"SPEED CONTROL BY UNIVERSAL MOTOR DRIVE"

Shreyash B. Gajbhiye [1] ,Akshay B. Shinde [2] , Nihal S. Humne [3] ., Khushali R. Khekade [4] . ,Darshana D. Wange [5]

Mr. Sandip D. Chahande,[6]
[1]

1) Shreyash B. Gajbhiye, Dept. of Electrical Engineering, PJLCE, Maharashtra, India
2) Akshay B. Shinde, Dept. of Electrical Engineering, PJLCE, Maharashtra, India
3) Nihal S. Humne, Dept. of Electrical Engineering, PJLCE, Maharashtra, India
4) Khushali R. Khekade, Dept. of Electrical Engineering, PJLCE, Maharashtra, India
5) Darshana D. Wange, Dept. of Electrical Engineering, PJLCE, Maharashtra, India
6) Mr. Sandip D. Chahande, Dept. of Electrical Engineering, PJLCE, Maharashtra, India

ABSTRACT

Speed control in universal motor drives is a critical aspect of various industrial and domestic applications, necessitating precise manipulation of motor speed. The universal motor, capable of operating on both AC and DC supplies, offers versatility but requires effective control mechanisms to regulate speed. Several methods are employed for speed control in universal motor drives, with voltage and frequency modulation being the primary techniques.

One commonly used approach is phase-angle control, where the firing angle of the thyristors in the motor drive circuit is adjusted to control the power delivered to the motor. This method allows for smooth speed adjustments but may introduce harmonic distortions in the motor current. Another popular technique is Pulse Width Modulation (PWM), which involves rapidly switching the voltage supplied to the motor at varying duty cycles. PWM offers precise control over motor speed and reduced harmonic distortions compared to phase-angle control.

Implementing speed control in universal motor drives requires careful consideration of factors such as motor load, efficiency, and desired performance characteristics. Additionally, advancements in electronic speed controllers have facilitated more sophisticated control strategies, enabling features like soft-start, dynamic braking, and feedback control systems for enhanced speed regulation and motor protection.

By understanding the principles and limitations of speed control methods in universal motor drives, engineers can design efficient and reliable systems tailored to specific application requirements. From power tools to home appliances, optimized speed control mechanisms play a crucial role in maximizing performance and energy efficiency while ensuring safe and reliable operation.

Keyword :*Universal motor , Speed control , Voltage adjustment , Pulse-width modulation (PWM) , Electronic speed controller (ESC) , Motor drive , DC motor , AC motor , Commutation , Motor speed regulation .*

1. INTRODUCTION

Till now, you want to have seen an AC motor that runs on AC drive and DC motor which runs on DC drive. If a fault occurs within the motor the whole if the drive has got to be changed. DC motors are widely utilized in industrial applications, robot manipulators and residential appliances, due to their high reliability, flexibility, and low cost, where speed and position control of the motor is required. This project deals with the performance evaluation of various sorts of conventional controllers and intelligent controller implemented with a transparent objective to regulate the speed of separately excited DC motor.

Due to the advancement in permanent magnetic materials, solid-state devices and microelectronics have resulted in new energy-efficient drives like Brushless Dc motor. Energy-saving, has been one of the important issues in home appliances hence tons of efforts, are made to scale back the energy consumed by the house appliances like refrigerators, air conditioners, cloth washers, vacuum cleaners, etc. these appliances typically believe motor technologies like DC motor, AC Motors.

Now a day's AC motors are the worked horses of the many industries which also replaced DC machines with their various advantages like lack of commutated, lower cost, reduced maintenance cost, robust, less weight and rugged structure. Due to their complex characteristics, it's not easier to regulate the speed of AC motor like DC motor, how we are getting to be solving this problem in it. The drive is employed within the industry system its function is to convert electricity into energy. This is often a mechanical device; Can the motion of the motor be controlled by the drive. Now I am getting to make an equivalent universal drive-by combing the control unit of AC & DC both drive in it. During which all the three motor AC, DC & BLDC motor will run on an equivalent drive

DESIGN AND IMPLIMENTATION

BLOCK DIAGRAM.

