

Monitoring and controlling the speed of dc motor using labview and proximity sensor

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ABSTRACT: The projects aim is to control the speed of dc motor by using the PID controller in Lab VIEW. It combines the advantage of proportional, derivate and integral control action. The most demanding speed torque characteristics are easily control by using the DC motor. Constant speed is carried out through the experiment. The simulation result of the experiment shows that a motor is running approximately at a constant speed regardless of a motor loop. It is concluded that a PID controller is a successful tool for controlling the motor speed in presence of load disturbances. The rpm of the dc motor is sensed and given as an input to the DAQ by the proximity sensor

KEY WORDS: Speed Control, Lab View, DAQ, L293D, PID Controller, Proximity Sensor

I.INTRODUCTION

DC motor converts electrical energy into mechanical energy. All dc motors have internal mechanisms such as electro mechanical or electronic to change the current flow direction. Large dc motors have various applications such as propulsion of electric vehicles, elevators, etc. the origin of the ac motor is possible by the advent of power electronics. Speed of the dc motor can be controlled by flux control method, armature control method, voltage control method. In open loop system the output is not reliable and accurate. So to get accurate results closed loop systems are used. Closed loop system automatically regulates a process variable to a desired state or set point without human interaction. In this project, the speed of the dc motor is measured by the proximity sensor and it is given to the PID controller. The PID controller varies the output according to the set point in PID. The overall closed loop plant is described in Fig.1.Block diagram of dc motor speed control.

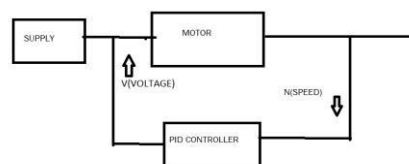


Fig. 1.Block Diagram Of Dc Motor Speed Control

The closed loop system consists of DC motor, proximity sensor and PID controller controlled by LabVIEW. The dc motor is controlled by a user interface LabVIEW through PID controller which processes the output of the sensor and controls the output. i.e.: motor. The LabVIEW controls the speed of motor where the output is monitored

and compared with proximity sensor through a PID controller to give a desired speed of the motor. The overall block diagram^[1] of LabVIEW based speed control is shown in Fig.2. The motor is drive by using a driver IC(L293d).The output from the motor is given to the proximity sensor. The proximity sensor sense the output voltage and the it is given to DAQ . From the DAQ it is given to the PID controller. The PID Controller generates the difference or error^[2]. The error is reduced by varying gain of PID.

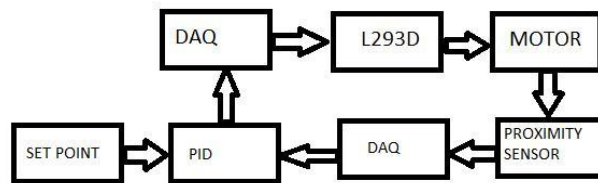


Fig .2.Overall Block Diagram Of Labview Based Speed Control

II. SIGNIFICANCE OF THE SYSTEM

The paper mainly focuses on how LABVIEW and proximity sensor can be applied to predict and control the speed of the dc motor. The study of literature survey is presented in section III, Methodology is explained in section IV, section V covers the experimental results of the study, and section VI discusses the future study and Conclusion.

III. LITERATURE SURVEY

The speed of the dc motor can be varied by using three methods. by changing the supply voltage current, and frequency. It can done by varying the flux and by varying the current through field winding. by varying the armature voltage, and by varying the armature resistance. Existing types of speed control are flux control, armature control, voltage control. The speed of dc motor is inversely proportional to the flux per pole. The flux is varied by adding resistance. the speed limit is maximum so it affect the commutation. In armature control speed is directly proportional to back emf. $E_b = V - I_a R_a$ by keeping the V and R_a constant. In voltage control the speed of the dc motor is varied by varying the input supply. In programming environment for laboratory automation and measurement the basic knowledge about labview, history of labview,existing components and its application are studied. The open system control architecture marshals tasks to each device and update the status to the database in real time.

