TWO WAY CHARGE-DISCHARGE CYCLING BASED DUAL-MOTOR ELECTRIC VEHICLE

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College ***:*** *Jawaharlal Nehru New College Of Engineering, Shivamogga*
Branch ***:*** *Department Electrical and Electronics Engineering*
Guide(s) ***:*** *Mrs. Padmashree H R*
Student(S) ***:*** *Mr. Harsha R Mundaragi*
Mr. Basavaraj N R
Mr. Chiranjeevi H G
Mr. Vinay H M

Keywords:

Dynamotors, Drivetrain.

Introduction:

The Electric Vehicle offers many advantages over conventional internal combustion engines. Yet there are significant barriers to the rapid adoption of electric cars, including the limitations of battery technology, high purchase costs, lack of recharging infrastructure, and heat management of batteries and drivetrains.

The future of transportation is mainly depending on Electric Vehicles. The technology used in an Electric Vehicle is rapidly developing day by day but still, one of the main obstacles in the development is the overall range of the vehicle compared to IC engine vehicles. Electric Vehicles as such will not be able to solve all current problems of transportation.

Overcome this obstacle, this project uses two motors that are separately connected to two individual batteries. Each motor is independently controlled in such a way that it may use as a drive motor to drive the vehicle or as a generator to recharge the battery for further usage. Using a secondary battery, the range of the vehicle will be increased by using a drive motor as a generator. This technique helps to overcome the problems such as the range of the vehicle, charging technique, and the cost of the vehicle.

Objectives:

1. To extend the range of Electric Vehicles in terms of distance.
2. To reduce the charging time.
3. To reduce maintenance costs.
4. To increase the overall efficiency of the drivetrain.
5. To enhance the performance of the vehicle.

Methodology:

In this project, two 12V DC Motor (Dynamotors) are used and these dynamotors can act as drive motors or generators depending on the requirement and can be effectively used

for better performance of the vehicle, another motor is separately connected to a 7.4V Battery to steer the vehicle. Arduino and LCD Display is separately energized by a separate 9V battery.

As shown in the diagram, two dynamotors (Motor / Generator) are used where each one of the dynamotors is mounted to the front and rear axles. One of the dynamotor acts as a drive motor and another dynamotor acts as a generator to regenerate the power, where both the dynamotors are connected to their respective batteries. The dynamotor at the front axle is used to drive the vehicle using a battery connected to it, during this period another battery is recharged with the help of the dynamotor mounted at the rear axle which acts as a generator and recharges the battery.

After some time, the driver of the vehicle shifts to the dynamotor mounted at the rear axle, when the battery is connected at the front axle drains and now this dynamotor starts to act as the generator and recharges the battery connected to it. The process of charging the battery and drive of the vehicle shifts continuously and Arduino is used to measure the voltage of the battery with the help of a voltage sensor.

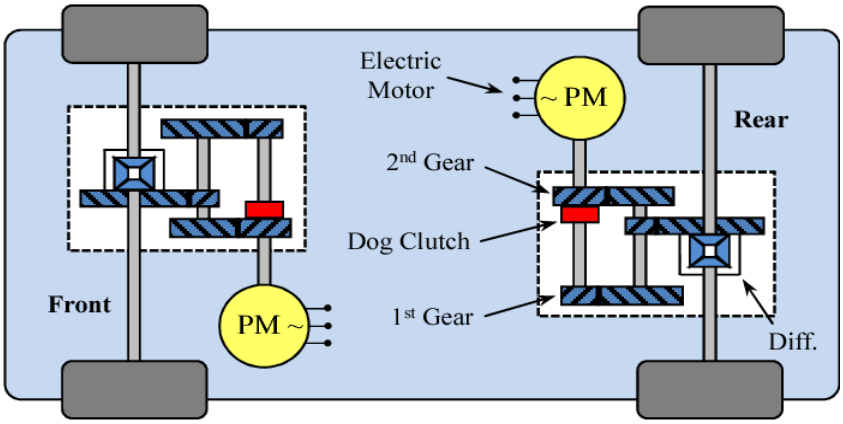

Fig 1: Chassis Design

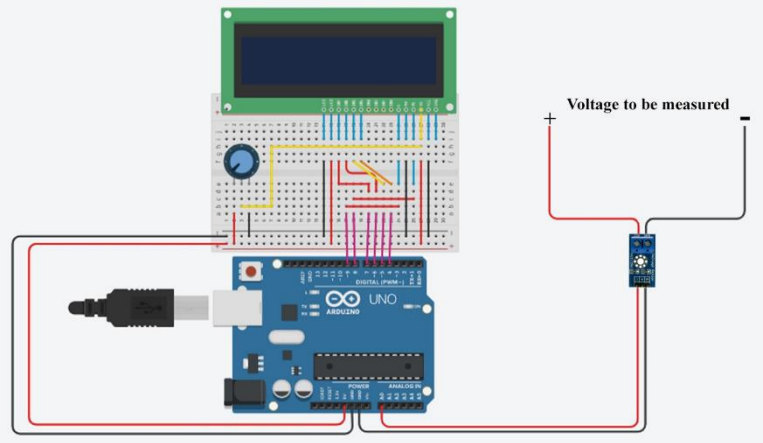

Fig 2: Voltage measuring circuit

Result & conclusion:

- Generated voltage has been measured and used to recharge the battery.
- The range of the vehicle is substantially increased by using an efficient drivetrain
- The Performance of the vehicle is enhanced by using both the dynamotors to drive the vehicle.
- Recharging time of the vehicle is approximately reduced to half the time compared to an Existing electric vehicle.
- Over the long-term use of the vehicle, maintenance of the vehicle becomes less cost-effective.

By this proposed method, the major demerits of the existing system will be overcome and enhance the performance of the vehicle without adding any extra equipment's.

Scope for future work:

Automotive Industry is switching towards the electrification of vehicles. Day by day this trend is growing rapidly, by the year 2028, Ninety percent of the vehicles around the world will be replaced by electric vehicles. To cope with this growth in the automotive industry, the proposed project gives a wide range of opportunities in various areas for future development, such as drivetrain management in a very efficient way, the performance of the vehicle can be improved by using different driving modes, charging time can be reduced significantly with the help of advanced electronics equipment and overall maintenance cost of the vehicle can be reduced to minimum.