
Automatic PCB Drilling Machine

Prof. Sandhya Shinde*, Pooja Dhamale, Rupali Rasal***, &
Pravin Bikkad******

**Department Of E&T C Engineering, Dr.D.Y.Patil Institute Of Engineering, Management & Research,
Akurdi, Pune, India*

***Department Of E&T C Engineering, Dr.D.Y.Patil Institute Of Engineering, Management & Research,
Akurdi, Pune, India*

****Department Of E&T C Engineering, Dr.D.Y.Patil Institute Of Engineering, Management & Research,
Akurdi, Pune, India*

*****Department Of E&T C Engineering, Dr.D.Y.Patil Institute Of Engineering, Management & Research,
Akurdi, Pune, India*

ABSTRACT:

This paper presents design of PCB drilling machine, Which drill holes automatically find out from an image of the circuit then it reduces the time management of labour and use to drill hole coordinates. The aim of this project is to design implementation of PCB drilling machine. Cardboard follows path as per requirement user command. Due to this project system makes more reliable and accurate.

Keywords-*Computerized numerical control, cardboard, drilling machine co-ordinate measurement machine*

INTRODUCTION

The aim of this project was to reduce the time and labour required for drilling holes in PCB using simple, user friendly and cost effective method, as PCB'S are extensively used in electronics.

The PCB will be placed in the system and then it will be drilled automatically according to user command. In this project we are use three DC motors for movement of X direction, Y direction and for drilling tool.

We are giving input from computer (MATLAB) through the USB to TTL converter to the LPC2138. In this project we are used crystal oscillator to provide a external clock pulses to the LPC 2138.

METHODOLOGY

The main challenges of this project were path planning and obtaining the drill hole coordinates from a PCB layout. We used the MATLAB to write the program and the EAGLE PCB layout development software was used to design the PCB schematic.

The system is controlled by using ARM to achieve the control over the movement axis . Several motor drivers are made, DC motor (X and Y-axis), one for the drill. Drill coordinates are extracted using matlab

BLOCK DIAGRAM

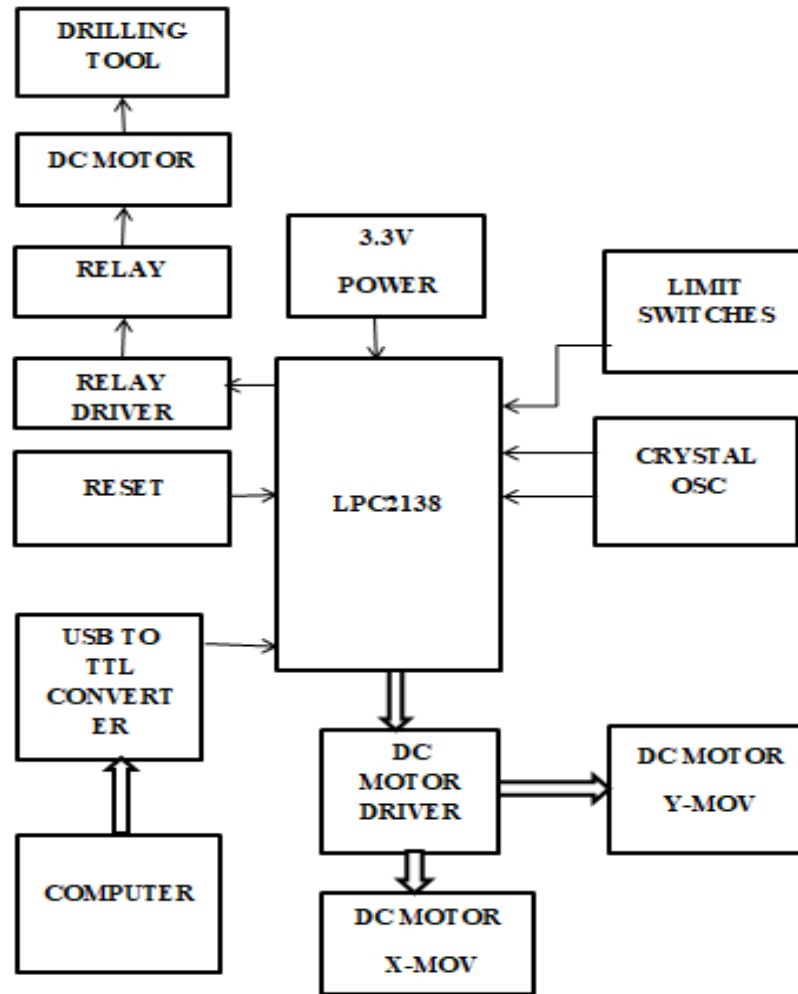


Fig. Block diagram of Automatic PCB Drilling Machine.

PROPOSED WORK

The machine designed based on co-ordinate measurement machine, The PCB is moved along the X and Y axis coordinate is used to move the card board. Drill co-ordinates are extracted using MATLAB. We are giving input from computer with a USB cable.

The first step is getting the PCB layout. This is simply done by the PCB design software.

Figure sample schematic of image file Once the image is obtained it is loaded into the MATLAB program which will extract the coordinates for plotting (To move X and Y direction).

Following are the major components from which proposed system is fabricated.

1. LPC2138
2. DC Motor
3. DC Motor Driver
4. Crystal Oscillator
5. Relay /Relay Driver
6. Power Supply
7. Computer
8. Drilling Tool

ADVANTAGES

The main advantage of this project is to overcome the NC and CNC machine which can be used in industrial area to reduce the cost for production. It is also used by replacing robotic arm which can be used in large industry. This is also reduce cost of many equipment which can be used in industry.

Accident is eliminated during drilling it increments morale and efficiency of workers.

Minimum maintenances are required.

It can be utilized as multipurpose equipment i.e. drilling, reaming, counter, vapid, tapping etc.

More drill can do in less time. •Increasing productivity.

It precision is high and preserves time.

It required diminutive space to keep in workshop. It's facile to operate.

APPLICATIONS

It can be achieved in large scale area i.e which consist of small scale area as well as medium scale area.

It can be used for teaching purpose where manufacturing and design is necessary.

CONCLUSION

In this paper, This setup of hardware with a combination of MATLAB gives better accuracy and reduce the tolerance. In addition to that the use of MATLAB makes it easy to get the information of holes(position of holes with respect to X & Y coordinates).

REFERENCES

- i. The difference between Cartesian, six-axis, and SCARA robots by Richard Vaughn, Senior Automation Engineer. <http://machinedesign.com/motion-control/differencebetween-cartesian-six-axis-and-scara-robots>
- ii. Christian Nilsson, "Heuristics for the traveling salesman Problem", Linkoping University.
- iii. AlperYildirim , "CNC printed circuit board drilling machine", Hacettepe university, 2003.
- iv. Rodrigo Basniak, "Design of a pcb milling machine", ABCM Symposium Series in Mechatronics-Vol 5, pg 1339,2012.
- v. Adam Kumpf, "PCB mill", 2003
- vi. ZulkifliTahir, NurAzman Abu, Shahrin Sahib, NannaSuryana Herman, "CNC pcb drilling machine using novel natural approach to euclidean tsp" , UniversitiTeknikal Malaysia, IEEE 2010.
- vii. MATLAB version 7.10.0.499, The MathWorks, Inc.
- viii. ARES Professional, version 7.10 SPO, Labcenter Electronic.