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ijmrset@gmail.com



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# Close Loop Control of BLDC Motor

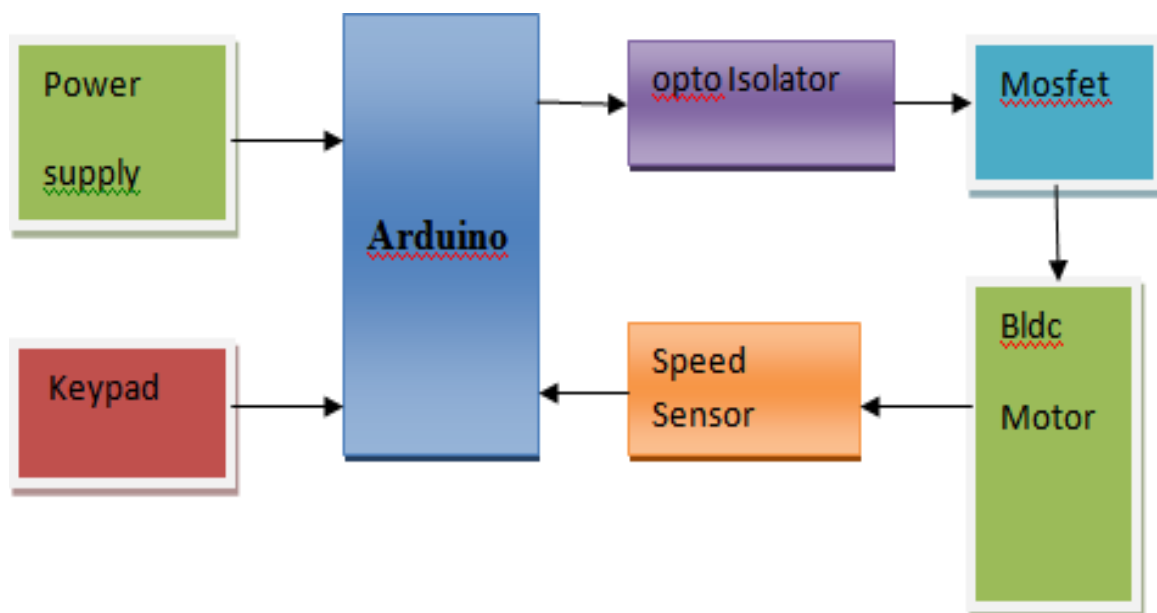
Mr. Sumit Lipne, Pratik Gedam, Shahaji Gghuikhedkar, Amruta Kadbe, Chandrakishor Bohane,  
Aditya Lande, Piyush Tadas, Prof. Atul A. Ghute

Department of Electrical Engineering, P. R. Pote Patil Education & Welfare Trust's Group of Institutions, College of Engineering & Management, Amravati, India

**Abstract:** The Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 2.0. This is called a boot loader. The ATmega328 on the Uno comes preprogrammed with a boot loader that allows you to upload new code to it without the use of an external hardware

## I. INTRODUCTION

Power supply Motor speed control of DC motor is nothing new. A simplest method to control the rotation speed of a DC motor is to control its driving voltage. The higher the voltage is the higher speed the motor tries to reach In many applications simple voltage regulation would cause lots of power lesson control circuit, so a pulse width modulation method (PWM) is used in many DC motor controlling applications. In the basic Pulse Width Modulation (PWM) method, the operating power to the motors is turned on and off to modulate the current to the motor. The ratio of "on" time to "off" time is what determines the speed of the motor. In this paper I am going to introduce speed control of DC motor. The microcontroller receive decoded binary signal and perform programmed logical operation and drive H- Bridge. The H-bridge is used to drive DC motor According to microcontroller input. Our project is programmable, Using keypad we can select, motor direction, Speed and time of rotation. The special feature of our project is that we have added one extra circuit which counts RPM of DC motor.





