback signal to the rotor. Logic controller was used control the electronic circuits like MOSFET and sensor units. Gate driver circuits to trigger the bridge circuit.

5. Results & Discussion

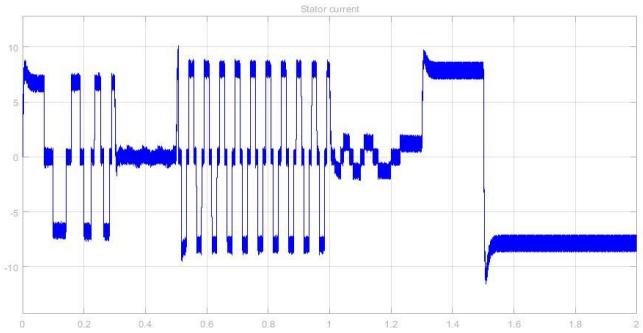

Fig.No:4 Stator current

Fig.No:4, this graph represents the stator current Vs time wave form. The current attains maximum value once the motor starts, current varies proportionally according to gear ratio. When the vehicle runs on maximum gear ratio the current rises to peak and gradually decreases.

SI.NO	Time in sec	Current in Amps
1.	0.05	9
2.	0.2	8
3.	0.3	7
4.	0.4	8
5.	0.5	8
6.	0.6	8
7.	0.8	8
8.	1	8
9.	1.2	0

Table No:1 Stator current

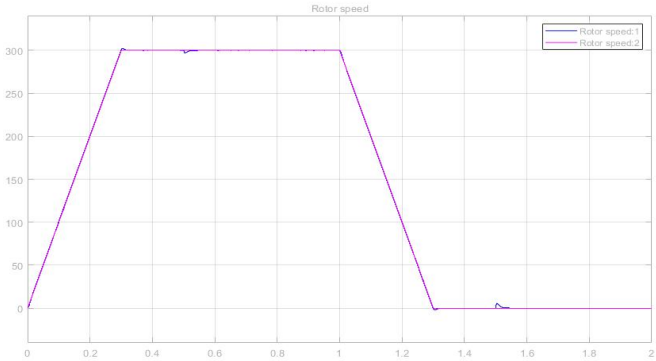

Fig. No:5 Rotor speed

Fig.No:5, Characteristics Rotor speed Vs time waveform has been shown. The speed varies with respect to gear ratio. Due to change in gear ratio speed varies proportionally.

SI.NO	Time in sec	Rotor speed in rpm
1.	0.2	200
2.	0.4	300
3.	0.6	300
4.	0.8	300
5.	1	300
6.	1.2	100
7.	1.3	0

Table No:2 Rotor speed

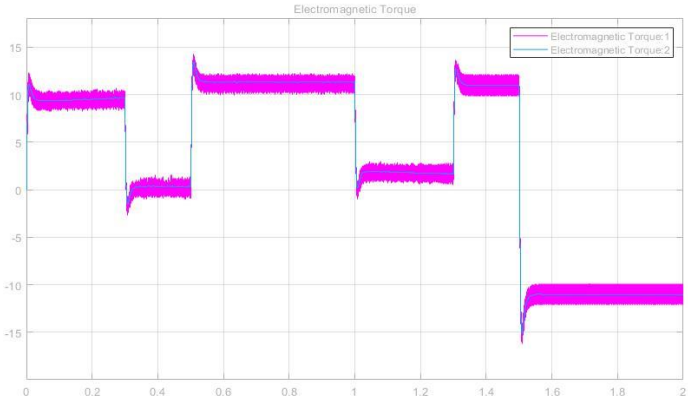

Fig No:6 Torque

Fig.No:6, Simulation result of Motor Torque waveform is shown. The initial torque reaches maximum when the gear ratio is changed. The obtained maximum torque in this system was 13Nm which is similar to a150 cc IC engine bike.

SI.NO	Time in sec	Torque in Nm
1.	0.05	13
2.	0.2	10
3.	0.3	3
4.	0.4	10
5.	0.5	13
6.	0.6	10
7.	0.8	10
8.	1	0
9.	1.2	3

Table No:3 Torque

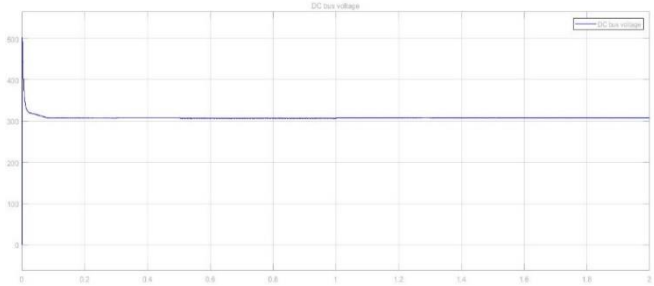

Fig.No:7 Dc voltage

Fig.No:7, Dc voltage wave form shown in the figure. The voltage reaches peak when motor starts, its clearly seen in result. In steady state condition of motor, the voltage level was linearly reduced in the battery and their readings are shown in below table.

SI.No	Time in sec	Voltage in Volt
1	0	0
2	0.01	500
3	0.02	330
4	0.1	300
5	0.2	300
6	0.4	300

Table No:4 Dc Voltage

6. Conclusion

This article refers E-vehicle is now ultimately developing product around the world. This industry faces the massive challenge was taking high amount of load. My project was the best solution for this problem because whenever torque increases the motor it capable to take over the weights smoothly and without any damages it the first success of my project. Next important output was this type of vehicle not preferable for hill station but in this vehicle easily overcome the problem also.

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