

# **SINGLE PHASE AC MOTOR CONTROL USING CPLD**

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## **ABSTRACT**

This project involves the design, development and operation of single phase AC motor using XILINX. The output voltage is controlled using well known Pulse Width Modulation (PWM) technique. The objective of this project is to regulate the output of AC motor (speed)) using Insulated Gate Bipolar Transistor (IGBT). The design is based on XILINX chip XC95108 Complex Programmable Logic Device (CPLD) that acts as a controller to control the switching of IGBT and modulate the PWM signal externally. A comparison was made between the experimental results obtained and the simulations results from PSpice.

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# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

Electric motors come in wide variety of sizes and types. A single-phase AC motor is one of an AC machine with low power rating, relatively simple to construct and widely used in home, office, shop and factories.

It required a single alternating current source single-phase motor can only produce an alternating field with the help of additional component such as capacitor or extra winding. An AC motor required driver which acts as an interface between a controllers Complex Programmable Logic Device (CPLD) and the motor. It means the energy here (converter) is refers to AC source had been used in the input. AC to AC converter also knows as 'AC voltage controller' converting and AC voltage to another AC voltage [1]. The driver must match the power signals (voltage and power level) with the control signal. The driver produces power conversion, application and ohmic isolation between the systems.

The speed of the AC motor is varied by varying the modulation index (varying the width of switching pulses either wide or narrow) by using digital control method or pulse modulation technique. There are two types of pulse modulation technique use in AC motor control. There are Sinusoidal Pulse Width Modulation (SPWM) and Pulse Width Modulation (PWM). Both of them have their own advantage suitable for their operation. In this project, it is specific on the control the output voltage by using Pulse Width Modulation (PWM) switching technique. This is done by using Xilinx Foundation Series software and then downloads it into XC95108 chip.