

Speed Control of DC Motor By Using Closed Loop Control

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Abstract:

This proposed system consists of ATMEGA 328 Arduino, 12v dc motor, diodes, micro farad capacitor, one kilo ohm resistors and push buttons. This method was used to control the speed of Dc motor. The control signals are transferred from arduino microcontroller to the push buttons. Diode is used for the protection of the motor. Capacitors are used for bypass the noise generator from the motor. Push buttons are used to switch the speed of motor for the different levels. Speed of motor depends upon the strength of the arduino.

KEY WORDS: Arduino ATMEGA 328, Diode, capacitor, resistors, PWM.

1. Introduction

The dc motor is a device that used in many industries in order to convert the electrical energy to the mechanical energy. This is all result from the availability of speed controls in wide range, easily and many ways. In most of the DC motors speed control is very important for the maintenance of the life time of motor.

There are many applications in our life that requires DC motor speed control in conclusion the simplicity of control speed made DC motors to be common in devices ranging from toys, house hold appliances and robotics to industrial applications. Today's industries are increasingly demanding process automation in all sectors. Automation results into the better quality, increased production and reduction cost.

The variable speed drives which can control the speed of AC\DC motors are indispensable controlling elements in automation systems.

Depending on the applications some of them are fixed speed and some of them are variable speed drives. Direct current (DC) motors have been used in variable speed drives for a long time.

The applications where we use the Dc motors are radio controller car, robotics, washing machines, dryers, compressors, rolling mills, cranes, elevators machine tools and locomotive drives, etc.

2. OBJECTIVE

The objective of this project is to increase and decrease the speed of an DC motor by using the arduino, diodes, capacitors and push buttons.

3. SPEED CONTROL METHODS OF DC MOTOR

There are three methods to control the speed of the dc motor. They are

- Flux control method
- Rheostatic control method or voltage control method
- Potential divider control method

The above methods have some demerits like a large amount of power is wasted in the controller resistance and efficiency is also decreased. By using like this we need some expensive arrangement for dissipation of heat produced in the controller resistance. By using this speed technique we cannot get the exact speed of the motor. This method produces very higher efficiency, greater reliability, quick response, higher efficiency.

4. METHODOLOGY

To overcome those advantages we use the pulse width modulation (PWM) technique in order to control the speed of the DC motor.

BLOCK DIAGRAM:

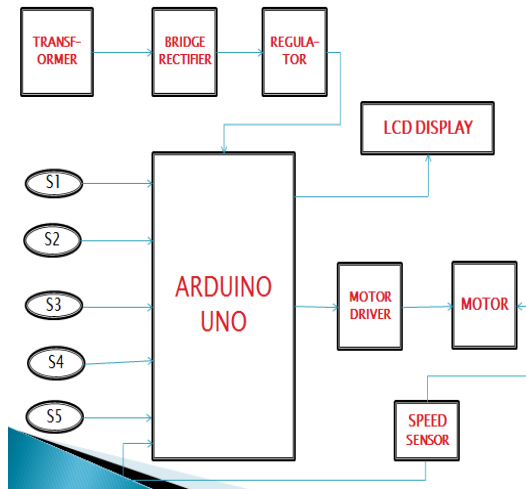


Fig: BLOCK DIAGRAM

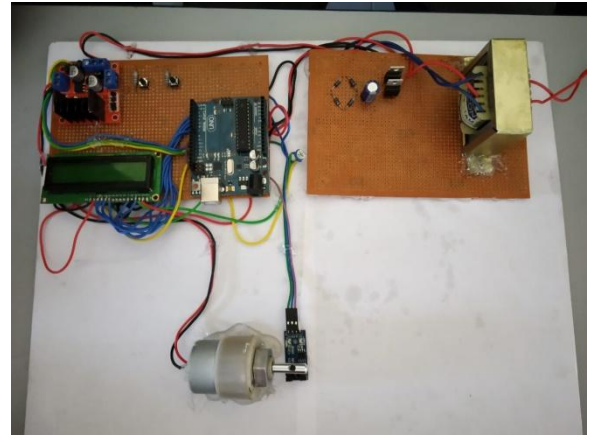
5. OPERATION

In the above methodology we use the 12v transformer, bridge rectifier, voltage regulator, arduino, Lcd display, motor driver, dc motor and speed sensor. Now when the 220v is connected to the 12v dc transformer which steps down the AC voltage level to the desired DC output then a bridge rectifier provides a full wave rectified voltage which is filtered by a simple capacitor filter to produce the Dc voltage. A regulator circuit removes the ripples and also remains the same dc value even if the input dc voltage varies or the load connected to the output dc voltage changes. Arduino is used to control the push buttons which are used to increase and decrease he speed ranges.

When we use the switches S1, S2, S3 for the increasing of the speed of the motor and S4, S5 for the decreasing of the speed of motor. When the speed is changed at that time the speed sensor senses the speed and we can notice that speed in the LCD display which is attached to

the arduino. The lcd displays the changing values of the speed by using the program which is already dumped in the arduino microcontroller.

6. HARD WARE SETUP



7. ACKNOWLEDGEMENT

We are great full to our department electrical and electronics engineering for helping and guiding for us to complete the project.

8. CONCLUSION

The project is purposed on the working of arduino, Voltage regulator, push buttons due to this cost of the project is not high. It is easy method to control the speed of DC motor.

9. FUTURE SCOPE

The speed control of DC motor is important because its speed can be changed wide variety of simple methods which is not possible in AC motor. In future this method can be applied in industrial drives for automatic speed controls.

10. REFERENCES

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