Digital Intelligence Systems for Lathe

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***Abstract*: In this project, the development of modern technologies in mechanical element to provide better and more efficient production. In this project, an attempt has been made to equip Digital Intelligence system (DIS) in lathe order to get more accurate dimensions and easier programming for the operator.**

I. INTRODUCTION

The development of modern technologies in mechanical element and hardware and firmware as well as the integration of these technologies in the industrial lines has proved better and more efficient productions can be machined. In this project, we have developed a digital intelligence system which we implemented to our own fabricated mini lathe in order to get more accurate dimensions and easier programming for the operator. The retrofitting process of the lathe machine demands two key elements, namely, mechanical and electronics parts.

In the mechanical part, a design is made to feed the DC motor to the lead screw. On the other hand, in the electronics part, an electronic circuit containing the motor driver circuit is designed in order to control and record the axis movements..

II. PRINCIPLE USED

1. The encoder used records the rpm of the motor using time and stores the movement in the micro controller.
2. Screw rod mechanism uses a screw rod to translate turning motion to linear motion.
3. IC drive is used to control two DC motors simultaneously.

III. PROPOSED SYSTEM

The working principle of this project shall now be discussed. At first the layman does the work while working the record button is activated, when the layman finishes the work for first time then the work is done automatically by activating repeat button. The recorded information stores in the controller memory. The information is reset for next process, and the next work is recorded again and done.

IV. MAJOR COMPONENTS AND MATERIAL USED ROTARY ENCODER

A rotary encoder is a type of position sensor which is used for calculating the angular position of a rotating shaft. It generates an electrical signal, either in digital or analog form according to the rotational movement.

Screw Rod

Screw rod is used as a linkage, to translate turning motion to linear motion. The screw rod travel between its male and female members. Screw rod mechanism provides machine slide motion in lathe.

Stepper Motor DC

A stepper motor is a brushless, synchronous electric motor that converts digital pulses into mechanical shaft rotation. It is an electromechanical device. The stepper motor uses the theory of operation for magnets to make the motor shaft turn a precise distance when a pulse of electricity is provided. The stator has eight poles, and the rotor has six poles.

Micro Controller

A microcontroller functions as a micro processor. the micro controller used in this project is ATmega328.it is a single chip microcontroller developed by atmel it is a 8bit AVR RISC based microcontroller combines 32kb ISP flash memory with read while write ,it has 23 I/O pins.

Transformer

A transformer is a static apparatus, which transforms electrical power from one circuit to another with change in voltage and current with no change in frequency. Step down transformer is used here to step down voltage from 12v to 5v.

IC Drive

L293D IC drive is used it is a 16pin IC. The main advantage of this IC is it can control a set of two dc motors simultaneously in both clockwise and anti- clockwise. It is also known as dual H-bridge motor driver integrated circuit.

LCD Display

LCD stands for liquid crystal display a 16*2 lcd display is used. It contains 32 characters, with 5*7 display matrix. It works with an input voltage of 5v.

V. LITERATURE REVIEW HISTORY OF LATHE

Lathe is a very ancient tool and its first use dates back to 1300 BC in Egypt. Lathe was also known and used in Assyria and Greece. Ancient Romans came to know about

this machine and they further developed this machine. During the medieval period, the use of this machine had spread to most parts of Europe and it was during the Industrial revolution when this machine gained popularity with its use in all the industries. After the development of electronics, automated lathes have been developed. The first lathe was a simple lathe which was is now referred to as two person lathe. One person would turn the wood work piece using rope and the other person would shape the work piece using a sharp tool. This design was improved by Ancient Romans who added a turning bow which eased the wood work. Later a pedal (as in manual sewing machines) was used for rotating the work piece. This type of lathe is called "spring pole" lathe which was used till the early decades of the 20th century. In 1772, a horse-powered boring machine was installed which was used for making canons. During the Industrial revolution, steam engines and water wheels were attached to the lathe to turn the work piece at higher speed which made the work faster and easier. After 1950, many new designs were made which improved the precision of work.

CNC

The idea of numerical control started when the automation of machine tools originally incorporated specific concepts of programmable logic. In the beginning, the first NC machines were built back in the 1940s. Slightly more advanced machines came along in the 1950s. These manufacturing machines were constructed based on existing tools that were modified with motors designed to move the controls of the machine. These controls followed specific points that were fed into the machine on punched tape. These early mechanisms were soon improved with both analog and digital computers. The introduction of computer technology into the concept of numerical control led to what we now know as computer numerical control. After World War II, John Parsons researched ways to improve aircraft by creating stiffened skins for them. This eventually led to a series of important Air Force research projects, which were conducted at the Massachusetts Institute of Technology (MIT). This research began in 1949. After the early planning and research phases, an experimental milling machine was designed at MIT. Professor J.F. Reintjes and his team of researchers were involved in this project. Before the MIT projects, Parsons Corporation in Traverse City, Michigan developed a system to produce templates for helicopter blades. John Parsons, who founded the company, discovered how to calculate airfoil coordinates on an IBM 602A multiplier. He then fed these data points into a Swiss jig borer. To date, this was considered the first true numerical control machine as it manufactured goods – helicopter blade templates, in this case – by feeding punched cards into a system, and the system then read and produced the parts based on preprogrammed information.