Figure 1: Block diagram of Universal Motor Driver

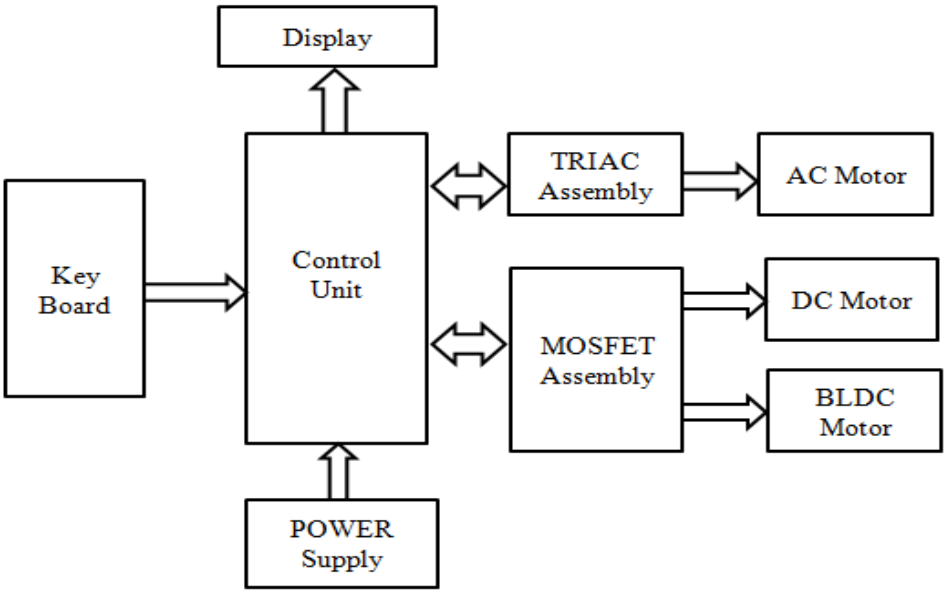

Figure 1: Block diagram of Universal Motor Driver

WORKING

Figure 1 shows they block diagram of Universal Motor Driver, figure shows they block consist of Key-Board, Display, Control unit, TRIAC, MOSFET, AC motor, DC motor, BLDC motor, Power supply section.

The above block diagram shows a complete view of the final project module, the systems control is done by the ATmega328 microcontroller. I have used to control unit to control all motor speed with the used of TRIAC and MOSFET. Control unit received the command from the Key-Board section and display the running command in 16*2 Display unit.

CIRCUIT DIAGRAM :

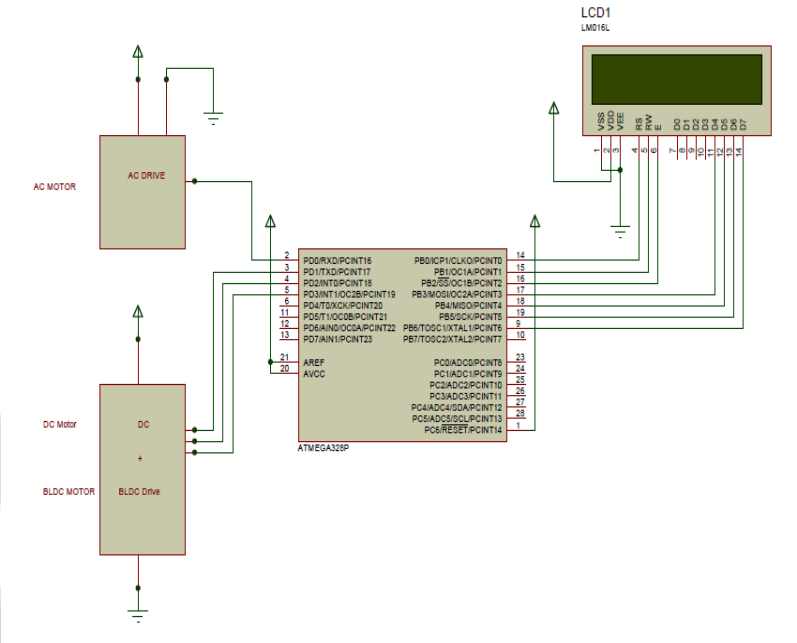

Figure 2: Circuit diagram of Universal Motor driver

4. CONCLUSIONS

We have designed a speed control system for AC, DC and BLDC motor, which has reliability, precision, and adaptability for different system ratting with the response. This designed system and implemented the speed control system of motor, it controls the speed of AC, DC and BLDC motor by using TRIAC and MOSFET. Microcontroller based system can be efficiently used for speed control of motors along with gates.

5. ACKNOWLEDGEMENT

We would like to express our sincere gratitude to all those who contributed to the development and implementation of the Speed control by universal motor drive and the success of this research project. Special thanks to [Insert Names or Organizations] for their invaluable support, guidance, and resources throughout the duration of this study. Additionally, we acknowledge the contributions of [Insert Names of Research Team Members] for their dedication and hard work in conducting experiments, collecting data, and analyzing results. This research would not have been possible without the collective effort and collaboration of everyone involved.

6. REFERENCES

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{4} These books cover various aspects of power electronics, motor drives, and control techniques, including speed control of universal motor drives. Additionally, you can find research papers and articles in academic journals and online platforms like IEEE Xplore and ResearchGate for more specific and recent developments in this field.