jose soares augusto,et al , instructor in course on control system which controller is suitable for controlling of dc motor is explained .PID is best because zero state error ,peak overshoot and stability is moderate, it response both fast and slow process variable

r.rannjani r.preethi,s.jerine sumitha et al,international journals of advance engineering the paper controlling of the speed of the dc motor using lab view ,the speed is controlled by using ripple current .the disadvantage in this method is the current ripple limit will vary based upon temperature.

sandip Parmar,kalpesh chudasama,jayesh vankar,apurva gohil et al. Monitoring the control of speed of dc motor using lab view speed is varied by using arduino. But there some problem with arduino the structure, cost and the main problem is when use start studying micro-controller means it is vary difficult to design complete circuit in future

pratap vikhe, neelam Punjabi, chandrakant kadu, et al 'real time dc motor speed control using PID controller in lab view' in this journal the speed of dc motor is controlled by using PID and tachometer. tachometer have magnet in it it will get weaker after a year and lead to less accuracy.

IV. METHODOLOGY

Labview (Laboratory virtual instrument engineering workbench) is a system design platform and development environment for visual programming language from national instrument. In lab view there are two main components front panel and block diagram. Front panel is just a user interface .block diagram shows the internal connection of design .

A) L293d

L293d is driver IC which is used to drive the dc motor. The pin diagram of L293D is shown in Fig.3.It is 16 pin IC. Pin 1 and pin 8 are shorted and it is given to supply .The supply is regulated power supply of 5v.Pin2 is input pin which is given from the DAQ.Pin3 is output pin which is given to the one terminal of the motor. The another terminal of the motor is given the ground Pin4.

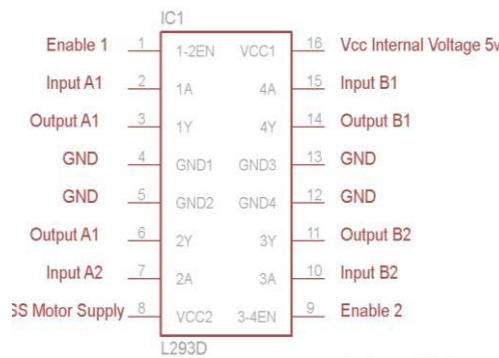


Fig .3. Pin Diagram of L293D

B) PID CONTROLLER:

PID controller stands for proportional–integral–derivative controller^[3] which is feedback closed loop controller. It compare the desired output with the present input and reduce the error and give the corrected or desired output. A PID controller is made up of three parallel elements of a Proportional element, an Integral element and a Derivative element. All the three elements are used to reduce the error and give the output to the desired value. The error will be managed in three ways, to:

1. the proportional term is used to handle present data
2. the integral term Recover past data
3. Anticipate the future, through the derivation term

C) DAQ (DATA ACQUISITION):

DAQ is the process of measuring an electrical parameters such as voltage, current, temperature, pressure etc. DAQ have 68 pin. Input pin AI0 to AI 15. Output pin AO 0, AO1.In this project we use 22,23,32,55 pin. The pin diagram of DAQ is shown in Fig.4.

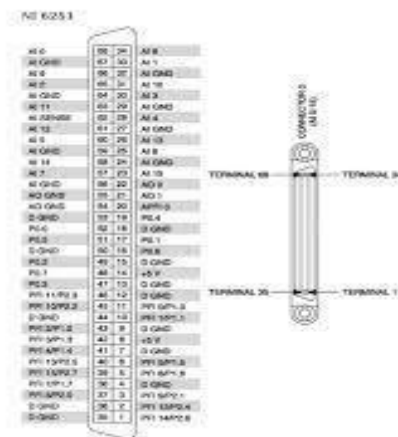


Fig 4.Pin Diagram Of DAQ

D) PROXIMITY SENSOR:

The presence of nearby objects is detected by proximity sensor without any physical contact. an electromagnetic field or a beam of electromagnetic radiation (infrared, for instance), is emitted from the sensor it will check for change in the field. In this project proximity sensor sense the how many times the metal object cross the sensor for the period of one minute. The proximity sensor give the output to the DAQ which in turn manipulated by the PID controller. Here NPN proximity sensor of 4mm measurable range of input voltage of 4V to 40V has been used.

