

PC CONTROLLED PCB DRILLING MACHINE

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ABSTRACT

Now days in industries for drilling purpose CNC machines are being used which are very costly and bulky. For small scale industry CNC machines are not affordable. So for small scale industries we are going to design a PC based PCB drilling machine, which is very less in cost and practically feasible. The number of holes and vias in the PCB influence the speed of drilling time if it is done manually. The idea is to implement an automatic drilling machine. The system consists of two main parts, i.e. software in PC and the drilling machine itself. The coordinates for holes and vias were generated by PCB drawing software as text file. In PCB drilling machines, the location of the drill holes are fed into the machine and the PCB will be drilled at the corresponding coordinates. In this project we are designing a PCB drilling machine which is controlled by PC. It adjusts the PCB according to the drilling point, so by using this device manual work is reduced. And accuracy is achieved also it works precisely. System consists of a microprocessor, a mechanic for drilling process and PC. The mechanism of drilling process is microprocessor's responsibility, but it is PC which sends the coordinates of the hole. In this project four stepper motors are used. The two motors are used for the movement of PCB in X,Y direction. One motor is used to move the drilling machine downwards and another one is used for rotating the drill bit.

Keywords Real: VB.net (Visual Basic 6.0), PCB drill holes, via

I. INTRODUCTION:

The development of electronic circuit usually uses PCB or Printed Circuit Board. One of the processes in making PCB is to make a hole, whether for vias and pads. For small PCB, this process can be finished soon. But for larger one, this can take longer time. This paper discusses the development of automatic drilling machine for PCB. After etching process, the PCB is placed to this system then it is drilled automatically. The same system has been made but the controller is PC and uses camera to detect the coordinate position [1]. Earlier a project was done in which they have used 89c51 and shafts for shifting the drilling machine [2]. Another system tried to optimize the mechanism using Genetic Algorithm in order to shorten elapse drilling time [3]. A research was done about replacing the processor with PLC [4]. All previous systems have slow response. System consists of a microprocessor, a mechanic for drilling process and PC. The mechanism of drilling process is processor's responsibility, but it is PC

which sends the coordinates of the hole. The mechanics bring the drill to the coordinate by DC motors, X- and Y-axis. There is one DC motor which controls the drill up and down. All motors are controlled by the microprocessor, while the microprocessor receives information from PC. PC gets coordinate information by reading a text file generated by software for PCB design.

II. REVIEW OF LITERATURE

A same research was done in which the shafts and motors are used for moving the drilling machine, which was done by H. Ferdinando, I. N. Sandjaja, G. Sanjaya[2]. In another system image processing is used to design and implementation of PCB drilling machine by Harris Ahmad Khan [5]. In a latest research named as "Automated printed circuit board drilling machine with efficient path planning" the drilling machine uses a path planning algorithm, which is capable of estimating an efficient traversing path for the drill bit minimizing the length of travel in 2014[6].

III. SOFTWARE SPECIFICATION DETAILS

In this we have used Visual basic 6.0 software. In CNC Machine G-Code programming language is used which is low level language and hence functional programming language get lengthy. But we are using VB.Net in our project which is a high level language. Length of program gets reduces and so that we can increase the efficiency of the programming. It can also reduce the time complexity of the programming. An interfacing card is used to interface the microprocessor and the hardware assembly. The programming language used is VB.net.

IV. HARDWARE SPECIFICATION DETAILS

The following are the hardware specifications used for this project:

1. PCB
2. Slider door scales
3. DC Stepper Motors
4. Relay
5. Transistors
6. Diodes
7. Resistors
8. LPT Connector
9. Microprocessor

Slider Door Scale:

Three slider door scales are used to adjust the PCB. As per the values of X, Y and Z co-ordinates the slider door scales are moves and adjust the PCB. These are connected via motors.

DC Stepper Motors:

There are four stepper motors are used, three are used for moving the slider door scales according to the input. And one is used for rotating the drill nib.

