

# Automated PCB Drilling Machine using DIP

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**Abstract**— This project work is taken up, which is aimed to design and develop one automated machine that can be used for drilling the PCB (printed circuit board). 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. Further the drilling machine uses a Path Planning method, which optimizes the use of the motors. Here the two stepper motors are used for the forward and reverse movement and the one DC motor is used for the up and down movement of drill machine.

**Key words:** DIP, PCB Drilling Machine

## I. INTRODUCTION

This project purpose is to design a fully automated machine for drilling a printed circuit board. This would be helpful for students related to electronics field.

Therefore the main goal of this project is to enable beginners in the field to use an automated PCB drilling machine with path planning capability. Nowadays specially in large scale industries the NC and CNC machines are used to drill the PCB hole but such type of machine cannot be used by the small scale industries. So this kind of project motivates us to develop low cost drilling machine. Hence this type of project implementation will be helpful to avoid the use of high cost CNC machine.

### A. Sequence of Obtaining the Drilling Events

Following shows the sequence of obtaining the drill events for automated PCB drilling machine using DIP.

- Get PCB Layout.
- Select the coordinates.
- Row by row scanning.
- Drill.

The layout image is obtained then it is loaded in the matlab program which is select the coordinates. After this the user uses a row by row scanning method for move a base of layout.

Once the process of selecting the coordinates and row by row scanning is done then drill pointer drill the coordinate.

## II. PROBLEM STATEMENT

To overcome the problem mentioned below the Automated PCB drilling machine using DIP is useful.

- 1) The use of high cost NC and CNC machine.
- 2) To avoid workload of human.
- 3) Early system designed drilling driver by using relay makes the system bulky and high amount of current in order to drive the motor is not provided.
- 4) Sometimes the Proper drilling is not get.

## III. PROPOSED SYSTEM

In order to overcome all the problems which are occurred in the drilling, the Automated PCB drilling machine using DIP is useful. We develop this machine using ARM7, DC motor, Stepper motor, Drill machine assembly, serial communication connector to give the proper drill.

Following figure shows the block diagram of automated PCB drilling machine using DIP.

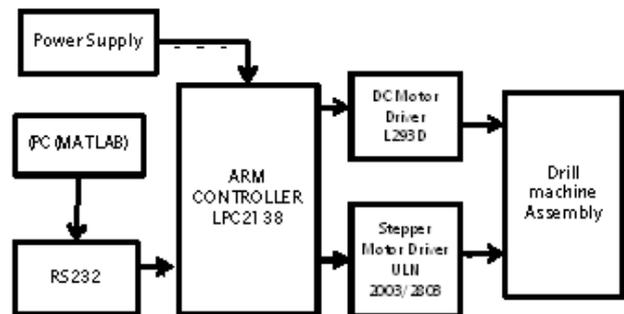


Fig. 1: Block diagram of Automated PCB drilling machine using DIP

### A. LPC2138 Microcontroller:

Microcontroller is the basic part system which controls its overall working.

#### 1) Features of LPC2138:

- The LPC2138 is a TDMI-S based high performance 32-bit RISC microcontroller.
- It has thumb extensions 512KB on-chip flash ROM within system programming and in application programming.
- 8-ch 10 bit ADC 32KB RAM.
- Vectored interrupt controller.
- Two UARTs, one with full modem interface.
- Two I2C serial interfaces.
- Two SPI serial interfaces.
- Three 32bit timers, Watchdog timer
- Real time clock with optional battery backup.
- Brown out detect circuit
- General purpose I/O pin.
- CPU clock up to 60Mhz
- On-chip crystal oscillator on- chip PLL

### B. PC (Matlab):

- Once the image is obtained then it is loaded into the MATLAB program which will select the coordinates for plotting.
- Then to find the centroids of each point as the point of drilling.
- After extracting the coordinates the path planning for the drill is performed.

### C. RS 232:

- RS-232 is serial connection found on IBM-compatible PC's.
- There is various features in RS-232 interface product.
- The main features described are the regulated charge pump, auto shutdown, RS-232 compatible versus compliant operation, ESD protection and data rates including mega baud rate operation.

#### 1) Features

- Operates from a single 5V power supply 1.0 microF charge pump capacitors
- Operates up to 120kbit/s V
- Low supply current: 8mA
- Two drivers and two receivers TTL/CMOS input levels into TIA/EIA-232-F levels

### D. DC Motor Driver L293D:

- The L293D are quadruple high current half-H driver.
- The L293D is designed to provide bidirectional drive currents at voltages from 4.5 to 36V.
- This device is designed to drive inductive loads.
- All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo- Darlington source.

### E. Stepper Motor Driver:

- The ULN2003A contains seven Darlington transistor drivers and is like having seven TIP120 transistors all in one package.
- The ULN2003A can pass up to 500 mA per channel and has an internal voltage drop of about 1V when on.
- It contains clamp diodes to dissipate voltage spikes when driving inductive loads.
- To control the stepper, apply voltage to each of the coils in a specific sequence.

## IV. CONCLUSION

The project "Automated PCB Drilling machine using DIP" has been successfully completed and tested with Integration of the feature of every hardware component for its development. Presence of every block has been reasoned out and placed carefully thus contributing to the best working of unit. The project has completed using very simple and easily available components making it lightweight and portable.

This gives better accuracy and reduce the tolerance. Thus this will overcome the workload of the human. In future we replacing this system to robotics arm for used in large scale industries.

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