National Conference on
"Role of Engineers in Nation Building" organized by VIVA Institute of Technology, Mumbai
(6th and 7th March 2020)
International Journal of Engineering Research & Science (IJOER)
ISBN:[978-93-5391-287-1] ISSN: [2395-6992] [Vol-6, Issue-3, March- 2020]

CNC Based Engraving Machine

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Abstract**—***There are different types of CNC machines used in industry. They are used for various purposes like cutting of wood in specific shape and design. In this project, we are trying to make a CNC machine that will engrave wood with the design given to it by the Computer.It would move along the wood with the laser and will engrave design which is given to it.the LASER will turn ON and OFF accordingly and the design will be engraved on the wooden plate given, laser will be controlled by servo motor. In the computer we have used Inkscape software for converting normal images into gray scale image, and then we will convert into g-code and then the program will be given to Arduino UNO and which will result in movement of vertically and horizontally placed motors by the Arduino UNO and the given image will be engraved on the given wooden plate/object.*

Keywords**—* **Arduino** ***UNO, Gray-scale image, G-code, Inkscape Software, LASER.***

I. INTRODUCTION

Engraving is an art of making a design on a surface by piercing grooves into it with tools. Due to errors made by human, while designing with the help of burin, it results damage of piece of object on which etching is to be done. One of the solution to solve this problem is, to engrave with the help of CNC (Computerized Numerical Control) machines using Laser. CNC based engraver machine will help to increase automation, and help to engrave the complex design with much accuracy at less time. The main intention of this project is to reduce a large scale engraving machines into a portable engravingmachines that are comparatively at much lower cost than the heavy engraving machines and it also engrave designs more accurate than humans.

1.1 Need

A more effective, easier and accurate way for engraving a given design on wooden/metal plate. This process requires an image, Inkscape software and CNC based machine. These three components when we put all together and step-by-step procedure is followed, an accurate and effective design will be engraved on the given plate/object, there is no need of complex machines . An image can be engraved at low cost and with more accurately with this machine.

II. LITERATURE SURVEY

This paper helps to understand the design and fabrication of a Laser based computer numerically-controlled ,CNC machine which uses a graphical-user interface (GUI) and Arduino micro controller to produce a pulse-width modulation in order to run the

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stepper motors which will be used in this work.This Paper focuses on the design of a high speed engraving machine, which is based on embedded system, wasdescribed in this paper. ARM (Advanced Risk Machines) and FPGA (Field Programmable Gate Array) were considered as the most beneficial component in hardware, as well as the real-time multi-taskoperating system c/os are used in this software system.This Paper enlightens about the Intelligent manufacturing which uses information technology as its core of traditional manufacturing revolution. CNC machining is a general manufacturing method. To make it efficient, and to cut down the cost, also to ensure quality effectively, researchers on CNC machining have focused on virtual machine tool, cloud manufacturing, wireless manufacturing.This Paper discusses During machining operations, user safety is a big factor need to consider. The more the interaction of the user with the machine, the more the user is prone to accident due to mechanical or tool failures. As in CNC systems, particularly in milling and router machines, user interaction are more seen during manual tools change operations. This study focuses on the design and development of an automatic tool changer for the computer numerically controlled (CNC) router machine of the Metals Industry Research and Development Centre (MIRDC).This Paper focuses onComputerized Numerical Control (CNC) as one of the development of automation machining technology that cansupport the demand for a product that has a complex shape, high accuracy and can work on objects that can't be done with conventional machining. The method of wood-working CNC machine building are done by the designing process to determine the dimensions of the machine, decide the calculation to determine the motor needs and specifications.This paper contains the information of a CNC milling machine firmware development for PCB manufacturing, using an Arduino UNO board to control, with a USB connectivity between the machine and regular PC. Thefirm wares will allow PCB manufacturers to build their own machines in less time and with less cost, and use them using regular PCs. With the help of engraving technology, engraving systems based on digital image processing technique has been accepted by market fast moulding and low cost and it will be used in advertising, mould etc. In this study the advantage of four thresholds algorithm is given by analysingproblems of traditional canny edge detection algorithm.

III. MATERIAL AND METHODS

3.1 Process Overview

The main process and working of this project is engrave designs given to it.In this process the cnc machine concept is basically used to engrave complex design using computer/laptop and arduino the basic flowchart of this project is given below.The main process starts from the pc/laptop.The pc or laptop is installed with software that converts image into gcode named inkscape, the input image is given to the software that we have to engrave on wooden piece. the image is converted into g-code using inkscape software. The image give to it is converted to black&white and the borders are considered for engraving.The G-code format is further proceeded to the g code executer, the g code executor is used to execute the g code and further it is transferred to the arduino the arduino is connected to the main hardware of this project. It correspondingly send signals to the servo motor and it controls the moment of the axis there is a small circuit between the arduino and the hardware that is consist of L293D it controls the motion of the axis while engraving. The engraving is done by laser it is also controlled buy a servo motor. the laser turns on and off according to the G code given. The design is engraved on the wooden pieces.The engraving is depended on the servo motor that controls the vertical and horizontal movement and the laser as well. Once the design or image is engraved on the wooden piece the axis returns to its initial position the wooden pieces is engraved using simple cnc concept at lower cost.The

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process ends and the motor get to the initial position and the engraving is completed the g code ones runs completely the image is engraved on the wood. We can engrave any image using this G code the image is easily converted to black & white format and the g coder is used to convert it into g code and execute it on arduino and to control motors and laser collectively to engrave the image.Once all the motor and laser reach their initial position.The laser is the main component of this project it engrave the given design or image according to input given to it.

