FINAL YEAR PROJECT REPORT

Design and hardware implementation of efficient regenerative braking for hybrid vehicles

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DESIGN AND HARDWARE IMPLEMENTATION OF EFFICIENT REGENERATIVE BRAKING FOR HYBRID VEHICLES

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In
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Declaration Of Inventiveness

I announce that all these details entitled —: **Design and Hardware implementation of Regenerative Braking for Hybrid Cars** is my own effort except all the references written at the end of the report.. The report has not been accepted for any degree and is not being submitted concurrently in candidature for any degree or other award.

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Acknowledgment

First of all, thanks to our loving parents, whose unprecedented love and care has been a source of continuous inspiration and motivation for empowering our souls at every stage of difficulty. Their kind and sincere dedication has made us come this far. We acknowledge the efforts of our worthy advisor, Jamil Ahmed who deserves a huge token of appreciation for guiding us in a well-organized way. His profound knowledge is a constant source of inspiration for us. And last but not the least; we appreciate all other mentors we got back before this, for without them we might not have been capable of achieving such success.

Abstract

The idea of this project is extracted from E-Bike which was launched at Karachi. The rated power to drive this bike is 500W, using plug-in charging, and the bike can run for 3-4 hours in optimum manner. So the need is to increase the battery timing and to reduce the electricity cost for charging. The main theme of this project is regenerative braking system in which we utilize the back energy (when the motor works as a generator in 2^{nd} and 4^{th} quadrant and mathematically power becomes negative) of the motor to charge the battery. This project illustrates with full details how to implement such idea on hardware practically to drive the vehicle safely, economically and with negligible environmental effects. So in this idea we are using a Permanent Magnet DC Motor (PMDC), Arduino microcontroller to produce variable duty cycle pulse width modulation PWM through up and down button to increase or decrease the speed with less loss and with very low price. This idea can be implemented through buck-boost convertor because back e.m.f voltages vary at different speeds and also to provide a constant voltage (12V) to the battery. With the combination of buck boost convertor and super capacitors (for quick charging) we can increase the working hours and overall efficiency of system (12%-15%) which will extract a large amount of energy in less time and then supplies that energy to the battery. The proposal is basically for hybrid cars so that we can save the cost of fuel which is used when petrol engine comes into play at higher speed and charge the batteries. Secondly, batteries are not yet much advanced so as the car could run for larger distance on batteries itself.so, our main try is to increase the efficiency of battery working hours as well as the overall system is concerned.

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Abbreviations

DC	Direct Current
PMDC	Permanent Magnet Direct Current
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PWM	Pulse Width Modulation
AC	Alternating Current
EV	Electric Vehicle
PIC	Peripheral Interface Controller
LCD	Liquid Crystal Display
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KERS	Kinetic Energy Reverse System

Introduction

Industries today are increasingly demanding applications AC and DC motors in all sectors. Now applications DC motors with high torque-to-date results in the best quality, increased production and reduced costs. The adaptable uniqueness of DC motors can provide high torque required for traction units and scooter request. Control over a wide speed range, both below and above the rated speed can be easily accomplished. Through a variety of matching of shunt, series, and field windings independent excitation that can be designed to show a wide variety of characteristics of voltage-current or speed-torque for both operating systems dynamic and steady state. DC motors are frequently used in applications requiring a wide range of engine speeds or accurate control of the motor output .In recent years, the technology of solid state drive has developed sufficiently and used to replace the old systems of control of new control advantages DC motors