

**DEVELOP AN INTELIGGENT SWITCHING FOR MULTISOURCE FOR DC
MOTOR**

HELYA SYAHIDA BINTI ABU ZAKI

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FARID ARAFAT BIN AZIDIN
Pensyarah
Fakulti Kejuruteraan Elektronik & Kejuruteraan Komputer
Universiti Teknikal Malaysia Melaka (UTeM)
Hang Tuah Jaya
76100 Durian Tunggal, Melaka

Tarikh: 11/06/2015

Tarikh: 10/06/2015

STUDENT'S DECLARATION FORM

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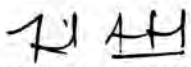
Name : Helya Syahida Binti Abu Zaki

Matric Number : B021210276

Date : 07/6/2015

SUPERVISOR'S DECLARATION

“I hereby declare that I have read this report and in my opinion this report is sufficient in terms scope and quality for the award of Bachelor of Electronic Engineering (Telecommunication) With Honours”

Signature: 

Name: En.Farid Arafat bin Azidin

Date : 07/06/2015

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ABSTRACT

This project aims to create an intelligent switching for multisource for DC Motor. Nowadays, increasing oil prices due to oil depletion, global warming and the introduction of compulsory standard gas emissions in cities have had a tremendous impact on the development of new transportations technologies. In this project use there has multisources such as battery, fuel cell and super capacitor. This circuit consists of switching circuit, basic motor driver circuit, battery capacity sensor circuit and power demand sensor. This circuit had been chosen to switching the multisource and control the speed of DC motor. The main task of the system is to maintain the power source to drive the DC motor.

ABSTRAK

Projek ini bertujuan untuk mewujudkan pensuisan pintar untuk multisource untuk DC Motor. Pada masa kini, kenaikan harga minyak disebabkan oleh kekurangan minyak, pemanasan global dan pengenalan wajib pelepasan gas standard di bandar-bandar telah memberi kesan yang besar kepada pembangunan pengangkutan teknologi baru. Digunakan projek ini ada mempunyai multisources seperti bateri, sel bahan api dan kapasitor super. Litar ini terdiri pensuisan litar, asas litar pemacu motor, kapasiti bateri litar sensor dan permintaan kuasa sensor. Litar ini telah memilih untuk beralih multisource dan mengawal kelajuan motor DC. Tugas utama sistem ini adalah untuk mengekalkan sumber kuasa untuk memacu motor DC.

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CHAPTER 1

INTRODUCTION

This chapter will discuss about the overview of the project, Problem statement, objectives, Project scope and the thesis outline.

1.1 Overview

Intelligent switching of multi-source for dc-motor is a process in which the switching board can select which source can drive the electrical motors depending on vehicle driving condition and the capacity of the source. In many Asian countries, scooters and three-wheeled vehicles are popular and are a cheaper form of transportation. They are often used in the cities to travel short distances and avoid traffic jams.

The energy source of these vehicles comes from fossil fuels that have a negative impact on the cities through pollution and noise. Oil depletion, global warming and CO₂ gas emissions have become a concern and have motivated the development of an efficient and extendable energy management system (EMS) using renewable energy sources for light vehicles. Multi-power sources from renewable energies can be implemented as an alternative fuel source in electric light vehicles. The renewable energies that can be used practically in

vehicles include FC, battery and SC. These three energy sources may be used in concert so that vehicles may have sufficient power and energy capacity in the future.

This paper focuses on the fully board switching for energy management system To coordinate the three energy sources so that the vehicle can consume less energy and produce higher power capacity. As a matter a fact, all renewable energy sources have weaknesses in either power or energy density. For instance, FC have high energy density but low power density and a start time that takes several seconds or even a minute to get into full operation. By creating an effective coordination system, the different energy sources can be used to assist each other, making the system compatible for light vehicle usage.

In order to meet the consumer requirement such as power, longer travel distances and reliability, EMS used battery as the primary source of energy, while the SC is used as the auxiliary energy source and the FC is used as an extended energy source if it has the high demand load. In addition, the battery can be recharged again. It can be charged at home.

