CHAPTER 1

INTRODUCTION

1.0 Overview

As the prices of the power electronic devices are getting cheaper and widely used in various applications like induction motor controllers, automation, inverters and so on. There are many types of digital controller like a microprocessor, microcontroller and DSP (digital signal processing) are widely used to control algorithm in motor controller. PID, Fuzzy logic, and neural network are the examples of algorithm techniques used in induction motor drive applications. This project was developed with an induction motor controller that use PID controller (proportional–integral–derivative controller) in microcontroller. The PID controller is widely used in the induction motor drive applications due to its simplicity in structure, superior robustness, and familiarity to most field operators. The key issue in designing PID controller for the induction motor drive is to settle the gains so that the controller works well in every condition [5]. Especially in applications like in induction motor controllers not only the frequency, but the magnitude of the voltage needs to be varied [3]. For these kinds of applications pulse width modulated (PWM) are more suitable [3]. The speed of induction motor was varied by controlling the PWM output using microcontroller program.
1.1 Background

A proportional–integral–derivative controller (PID controller) is a generic control loop feedback mechanism (controller) widely used in industrial control systems. A PID controller attempts to correct the error between a measured process variable and a desired setpoint by calculating and then outputting a corrective action that can adjust the process accordingly [6].

The PID controller calculation (algorithm) involves three separate parameters; Figure1 shows Proportional, the Integral and Derivative values. The Proportional value determines the reaction to the current error, the Integral value determines the reaction based on the sum of recent errors, and the Derivative value determines the reaction based on the rate at which the error has been changing. The weighted sum of these three actions is used to adjust the process via a control element such as the position of a control valve or the power supply of a heating element [6].

By "tuning" the three constants in the PID controller algorithm, the controller can provide control action designed for specific process requirements. The response of the controller can be described in terms of the responsiveness of the controller to an error, the degree to which the controller overshoots the setpoint and the degree of system oscillation. Note that the use of the PID algorithm for control does not guarantee optimal control of the system or system stability [5].
Some applications may require using only one or two modes to provide the appropriate system control. This is achieved by setting the gain of undesired control outputs to zero. A PID controller will be called a PI, PD, P or I controller in the absence of the respective control actions. PI controllers are particularly common, since derivative action is very sensitive to measurement noise, and the absence of an integral value may prevent the system from reaching its target value due to the control action [5].

![Diagram of PID Controller](image)

**Figure 1**

### 1.2 OBJECTIVE

The aim of this project is to design a controller system to control three phase induction motor using PID controller. In orders to achieve the objective, a few important thing need to be accomplished before the project can be done or continued which are:

i. To design and fabricate three phase induction motor controller.

ii. To control speed of induction motor by using V/f control method.

iii. To simulate PID Motor Controller system