2 AXISAUTOMATIC FOAMCUTING MACHINE

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Abstract: The present work is aimed to study the Automated Wire EDM, which is commonly used in mold and die manufacuring processes by giving a single command to the programmed machine, particularly for extrusion dies and blanking punches. The software and processor used are also studied and discussed briefly along with the sheer quantity of programming that would be required. Predictedprograms have been used in to achieve desired yield of the process by allowing the wire to cut through metal by the use of heat from electrical sparks, while preventing rust.. The system flexibility for handlingdifferent workpiece geometries is given by this method. A technique for generating the required cutting paths from the modelled geometry is also shown. For the cutting of automotive seat cushions a developed methodology has been applied. The results show that the automated system significantly reduces the cutting time and produces cuts of improved quality.
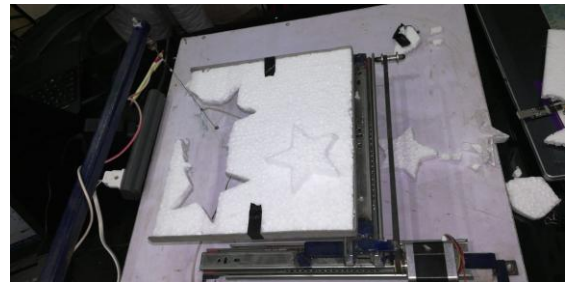
I. INTRODUCTION

The idea behind this project is to develop a conceptual machine tool which would be capable of performing the foam cutting operation economically and efficiently. Cutting is one of the processes of manufacturing in which the specified shape to any work piece is imparted by removing the surplus material. In this machine the foam material is separated by using the wire in which the current is supplied and the hotness of that wire cut the foam smoothly with a proper finishing.

The complex erosion effect by rapid repetitive and discrete spark discharges between thewire tool electrode and work piece immersed in a liquid dielectric medium (used to conduct electricity) are involved in WEDM. An electrical discharge is created between electrode and work piece. From prototypes to full production runs, it can be used in everything and formanufacturing metal components and tools it is most often used machine. Complex parts and precision components can be easily machined out of hard conductive materials on a single command that is supported by the programme running using the software.
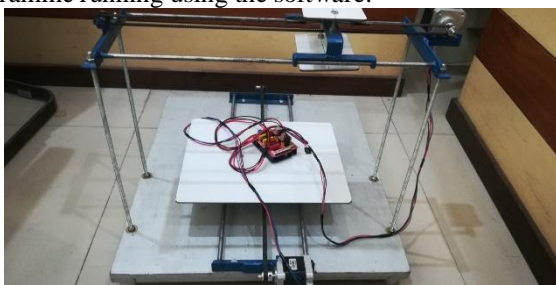
Fig; Sample pic of the working project

Fig; Sample pic of cutting a foam piece by the working machine

Need of development of machine

Various cutting operations are performed on various industries nowadays, and the production cost and time required to perform these operation is hence increased because of that. Also we required more electric energy to run all these machines to complete the operation. Cutting operation on the different materials can be done by changing the wire and the electric supply through it. The developments in a manual Wire EDM are made using appropriate Arduino softwarei.eInkscape, to save time for production and modelling of the desired yield of the process. And this modification is a progress in the manual machine which makes the task easier to be performed, as various programs have been written for performing various tasks by this machine based on its principle.

Working Principle

This machine only works through heat generation method. In this machine tool the heating effect of the nichrome wire results in the cutting of the foam in to the design which we want, by a single click or by giving a single command to the machine, so that it works automatically based on the command given as per written program for a specific task

Software

The software that has been used in this machine is INKSCAPE. It is a open source free vetorgraphic editor. The primary vector graphics format used by inkscape is Scalable Vector Graphics, and can render primitive vector shapes and text. It also supports embedding and optional tracing of raster graphics.it also allows the object manipulation such as they can be grouped together and further can be edited without ungrouping.It also has comprehensive tool set to edit paths :

- Edit path by node tool
- Tweak tool (sculpting / painting)
- Path offsets; Inset- Outset, Dynamic or linked
- Path conversion; Object to path
- Path conversion; Stroke to Path

- Path – Simplify
- Path operations (Boolean operations)

It is supported by many operating systems such as FreeBSD, Linux, macOS, Windows etc.
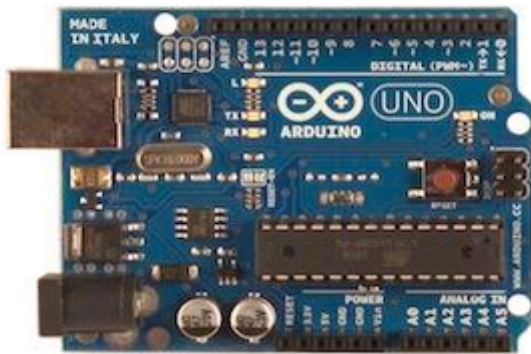
Arduino

