

# A DC Motor Speed Controller using LABVIEW and Visual Basic

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## Abstract

Motor control are realized with two approaches: Hardware and Software through the application of Visual Basic (VB). A permanent magnet moving coil dc motor adjustable speed drive control is implemented with hardware setup and software program in Visual Basic code. The main feature used in Hardware and Software is their peripherals (parallel port peripherals) are used to interface with hardware and software medium like simulation. We have connected the hardware with the 32 bit parallel port cable to the CPU. As we increase the load on the DC motor the voltage of the Driver circuit decreases, which leads the connected LEDs to glow showing that we have reached to the peak value of the motor RPM. The output of the given system is achieved from the GUI of the LABVIEW; the coding is done in the Visual Basic.

## Keywords

DC Motor Speed, Controller, VB, Labview

## I. Introduction (About Visual Basic)

There are literally hundreds of programming languages. Each was developed to solve particular type of problem. Most traditional languages are considered procedural languages. That is, the program specifies the exact sequence of all operations. Program logic determines the next instruction to execute in response to condition and user request. The higher level language use a different approach: object oriented programming and event driving programming [10]. Microsoft refers to Visual Basic as an event driven programming driven model, programs are no longer procedural; they don't follow a sequential logic. So, there is no need to take control and determine the sequence of execution. As the world turn to graphic user interface(GUI), visual basic is one of the language that changes to accommodate the shift. Visual Basic is designed to allow the program run under the windows without the complexity generally associated with windows programming. The designed screens can holds the windows button such as command buttons, check boxes, option buttons, text boxes, and so on. Each of these windows object, operates as expected, producing a "standard" windows user interface. Visual Basic and Labview recently used as the most popular program to chose. It provide standard windows object and graphic user interface that will make the program become user friendly.

## II. Methodology

The programming in visual basic through parallel port is used to control DC motor speed at desired speed. The block diagram of the system is shown in fig. 1. It is a closed-loop with real time control system.

Control is a part of engineering and mathematics that deals with the behavior of dynamical systems. The desired output of a system is obtained when one or more output variables of a system need to follow a certain reference over time, a controller manipulates the inputs to a system to obtain the desired effect on the output of the system [8].

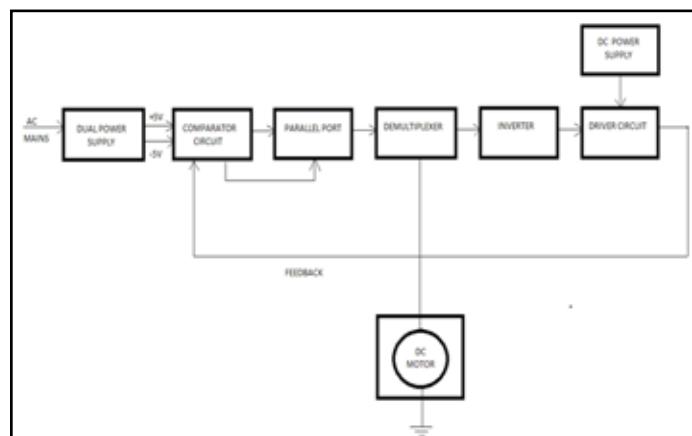


Fig. 1: Block Diagram of DC Motor Speed Control

Diagram shows, firstly the power supply is switched on then the supply corresponding to the driver circuit is on and it is provided to the dc motor. Motor starts rotating due to the supply voltage. When mechanical loading is applied to the motor, the voltage across the dc motor will decrease and the current will increase, to make the dc motor with the same speed we have interfaced it with the pc through parallel port. The speed control of dc motor is very crucial in applications where precision and protection are of essence [1]. There is a program made in visual basic by executing this program it actually increases the voltage across the dc motor to maintain the speed of dc motor. When for the first time the load is applied to the dc motor, the voltage decreases across the it and to maintain the voltage we have to increase the voltage across the dc motor. The coding done in VB when executed selects the first input for the dc motor, the comparator circuits compare the voltage across the dc motor and according to that it is given to the corresponding pins of the parallel port. And there is two output pin, which give two binary output i.e. for 01 first output voltage is selected, for second binary output i.e. 10 the second output voltage is selected and for third binary output i.e. 11 the third output voltage is selected. The output pins of the parallel port are connected to the demultiplexer. The demultiplexer outputs are connect to the inverter chip ,during selection of output it makes the inverter [3], output to be one of the particular output for the selection of the first output. During the selection of first output voltage for the dc motor the pin from the parallel port is selected which is connected to the relay which cuts the first resistance of the driver circuit and the increased voltage is fed to the dc motor. In the same way pins are selected for second output voltage and the third output voltage. This circuit is a feedback circuit whenever the load is applied to the DC motor the comparator circuits detects the voltage and the program selects the particular option for the output and the increased voltage is given to the dc motor by driver circuit made.

## III. Result

A Graphical User Interface (GUI) hosted on a Personal Computer (PC), and containing virtual instruments that allow the user to interact with the DC Motor, can provide a versatile and flexible

solution to the problem [7]. The software implementation and the hardware implementation of DC motor circuit like transformer,dual power supply,variable resistor,demultiplexer inverter,interfaing through parallel port and the coding in visual basic. The result is obtained by Graphical User Interface done in VB.The main objective of this project is to design a DC motor speed control system by interfacing it with the pc through parallel port. It is a closed-loop real time control system [2]. The controller will maintain the speed at desired value when there is a variation of load. By applying the load from belt drive to the motor driver, speed of the motor varies and can be controlled back to constant value by giving an increased voltage through feedback circuit which is controlled through the computer.The programming is done in visual basic,whenever the load is applied to the motor ,the status port in the GUI of the program indicates the selected feedback voltage to maintain the speed of motor.

#### A. GUI for the First Loading Effect



Fig. 2: GUI for the First Loading Effect

Fig. 2, in the result shows that status port in the GUI displays a port no that is assigned in the program which indicates the load is applied for the first time to the dc motor, the speed of motor will decrease this will send a signal to the parallel port and by executing the program, the increased voltage signal is send to the hardware circuit and the corresponding status port is indicated on the GUI.

#### B. GUI for the Second Loading Effect



Fig. 3: GUI for the Second Loading Effect

#### C. GUI for the Third Loading Effect



Fig. 4: GUI for the Third Loading Effect

In the same way fig. 3 and fig. 4, of the result is showing the status port no and the corresponding increased voltage is fed to the driver circuit so that it can maintain constant speed. This figure depicts the response of the motor speed to a step increase in the reference speed for different loading effects [6]. Such simulation develop concepts and skills in feedback control design and their applications into DC motor drive system.

#### IV. Conclusions

Recent developments in science and technology provide a wide range scope of applications of high performance DC motor drives in area such as rolling mills, chemical process, electric trains, robotic manipulators and the home electric appliances require speed controllers to perform tasks [5]. DC motors have speed control capabilities, which means that speed, torque and even direction of rotation can be changed at anytime to meet new condition.

Its real work based on designing a DC motor speed control system by interfacing it with the pc through parallel port [9]. It is a closed-loop real time control system. The controller will maintain the speed at desired value when there is a variation of load [4]. By applying the load from belt drive to the motor driver, speed of the motor varies and can be controlled back to constant value by giving an increased voltage through feedback circuit which is controlled through the computer.

The programming is done in visual basic,whenever the load is applied to the motor ,the status port in the GUI of the program indicates the selected feedback voltage to maintain the speed of motor.Its a fully automated real time control system with many applications in various fields. Besides, time for getting data and for controller to take action also can be reduced. So, the motor speed response will become better.

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