

Speed & Direction Control of DC Motor Using Android Smartphone Application

Mansi Mahalunge¹

¹Student, Dept. of Electronics Engineering, V.E.S. Institute of Technology, Mumbai, MH, India

Abstract - The electric drive systems utilized in mechanical applications are progressively needed to meet better performance and reliability prerequisites. The DC motor is an alluring piece of hardware in numerous modern applications requiring variable speed and load characteristics because of its ease of controllability. Microcontrollers give a reasonable means for addressing these requirements. Additionally the Android is the most mainstream versatile stage, which is exceptionally helpful in creating a lot of real time applications which are valuable in our everyday life. Among the wireless connections, Bluetooth innovation is regularly implemented. In this paper the method of controlling of the Direct Current motor by using the Bluetooth technology is presented. The signal is dispatched from the smart cell-phone, that is connected to Arduino Uno board via Bluetooth module HC05. PWM strategies are generally used to the control speed of the Direct Current motor.

Key Words: ARDUINO UNO board, Android mobile, DC Motor, Bluetooth module HC05.

1. INTRODUCTION

Today a greater part of the businesses use DC motors. Speed controlling of DC motors play an exceptionally vital part. Monitoring and controlling the speed of a DC motor by utilizing Android Smart cellphones have advanced the Bluetooth technology, so an external Bluetooth module HC05 is interfaced with the arduino uno microcontroller unit for the remote association. Exactly when an Android device sends commands, it is received by the Bluetooth modem which later, advances the commands to the microcontroller. The microcontroller then controls the DC motor via motor driver. The whole system is fueled by 12V transformer. The android application is utilized to control the whole framework. Bluetooth module gets commands from the cell phone android application. Thus, as indicated by the input signal, with the assistance of arduino, MOSFET can be utilized to change the voltage and speed of the DC motor using PWM method. Direction of the DC motor can likewise be shifted with the assistance of relay circuit or H-Bridge.

2. LITERATURE SURVEY

- VJ SIVANAGAPPA & K.HARIBALAN-utilized rectifier, channel capacitor, DC to DC Converter IGBT
- Bhattacharyya and group: speed control of BLDC through Bluetooth control in either course clockwise and anticlockwise.
- Ankesh N. Nichat and team: speed and direction controlling by DC motor is achieved by radio frequencies Technology science and wireless .
- N. Barsoum: DC motor control by dispatching SMS from telephone microphone. GSM module will get sms of required motor speed in RPM
- Abhishek Khanna and Priya Rajan: Motor driver IC L293D interface with arduino Uno utilized Solar Panel for 12 volt supply in connector, cost effective and eco-friendly projects utilized for robotic drones, house entryways and so forth.

3. COMPONENTS

The major elements here are:

1. Arduino UNO
2. Bluetooth Module
3. DC motor

3.1. Arduino UNO:

The Uno is a microcontroller board that uses the ATmega328P. It has 14 digital input/output pins (of which 6 can be utilized as PWM outputs), 6 analog i/ o sources, a 16 MHz quartz crystal, a USB connection, power jack, an ICSP header and reset button. The ATmega328 on the Uno is preprogrammed with boot loader that permits you to transfer new code to it without the utilization of an external software engineer.

3.2. Bluetooth Module:

Bluetooth serial communication module has two work modes: request response work mode and automatic connection work mode. There are three jobs at the automatic connection work mode. At the point when the module is at the automatic connection work mode, it will

follow the default way set in conclusion to send the information automatically. At the point when the module is at the corresponding work mode, client can send the AT order to the module to set the control boundaries and send control request. The work mode of this Module can be exchanged by controlling the module PIN (PIO11) input level. In this project Bluetooth module is utilized to convey messages from the ARDUINO UNO.

3.3. DC Motor:

Pretty much every mechanical development that we see around us is reined by an electric engine. Electrical machines are utilized for the converting energy. Motors take electrical energy as input and produce mechanical energy as output. Electric motor is utilized to control many gadgets we use in daily life. An illustration of small motor applications incorporates motors utilized in vehicles, robot, hand power instruments and food blenders.

4. SOFTWARE SIMULATION

The android application in the cell phone is created with the assistance of Android Studio Software.

4.1. ANDROID STUDIO

Android Studio is a free integrated development environment (IDE) from Google and official advancement environment for Android. Android Studio depends on Intelligent IDEA. Notwithstanding the elements that are already carried out in IntelliJ IDEA, moreover, the accompanying capacities are accessible: Support for the development of Android, Android Wear and Android TV Apps. Android Studio utilizes a build management automation tool, on Gradle is based. The framework offers the developer the chance for various gadget types such. B. Tablets to make enhanced renditions of the application. Topic editorial manager Android Lint It is feasible to design Google administrations like Google Cloud Messaging inside the IDE and apply it straightforwardly to the application. Backing for Pro Guard and automatic app signing. The source code of Android Studio is uninhibitedly accessible.