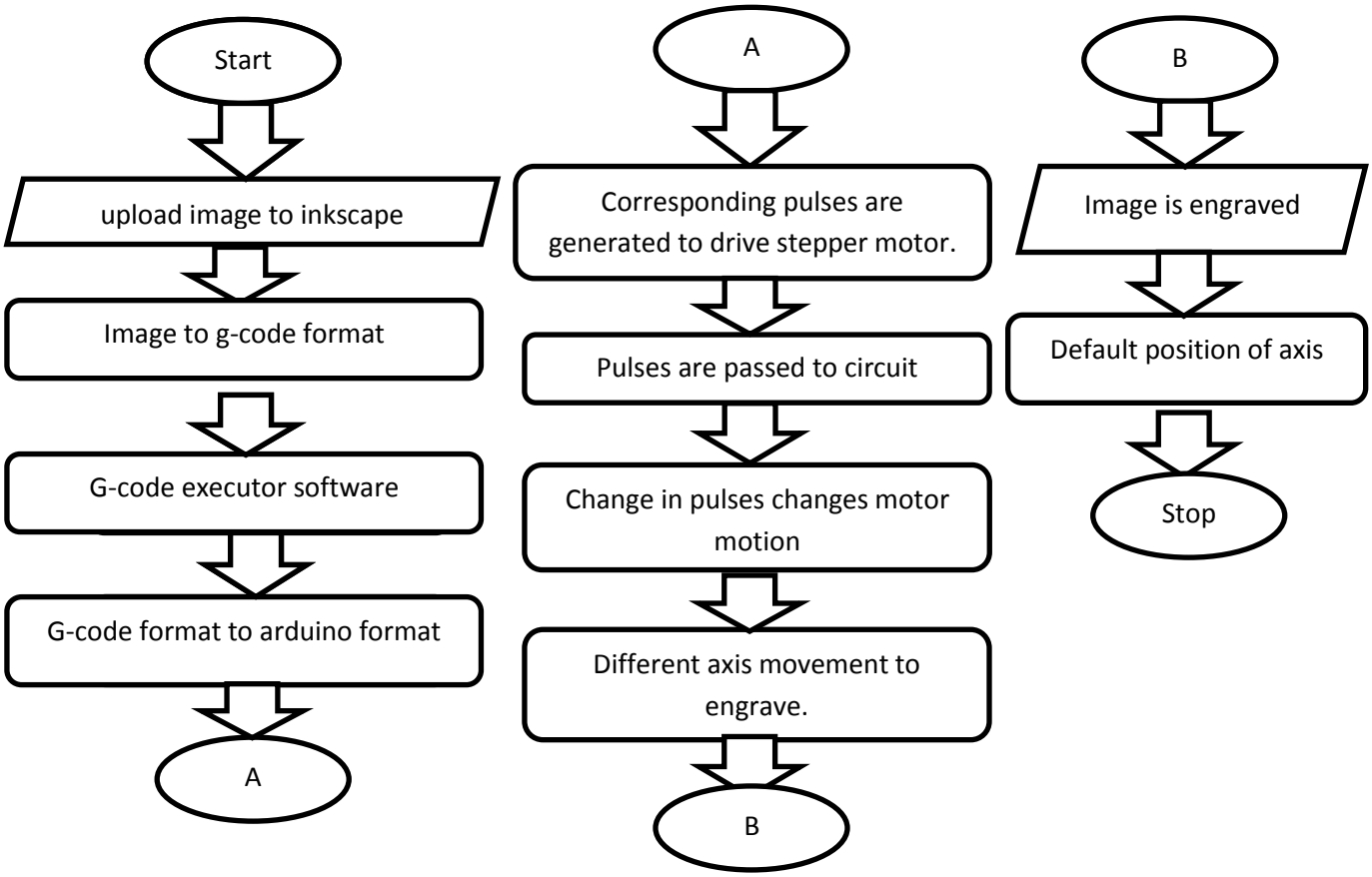

FIGURE 1 Flowchart of Project

IV. RESULT & DISCUSSION

The image will get engraved on the wooden piece.The engraved image is engraved using g code we have tried a similar method to engrave at lesser cost and the engraving will be done. The axis are controlled by the g code and the method of g-code that is used in most of the cnc machines is used in it.The machine engraves images with details that are given using G-code.The motor works with coordination with each other and as well as with the laser to engrave the design given to it. Basically we can say we have tried to make a machine that can engrave images on a wooden piece at lower cost as well as easy to change the image whichever we have to engrave on the wooden piece.We can easilychange the image which we have to engrave on the wooden piece. The vertical and horizontal motors as well as engraving lasers, are also controlled by the servo motor according to the command given in g-code.The inkscape software and g-code executor are the two main software components of this project. The inkscape software converts image to gray scale image and the g-code executor helps to execute image into g-code and further connecting it to arduino.The arduino controls the movement of the servo motor using L293D IC.The servo motor controls

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movement of Laser as well.All the collective movements of the vertical and horizontal plane and the laser helps in engraving the image on the wooden piece.

V.CONCLUSION

This paper is about to build a CNC machine based on Arduino which will engrave an design on a wooden plate.This machine is user friendly and can be made at low cost. So an design can be engraved easily and with much perfections, without using costly machines.The machine has very simple mechanism that can be easily afforded.The main intention of making is to bring the costing of CNC machine at lower cost.Even the software used in the project are easily available on internet.

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