Arduino is an open-source electronics prototyping platform which is based on flexible, easy-to-use hardware and software, with a microprocessor and input/output pins for communication and controlling physical objects. Ithas an open-source software component which is like C++. The Arduino integrated development environment (IDE) allows to write code, compile it, and then upload it to the Arduino for stand alone use in prototyping and projects.
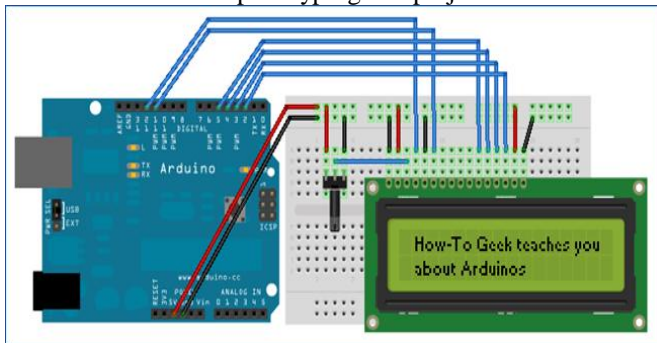
The Arduino comes in a variety of different types that provides the flexibility in choosing the perfect solution as per the requirements for desired yield of product or result.

Arduino Uno

It is a great starter Arduino, for those just getting startedit provides a solid foundation and also provides a lot of the options one want as they explore the platform. With almost every shield which is available, it works.
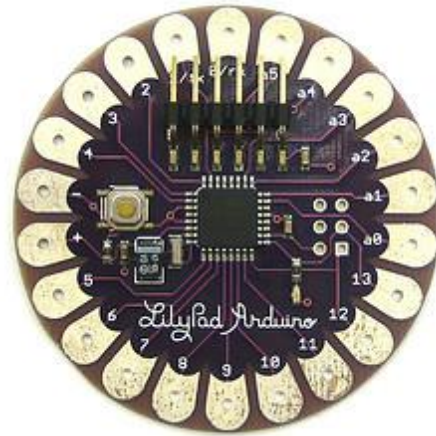
Arduino Nano

It is almost featured as same as the Arduino Uno, but it's size is about 1/3 and it cannot use shields easily.

Arduino Lilypad

It's unique design can be seen into fabrics for wearable projects or art. On this Arduino shields won't work so expansion may become difficult.
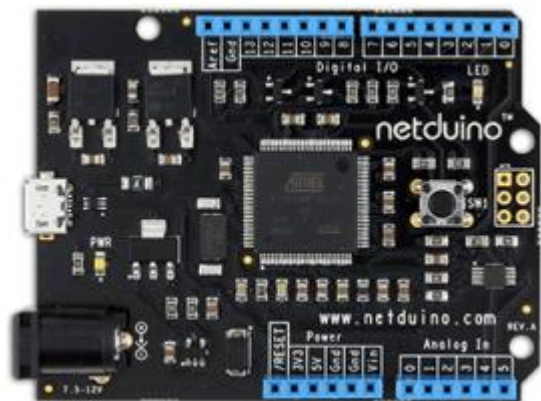

Arduino Mega 2560

It hasmore I/O pins and more memorythan any other Arduino. It is the biggest and best Arduino one can get, but that much power if projects don't call for it is not needed by one. It also would be a more expensive Arduino to be left in a project permanently.

Netduino

It is the cousin of the Arduino, an open source hardware hacking and prototyping solution. But NET Micro Framework is ran by it for its software base. It is pin compatible with Arduino shields, but may require drivers to run

Arduino Accessories (Shields)
Ethernet
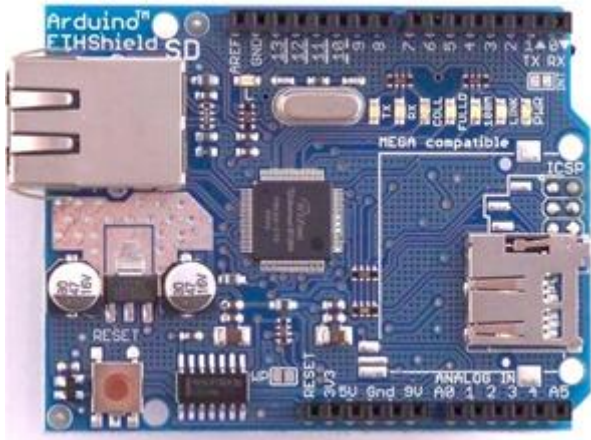
It expands the Arduino to be able to use the internet for communication and control.

XBee

It makes point-to-point wireless communication easy.

Motor

The motor shield ramps up that ability to control the motor and servos.