In this project intelligent switching for multi-source for dc-motor had been choosen to coordinate the three energy source. The main task of the system is to maintain the power source for drive the DC motor.

1.2 Problem Statement

The single sources have some limitation in driving range and power. It cannot travel in long distance because of not enough energy that can drive the electrical motor. If they using a fossil fuel. It will cause air pollution and global warming. So by implemented the intelligent switching for multi-source. It can travel and have a speed same as the combustion engine. It can travel in long distance and reduce the air pollution. Figure 1.0 shows estimate the percentages of oil demand between the years 1998 until 2026.

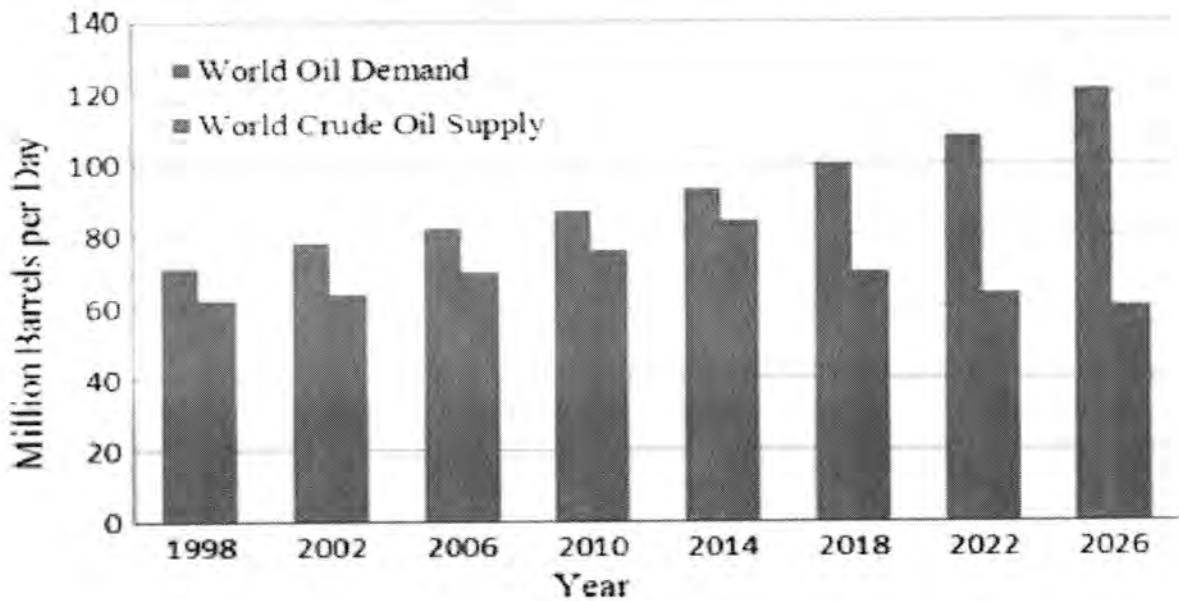


Figure 1.0 : Oil price forecasting based on demand and supply.

1.3 Objectives

There are some objectives of this final year project that need to be achieved due to the following aspects below:

- To design and develop an intelligent switching for multi-source for DC motor
- To design a fully board switching that use to coordinate for energy management system

1.4 Scope of Project

Since this project will focused in hardware part about Intelligent switching for multi-source for DC-motor, so, this project focus on the following properties below:

- Design a complete switching board that manage to coordinate energy management System that consist of voltage regulator, basic drive motor, SC,FC and battery circuit switching, current detection sensor and battery capacity sensor.
- Use three sources of multi-source switching that is battery, fuel cell, and super capacitor. The rated voltage of the DC motor is 24V.

