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# AUTOMATED CUTTING MACHINE

Shradha Kadam
BE Student, Mechanical Deptt. ICEM, Pune, INDIA
kadamshradha79@gmail.com
Mrudul Patle
BE Student, Mechanical Deptt. ICEM, Pune, INDIA
mrudulpatle666@gmail.com
Nikhil Dhage
BE Student, Mechanical Deptt. ICEM, Pune, INDIA
dhagenikhil2@gmail.com
Shubham Nikanke
BE Student, Mechanical Deptt. ICEM, Pune, INDIA
S8308209081@gmail.com
Smriti Sahu
Asst. Prof., Mechanical Deptt. ICEM, Pune, INDIA
Smriti.sahu@indiraicem.ac.in

**ABSTRACT**

The recent advancements in digital technology especially embedded systems, have now enabled us to make low-cost machines for Real time applications. This paper presents a simple way of designing and implementing an automatic metal sheet cutting machine using easily available low-cost micro-controllers. This machine takes shapes to be cut on the sheet in, as input a highresolution raster image via laptop and cuts the sheet accordingly. Results have shown that the performance of this machine meets well the industry requirements at a much lower development cost.

*Keywords - component; Image Controlled Automatic Machine, Sheet Cutting,Digital Plotter, 8vector Algorithm, CNCmachine, Stepper control, Real time.*

## .I. INTRODUCTION

Current trends in Software research are focused especially on autonomous and semiautonomous robots. Robotics is the branch of technology that deals with the construction ,design, operation, and application of robots, as well as computer systems for their control, sensory feedback, and information processing. A robot is a mechanical agent, usually an electro-mechanical machine that is guided by aelectronic circuitry orcomputer program. It is mainly focused on the automation and reducing the human work. Its an integral part of most backup and archive procedures but are often taken for granted and implemented without too much thought.

The growth rate of drilling technology expands the application areas of drill machines.this machine is used for cutting templates,drill has been widely used in modern manufacturing industry in line cutting drill cutting, drill cutting is widely used in electronics, automobile and other industrial fields. It takes part in the improvement of product quality and production efficiency.Also it is known that sheet metal has sharp edges which may tear off the skin while working on it. So we design the automated template cutting machine.This study intends to design and develop a drill cutting robot utilizing Arduino based microcontroller that will help address the problem of our local artists, illustrators and designers and even students in cutting and engraving items from flat sheet materials like plastic, wood, fabric and paper.Nevertheless, the coding for the CNC system which is the G-Code programming can be modified and simplify to the 2 axis coding movement. Letters or words are drawn in inkspace ,whereinkspace is a software Graphics creation program that can create and also import graphics from other sources and then prepare the outputneeded for the DrawBot to draw.Inkscape MI GRBL Extension ,This software knows how to convert the graphics file into G-Code which the DrawBot uses to draw the graphic. Throughout history, robotics has been often seen to potray human behaviour, and often manage tasks in a similar fashion. Today, robotics is a rapidly growing field, as technological advances continue; research, design, and building new robots perform various practical purposes ,whether domestically and , commercially, or militarily.

## 2. LITERATURE REVIEW

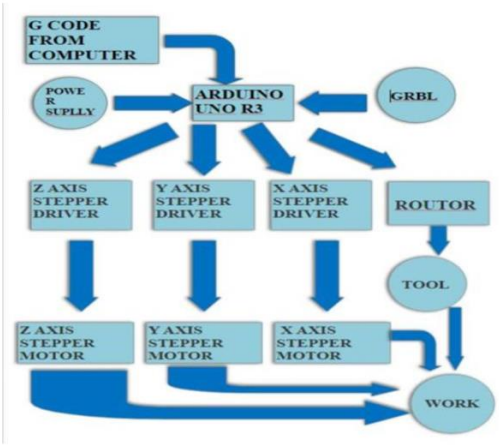
(Multi Functional Android Controlled Robotic Arm for Drilling, Cutting and Cleaning Application) in this paper the authors has worked on the robotic arm which is controlled by using an Arduino micro-controller through a android app. Which is applicable for drilling, pick and place, cutting and cleaning applications. The benefits of this work are visual movement of the device, text-to-speech recognition, compact in size and economical. It is also capable of carrying out operations which are difficult for the humans to perform. The authors said that the process works on the principle of interfacing servos and potentiometers with the help of aurduino.
The main objective of their paper was to Automate the process of drilling, cutting and cleaning using robotic arm , Use of robotic arm in small areas of work , synchronization of robotic technology and android system. The authors conluded that the The prototype developed is more user friendly and less costlier, It will perform the desired operation very smoothly. The system can be controlled within a range of 15 meters using android smart phone.

