



MICROCONTROLLER BASED AUTOMATIC DRILLING MACHINE

Lakshya A. Shrungarpure¹, Parita H. Patel², Kandarpi V. Shah³, Ramanuj K. Gupta⁴

^{1,2,3} Student, Electronics and Communication Engineering, Sigma Institute of Engineering

⁴Asst. Prof., Electronics and Communication Engineering, Sigma Institute of Engineering

Abstract : Any industry desires to maintain safety and security while drilling to the material. Addressing this challenge is an important task as any injury to the worker costs company a lot. This system provides safety to the workers. This also provides accurate and automatic drilling due to the IR sensor used. After sensing the object, the drilling machine comes to the target position through the automatic lift system. The drilling machine drills the particular position and moving up direction. Then the object will rotate to the next place on the conveyor. The drilling machine drills the next position also like this. The machine drills number of objects. The automatic sensing of the object is provided with the IR sensor that is placed at target place. The sensor gives the proper object location to the embedded controller. The controller operates the drilling machine as per the received signal from the IR sensors. The present project is designed around a microcontroller as a control unit. The microcontroller senses the object through the IR sensor and controls the drilling machine, and it continuously monitors the drilling machine.

Keywords- Drilling machine, embedded system, microcontroller 89s52, IR sensor, automatic drilling.

I. INTRODUCTION

This application is in the area of embedded systems. An embedded system is some combination of computer hardware and software, either fixed in capability or programmable, that is specifically designed for a particular function. Since the embedded system is dedicated to specific tasks, design engineers can optimize it reducing the size and cost of the product and increasing the reliability and performance. Embedded systems are controlled by one or more main processing cores that are typically either a microcontroller or a digital signal processor (DSP). Embedded systems control many devices in common use today. The keil C51 compiler for the 89s52 microcontroller is the most popular 89s52 compiler in the world. It provides more features than any other 89s52 compiler available today. The C51 compiler allows you to write 89s52 microcontroller applications in C that, once compiled, have the efficiency and speed of assembly language. Language extensions in the C51 compiler gives you full access to all resources of the 89s52. The C51 Compiler translates C source files into reloadable object modules which contain full symbolic information for debugging with the µvision Debugger or an in-circuit emulator. In addition to the object file, the compiler generates a listing file which may optionally include symbol table and cross reference information. Embedded C is an extension for the programming language C to support embedded processors, enabling portable and efficient application programming for embedded systems. The AT89s52 is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89s52 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications. This system provides the safety and accurately, automatic IR sensor sense the wood plates, after sensing the wood plates the automatic drilling machine comes to the target position through the automatic lift system. The drilling machine drills the particular position and moving up direction then, The wood plate will rotate for next position. The drilling machine drills the next position also like this the machine will drills the no of wood plates and different positions also signals. The automatic sensing the wood plate system is provided with the IR sensors placed at a target place. These sensors gives the wood plates are located in the particular position status to the embedded controller at the motor to which they are connected. The controller operates the drilling machine as per the received signal from the IR sensors.

Would provide benefits to the laborers making a PCB is an involving process that those who are involved in electronic circuit manufacture have to go through. Not least among its many tasks is the act of drilling the PCB holes which needs both precision and patience. Often, the repetitiveness of the task can lead to countless frustrations among the labourers particularly the beginners. Further, the time taken to drill a PCB can have a significant effect on the production efficiency in mass scale production. Therefore the main goal of this project was to enable beginners in the field to use an automated PCB drilling machine with path planning capability to complete the job efficiently. Nowadays specially in large scale industries the NC and CNC machines are used to in order to drill the PCB hole but such type of machines cannot be preferred by the small scale industries. The aim of this project is to develop a low cost PCB drilling machine such that it can be preferred by the small scale industries and can be helpful to avoid the workload of human. So such kind of project motivates us to develop low cost drilling machine such that it as well as the industries.⁽¹⁾ Estimating the drilling depth while

