CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Technological development offers new possibilities to make people's daily lives more healthy, safe, understandable, independent, fun and comfortable. New technologies provide us, for instance, with energy-friendly and sustainable solutions to improve the environment in which we live as well as tools for elderly people to live longer on their own. To make continuous production of new technology, factories opened their doors to modern industrial robots.

Robot factory workers are not without their limitations. In their simplest forms, industrial robots are mere automatons. Humans program them to perform a simple task, and they repeat that task over and over again. Tasks that require decision-making, creativity, adaptation and on-the-job learning tend to go to the humans. For instance, Australia's Drake Trailers installed a single welding robot on its production line and benefited from a reported 60 percent increase in productivity (ABB Australia, 2010).

1.2 PROJECT BACKGROUND

Robots are important technology that greatly increases the productivity. Robotic are being used in the high-value areas such as automobile manufacturing. Robotic can
eliminate the problems of social security such countries competing for pool of workers and lack of workers due to old age.

Robotics is the branch of technology that deals with the design, construction, operation and application of robots and computer systems for their control, sensory feedback, and information processing. These technologies deal with automated machines that can take the place of humans, in hazardous or manufacturing processes, or simply just resemble humans.

In robotics a manipulator is a device used to manipulate materials without direct contact for dealing with radioactive or bio-hazardous materials, using robotic arms, or they were used in inaccessible places. Most of the existing robotic manipulators are designed and build in a manner to maximize stiffness in an attempt to minimize the vibration of the end-effectors to achieve good position accuracy.

There are several type of manipulator. They are single link flexible manipulators, two link flexible manipulator and multi link flexible manipulator. Single link manipulator is a link which did not have any join on it. The movement of the link is directly based on the rotation of the dc motor. Two link flexible manipulator have two joint on the link. Both joint can be rotate by a controller.

In this project, a single link flexible manipulator is used. It is in a cantilever condition which first ending link will attach with a dc motor and the other end point is free condition. When dc motor is rotated to certain angle, the single link also will rotate on x-axis. The vibration amplitude is produce directly from the speed of the rotation of the dc motor when it stops. Because of being lighter and more flexible, the robot is unable to reach the precise position at high speed because of vibration (Zhang Tiemin, Liu Youwu:1996). A study to counter this problem had been made to control and maintains the accurate position of the single flexible manipulator.
Matlab (matrix laboratory) is software that will be use in the study. It is a numerical computing environment and fourth-generation programming language. Many would claim that its biggest benefit is that it is a mature program that is heavily supported and allows for quick prototyping of design ideas. For example, there is a design of a control system, using Matlab, it can quickly create a plant model and start experimenting with a controller such as a PID system. Without ever building the system, Matlab can obtain the ideal control parameters subject to some set of constraints. Later the person in charge could then see bode plots and such all within the same environment.

1.3 PROBLEM STATEMENT

A manipulator is a device used under human control to manipulate materials without direct contact. The materials are often heavy, radioactive, bio hazardous or in inaccessible places. However, in a movement there is vibration. In design and analysis of robot manipulator, it is common practice to assume that the system is structural rigid. This assumption is justified since all mechanical devices are subject to deformation under loading hence an inherent requirement of design is to stiffen the mechanical structural at the expense of performance. In order to overcome these effects controller of single link have been proposed.

1.4 OBJECTIVE

In industry, there are problems of arm vibration during high speed motion. This situation had puts a lot interest to researcher to counter the problem for industries application. The objective of this project to control vibration on the single link flexible manipulator using Proportional Integral Derivative (PID) Controller. Active Force Control Controller also will be used with PID Controller to compensate the vibration.