FUEL ECONOMY OF A HYBRID ELECTRIC VEHICLE WITH SHORT TERM VELOCITY PREDICTIONS : GA BASED APPROACH

A dissertation submitted to the

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degree of Master of Science

by

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DECLARATION

The work submitted in this dissertation is the result of my own investigation, except where otherwise stated.

It has not already been accepted for any degree, and is also not being concurrently submitted for any other degree.

UOM Verified Signature

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Date : 30th January 2009.

I endorse the declaration by the candidate.

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Abstract

The increasing of fuel price and environmental concerns, researches were pushed to think about more fuel-efficient and less emission vehicles. As a result of this great enthusiasm, researchers were able to introduce Hybrid technology to the field of automobile. In hybrid electric power trains, an internal combustion engine (ICE) together with an electric motor (EM) is used as two energy sources. Use of an electrical motor in place of the ICE during different stages of driving results a definite saving in fuel usage.

Researches did not satisfy with this saving and these endless efforts gave the birth to the concept of intelligent vehicles or telematics – enabled Hybrid Electric Vehicles (HEV). These vehicles may use a sensor network to obtain the information about the degree of traffic flow in the environment which they are operating, and subsequently adjust their drive cycle to get the better improvement in fuel economy based on these information.

In this thesis, a conventional vehicle and a HEV with different amount of traffic flow information are compared in terms of fuel economy over two different drive cycles. First simulation results for conventional vehicle was compared with simulation results for an HEV without traffic flow information and HEV with available of traffic flow information for 4 seconds & 8 seconds ahead of current time, over New European Drive Cycle (NEDC). Thus estimated the same for a Sri Lankan Drive Cycle named Colombo Drive Cycle (CDC) .

Results show that with increase of traffic flow information, the fuel economy of the HEV is increased. Finally two drive cycles were compared and the comparison shows that the improvement in fuel saving is very significant for CDC.

Dedication

I dedicate this dissertation to my loving parents.

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ADVISOR	ADvanced VehIcle SimulatOR
CDC	Colombo Drive Cycle
DOE	Department of Energy – United States of America
EM	Electric Motor
ESS	Energy Storage System
FC	Fuel Cells
GA	Genetic Algorithm
GHG	Greenhouse Gas
HEV	Hybrid Electric Vehicle
ICE	Internal Combustion Engine
IEEE	Institute of Electronic and Electrical Engineers
IGBT	Insulated Gate Bipolar Transistors
NEDC	New European Drive Cycle
NREL	National Renewable Energy Laboratory
SCRAM	Signal Coordination in Regional Areas of Melbourne
SOC	State of Charge (of the battery)
SUS	Stochastic Universal Sampling
UN	United Nations
w.r.t	With Respect To