drilling manually through a conventional drilling machine is extremely impossible, often the job will be failed due to the over drilling. In many cases, after completing the drilling work, it is very difficult to measure the depth; especially thin holes depth can't be measured. Therefore an automatic drilling machine that performs the function of drilling according to the drilling depth generated & forwarded to the control circuit is essential; hence this project work is taken up, which exposes the technology of special purpose drilling machines. The Electrical drilling machine designed here is quite useful for mechanical workshops. The machine is constructed with power feed technology is aimed to drill the job up to certain specified depth, For ex: if a particular piece of job is supposed to be drilled to a limited depth, doing it manually consumes lot of time, because every time depth has to be measured through a crude method, thus estimating the drilling depth is quite complicated. For this reason this machine is designed & its mechanical movements are restricted by programming the drilling depth through a potentiometer interfaced with microcontroller.⁽²⁾ 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 via 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. Another system tried to optimize the mechanism using Genetic Algorithm in order to shorten elapse drilling time. The last research was about replacing the controller with PLC. All previous systems have slow response. System consists of a microcontroller (89s52), a mechanic for drilling process and PC. The mechanism of drilling process is 89s52'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. There is one DC motor which controls the drill up and down.⁽³⁾

Components Used	Specifications
Microcontroller	89s52 (8KB memory)
Comparator IC	LM358
Driver IC	ULN2003
Voltage Regulator IC	7805
Crystal Oscillator	11.0592 MHz
Drill motor	750 rpm (M.S,Copper,magnet,AL and Plastic)
Conveyor belt	121 mm X 63 mm (Rexine)

Table 1.1: Specification of components

II. METHEDOLOGY

2.1 Experimental Specification

In manufacturing of automatic drilling machine different component are used and <table 1.1> shows about basic specification and models of components used.

<Figure 1.1> shows basic block diagram of automatic drilling machine, In block doagram connection between different component is shown and <Figure 1.2> shows a 2D view of automatic drilling machine with dimenssions of different parts and <Figure 1.3> shows circuit diagram in which different point of microprocessor are connected with different parts to acutate drives.