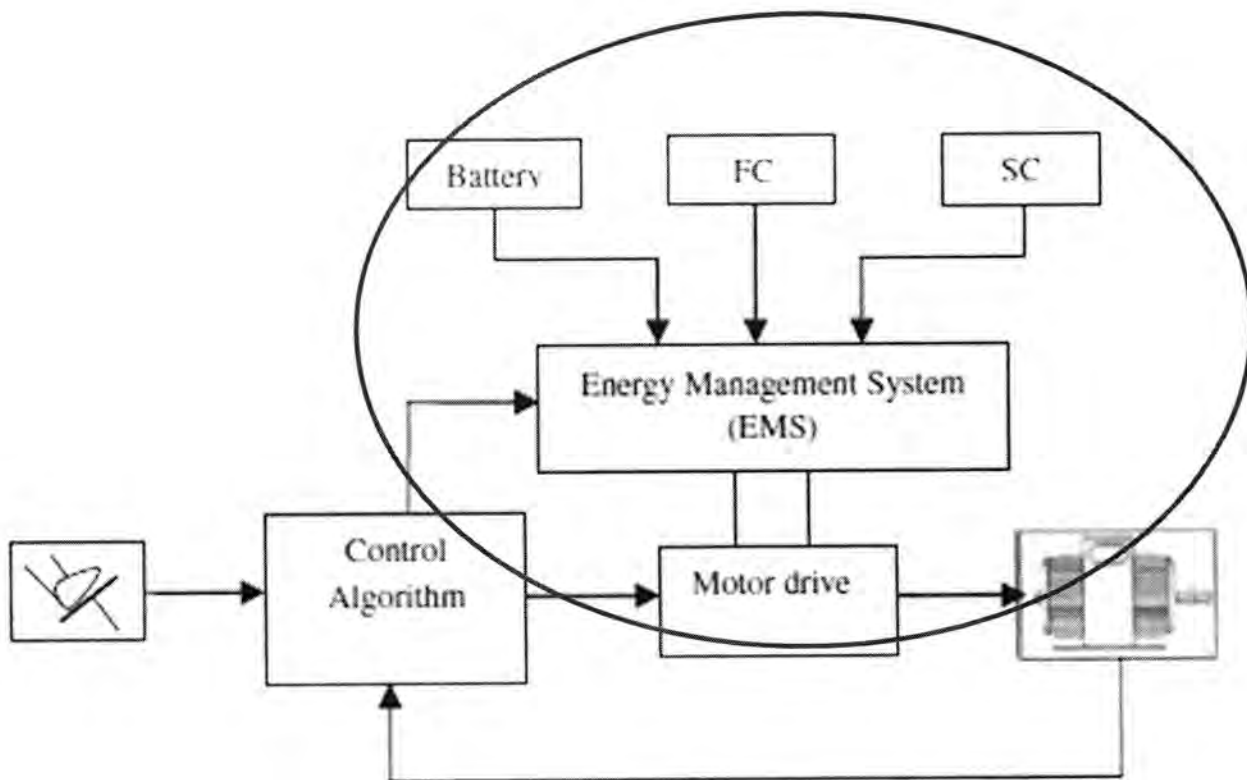


Figure 1.1: scope of the project

1.5 Project Methodology

Phase 1: Research

- Must understand the concept of switching circuit, basic motor driver circuit and sensor
- Surf web, journal and read book.

Phase 2: Design

- Designed the basic motor driver and switching circuit.
- Developed sensor circuit for detection of power demand and battery capacity.

Phase 3: Hardware development

- Developed basic motor driver, switching and sensor circuit.

Phase 4: Hardware testing

- Testing hardware to test functionality.
- Fabricate in PCB board to test result.

Phase 5: Hardware implementation

- Phase involving each switching and motor driver having connection each others.
- Phase involving sensor

Phase 6: Analysis Data

- Data will be collected for analysis and suggest for overcoming weakness of project.

1.6 Project Planning

This Project is done based on the project planning schedule which is Gantt chart and also follow the flow chart . This project started from September 2014 until June 2015.

