Design and Development of Mechanism for Interior cleaning of the car

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Abstract

This paper presents a case study for the interior cleaning of the car which consists of a mechanism using XY plotters, servo motor, vacuum pump, servo motor shield for controlling the mechanism. The invention of XY plotter is to recording or plotting two dimensional data on a rectangular coordinate system. This study emphasizes the fabrication of XY plotter by using mechanism from scanner and microcontroller system (Aurdino) to control the movement of XY axis. Working of the plotter is controlled by servo motor and is carried out through the computer code with the help of java programming, algorithm and G-code.

Keywords: *Plotters, code, Aurdino, java programming, vacuum pump, G-code*

1. Introduction

In this 21st century car has become an essential part of the human life. In day to day life car plays a significant role for driving the human life ahead. Most of the people around us are having cars and the compelling problem most of the car users face is the interior dirt cleaning. So the XY plotter mechanism with the help of vacuum pump is used for the interior cleaning which will suck the dirt in the car moving in XY direction on the floor of the interior. The system will not take much space and is also convenient at the same time which makes it easier to use. The mechanism consists of a microcontroller system controlled by Arduino board, and java programming and servo motor. The end of the XY plotter will have a nozzle. Nozzle will maintain certain distance from the floor.

The mechanism will follow pre-programmed path and collect all debris using G-Code. G-Code is the generic name for a control language for Reprap machines. It is a fuction to tell the machine to move to various points at the desired speed. In this mechanism. G-Code is employed by the part programmer. For the core system. Arduino system is most familiar by the inventor and mainly used in most of the electronic components because of compatibility of the system with the hardware. Meanwhile, low cost and easily controlled fuction of Arduino system contributed on simplifying the building circuit of the microcontroller in the mechanism.

2. Literature Review

Standard plotters which has control only of the "y" axis, the "x" axis being continuously fed to provide a plot of some variable with time to overcome this drawback X-Y plotter are used which has control over both the axis. Inkjet and laser printers use a very fine matrix of dots to form images, such that while a line may appear continuous to the naked eye, it in fact is a discrete set of points instead plotter draws a continuous line, much like a pen on paper. Manual writings are probably incompatible in precision and accuracy. These are more prone to mistakes. Even though a skilled person may be precise and accurate in his writing, he can have physical deficiency in continuous writing. Using microcontroller [1]: Most of the plotter is designed in bi- directional movement and square type model. Whereas X-Y plotter design is concerned, axis movements are mounted on each other and belt driven mechanism for plotting. Main applications are engraving machine, CNC machine, graph plotting machine. Stepper motor, timing belt, timing pulley are used for positioning and to provide better accuracy. Though there are several models for plotter, this plotter is designed in economical way. Main advantage of this plotter is we can replace the tool based on any application such as engraving machine, laser cutting machine, painting any surface and drawing purposes.

3. Methodology

The invention of the X-Y plotters is to recording or plotting two dimensional data on a rectangular coordinate system. This study emphasizes the fabrication of a XY plotter by using mechanism from scanner and microcontroller system (Arduino) to control the movement of XY axis. Modelling and analysis on X-Y plotter is carried out through the computer linked with the Arduino software. In the present study, the X-Y plotter is designed to recording and plotting two-dimensional data on a rectangular coordinate system. The material selection of the mechanism was made considering the cost and wide range of applications such as servo motor. Servo motor can be differentiated through the cost, peak torque capability, speed range to compromise the standard and application of the system For the core system, Arduino system is most familiar by the inventor and mainly used in most of the electronic components because of is compatibility of the system. Arduino mega 2560 is compatible with hardware system.

4. Design and Development

3.1 X-Y Table-

X-Y table is a such that provides the horizontal motion to the automated machinery such like 3-D printer, robot assembly etc. The table has the limited range of

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motion. It allows the motion along X and Y axis and the base remains same.

3.2 Design-

XY table contains the two drive motors i.e. stepper motor with pulleys. The table consist of 4 links for one horizontal motion and other 4 links for other horizontal motion. There are fice bearing our of four bearing at the corner of platform. The other one bearing is placed apart from platform to 90 with the stepper motors. A open belt is wrapped to the bearings and pulleys. The motion of two stepper motors can the travelling of platform in horizontal plane. The sense of rotation define the axis of motion. The stepper motor are operated through the aurdino and powered by lithium-polymer batteries. The suction will be through vacuum pumps provided at the end of the X-Y plotter.

To make g code files that are compatible with this X-Y plotter, the Java Programming is used. Java is a general-purpose computer programming language that is concurrent, class-based, object-oriented, and specifically designed to have as few implementation dependencies as possible [32]. Java code can run on all platforms that support Java without the essential for recompilation. Java applications are typically compiled to byte code that can run on any Java virtual machine (JVM) regardless of computer architecture. The language derives much of its syntax from C and C++, but it has fewer low-level facilities than either of them.

The gray scale image is moved, and delete the color one behind it. Move the grey image to the correct place again and click from Path menu "Object to path". To export as gcode, go to file menu, click save as and select. gcode. Click ok on next window. Use the gctrl.pde app to print the gcode file on the Arduino X-Y plotter. G-code is a language in which people tell computerized machine tools how to make something. The "how" is defined by instructions on where to move, how fast to move, and what path to move. The most common situation is that, within a machine tool, a cutting tool is moved according to these instructions through a toolpath and cuts away material to leave only the finished workpiece.

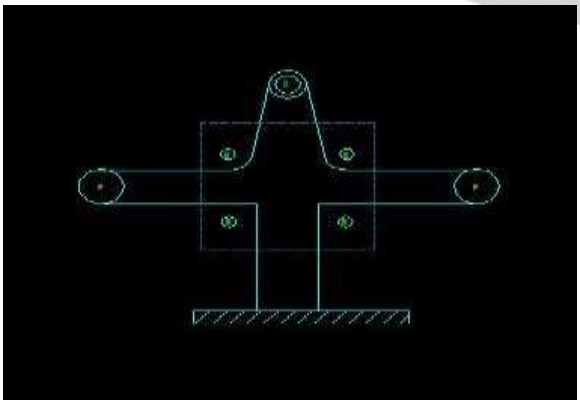

Fig1- Layout of mechanism

5. Conclusion

In this study, it was aattempted to develop XY plotter mechanism for dirt cleaning with the help of vacuum pump that accurately synchronize with the Arduino software system for better response on the movement of X and Y axis. Different IDE and different languages have been tried to complete this project to meet the objectives. With a lot of new technologies being developed nowadays, this project serves to provide a good platform for future development for XY plotter system and even other system. This project is the perfect way to demonstrate our understanding and the application of mechanical engineering knowledge into solving every day's problem for the benefit of mankind.

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