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CLOSED LOOP SPEED CONTROL OF DC MOTOR BY USING PI CONTROLLER

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ABSTRACT:- *The development in technology has increased the demand of industries in present time. In this project the controlling speed of dc motor is done using Proportional Integral (PI) controller. The speed controller is a very important aspect, which is commonly used. PI has been used as a main aspect for controlling the speed. In this paper the input of the motor is changed so as to change the duty cycle of motor. IR sensor is used for sensing and then actual speed is displayed on LCD connected on arduino. Then reference speed is given by the potentiometer to the arduino then it will change the duty cycle and speed is varied.*

Key Words: Arduino, LCD, protious, IR sensor, PI controller, DC motor.

1. INTRODUCTION

Today's industries are increasingly demanding process automation in all sectors. We are using speed control of DC motor using PI control the speed easily control increase the production and reduce the cost. Dc motor have long been primary means of electrical traction DC motor are always a good providing ground for advance control the speed of the motor. Normally close loop operation of PI controller inner current loop and outer speed loop is employ for speed control. The dc motor can provide a high starting torque control over a wide speed range, both below and above the rated speed can be very easily achieved. The method of speed control is simpler and less expensive.

2. WORKING PRICIPAL

At given to the ac supply to the transformer then the voltage is been step down to the desired voltage .Regulator will give a pure DC supply to the arduino and then the supply is given to the motor and it will start at its desired speed. This speed has been sensed by the IR sensor and actual speed is given to the arduino and that actual speed is displayed on the LCD and the reference speed is given to the arduino and PI will generate the error and it will change the duty cycle by using the Potentiometer we will change the input of the dc drive is changed. By changing the input voltage of the DC drive and then the changed voltage supply with the help of the potentiometer will change the speed of the motor and IR sensor will sense the changed speed and that will be given to the microcontroller and then it is been displayed on the LCD.

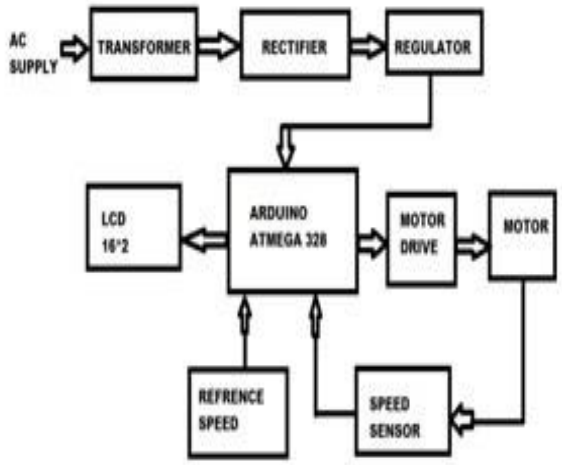

Fig.1 Block Diagram

3. ARDUINO OF PI CONTROLLER

1) We are using a microcontroller name as a Arduino. it is a single board. it is a easy access and directly connected to PC via USB port and the software used to control the Arduino. it can be in the language of c or c ++.the hardware board we are using in at 328. The main reason select the Arduino that it is a cheaper and highly available in the market. it is highly used by the student

2) Example. used Home Automation, projects, technical events

3) Arduino has been operated by the protious software and this software is license copy available in the market. Arduino is highly use microcontroller which having digital and analogue input output pins. We are connected to the digital output pins of the LCD

because of arduino know we using the less amount of component in our project

4) Setup- it initialize the setting in the instruction runs at the start of programs arduino used in the protious software of a programming

5) Application-it is largely use in oscilloscopes

6) It is used in mostly in equipment

7) It is also used in electronics components

8) WHY WE USE ATMEGA328?

8051	ATMEGA328
Difficult language	Easy language
40 pins	28 pins
More space	Less space
Expensive	Cost efficient

Fig.2 layout of ARDUINO

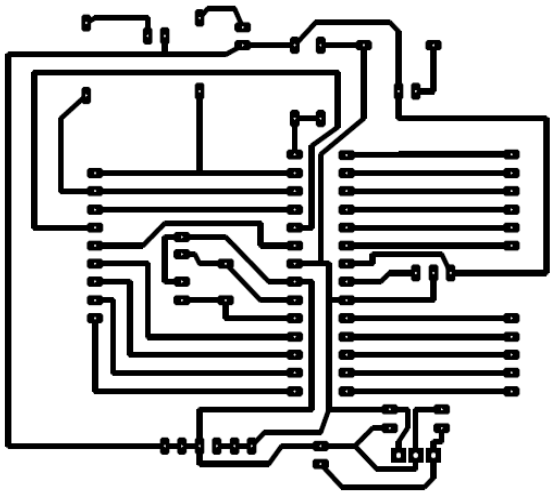

Fig.3 ARDUINO copper

4. LCD

Fig.4 A liquid-crystal display (LCD)

16*2 LCD (Liquid Crystal Display) interface with PI controller circuit for measurement of speed of dc motor it gives us digital form and easy to detect output.

LCD is required small amount of power (5 voltages) and it is already available in arduino PI circuit

Operation- IR sensor senses the speed physically and give the signal to the microcontroller and compare the mathematical value just like compare with given reference speed already programmed in our system the actual speed and the reference speed s displayed on the LCD and the applications of the LCD is it is used in the transport section, egg railways, buses and etc .

