

AUTOMATIC PCB DRILLING MACHINE

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ABSTRACT

Creating holes on single or multilayer printed circuit boards (PCBs) is an important stage in electronic production. Holes of different sizes and at a large number of positions (up to thousands) must be drilled with high precision for manual or automatic insertion of various electronic devices and components. For this purpose, we have designed and built an automatic PCB drilling machine. The PCB pattern of the circuit schematic diagram is drawn on the monitor screen, with the help of software such as Orcad. This pattern layout is printed out to make the PCB, and it's just from this layout the computer will control the drilling automatically.

Keywords: shortest path algorithm, pcb drill hole, pcb, path planning.

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I. INTRODUCTION

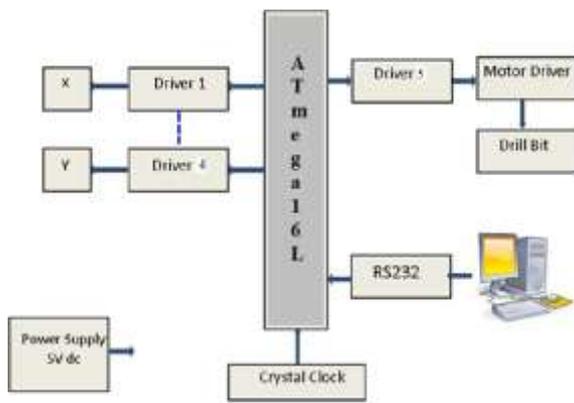
This project is designed so that students can understand the technology used in now-a-days. Robots of today are not exactly the walking, talking intelligent machines of movies, stories and our dreams. Today we find most robots working for people in factories, warehouses, and laboratories. In the future, robots may show up in other places: our schools, our homes, even our bodies. Robots have the potential to change our economy, our health, our standard of living, our knowledge and the world in which we live. As the technology progresses, we are finding new ways to use robots.

Machine aided systems are often used in conjunction with industrial robots to automate manufacturing operations. However such automation is limited by the need for accurate calibration of both the positioning system and computer program used for positioning of the drilling machine.

The Serving Industrial has been designed to enable the drilling and routing of printed circuit boards to be carried out quickly and efficiently by non-technical personnel with the help of computer. This in turn eases the integration of mandatory human supervision with certain industrial processes. Particular consideration is given to the application of this technique to printed circuit board (PCB) drilling. His is because electronic circuits have been

constructed using printed circuit boards (PCB) s for several decades and this is unlikely to change in the foreseeable future. The PCB provides a convenient mechanism for physically securing electronic components whilst connecting them electrically in the required configuration. This project involves the development of an XY based software controlled PCB drilling machine. The software is developed in VB. The control is done through an 8 bit microcontroller and the command signals are passed from the software to the microcontroller using the serial port. The microcontroller will be programmed using embedded C. This microcontroller will be used to control two stepper motor one for each axis. Also, two solenoid will be used to control the drilling action of the machine. A high speed dc motor will be used for drilling. Automated machines are currently used in many industrial applications since they provide numerous advantages over simpler forms of mechanization and human labour. These include higher productivity reduced down time and increased quality and consistency. Since robotic systems are programmable they can accommodate changing requirements in the production line.

II. BLOCK DIAGRAM



The block diagram for the hardware configuration is as shown behind. Our project is based on the concept of Machine Vision System that is often used in industries to automate manufacturing operations. Electronic products have been constructed using Printed Circuit Boards (PCBs) for several decades and this is unlikely to change in the foreseeable future.

There are three kinds of holes on PCBs: Holes for device insertion, via holes and fringe holes for board fixing. Each hole has two parameters: Position and size (diameter). Hole quality is also important. Hole position consists of X-Y coordinates measured from monitor screen upper left corner. These parameters are used to position the drilling bit, whereas size parameter is used to choose bit size (usually 0.5mm, 1mm . . .). Hole data file supplied by the electronic software is for controlling the drilling machine. The drill (comprising motor, chuck, and bit) is moved horizontally to X-Y coordinates of a hole, then moved down in Z direction to make the hole, then withdrawn and translated to another place. The electro-mechanical system is responsible for the 3D motion to position the drill, and should be of real industry standard to guarantee the force, torque, precision, robustness requirements. The idea is to choose stepper motors and linear axes for the electro-mechanical system. Servo motors are more appropriate but stepper motors are more convenient.

III. APPLICATIONS

- This system is very useful in small institutes & companies where PCB's are made.
- Less weight and easy mobility
- High-speed and high accuracy

IV. CONCLUSION

2D Vector plotters designed as Cartesian robotic systems can be viably applied to an automated PCB drilling system due to their capabilities of load bearing, precision, simple design and programming. A simple drill hole map can be successfully used to obtain the coordinates needed to perform an automated drilling operation. The importance of path planning in vector plotting especially in the context of an automated PCB drill was clearly observed in the great

difference in distance travelled by the pointer as seen clearly in the results.

V. REFERENCES

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