**1. INTRODUCTION**

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The main goal of this work is to use low cost hardware, to connect Simulink with a real system for lab practices in Control Engineering bachelors and B.Tech. Nowadays, the practical prototypes are connected to a computer through expensive DAQs. When computers or DAQs are updated, it implies a very high cost. In the case of internal DAQs, connected on an internal bus of the computer, the difficulties are bigger. New Arduino based DAQ must be adapted to the lab prototypes in order to avoid hardware changes or modifications on it

**1.2 EXISTING SYSTEM**

The problem of control practices using analog circuits is difficult. For example usage of IC555 timers in control practices. In IC555 timers the availability of RC combination circuits are difficult to achieve a required frequency pulse. So we cannot get the effective control of speed from these circuits and designing of circuits is also difficult. In digital control practices microcontrollers and microprocessors can be used for effective control, but the problem lies in coding of microcontrollers and microprocessors, which required a knowledge of embedded C or python, etc. and a depth knowledge of architecture of microcontrollers.

Thus in this paper we are concerned about speed control of permanent magnet DC motor as main objective.

**1.2.1 DRAWBACKS OF ANALOG SYSTEM**

* It requires more analog components.
* It has complex circuitary for implementing efficient algorithms.
* It is hard to find faults in analog systems
* Once a analog circuit is designed for a specified task, it can not be used for other tasks.
* Communication devices can not be added to analog systems

**1.2.2 DRAWBACKS OF DIGITAL SYSTEMS**

* Digital system provide a superior performance then analog systems.
* But to use the digital system we need to have a good microcontroller programming knowledge.
* Which is hard to learn and implement.
* Live monitoring of system using microcontroller is difficult by using normal software.

**1.3 PROPOSED SYSTEM**

The proposed system consists of PC with Simulink (Simulink support packages for Arduino) used to program Arduino Mega 2560. And a microcontroller board Arduino Mega 2560 powered with ATMega 2560 microcontroller. We have designed a H-bridge with TP41C transistors for speed and direction control of permanent magnet DC motor. We also used opto-coupler 4N35 for optical isolation with Arduino board and to provide PWM signals to the base of the transistors.

For the demo purpose we have a permanent magnet DC motor with Hall-effect sensor based quadrature encoder used to detect speed and direction of motor. Here we used the feedback to calculate only the speed and direction reversal is shown by using voltmeter in DMM (Digital Multi Meter).

**1.4 OBJECTIVE**

The objectives of this project are:

1. To control the adjustable closed-loop of DC motor speed by using micro controller.
2. To vary the speed of DC motor by using Pulse Width Modulation technique.
3. We can reach required variable speed with better performance.
4. Reduce the cost occurred for the controlling as well as operating of Permanent magnet DC motor.
5. For controlling purpose it is easy and consuming less time.
6. Operation is flexible.
7. Based on PWM pins we can controlled any number of permanent magnet

DC motor simultaneously.

**1.5 SCOPE OF PROJECT**

The scopes of this project are:

1. Design an adjustable speed control system of DC motor by using micro controller programmed by Simulink.
2. Build hardware for the system.
3. Live control of hardware can be done by Simulink.