## II. Speed control using PWM

The speed of the motor is controlled with a series of “ON-OFF” pulses and varying the duty cycle, the fraction of the time that the output voltage is “ON” compared to when it is “OFF”, of the pulses while keeping the frequency constant

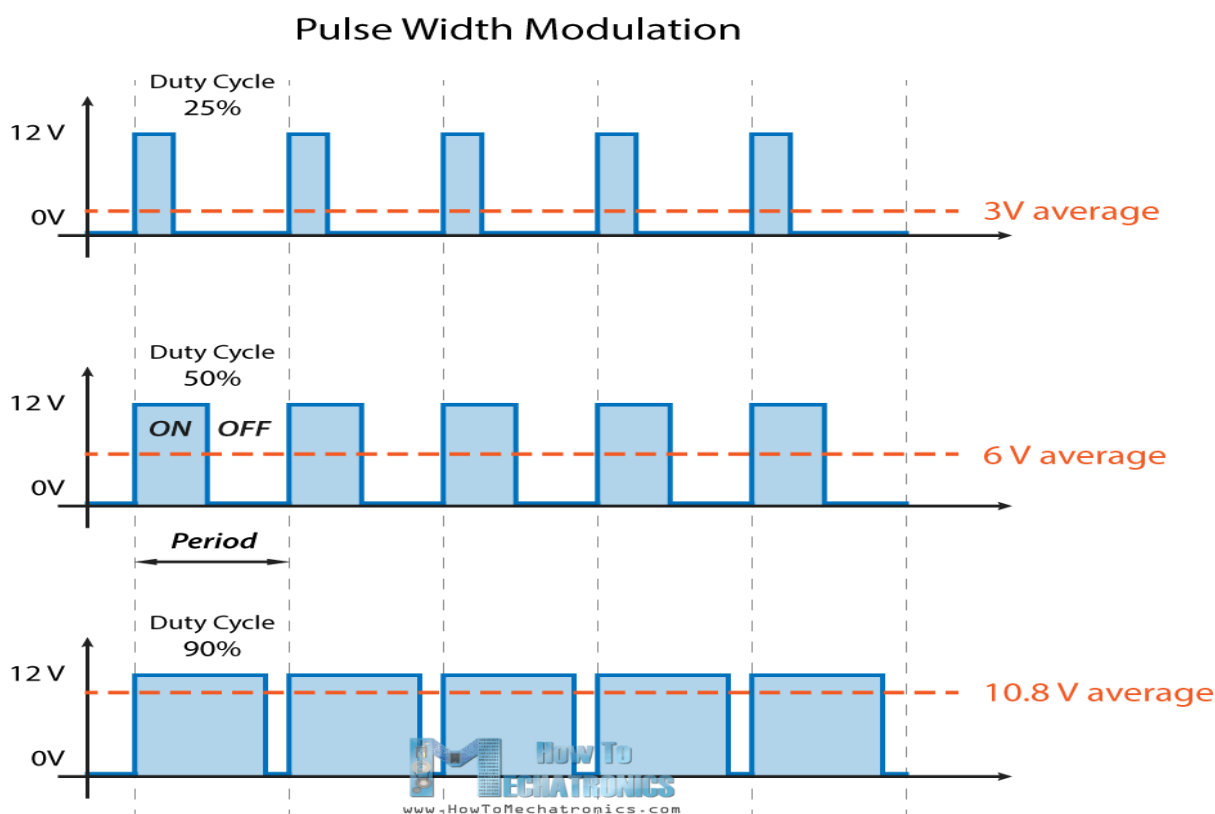
$$V_{avg} = D * V_{input}$$

Where,

D = Duty cycle

Vavg = Average output voltage

Vinput= Input DC voltage



**Fig. 2 Variation in the output Voltage**

### Current Control Design:

- ] The concept of current controlled modulation method is based on comparison of phase current with reference current and the error between them is used to drive the inverter
- ] During the operation, the main task of this control method is to force the phase current to follow the reference current.
- ] For triangular carrier control, the switching frequency is constant.



] Mentioned Fig. represents the concept of triangular carrier control.