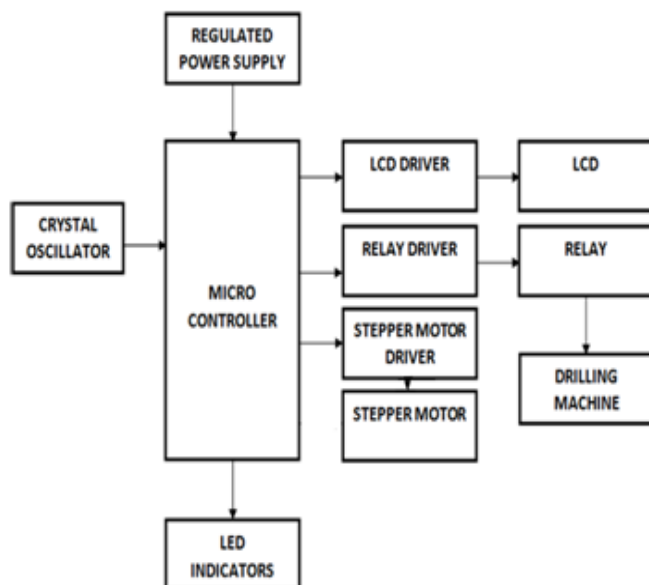


Figure 2.1 Block Diagram

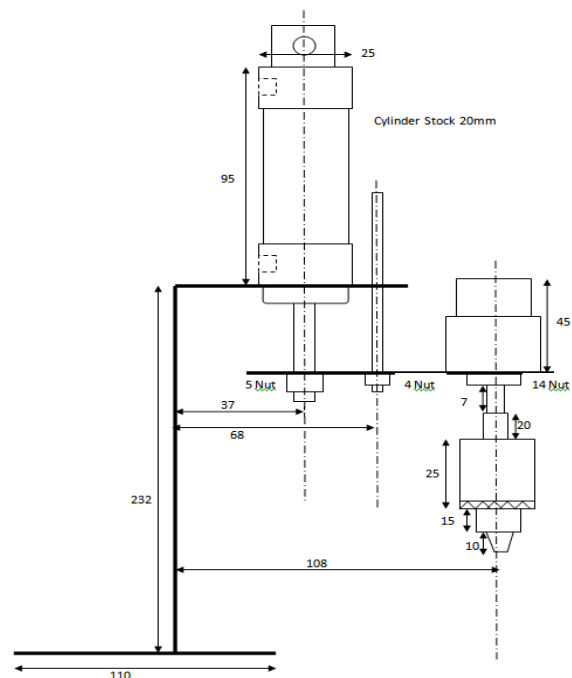


Figure 2.2 Systematic Diagram of model

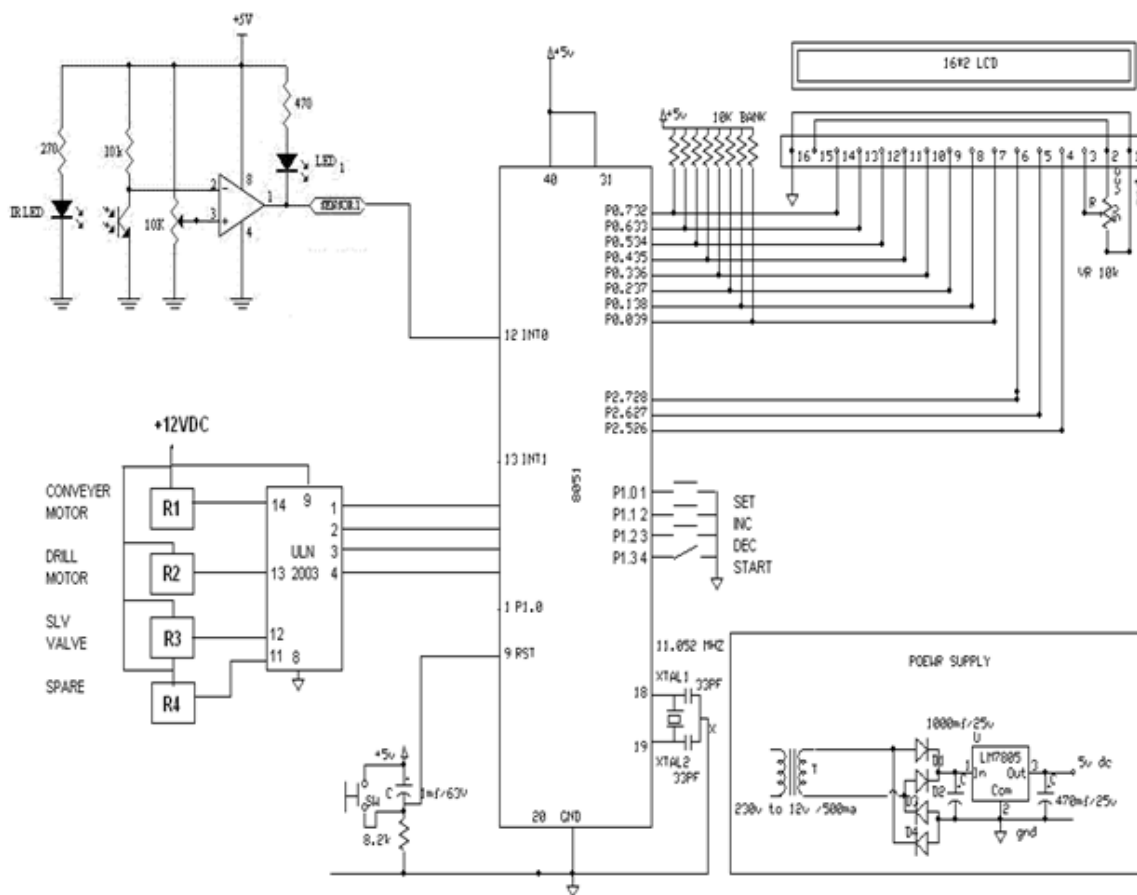


Figure 2.3 Circuit Diagram

2.2 Experimental Procedure

- First, input the number of seconds for which the drilling machine will be on.
- The machine is started by pressing starting button.
- Microprocessor will take the input and it generate actuate signal for conveyor motor, gripper and drilling machine.
- Firstly the conveyor motor rotate on predefined speed and work piece are placed on conveyor belt. When sensor analyses the work piece it pass signal to microcontroller and microcontroller actuate stopping signal to conveyor motor thus stopping work piece in defined position.
- Gripper will come and hold the work piece rigidly.
- Drill start rotating and gradually comes down and produce hole in work piece. The length of which the drill will come down is already defined as per geometry of work piece.
- Drill will come on its original position and so also gripper will move to its original position
- Again conveyor belt will rotate by to remove finished product and also to define new work piece below the drill.