Hardware Components Used:
- AT89S52 MICROCONTROLLER
- BLUETOOTH MODULES

- 4 WIRE RESISTIVE TOUCH-SCREEN
- 16 x 2 LCD MATRIX
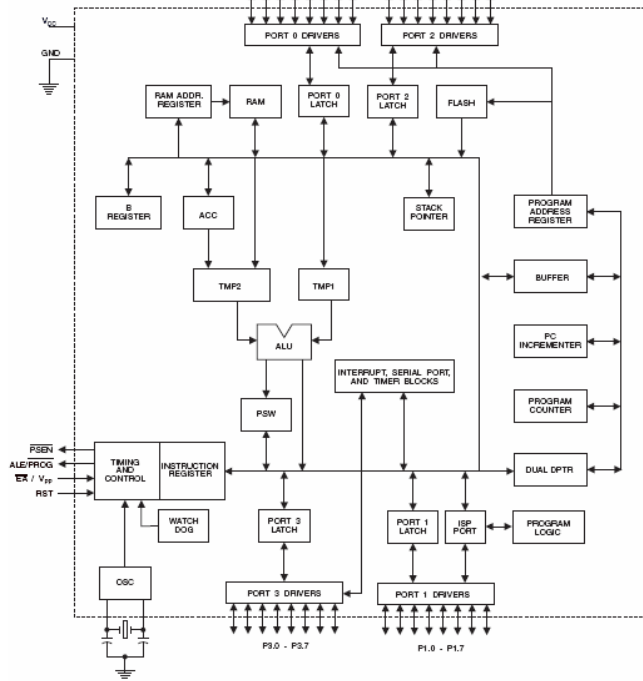- ANALOG – DIGITAL CONVERTER : 0848

Block Diagram for microcontroller

Fig.;Block diagram of the microcontroller

Switch

A Single Pole Single Throw (SPST) switch, it has a one input terminal and only one output terminal.
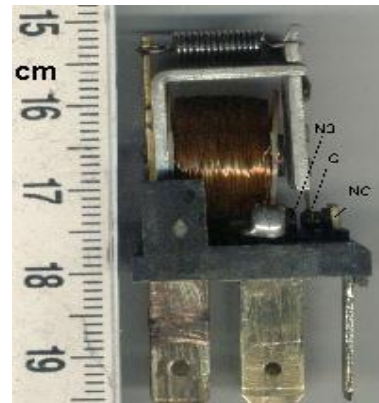

It serves in circuits as on-off switches. For a switchwhich is closed, the circuit is on. For a switch which is open, the circuit is off.

Relay

Miniature relay of automotive-style whose dust cover is taken off

It is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but some other operating principles such as solid-state relaysare also usedalongwith it.

The Light Emitting Diode

The "Light Emitting Diode" is basically just a specialised type of diode as they have similar electrical characteristics to a PN junction diode. This means that current is passed in its forward direction but blocked in the reverse direction.
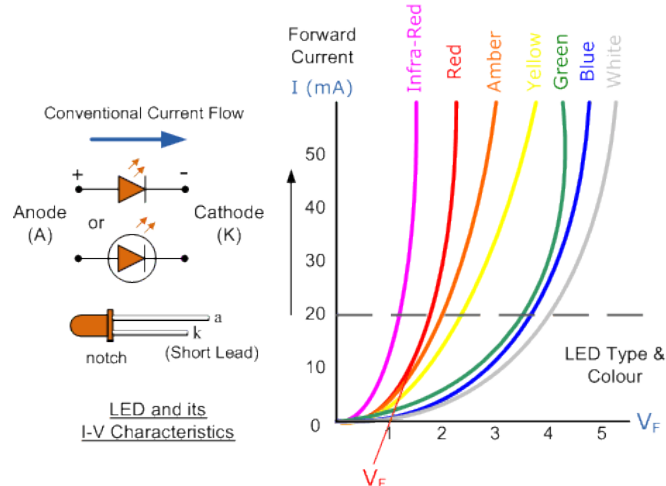
APPLICATIONS

- To process various punch tie
- To process plastic mold
- To process powder metallurgy
- To cut various sample plate
- To cut silicon steel sheet etc.

ADVANTAGES

- No balancing required, Self Balances Itself
- Become more productive
- Become more recognizable
- Low operating costs
- Reduce fatigue caused by walking
- A clean, green, eco-friendly machine !

II. CONCLUSION

For practical use the presented machine is designed and configured. This machine can be used to design various 3D foam models of project design to visualize the shape and size in industries, also the packing for various material can be manufactured with the help of this machine . As well as the decoration industries can adapt this machine for ease in decoration designing and production. All the tools and modules such as ; LED, Arduino, shields, microcontrollers etc. which are described above are used in this machine for its proper designing to obtain better results.

Acknowledgment

REFERENCES

[1] Research paper of design and development of multi operational mechanical tool by Devashish Sharma and Ayush Bhardwaj.

[2] Research paper of foam cutting apparatus by Primary Examiner-Andrew R. Juhasz

[3] Assistant Examiner-W. D. Bray and Attorney-Robert G.

[4] Mr.C.Gao et al.,(2012) demonstrates "research on WEDM process optimization for PCD micro milling tool" International Journal of Scientific and Research Publications, Volume 2, Issue 12, December 2012 1 ISSN 2250-3153

[5] Developers, Inkscape website. "Announcing the 0.92.3 Release of Inkscape – Inkscape".inkscaoe.org. Retrieved 15 October 2018.