As numerical control technology moved into the 1960s and 1970s, a very familiar form of a CNC machine that most would recognize today started taking shape. Digital technology then entered the fray, and automation in production processes became more efficient than ever. In fact, many individuals can purchase – and even design – their own homemade CNC machines. Because of how advanced computers are nowadays, it's more common than ever to find CNC machines in all industries.

Micro Controller

It was during 1970 and 1971 when Intel was working on inventing the world's first microprocessor, that Gary Boone of Texas Instruments was working on quite a similar concept and invented the microcontroller. Boone designed a single integrated circuit chip that could hold nearly all the essential circuits to form a calculator; only the display and the keypad were not incorporated. Surprisingly, this exceptional breakthrough in the field of electronics and communication was rather given a mundane name of TMS1802NC; however, the device wasn't ordinary. It had five thousand transistors providing 3000 bits of program memory and 128 bits of access

VI. CIRCUIT DIAGRAM

memory!! So, it was possible to program it to perform a range of function. Intel also created many significant microcontrollers besides producing the world's first ever microprocessor. The important ones produced by Intel are the 8048 microcontrollers. 8048 was introduced in 1976 and was the first of Intel's microcontrolle s. It was used as the processor in the PC keyb

The 8051 microcontroller was introduced in 1980 and is one of the most popular microcontrollers. It is even used now and is considered to be o

long-lived microcontrollers .It was during the 1990s that advanced microcontrollers with electrically erasable and programmable ROM memories such as

A lot of currently used microcontrol lers such as the ones available from Atmel and Microchip use the flash memory technology. Today, in addition to the general purpose gadgets, unique microcontrollers are being created for areas like lighting, automotive, communications, and low-power driven consumer goods. The present day microcontrollers like AVR, and PIC have become smaller and sleeker yet more and more powerful

and the 8051

re of the most

card of IBM.

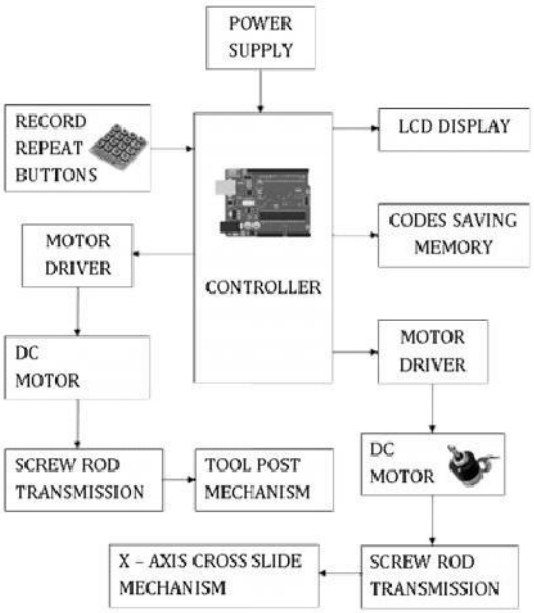

Fig 6.1

VII. CAD MODEL

The setup of this digital intelligence lathe machine is given with the solid works software.

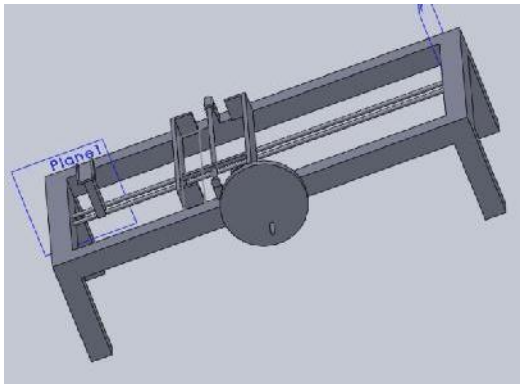

Fig 7.1

VIII. ADVANTAGES

1. The cost of the machine is low compared to CNC.
2. There is no need for special CNC programming g-codes and m-codes.
3. Importance to man power.

IX. FINAL DESIGN

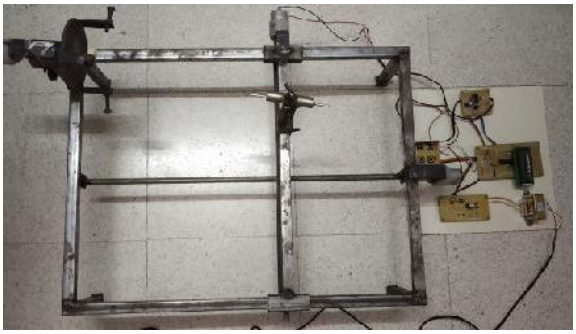

Fig 9.1

X. CONCLUSION

This being a creative project, there are no particular instances of this type of machine being available in the commercial market. But that aim of this project is to show that this type of machine is also an option for lathe machining in industries. Further improvements include using shadow recognition, using more powerful motors can be done.

XI. REFERENCES

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