E) EXPERIMENTAL SETUP:

By varying the slide, the set point is set to desired value. The process variable is compared to the set point to produce the difference by PID. The PID adjusts the output according to the set point in terms of gain. The proximity sensor output can be checked using gauge. And, the overall manipulated output is given to DAQ, then to the driver circuit L293d which drives the output. The experimental setup of hardware is shown in Fig.5



Fig 5.Experimental setup of hardware of desired setpoint of 10

V. EXPERIMENTAL RESULTS

The output from the proximity sensor is given to the DAQ assistant 1. It is given to the PID process input. The point compares the set point and process variable and give the output. On experimenting, PID which processes the output goes on increasing step by step speed to desired setpoint. With our desired setpoint of 10, the compared output of PID increases on a decimal value shown in the following figures. In Fig.6.Output of 7.91V and the output from the proximity sensor on increasing to desired setpoint and output of 8.31V as shown in Fig.7.

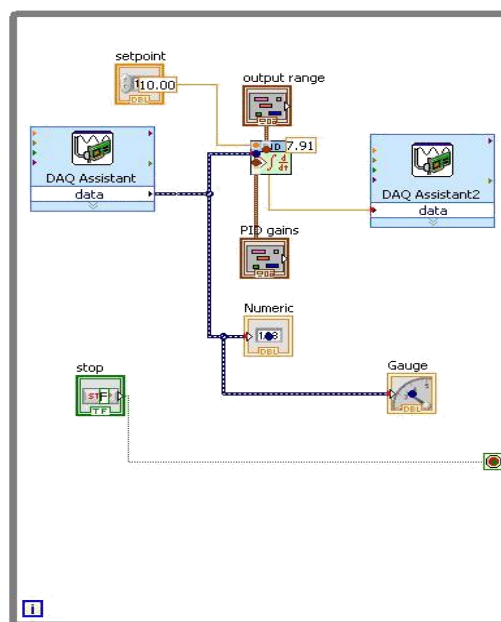


Fig.6.Output Is 7.91v

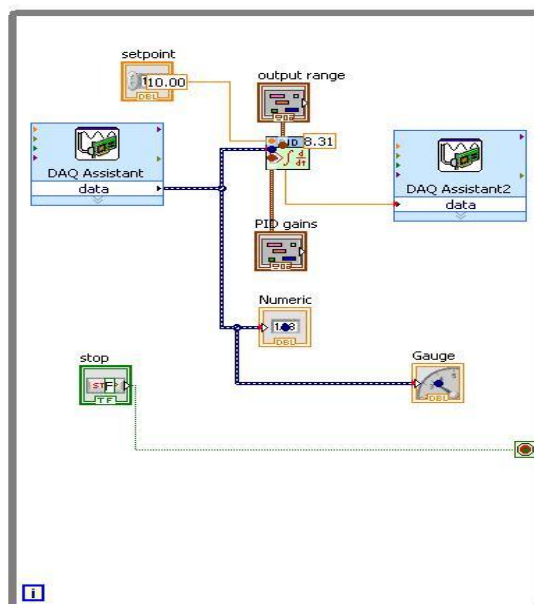


Fig.7.Output Of 8.31V

VI. CONCLUSION AND FUTURE WORK

From this project, the problem faced by the open loop system is overcome and the new way control by using LabVIEW is experimented... The output is varied by automatically without any human interface. So we can able to get the accurate results at the output of 10V by comparing the various processed inputs from the proximity sensor as shown in Fig.8. Output of 10

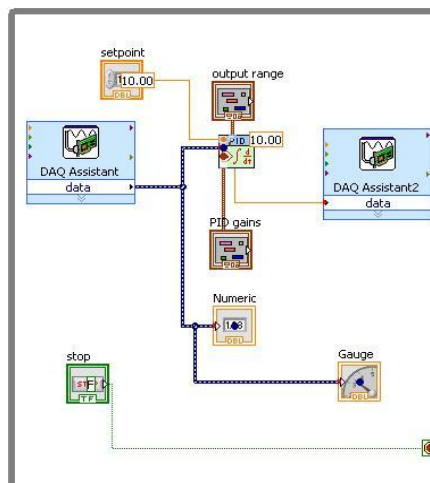


Fig.8. Output Of 10

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