Automated Drilling Machine with Depth Controllability Using A Microcontroller And An Android Application

Ms. Vani K[1], Dr. R. Suresh[2]
[1]Dept of Industrial Automation Engineering
[2]Professor and PG Coordinator, Dept of Industrial Automation Engineering
[1, 2] VTU Regional Centre, Mysuru, Karnataka

Abstract- *Estimation of drill depth of a hole which is drilled manually is very difficult, most of the time the job will be damaged by drilling wrong depth. In some cases, after the completion of drilling depth, normally measuring of thin holes is very difficult. So, here an automated drilling machine which has control over drill depth is designed and developed. The drill depth, movement of drilling machine and the work table movement is controlled by using an android application called Bluetooth electronics. The controller accepts information form android device and performs operations.*

I. INTRODUCTION

The main goal of this project is to drill the hole as per the programmed depth on a work material accurately. The prototype consists of a drilling setup which is controlled by an android application.

Mechanical unit is completely controlled by three DC motors, one is to rotate the drill bit, other two are there to control the horizontal and vertical movement of the machine. As per the drill depth mentioned in the android application, DC motor motion is regulated by microcontroller in the Arduino panel.

Prototype working is completely based on various fields of electrical, mechanical and electronics engineering. To achieve the goal all the above technologies are very much needed. Design and development of the prototype is the critical part of project.

ATmega microcontroller forms the lead role in controlling the project to achieve the desired aim. We can program the drill depth by an android application Bluetooth electronics.

In this current situation we can't drill a hole with depth and measure it. In this project we can accurately drill a hole with depth and its measurable. And the complete machine is automated, and Bluetooth controlled.

II. BLOCK DIAGRAM
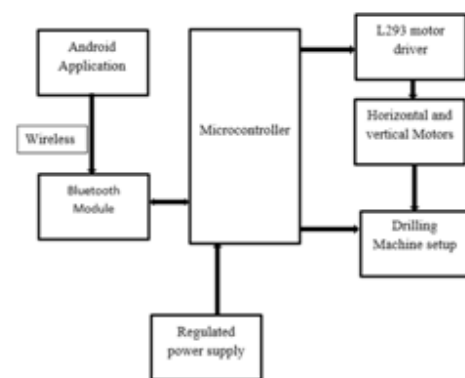
III. COMPONENTS DESCRIPTION

1. Arduino Uno microcontroller

It belongs to ATmega 328 family. It composed of 14 functional pins, in which 6 are utilized for PWM outputs and remaining 6 for analog inputs one for the transmission and one pin for receiving the signals. A 5V supply is required to energise the controller board. The panel accepts the Arduino IDE software program which will be accepted by the controller present on board.
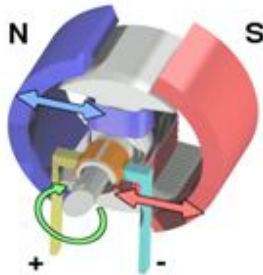
2. Drilling machine setup

The drilling machine setup consists of following parts

- DC motor.
- 1 mm drill bit which is of stainless steel material.
- Coupling: Required to couple the drill bit holder with the shaft of DC motor.

DC Motor:

A dc motor mainly used to obtain mechanical energy by converting electrical energy. the dc motor is the most widely used motor such as in toys elevators, domestic appliances, automobile etc. the movement of the dc motor drive can be achieved, by controlling voltage ratings and current of field windings.

3. Regulated power supply
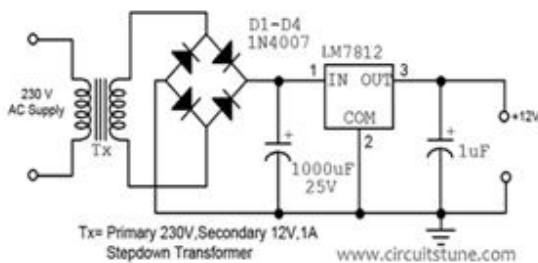
From a 12V Adaptor, input is taken into the power source unit through a DC Socket. 5V controller circuit is planned using LM7805 IC of consistent ratings. A 12V Bridge rectifier in between the DC Socket and LM7805-5 V is used.

The 12V source is given to LM7805 IC which is provided with a heat sink because LM7805 IC produces enormous amount of heat. This IC is used because the Arduino board needs a supply of only 5V.

4. HC-05 Bluetooth module
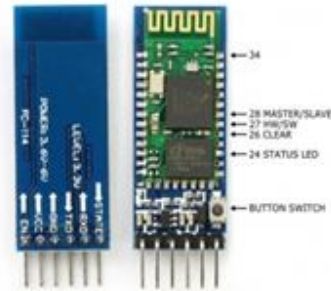
Serial port protocol Bluetooth module designed for serial wireless assembly used. To make the element as wireless communication, master-slave formation is used. It uses serial port with 3Mbps modulation and 2.4Ghz. Here master-slave module is formed as Bluetooth module. Slave is the default factory setting. Additional Bluetooth device cannot establish connection with the slave module but can accept information. Many devices can establish connection with master.

Arduino is connected to the module through Vcc and ground. Transmission pin and receiver pin of the element is connected to receiver and transmission pin of controller board respectively. To make the process better the Light emitting diode is connected exterior.

5. L293D Motor driver module
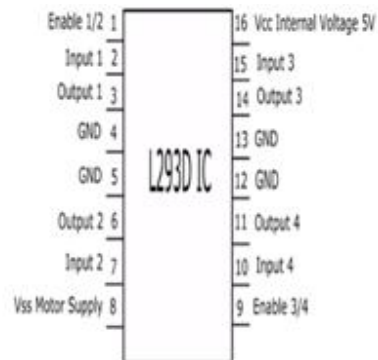
To make the DC motor working a L293D motor driver component is used. This module makes the DC motor to rotate in both clockwise and anticlockwise direction. By using one motor driver we can drive 2 DC motor. So, here in this

project we are using 2 motor drivers. One is to drive horizontal and vertical motor and other is to drive the drill motor.

Working mechanism:

The status of enable pins are responsible for the rotation of motors. If enable pins are the motor gets activated. As per the inputs provided the motor works.

Input 1	Input 2	Result
0	0	Stop
0	1	Anti-Clockwise
1	0	Clockwise
1	1	Stop

IV. WORKING PROCEDURE AND PROTOTYPE

The drilling machine is controlled by an Arduino atmega238microcontroller. The motor driver is given a input so that it should rotate the motor clockwise and anticlockwise. The drill depth is ensured by giving input from an android application called Bluetooth electronics which is interfaced with the working model by a Bluetooth module. We can change the drill depth in the app and we can drill the blind holes of different depths and at different position serially.

V. CONCLUSION

By executing this project, we can decrease the cost and time in drilling process and the machine has whole control over drill depth. The hardware is integrated to develop the prototype. All the components are placed carefully in the specific place, to form the effective working model. Use of android application to control the drilling operation is main advantage of the current project and this reduces the hardware used and the complexity in machine and human errors caused. Usage of high end IC's will help in improving the knowledge. Hence this project is designed, developed and tested effectively.

REFERENCES

[1] Automated drilling machine with depth controllability by G. Niranjan, Chandini, P Mamatha.
[2] Long hole drilling automation by Maunu Manttari.
[3] Automation of drilling machine using elecrto-pneumatics by Akshay R Mahendraker.