1.0 Introduction

Chapter I is the Introduction of the overall project which included Project Background Problem Statement, Objective of project as well as Scope of Project are highlighted in this chapter.

1.1 Background of Study

Printed Circuit Board, PCB is invented by an Austrian inventor born in Vienna called Paul Eisler in 1936. [1] It is a board made of glass reinforced plastic with conductive line printed onto board. [2] Electrical and electronic components such as resistor, inductor, capacitor, and many more are mounted on the board and connected by conductive line printed onto board instead of wire in order to form a complete circuit. Holes are necessary to be drilled on the PCB in order to mount electronic components on the PCB. A normal drilling machine does not suitable to drill holes on a PCB.
In order to overcome this issue, it is essential to develop a machine called PCB drilling machine. In the Printed Circuit Board manufacturing, PCB drilling process is very important. There are two purpose of drilling operation. First is to provide component lead mounting and with structural integrity and another one is to make an electrical interconnection between top and bottom of the board. [3]

PCB drilling machine can be divided into two types. One is Manual Controlled Machines and the other is Computer Numerically Controlled Machine. A manual controlled PCB machine requires an operation in order to position the work piece and initiate the drilling cycle. Computer Numerical controlled (CNC) machine requires inputs from the computer to positioning and initiate the drilling cycles. The quality of a drilled hole is depends on various factors such as drilling techniques, quality of the drilling tool, and operator skill in control. Therefore, it is important to give a great attention on drilling operation.

The PCB drilling machine must be able to work in precise and accurate. PCB drilling machine can moves in 3 axes (X, Y, Z) in order to drill holes on PCB depends on the coordinate projected manually or automatically. In the industry, complex and expensive PCB drilling machine is designed and used to do the drilling process but a simple and cheap PCB drilling machine can be made by using various microcontrollers as well. Among these microcontroller that available for develop a PCB drilling machine, Arduino is the one that was studied in this research study. Arduino is a very small computer used to read variety of sensors or switches. Besides that, Arduino can be used to control variety of motor such DC motor and stepper motor and light emitting diode. Furthermore, it can be used to communicate with software running on a computer in a project.
1.2 Problem Statement

Drilling process is a very important stage in the PCB manufacturing. The PCB drilling machine is developed as the substitution of the manual drilling but the price of a PCB drilling machine is expensive nowadays. Besides that, the holes drilled by manual are not accurate and consistent compared to machine.

1.3 Objective of Project

I To design a PCB drilling machine with high accuracy to locate the holes to be drilled
II To fabricate a 3 axes low cost PCB drilling machine

1.4 Scope of Project

I Designing a PCB drilling machine by using Catias
II Fabricating a PCB drilling machine using CNC and milling machine
III Controlling stepper motors by using Arduino board and CNC shield