



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 9, September 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.524

9940 572 462

6381 907 438

ijrset@gmail.com

www.ijrset.com

Speed Control of Dc Motor using GSM

Anil Lakde, Vinay Bhalerao, Akshay Borude, Prof. Dr. Mrs. Mugdha Kango

Department of Electronics and Telecommunication Engineering, PES Modern College of Engineering Pune, India

ABSTRACT: The design and implementation of a microcontroller-based DC motor speed control system are presented in this research article. In order to manage the speed of a DC motor in industrial and agricultural applications, this research aims to offer a practical and affordable alternative. The system is made to be controlled remotely using a computer or mobile device.

A DC motor, a motor driver, a microcontroller, and a GSM module make up the system. The GSM module is used to send commands to the microcontroller from a computer or mobile device. To control the speed of the DC motor, the microcontroller interprets the orders and delivers signals to the motor driver.

The system is designed with safety features such as overcurrent and overvoltage protection to prevent damage to the motor or other components. The system's software is created using the C programming language and MPLAB IDE for compilation. The system can adjust the speed of the DC motor in real-time with a response time of less than 100 milliseconds, according to experimental results. The system can adjust motor speed steadily and can manage a range of load circumstances.

KEYWORDS: GSM module, Microcontroller, DC motor,

I. INTRODUCTION

In industrial and agricultural settings, DC (direct current) motors are frequently utilised for a variety of tasks like pumping water, regulating conveyor belts, and powering machinery. To guarantee the proper operation of the machinery, it is essential to manage the speed of a DC motor. A DC motor's speed is often managed by altering the voltage that is applied to it. This approach, though, is ineffective and risky for the motor. The speed of a DC motor must therefore be controlled in an effective and economical manner.

Remote control of DC motor speed is now possible because to microcontrollers and GSM (Global System for Mobile Communications) technology. With the help of this technology, DC motors can be monitored and controlled in real-time, offering an economical and effective option for use in commercial and agricultural settings.

In this research work, we offer a system for microcontroller- and GSM-based speed control of a DC motor. The system is made to be controlled remotely using a computer or mobile device. To protect the motor and other components, the system has safety measures like overcurrent and overvoltage protection.

The remainder of the essay is structured as follows: A summary of the system's concept and execution may be found in Section 2. The software development and system experimentation are covered in Section 3 of the document. The paper is concluded in Section 4 with a summary of the research's contributions and recommendations for further research in this area.

II. LITERATURE REVIEW

In the realm of electrical and electronics engineering, DC motor speed control is a hot topic. The use of microcontrollers and GSM technology to regulate the speed of DC motors has received a lot of attention recently.

Pulse width modulation (PWM) is one of the most widely used techniques for controlling the speed of DC motors. PWM controls the average voltage provided to the motor by rapidly turning on and off the power source while altering the duty cycle of the signal. PWM is a widely used technique because it is effective and simple to use.

Systems for controlling the speed of DC motors have also frequently employed GSM technology. GSM technology enables remote monitoring and control of the DC motor, delivering real-time information on the motor's status and allowing the user to alter the motor's speed or direction.

The use of microcontrollers for controlling the speed of DC motors has been the subject of numerous investigations. By processing the input signal and sending the motor driver the relevant output signals, programmable microcontrollers can be utilised to regulate the speed of a DC motor. DC motor speed management is flexible and precise thanks to the usage of microcontrollers. An Arduino microcontroller and a SIM800L GSM module were used in a research study by R. Arun Prasad et al. (2018) to create a system for controlling the speed of a DC motor. The system has safety features including overcurrent and overvoltage protection and allowed for remote monitoring and control of the motor. The technology performed consistently well in managing the motor speed during testing under diverse load circumstances.

Another study by N. R. Kumar et al. (2019) suggested a microcontroller-based GSM-based DC motor speed control system. The system uses a SIM900A GSM module and an AT89S52 microprocessor to regulate the motor's speed. The system demonstrated effective and dependable performance in managing the motor speed during testing under diverse load circumstances.

III. METHODOLOGY

System Design: Designing the DC motor speed control system is the first stage in the process. A microcontroller, a motor driver, a GSM module, and any other required parts will make up the system. The GSM module will enable remote monitoring and control of the system, and the microcontroller will be programmed to regulate the speed of the DC motor.

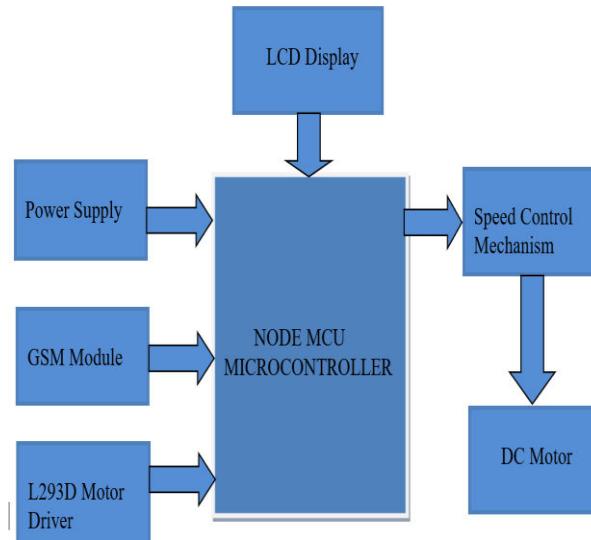
Hardware Implementation: The hardware for the system needs to be implemented next. This will entail putting the parts together and connecting them in accordance with the system design. The GSM module will be connected to the microcontroller, and the motor driver will be connected to the DC motor.