1.7 Report Outline

In this thesis, there are five chapters involved to switching multi-source for dc-motor. First and foremost, it is Chapter 1. This chapter will discuss briefly about the project introduction that consist of objectives, problem statement, scope of the project and report outline in order to conduct the project.

Next, the thesis is continued with Chapter 2. This chapter contains the literature review on the past research and some theoretical concepts applied in this project. It contain the collection information of the project in order to complete the whole project. Then, Chapter 3 focus on the methodology used in order to complete this project to design the hardware. In this chapter, there is flow chart to explain the procedures of designing the hardware and simulation. Next, the detail description about experimental setup is discussed in this chapter too.

In chapter 4, results consist of two parts which are simulation and experimental results. Several comparisons include the theoretical, simulation and experimental setup will be discussed in this chapter too.

Last but not least, Chapter 5 deals with the conclusions and recommendations of this project. In this section, it is concluded achievement and the overall project. Then, some proposals have been made to recommend further research will come and improved from time to time. A summary of project intelligent switching for multi-source for dc-motor is discussed as well as the recommendation is provided for future work in this chapter. The conclusion that will be done includes the whole chapter.

CHAPTER 2

LITERATURE REVIEW

This chapter contains the literature review on the past research and some theoretical concepts applied in this project. It contains the collection information of the project in order to complete the whole project.

2.1 Introduction

Light vehicles, such as scooters or auto rickshaws, are important modes of transportation in many Asian countries, including Malaysia and Indonesia. As a result, it is necessary that the battery has storage capacity for energy harvesting when it is plugged into the grid. Unlike other hybrid electric vehicle designs, which use a combustion engine or fuel cell as the primary source, this system uses the battery as the primary energy source. The FC is used as an extended source, and the SC is used under high power conditions. Some of the sources such as SC require a dc-dc boost converter to drive the motor at the rated voltage.

In the motor driver system, energy is normally supplied from a single source. A basic open loop motor drive system is shown as figure 2.0. While, in the cases of multi-power

source an Energy management system is needed to manage the power system before the load. The block diagram of multi-source power in an open loop system is shown as Figure 2.1.