(Design anddevelopment of arduino controlled writing robot) The main aim of authors was to develop a writing robot in order to help the education system to make more

interesting by speech recognition technique.In which visual basic software is used in this system. Speech recognition has been implemented using arduino microcontroller (ATMEGA328). It has been used to control the robotic arm by servo motor based on the user's input.the analog signal given to the personal computer, with Microsoft visual basic studio 2010.Using speech to text conversion algorithm analog signal converted into text depend on the user's input. Then the converted text will send to the arduino controller using serial cable (RS232).Servo motor used to control the angular movement of robot hand. It makes writing on a paper using robot hand fixed with Pen. The authors concluded in their paper that , the robotic arm was successfully trained to recognize speech inputs that were recorded using a microphone as well as speech sample obtained from the database and Interaction between human and machine is an important factor of developing a technology of Speech recognition.

(Implementation of a Low-cost CNC Plotter Using Spare Parts) the authors of this paper presented an affordable model of a CNC plotter machine which is able to draw a circuit layout on PCB or any other solid surface using simple algorithm and available components. At first the user needs to convert any image file or text file into G code using Inkspace software and then feed it to the machine using Processing software. Arduinounowith an ATmega328P microcontroller is used as the control device in their project. The microcontroller converts G-code into a set of machine language instruction to be sent to the motor driver of the CNC plotter. They concluded that ,Their project is about building a mechanical prototype of a CNC plotter machine which is able to draw a PCB layout . it consumes less power and work with high accuracy due to precise control of stepper motor ,The algorithm used is simple. The pen can be replaced with a pinhead or laser head or any other tool for different purpose of use. Software that has been used is open source and userfriendly.

(Design and Implementation of CNC Router) The aim of their project is to reduce cost and complexity of machine. This project deals with the design of automatic CNC machine for PCB drawing and drilling, wood engraving and cutting, glass cutting. This work is concerned with the design and development of Control unit consist of the Arduino as the core element in controlling the motion in X, Y and Z direction of the Computer Numerical Control machine. Three unipolar stepper motors are used for controlling the machine axes.The G code is interfaced with Arduino CNC based controller by GRBL module which is used to convert the code in convenient controller codei.eserial to USB converter. Hence it acts like interfacing module between PC to Controller. This code is further passed to stepper motor by easy drivers which converts the code and as per instructions the stepper motor moves. We need three axis X,Y,Z which operates as follows X stepper motor move left and right Y stepper motor moves front and back and Z stepper motor up and down as per given dimensions these axis's will move on.




This project is about building a mechanical prototype of a CNC ROUTER which is able to draw a PCB layout and Wood engraving.This setup of hardware with a combination of G-code gives better accuracy and reduces the work load. G code make easy to find the information of locations of all stepper motor moving, as the status of our moving motor are directly seen on computer hence we can start or stop the machine whenever we are needed. Making a small machine brings an flexibility to do work.

(Arduino Based Cost Effective CNC Plotter Machine) Their paper deals with the design of automatic mini CNC for PCB drawing and drilling. The idea behind their project is to design and drill PCB based on low cost CNC system the lower cost is achieved by incorporating features of PC with ATMEGA 328 controller in an Arduino. The authors have used an G code for whole system operation.They have concluded that this setup of hardware with a combination of G-code givesbetter accuracy and reduces the work load.G code make easy to find the information of locations of allsteppermotor moving, as the status of our moving motor are directly seen on computerhence we can start or stop the machine whenever we areneeded.Making a small machine brings an flexibility to do work.

( Wireless base CNC mini plotter three axis control)

In this paper, the authors have made sure about the propensity to a style a cheaper cost wireless CNC mini plotter three axis control machine that combined with a microcontroller. The system essentially works with HC-05 Bluetooth element, 2 Stepper motor for axis of rotation and one for servo motor. They had propensity to use HC-05v element for wireless communication between CNC machine and laptop or input devices, they have propensity to manage CNCmachine with wireless communication. They have together concluded that

A CNC machine is employed for cutting, writing, edge drilling and routing of virtually any material for any reason and it are often used for any project. The wireless base CNC mini plotter is an embedded system that works on the rule of pc numeric management (CNC).

## III. CONCLUSION

An Automated Cutting Machine is device to help any factories which are still using the old way to manage their manufacturing. The old way like using labour for an operation using manual work is hassle, fast product generation is not possible. But by using this, user can overcome all the problems mentioned above. This system can manage all the happenings of the work needed to be done. An autonomous robotic cutting system is built as a prototype. The basic aim of performing cutting operation with greater accuracy and precision with low expenses deposited is the motto.

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