FINAL YEAR PROJECT REPORT

CNC Router in 2D

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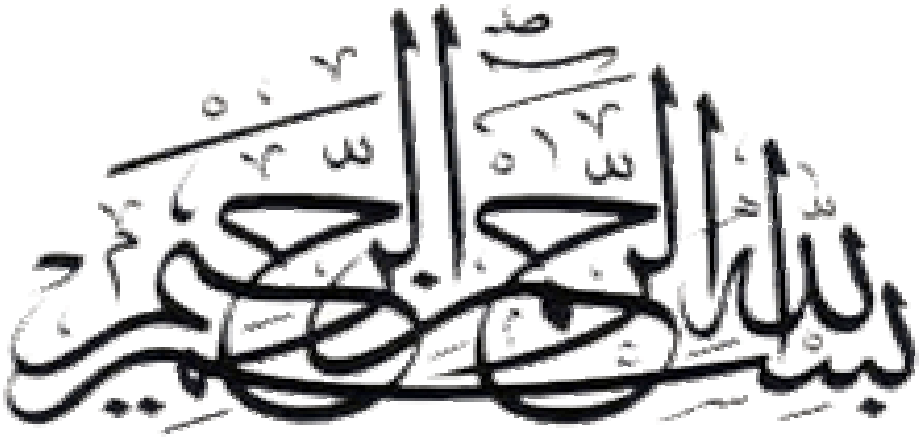

IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL.

MESSAGE FROM QURAN

“O ye who believe! When it is said unto ou, Make room! In assemblies, then make room; Allah will make way for you (here after), And when it is said, Come up higher! Go up higher; Allah will exalt those who believe among you, and those who have knowledge, to high rinks. Allah is informed of what ye do. ”

(Surah Al-Mujadila)

PROPHET MUHAMMAD (S.A.W)

“Let there be no envy, except in two things:
1. A man whom Allah gave a wealth and guided him to spend it in righteous way.
2. Or a man whom Allah gave wisdom and he acts wisely and teaches to the others”

(Al-Bukhari and Muslim)

Abstract

In this report a practical CNC router system is proposed, combining image processing, serial port interfacing and control of servo motor using PIC microcontroller 16F877A. Image visualization method manipulated in MATLAB, serial port interfacing also carried out in MATLAB with LCD support.

The servo motors were controlled by PIC microcontroller using Proton Pro coding in simple C. It also includes the modification of servo motor to make it rotate full revolution of 360˚, also with the full construction of the mechanical part of the project.

This report describes the major background areas relevant to the project. A discussion of hard ware implementation is presented, including component selection, with the majority of hardware implemented successfully. Major issues encountered are introduced, as areas of possible expansion of functionality.

Dedication

To our respected parents whose utmost love, care and struggle against all odds brought us to this height of knowledge with the care and help of the Allah Almighty

Acknowledgements

First of all, we are grateful to Allah Almighty who gave us the strength to achieve our goals. Without His divine help, we could do nothing. Secondly, we would like to pay deep regard to our parents who, with their selfless and extreme love, were always there to give us the required motivation, courage and confidence to complete our tasks. We would like to salute them because of their patience in managing with our busy routines and tight schedules. We are also extremely thankful to Mr. JawwadChattha, our project advisor, who gave us the desired knowledge and right direction to move forward. He was really cooperative through our complete voyage and provided us with each and every facility whenever and whatever was required for our project. He remained with us from the start till the end and though he used to be busy with his own work, he never refused our calls and whenever we wanted to meet him, he was there for our help. In the end, we are grateful to our friends, who were always there to give us company whenever we were down on something. They created the right mix of work atmosphere in the university which led us all to complete our projects successfully.

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CHAPTER 1
INTRODUCTION

Have a look at the photograph on the right. Can you imagine how long it would take a skilled worker to 'carve' this shape out of wood or a soft material - it would probably take a full day. We will be going through its manufacture, one step at a time using a CNC machine. How long do you think manufacturing this product with a CNC machine will take?

Figure-1 CNC Work

1.1 Introduction

In Industry it is not efficient or profitable to make everyday products by hand. On a CNC machine it is possible to make hundreds or even thousands of the same items in a day. First a design is drawn using design software, and then it is processed by the computer and manufactured using the CNC machine. This is a small CNC machine and can be used to machine woods, plastics and aluminum. In industry, CNC machines can be extremely large. We are introducing a small model which can be used for small scale printing and cutting in schools.

Numerical control (NC) refers to the automation of machine tools that are operated by abstractly programmed commands encoded on a storage medium, as opposed to manually controlled via handwheels or levers, or mechanically automated via cams alone. These early servomechanisms were rapidly augmented with analog and digital computers, creating the modern **computer numerical control** (CNC) machine tools that have revolutionized the machining processes.

1.1.1 Previous work

The first NC machines were built in the 1950s, based on existing tools that were modified with motors that moved the controls to follow points fed into the system on punched tape. Many of the commands for the experimental parts were programmed "by hand" to produce the punch tapes that were used as input. Since about 2006, the idea has been suggested and pursued to foster the convergence with CNC. CNC consist of a table that moves in the X and Y axes, and a tool spindle that moves in the Z (depth). The position of the tool is driven by motors through a series of step-down gears in order to provide highly accurate movements, or in modern designs.

1.2 Aim of the Project

The aim of this project is to accomplish the Printing by an image; the design which we want to print can be in *bitmap* image file. The file is then processed to find the path (will discuss in next chapters) using image processing in MATLAB, also the connectivity of the Microcontroller to the PC to synchronize the data from the image to be used in printing, and the control of servo motors to move in XY-Plane to drive the pen and design and construction of the mechanical part of the project.

1.3 Areas of the Application

CNC plastic machining is one of the most popular options for manufacturing various plastic products today. Unlike the traditional methods of production, this method requires less manual intervention and gives better output in lesser time. Similarly, plastic injection molding is used hugely for cheap and durable construction of many consumer and industrial plastic items. Know the various application areas of plastics today.