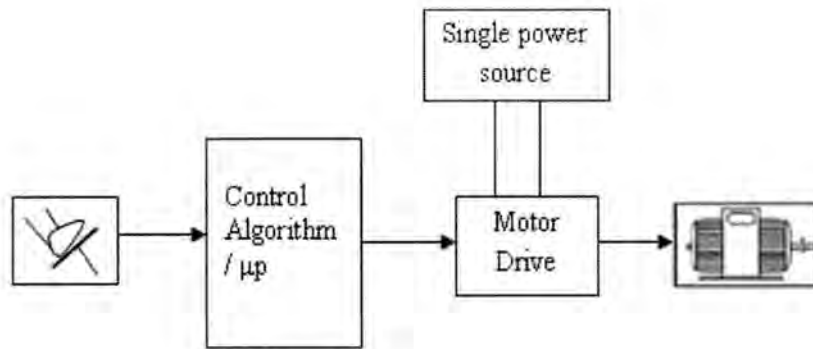


Figure 2.0: A basic open loop motor driver system

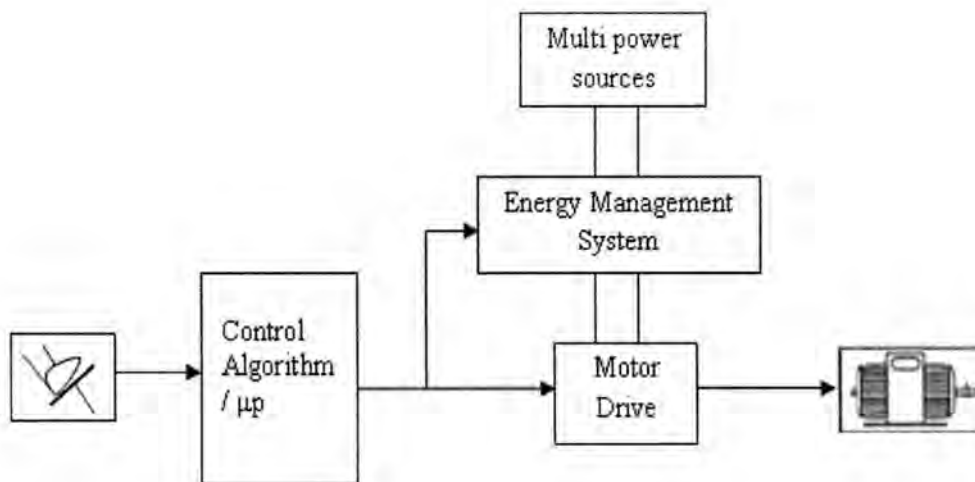


Figure 2.1 : A basic multi-power source open load motor driver system

In the EMS, the SC has two functions: to enhance the power and to extend the battery life by compensating for the high current of the load. Apart from being environmentally-friendly, It is essential to reduce dependency on depleting fossil energy resources too. As one the most important aspect in life transportation sector has shown significant success in introducing electric vehicle and hybrid electric vehicle as green alternatives to consumer. Honda insight and the Toyota Prius are two example that minimize the use of combustion engine by integrating it with electric motors (Jorgensen 2008)

2.2 Electric vehicles

An electric vehicle is a vehicle that has the following features: (1) the energy source is portable and electromechanical in nature, and (2) traction effort is supplied only by an electric motor. Figure 2.2 shows the block diagram of an electric vehicle system driven by portable energy source. The electromechanical energy conversion linkage system between the vehicle energy source and the wheels is the powertrain of the vehicle.

The powertrain has electrical as well as mechanical components. The fuel for electric vehicle is stored in an energy storage device, such as a battery-pack, for energy delivery on demand. The primary source of energy for this electricity generation of this vehicle is through the electric power transmission system.

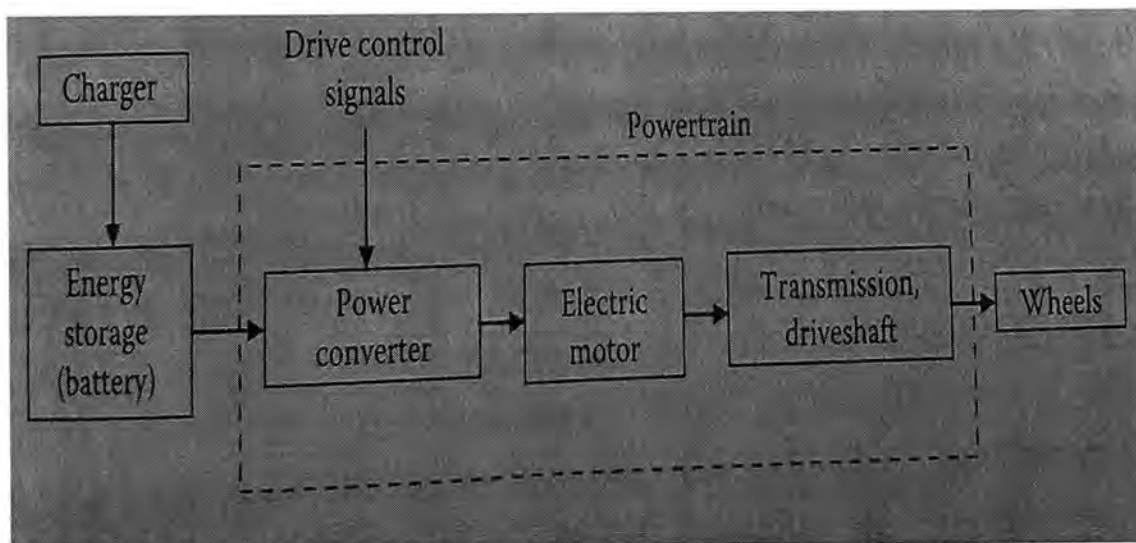


Figure 2.2 : An electrical vehicle system