- And to stop the system, press and hold the stop button and the system will stop after the completion of the cycle.

III. RESULT

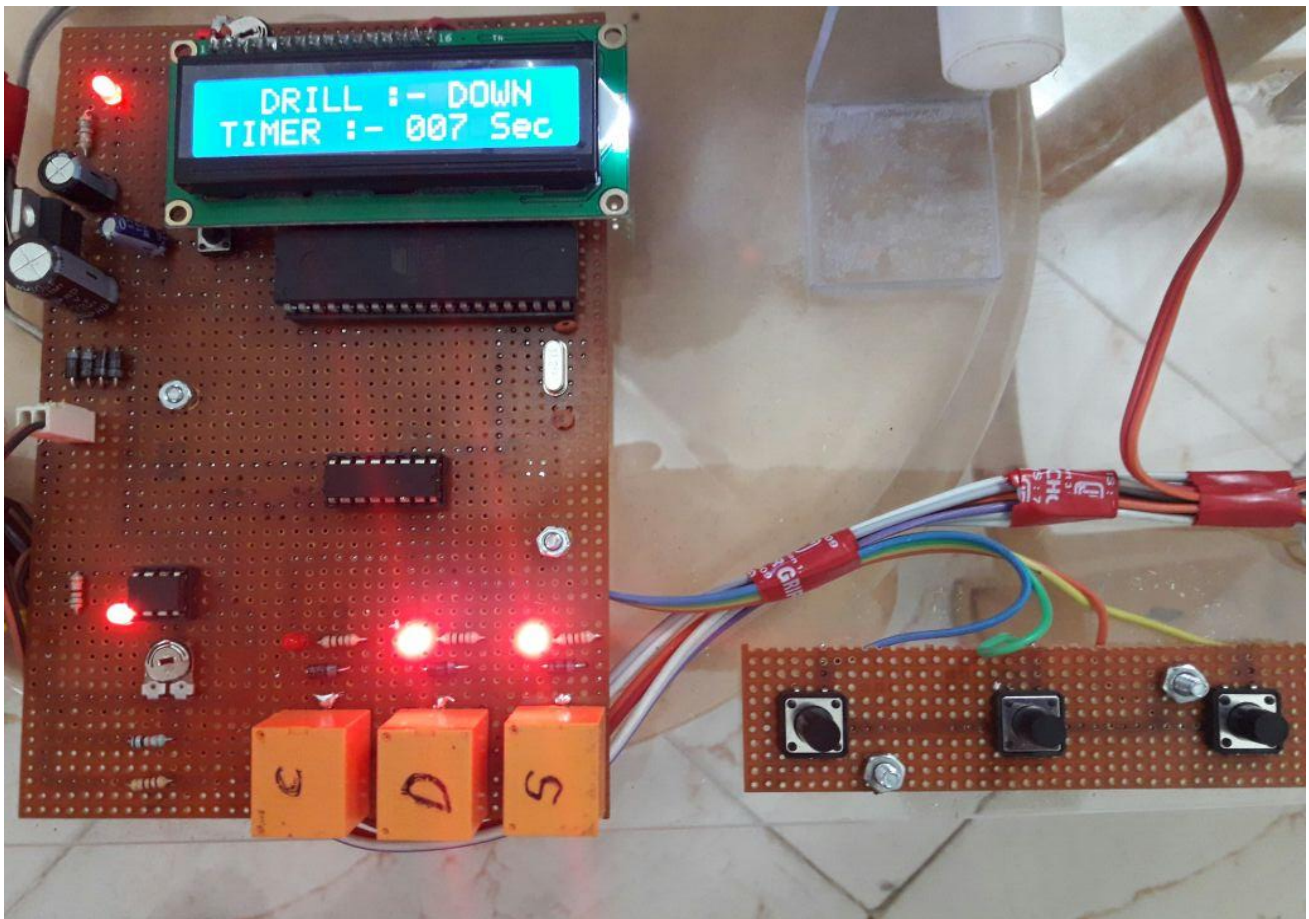


Figure 3.1 Electronics portion of product

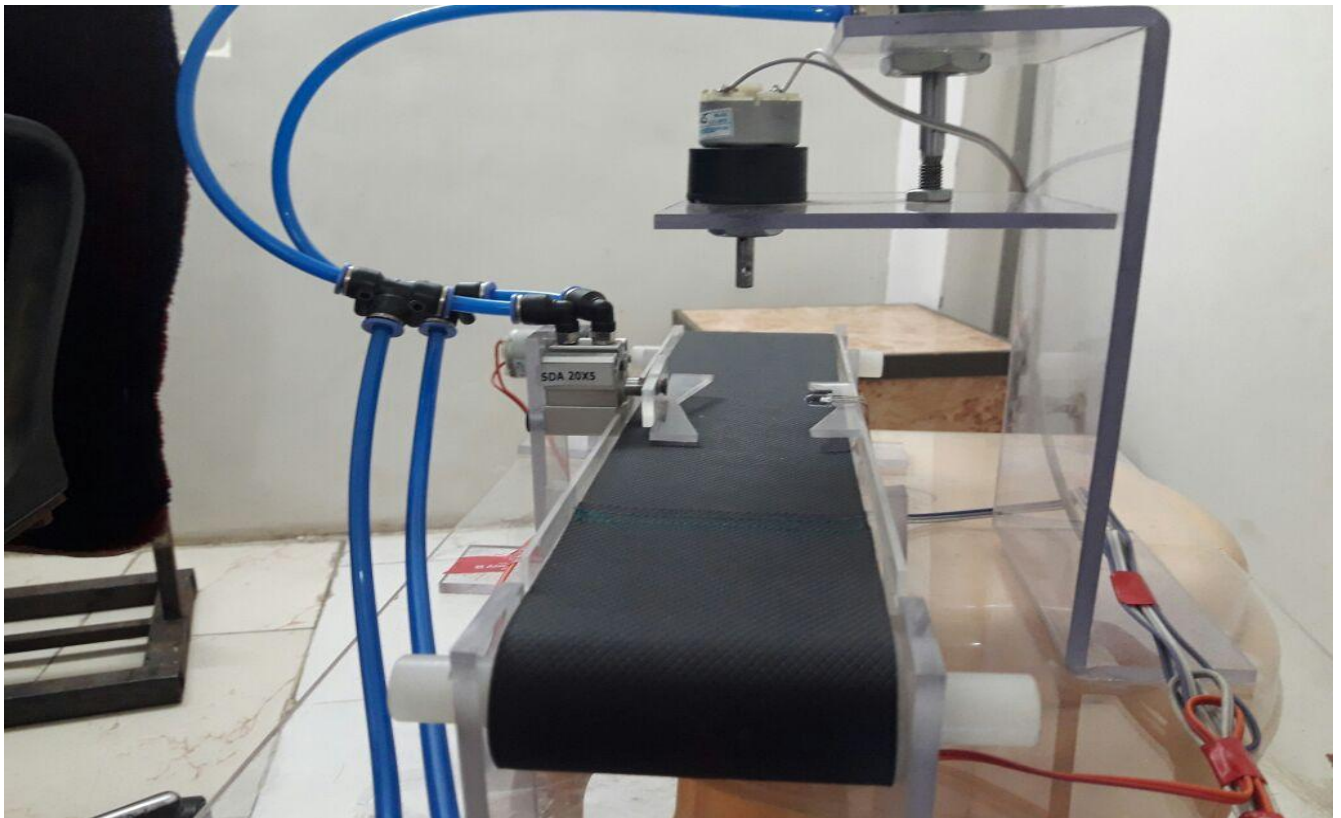


Figure 3.2 Hardware portion of product

IV. CONCLUSION

Due to using of automatic drilling machine it has been observed the production time of drilling is reduced by greater amount. As automatic positioning of workpiece result in increase in efficiency of machine and thus overall machining time is reduced which fit best in mass production type industries. Reduction in employee fatigue due automatic positioning.

V. REFERENCES

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