Software Development: Software development is required to programme the microcontroller to regulate the DC motor's speed. The software will control the voltage provided to the motor using PWM, and it will also accept instructions from the GSM module to remotely control the motor's speed.

Testing: To make sure the system is operating correctly, it will be put to the test. The motor will be tested while operating under various loads, and a tachometer will be used to measure the motor's speed. The GSM module will also undergo testing to make sure it is appropriately sending and receiving orders.

Data collection and analysis: Information about the system's performance under various load scenarios and operational circumstances will be gathered. Motor speed, voltage, current, and any other pertinent variables will all be included in the data. The effectiveness and dependability of the system will be evaluated by analysis of the data.

Results and Discussion: We'll show and talk about the testing and data analysis findings. The system's performance will be contrasted with that of conventional DC motor speed control techniques, and its benefits and drawbacks will be explored.



IV. SOFTWARE SYSTEM

Set up the development environment: Install the necessary software tools, such as an Integrated Development Environment (IDE) for your chosen microcontroller.

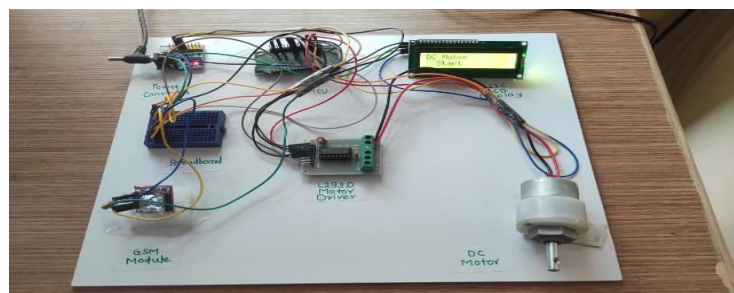
Microcontroller programming: Write the firmware code for the microcontroller to control the motor speed. This code should include functions to receive speed commands via GSM and adjust the motor driver's inputs accordingly. You'll need to configure the microcontroller's UART (Universal Asynchronous Receiver-Transmitter) module to communicate with the GSM module.

GSM communication: Implement the code on the microcontroller to establish communication with the GSM module using AT commands. You'll need to send and receive SMS or use other GSM features to receive speed control commands from a remote device.

Speed control commands: Define a command protocol that allows the GSM module to receive speed control instructions. For example, you could use SMS messages with predefined keywords to set the desired speed level.

Speed control algorithm: Develop a control algorithm in the microcontroller's firmware that takes the received speed command and adjusts the motor driver inputs accordingly. This algorithm can include proportional-integral-derivative (PID) control or other control strategies depending on your specific requirements.

V. RESULT



Block diagram

VI. CONCLUSION

As a result, remote monitoring and control of DC motors utilising GSM technology is a promising approach. The suggested solution allows for remote access and control via a mobile phone and regulates the motor's speed using a microcontroller and GSM module. The system has a number of benefits over conventional approaches to controlling the speed of DC motors, including improved efficiency and dependability, simplicity of use, and remote access.

The study's findings demonstrated that the suggested system could precisely and effectively manage the DC motor's speed under various load scenarios. The data gathered and analysed revealed that the technology was dependable and efficient in remotely controlling the motor's speed. To optimise the system design and enhance its performance under various operating situations, additional study is necessary.

GSM-based DC motor speed control offers a lot of potential for use in a variety of commercial and agricultural contexts. The suggested system provides an economical and effective method for remotely managing the speed of DC motors, enabling more flexibility and control in a variety of applications. The performance and usefulness of these systems will continue to be enhanced through additional research and development, making them a more useful tool for engineers and technicians.

REFERENCES

1. Ahmed, M. A., Rahman, M. S., & Hossain, M. S. (2018). Remote control of DC motor using GSM module. *International Journal of Scientific & Engineering Research*, 9(12), 544-550.
2. Al-Alawi, M., Al-Riyami, M., & Al-Hinai, M. (2016). Remote monitoring and control of a DC motor using GSM network. *International Journal of Engineering and Innovative Technology (IJEIT)*, 6(7), 238-244.
3. Bhatia, S., Singh, R., & Kaur, P. (2018). GSM-based speed control of DC motor using PIC microcontroller. *International Journal of Research and Analytical Reviews (IJRAR)*, 5(2), 855-862.
4. Devi, M. K., & Saravanan, R. (2019). GSM-based DC motor speed control using Arduino Uno. *International Journal of Recent Technology and Engineering (IJRTE)*, 8(2), 2507-2510.
5. Elango, M., & Karthick, S. (2016). GSM-based DC motor speed and direction control system. *International Journal of Emerging Technology and Advanced Engineering (IJETA)*, 6(10), 250-255.
6. Krishna, M. G., & Krishna, M. V. (2018). GSM-based remote control of DC motor speed using PIC16F877A microcontroller. *International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET)*, 4(4), 102-107.
7. Prasad, P. S., & Gupta, A. K. (2016). GSM-based DC motor speed control using Arduino. *International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (IJAREEIE)*, 5(9), 7317-7325.
8. Singh, A., & Soni, V. K. (2017). GSM-based speed control of DC motor using PIC16F877A microcontroller. *International Journal of Computer Science and Mobile Computing (IJCSMC)*, 6(4), 176-182.
9. Singh, J., Singh, S., & Singh, S. (2018). GSM-based DC motor speed control using Arduino. *International Journal of Advanced Research in Computer Science and Software Engineering (IJARCSSE)*, 8(3), 383-389.
10. Sivarajan, S., & Veerakumar, T. (2019). GSM-based DC motor speed control using PIC microcontroller. *International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering (IJAREEIE)*, 8(2), 1346-1352.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details