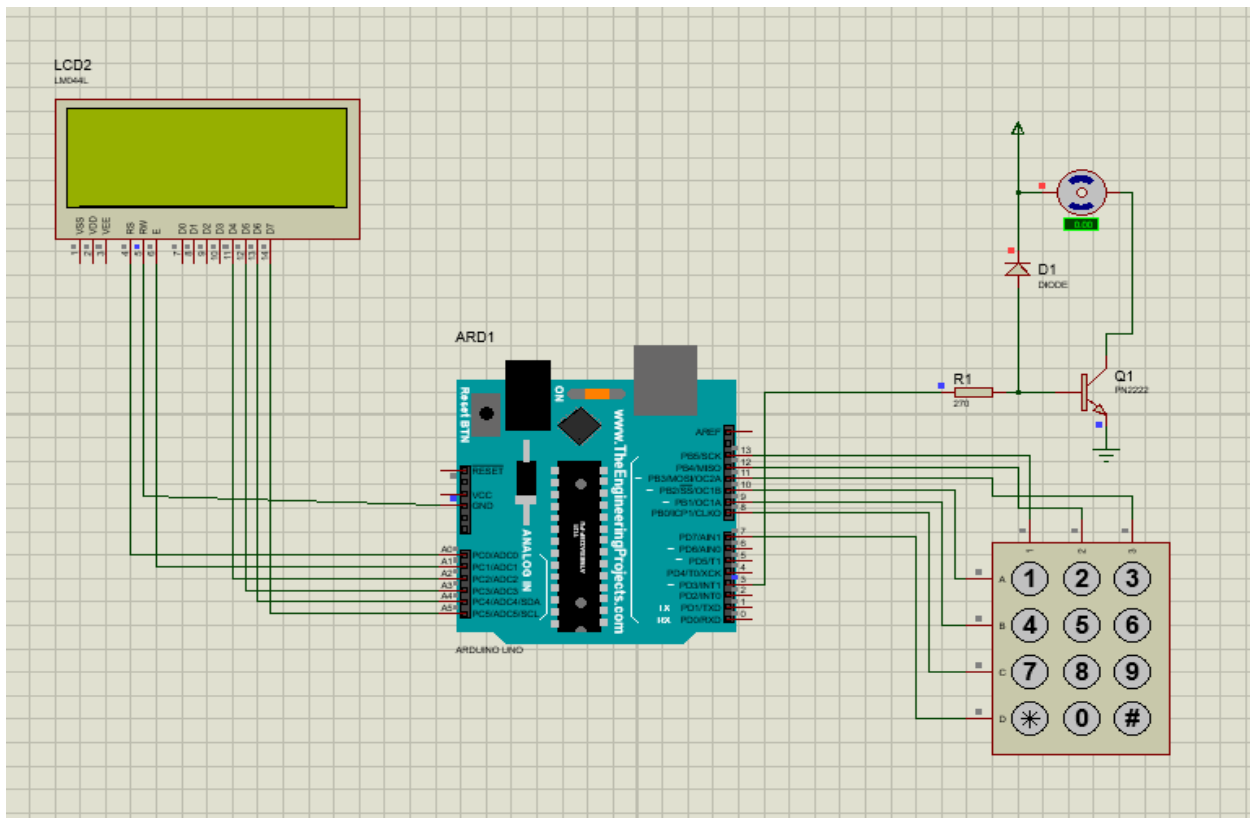


Fig. 3 Circuit Diagram

**Application And Advantages:**

- ] By using this closed loop control for BLDC motor system, the user can easily run BLDC motor any speed.
- ] This closed loop control for BLDC motor system could be used in drilling machines, lath machines, spinning machines, elevators and electric bikes.
- ] This system controls the BLDC motor speed more efficiently and precisely as compared to other systems.
- ] It is friendly to use no need of any expert person.
- ] It is less costly as compared to other systems

**Future work:**

- In future we will prepare flow chart which will give brief information about the steps of program.
- We will make real time simulation.
- Program implementation in the hardware

**III. CONCLUSION**

Arduino represents the receiver side interface 8 channel relay module with 8 bit RF receiver. It is isolated from transmitter side. Figure 8 represents the DC SSR interface with DC Geared motor. Arduino Uno microcontroller board is interfaced with the RF transmitter side. Console is connected with personal computer through USB cable. DC SSR is placed between H- Bridge and DC source. It is operated by PWM signals from Arduino Uno board.



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