5. WORKING

Signal from Android gadget will be sent through Bluetooth. This signal will be communicated with a arduino with the assistance of transmitter and receiver of both the gadgets. This signal will be addressed by a

solitary letter which signifies the speed of the motor. There are three different direction of rotation: clockwise, anti-clockwise and stopping of the motor and these will be addressed by various letters. This letter will fluctuate the speed concerning the Arduino code. For forward direction the semiconductor Q1 and Q4 will be ON and for the converse course Q2 and Q3 will ON. Q1 and Q2 are PNP semiconductors which becomes ON when low signal is sent and Q3 and Q4 are NPN semiconductors which becomes ON when high signal. PWM pins 5 and 6 are utilized to control the speed of them in the two ways, they utilize the idea of changing the duty cycle (PWM Technique). Duty cycle changes from 0 -225. So by picking diverse duty cycle speed can be varied. Direction is controlled with the idea of having H-Bridge.

6. METHODOLOGY

Steps include planning project-

Stage 1: Connect all parts according to block diagram.

Stage 2: Open the android application, it requests Bluetooth connection.

Stage 3: Once the application is opened, check for the Bluetooth device and pair it with HC-05.

Stage 4: Give the message from application for increasing or decreasing the speed.

Stage 5: The message is received by microcontroller and processed message is forwarded to Arduino.

Stage 6: PWM program/coding is stored in Arduino.

It gives the necessary output and the motor speed varies as per the message given by the client from the application.

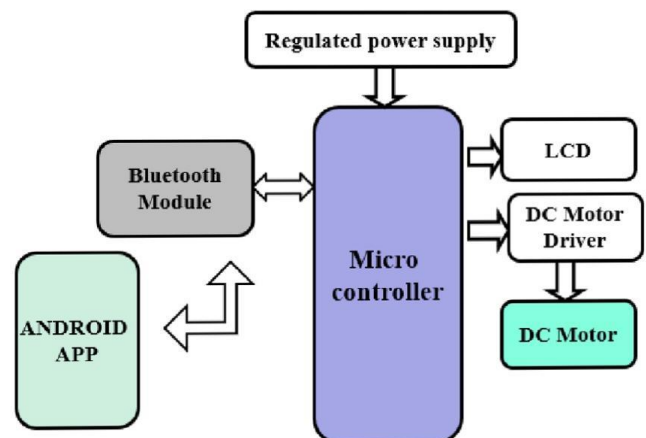


Fig. 1 Block Diagram

7. ADVANTAGES

- Bluetooth devours less power than other devices.
- Android application is easy to use.
- Technically expert people are not needed.
- Wireless communication is improved.
- Programming is easier.

8. DISADVANTAGES

- Usage of Bluetooth module makes the utilization just in a short range.
- Usage of android application in smart mobile phones drains it's battery.

9. APPLICATION

- Home automation.
- Many industrial applications require adjustable speed drive and constant speed for improving the product quality.
- Intensity of light can likewise be controlled with the assistance of android application.

10. CONCLUSION

In this way the speed and direction control of the DC motor is accomplished with the assistance of Android smartphone application and with the assistance of Bluetooth technology. Thus, remote communication is also accomplished.

11. FUTURE SCOPE

- In future, besides controlling the speed and direction of DC motors, a similar technology can be adopted in both single phase and three phase AC motors also.
- For long range wireless communication WIFI module can be utilized.
- Touch screen technology can likewise be executed.

12. REFERENCES

- [1] Ritesh, Deepak, Saketh, Dr Sudeshna: Speed & Direction Control of DC Motor using Android App.
- [2] Satapathy S., Bhateja V., Das S. : Smart computing and Informatics. Smart innovation, system and technologies, vol 78. Springer, Singapore.M. Young, The Technical Writer's Handbook. Mill Valley, CA: UniversityScience,1989.
- [3] Sunita, Tirupati Gupta: Speed control of Single phase Induction motor using android bluetooth.ISSN-2321-3361 International Journal of Engineering Science and Computing Volume 6 Issue 5 September 2016.
- [4] Mr.K.Narasimhaiah: Speed Control of DC motor by using blue control app.ISSN-2393-9923 Global Journal of Trends in Engineering Volume 1 Issue 2 September
- [5] N.Barsoum: DC motor speed control using SMS application, Journal of Intelligent Control and Automation, 5 2012.