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Stepper Motor Controller Using Arduino (ATMEGA 328)

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ABSTRACT:

- *The rotational motion of the stepping motor increases from one equilibrium position to the next. Therefore, the speed of a stepper motor is a function of the frequency at which the windings are energized. Stepper motors can be used in open-loop positioning systems because the motor moves accurately at each step. Due to these characteristics, stepper motors are the first choice as servo drives for a variety of cost-effective applications. This chapter describes the types of stepper motors available and their characteristics. The drive design required to drive the stepper motor is taken into account with the choice.*
- *Stepper motors are used in many devices in our daily lives. Obtaining variables such as position, velocity, and current for control purposes is a common problem in many industrial drive applications. Capturing signals that actually represent system variables such as B. Absolute position of the shaft can be difficult due to cost or physical limitations. In such cases, it is necessary to estimate all or part of the missing variables from the limited measurements that can be noisy. This project summarizes how to estimate rotor speed using a microcontroller. The microcontroller used for this is AT89C51 / ATMEGA328.*

KEYWORDS: *AC Supply, DC Supply, Micrcontroller , Stepper Motor .*

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I. INTRODUCTION

• Engineers rely on motion-control devices to improve efficiencies and production rates on automated factory floors, or at least maintain them. One family of such devices, stepper motors, is widely used because of their simple implementation, attractive price/performance ratio, and high torque at low speeds. In the past, stepper motors couldn't keep up with servo motors in demanding applications, but recent advances have greatly upgraded stepper-motor performance, expanding the areas in which they can make positive differences.

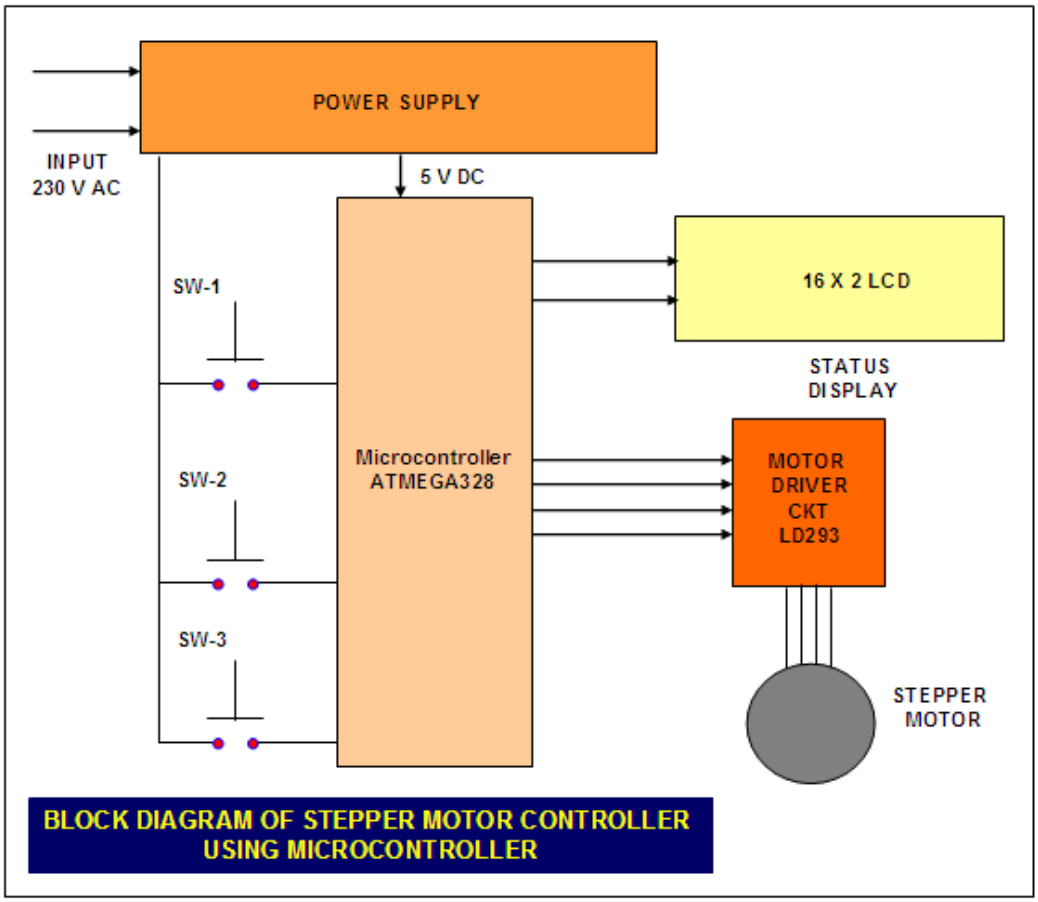
• Stepper motors are often used in demanding applications, such as this packaging machine, automatic punching machine, automatic rotating table etc.

• In our project we are using LDR based system which sense the object and start rotating table for punching and automatically stop when complete particular hole or angle. For this purpose we are using two LDR sensor one for start stepper motor and other for stop motor.

• Displacement corresponds to the number of input pulse signals, not long-term accumulation of step error, can be composed of relatively simple structure but also has a certain precision of the open-loop control system can also require higher accuracy when the composition of closed-loop control system;

II. METHODOLOGY

.• Stepper motors are brushless DC motors that can rotate at small angles, which are called steps. In general, stepper motors use 200 steps to rotate 360 degrees. That is, it rotates 1.8 degrees per step. Stepper motors used in many devices that require accurate rotational motion, such as robots, antennas, and hard drives. By giving the correct instructions, you can rotate the stepper motor to a specific angle.



A Stepper motor comes in two types: Unipolar and Bipolar. Unipolar stepper motor generally has five or six wires, in which four wires are one end of four stator coils, and the other end of the four coils is tied together that makes the fifth wire, this is called common wire. Bipolar stepper motor there is just four wires coming out from two sets of coils, meaning there are no common wires.
The working of this circuit is very simple. A method called HalfStepping is implemented in the program to rotate the Stepper Motor. Press the forward button and the stepper motor will rotate clockwise
Similarly, pressing the reverse button will start rotating counterclockwise. To stop the rotation completely, press the stop button. Currently, When this circuit is implemented in a automated punching machine, an LDR / IR based sensor circuit will be added to detect objects and automatically start and stop stepper motors.

APPLICATION OF STEPPER MOTOR:

• Stepper motors are used as paper feed motors for typewriters and printers.

• These motors are used to place the printhead, pen on the XY plotter.

• Stepper motors are used in machine tools.

• Stepper motors are used on the camera to automatically control focus and zoom functions.

• These motors are for safety.

• Stepper motors are used for accurate positioning with the motor. B. Robots, antennas, hard disk drives, telescopes, and some toys.

•printer

• CNC machine

• 3D printer

• Laser and optics

• Industrial Machinery

III. CONCLUSIONS:

This hardware setup is a stepper motor stepper driver (LD293) connected to an Arduino Uno board. The output is a stepping motor that rotates in the forward and reverse directions and controls the angle. Obtain a PCB layout image using Proteus software. In general, stepper motors can be rotated directly by connecting the motor to a power source. But by creating an Arduino program that can rotate a stepper motor using an ATMEGA microcontroller. The speed and direction of rotation can be controlled by editing the Arduino program. These Arduino programming stepper motors can be used primarily in the automation process industry. In general, stepper motors can be used for a variety of purposes. However, by programming and rotating a stepper motor, it can be used for industry automation processes.

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