The contrast of the LCD changed according to the requirement of the consumer and it is concerned with the black light variation or the side light and it requires less time for the easily display. we can display the hidden and reset and preset data on display of LCD. The LCD pins include the

R_S –Reset
E-Enable
R_W-Read Write pins
D-Digital pins

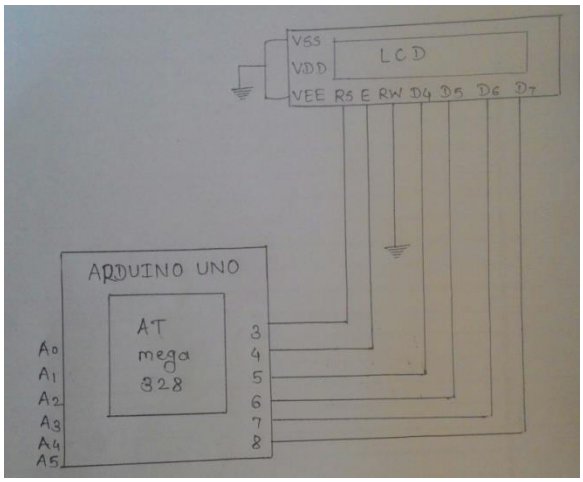

Fig.5 LCD ARDUINO interfacing diagram

5. DC GEAR MOTOR

Dc gear motor is highly used motor it is easily controlled speed & It has high starting torque to start the motor & our project are using 12 V Dc gear motor on the shaft of the motor. We will stick shaft of the dc gear motor which help of the IR sensor to calculate speed of motor. The operation of DC gear motor the input is given through Dc drive (IC-L293D) the drive is directly connect Arduino microcontroller. The dc drive will take require voltage from microcontroller and applied into the motor.

Nowadays Ac motor is overtaking to the Dc motor but in some cases no option dc motor. The reason behind that reduction user in our project dc conversion require Rectifier is used conversion Ac to Dc supply even if there high torque capability. The dc motor which can be used conversion electrical input into mechanical output.

In advantage of Dc motor easy speed and torque regulation main component of dc motor stator, rotor, shaft, Commutator.

6).**IR SENSOR**

IR sensor used in our project for sensed the speed of the motor in this project we will learn IR remote signal with arduino and to controller speed of dc motor

IR sensor can measure the speed of this motor

IR sensor is known as infrared sensor

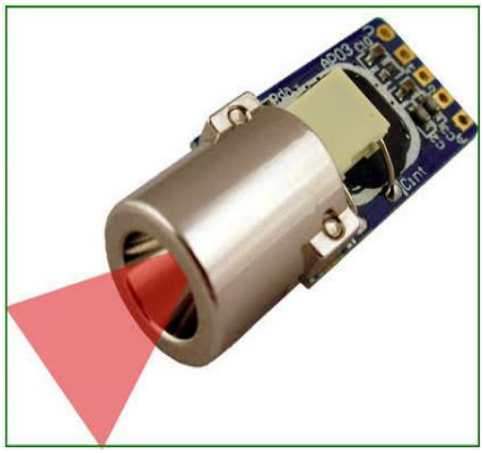

Fig.6 IR sensor

7. HARDWARE

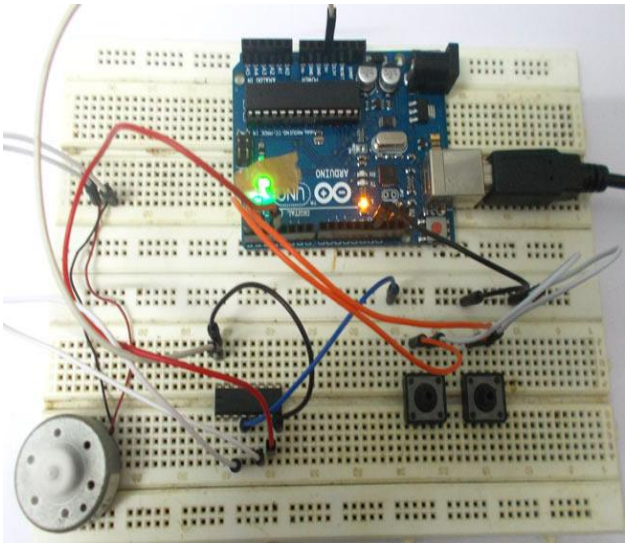

Fig.7 Hardware Diagram

8. RESULT:

Actual speed is been sensed by the IR sensor and then reference speed is given to the arduino and the input of the DC drive is changed and then the motor speed is changed and then changed speed will be sensed by IR sensor and displayed on the LCD.

9. CONCLUSIONS:

The closed loop control of DC motor using microcontroller is designed. We used arduino microcontroller to implement PI control and estimate the duty cycle and supply the motor through motor driver (IC-L293D). Reference speed input given through potentiometer and it was observed that the motor desired speed is traced rapidly. Hence speed of DC motor can be changed to desired value by implementing low cost control using arduino. The project can be extended to restrict the motor currents within limit.

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