

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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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 2nd and 4th 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.

Contents

DESIGN AND HARDWARE IMPLEMENTATION OF EFFICIENT REGENERATIVE BRAKING FOR HYBRID VEHICLES	1
<i>Declaration Of Inventiveness.....</i>	<i>3</i>
<i>Acknowledgment</i>	<i>4</i>
<i>Abstract.....</i>	<i>5</i>
<i>List Of Figures</i>	<i>9</i>
<i>Abbreviations</i>	<i>10</i>
Chapter 1	11
Introduction & Problem Statement.....	11
<i>Introduction</i>	<i>12</i>
<i>Problem Statement.....</i>	<i>13</i>
<i>Solution to problem</i>	<i>14</i>
Chapter 2	15
Main Components of the Project.....	15
<i>Motor</i>	<i>16</i>
<i>Importance of Motor.....</i>	<i>16</i>
<i>Selection of Motor</i>	<i>17</i>
<i>Battery</i>	<i>18</i>
<i>Battery Layout.....</i>	<i>18</i>
<i>Boost Convertor.....</i>	<i>19</i>
<i>Principle of the Boost Convertor</i>	<i>19</i>
<i>Power MOSFET</i>	<i>20</i>

<i>MOSFET Driver</i>	21
<i>Speed Control</i>	22
<i>Circuit Diagram of Speed Control</i>	22
<i>Functioning of 555 Timer in PWM Generation</i>	23
<i>Pin Description</i>	23
<i>Control Unit</i>	24
<i>Arduino and Its Pin Description</i>	24
<i>Data Display Unit</i>	25
<i>LCD (Liquid Crystal Display)</i>	26
<i>Pin Description</i>	26
<i>Optical RPM Sensor</i>	27
<i>Battery charging indicator</i>	27
<i>Super capacitors module</i>	28
<i>Mechanical Load Coupling</i>	29
Chapter 3	30
Proposed Hardware Design and Implementation	30
3.1 <i>Study and Analysis</i>	31
3.2- <i>Four Quadrant Operation of Motor</i>	32
<i>Motor Testing</i>	33
<i>Motor Testing Without Load</i>	33
<i>Motor Testing Under Load</i>	33
<i>Generated Voltage equations</i>	34
3.4- <i>Designing of Boost Convertor</i>	35
3.4.1- <i>Implemented Design of Boost Convertor</i>	36
3.4.2- <i>Purpose of Using Feedback Loop</i>	36

3.4.3- Simulation of boost convertor	37
3.5-Designof speed control.....	37
Equations of 555 timer	38
PWM Generation Waveforms.....	39
Simulation of Speed Control Module.....	39
3.5.4- Simulation of Battery Charging Indicator	40
3.6- Final Designed Layout.....	41
3.6.1-Basic Working Principle of the Project.....	42
3.7- Microcontroller program.....	43
Chapter -4.....	45
Applications and Future Scope	45
4.1- Applications of Regenerative Braking System.....	46
4.2- Advantages of Regenerative Braking	46
4.3- Efficient Regenerative Braking System	46
4.4- Future Scale	47
4.5- Conclusion.....	47
References.....	48

List Of Figures

Figure 1- Motor	17
Figure 2- Batteries	18
Figure 3- Boost converter.....	19
Figure 4- Power MOSFET	20
Figure 5- MOSFET Driver	21
Figure 6- Speed control.....	22
Figure 7- Arduino.....	24
Figure 8- RPM sensor	27
Figure 9- charging indicator	28
Figure 10- Super capacitors	28
Figure 11- Motor under load	29
Figure 12- Four quadrant operation	32
Figure 13- Motor equivalent	34
Figure 14- implemented design of boost.....	36
Figure 15- simulation of Boost	37
Figure 16- PWM Generation.....	39
Figure 17- speed control Simulation	39
Figure 18- Simulation of Charging Indicator	40
Figure 19- Final Model	41

Abbreviations

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

