SPEED CONTROL AND MONITORING OF BLDC MOTOR

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Abstract

This paper provides a technical review of position and speed sensorless methods for controlling Brushless Direct Current (BLDC) motor drives, including the background analysis using sensors, limitations and advances. The performance and reliability of BLDC motor drivers have been improved because the conventional control and sensing techniques have been improved through sensorless technology. Then, in this paper sensorless advances are reviewed and recent developments in this area are introduced with their inherent advantages and drawbacks, including the analysis of practical implementation issues and applications. The study includes a deep overview of state-of-the-art back-EMF sensing methods, which includes Terminal Voltage Sensing, Third Harmonic Voltage Integration, Terminal Current Sensing, Back-EMF Integration and PWM strategies. By using the microcontroller (Atmega8A) board interface with the ECS, motor speed can be controlled by varying the 10k potentiometer. The parameter like speed and rpm show in the load display.

Keyword:-BLDC, PWM, ECS, Microcontroller (Atmega8A), Potentiometer

I. INTRODUCTION

Brush less DC motor are excited with permanent magnet are pretty largely used in a huge amount of applications because of decent performance profits like higher torque current ratio, less noise, efficient, small size and inexpensive, lesser torque ripples, lesser supervision and well control characteristics on a huge range in torque speed period. Brushless DC motors which are used in ceiling fans ate reduced in size and heaviness than AC fans which has Universal motors. As these motors have the capacity to work with the small supply source voltages. Commutation process of a Brushless DC motor in controlled by Electronic speed controller (ECS). ECS will energizers the stator winding and in a proper sequence which supports to rotate the Brushless DC motor. Brushless Direct current motor speed can be controlled and other parameters are monitored on LCD display,

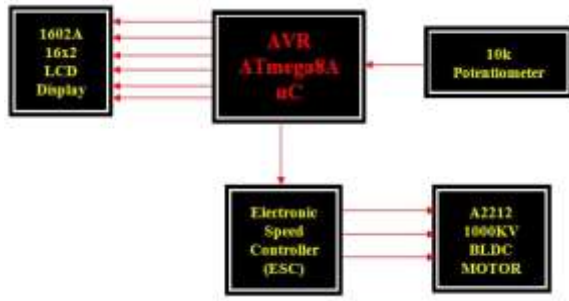### I.   BLOCK DIAGARAM

Fig. 1 Block diagram of the Proposed System

Hardware Consist of the following are

1.   Microcontroller (Atmegaa8A)
2.   Electronic Speed Controller
3.   LCD Display
4.   Power Supply
5.   BLDC Motor
6.   Potentiometer

Microcontroller (Atmegaa8A) and ESC are two the main parts of the hardware, Arduino board is loaded with program written in embedded C^{++} language and use software ATMEL STUDIO 6. When Supply of 12v is applied and by varying the 10K potentiometer. Microcontroller (Atmegaa8A) generates the PWM   signals and depending the pulse width duration ESC will drive the Motor. As soon as ESC receives the pulses from Arduino it will energize the Phase wires of Brushless DC motor and motor starts rotating. Speed controlling of the Brushless DC motor is done by ESC. Rotation of the speed and other parameters can be visualized in the LCD screen. Sensorless BLDC control eliminates the need for Hall Effect sensors, using the back-EMF (electromotive force) of the motor instead to estimate the rotor position. Sensorless control is essential for low-cost variable speed applications such as fans and pumps. Refrigerator and air conditioning compressors also require sensorless control when using BLDC motors.
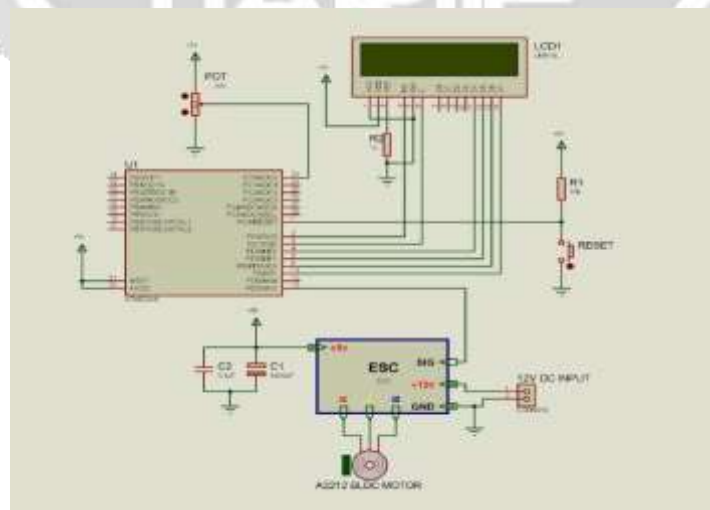

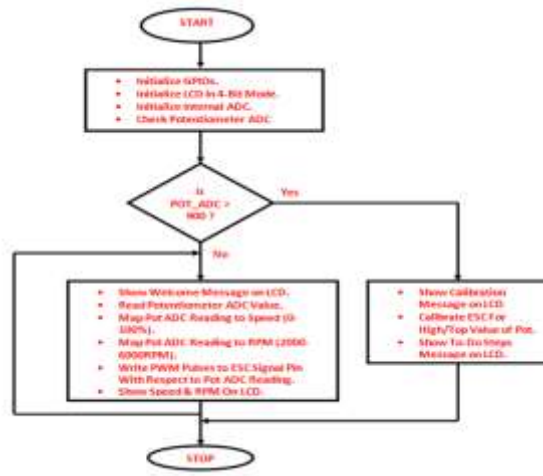Fig. 2 Function diagram of proposed System

III. FLOW CHART

Fig. 3 Flow chart Proposed System

IV.HARDWARE ASSEMBLY

Fig.4 Hardware Assembly of proposed System

V. RESULT AND DISCUSSION

After completion of Design and implementation of hardware and circuit, the desired speed will be able to attain. The speed of motor will be displayed on LCD display When the BLDC motor attend it's maximum speed then rpm of motor show 6000 on LCD display.

Fig 5.Speed and RPM Displayed on the LCD Screen

VI. CONCLUSION

Brushless Direct current motor speed is controlled successfully by using Electronic speed controller (ESC) and parameters can be monitored on a LCD display and as well as on the configured electronic gazettes. Speed of a Brushless Direct current motor is controlled successfully by using Electronic speed controller(ESC) and parameters can be monitored on a LCD display and as well as on the configured electronic gazettes.

VII. FUTURE SCOPE

Future we can implement Arduino wireless NRF communication in that, speed control is done by wireless technology.

Solar power can be used to run the Brushless Direct current motor.

We can add other sensors to monitor the other parameters like temperature, humidity near the motor etc.

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