LPT Connector:

LPT Connector is used to connect the PC and interfacing card i.e. transistors driver and relay assembly.

Microprocessor:

Microprocessor is a multipurpose, programming device that accepts digital information as input, and processes it according to instructions stored in its memory, and provides results as output.

V. METHODOLOGY:

System consists of a microprocessor, a mechanic for drilling process and PC. The mechanism of drilling process is microprocessor's responsibility, but it is PC which sends the coordinates of the hole.

The mechanics bring the drill to the coordinate by stepper motors, X- and Y-axis which are of 100 RPM used to move the PCB. There is one DC motor which controls the drill up and down i.e in Z- axis which is also of 300 RPM and one is used for rotating the drill bit i.e. for drilling purpose. This motor is of 1000 RPM.

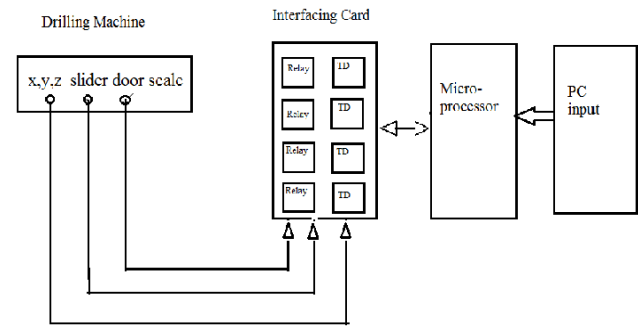


Figure 1:

All motors are controlled by the processor, as shown in fig [2] while the processor receives information from PC. PC gets coordinate information by reading a text file generated by software for PCB design.

The data communicated via serial port.

The goal of this research is to shorten the elapse drilling time. It makes the performance better than the previous systems. In this the PC will take the coordinates where drill is to be done is taken by user. Then it sends it to processor and it is processed and through interfacing card it shifts the scale on which the PCB is fitted through screw and nut arrangement.

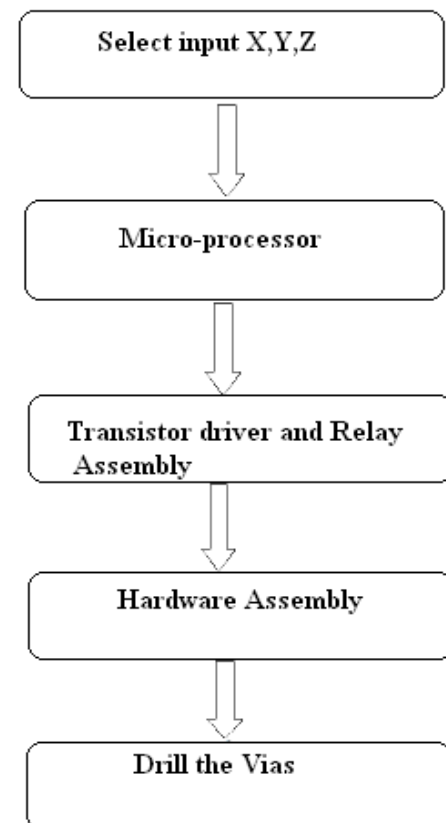


Figure 2:

VI. OBJECTIVES

The objective of this project is as follows:

1. To reduce the cost.
2. Useful for small scale industries and institutes.
3. Compact in size as compare to CNC machine.
4. Efficient

VIII. Applications & Uses

1. In small scale industries.
2. In educational institutes.
3. It can be further modified into a automatic cutting machine.

IX. CONCLUSION:

We have put our best efforts to make this project i.e. PC controlled PCB drilling machine. So that small scale industries and institutes can replace the CNC machines by this drilling machine which very cost effective. The current system has better performance than the previous system. This result is achieved by replacing the both scales for X- and Y-axis. The performance of the system can be upgraded by using smaller delay for the DC motor. In this way we have implemented our engineering

learning through the project of PC controlled PCB drilling machine.

X. REFERENCES:

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