# IMPLEMENTATION OF A SINGLE PHASE AC ADAPTOR USING PIC16F877 MICROCONTROLLER

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# ABSTRACT

This thesis presents the design and implementation of a single phase ac adaptor which can be used in a car. A single phase inverter converts a 12 v dc to a 230 v ac voltage with a 50 Hz frequency. The inverter was fabricated and controlled by PIC16F877 microcontroller employing a PWM technique. In this paper UPWM switching technique is first reviewed. Programming was done using Microcode Studio Plus. Subsequently control circuit and power circuit for inverter are discussed. Finally the simulation and experimental results are discussed. The prototype of the inverter was tested with the resistive load and found that total harmonic distortion (THD) is less than 4.6 % voltage.

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# CHAPTER 1

# INTRODUCTION

## 1.1 INTRODUCTION

The standard AC output waveform supplied by Tenaga Nasional Berhad (TNB) in Malaysia is 240 ± 10 V ac, 50 HZ for a single phase supply. Based on this standard, most of electronic equipment such as laptop (Toshiba) has a 100 to 240 V ac and 50 Hz to 60 Hz input voltage. During travelling in a car, the electronic equipment may need this standard voltage source. Thus a DC to AC adaptor with a 12 V dc input for the car battery may provide such a source. This requires a single phase inverter to be employed. Pulse width modulation can be used to digitize the power so that a sequence of voltage pulses can be generated by turning on and off of the power switches.

The pulse width modulation inverter has been the main choice in power electronic for decades, because of its circuit simplicity and rugged control scheme [1]. PWM switching technique is commonly used in industrial applications. In this development a multiple PWM voltage modulation type is selected because this method can reduce the harmonic content using several pulses in each half-cycle of output voltage [2] and offers the advantage of effectively doubling the switching frequency of the inverter voltage, thus making the output filter smaller, cheaper and easier to implement[3]. This type of modulation is also known as uniform pulse-width modulation (UPWM) [2]. UPWM techniques are characterized by constant amplitude pulses with constant duty cycle for each period.