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Speed and Direction control of DC Motor by Current and Voltage Contolled Device By android application

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ABSTRACT

This project uses the principle to control the speed of the motor by varying the duty cycle of the pulse applied to it (popularly known as PWM control). Remote operation is achieved by any smart-phone/Tablet etc., with Android OS, upon a GUI (Graphical User Interface) based touch screen operation.

The project uses Bluetooth device, interfaced to the microcontroller, which are used to control the speed of motor. PWM (Pulse Width Modulation) is generated at the output by the microcontroller as per the program. The program can be written in Embedded C. The project is designed to control the speed of DC motor by current and voltage controlled device using Arduino microcontroller with android application device.

KEYWORD:(PWM) pulse width modulation,bluetooth module,android,GUI

I.INTRODUCTION

Today most of the industries use DC motors. So, speed controlling of DC motors plays a very vital role. Therefore our paper based on monitoring and controlling the speed and direction of DC motor using Android mobile application, with the help of Bluetooth technology both forward and reverse direction simultaneously with the help of L293D IC. Smart phones have in-built Bluetooth technology, so external Bluetooth module is interfaced with the microcontroller unit for wireless communication. The Bluetooth module receives command from the mobile phone android application. So, according to the input signal, with the help of arduino, MOSFET can be used to vary the voltage and IGBT can be used to vary the current as well as the speed of the DC motor using PWM technique. Direction of the DC motor can also be varied with the help of relay circuit or H-Bridge network.

II. BLOCK DIAGRAM

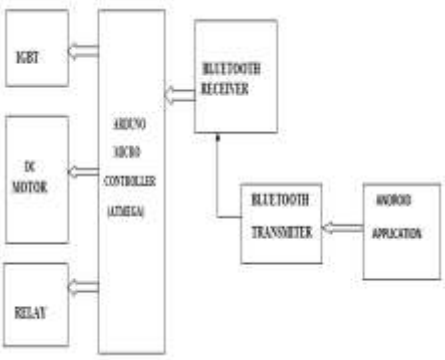

Fig .1 BLOCK DIGRAM

III.WORKING

Signal from Android device will be sent through Bluetooth. This signal will be communicated with Arduino with the help of transmitter and receiver of both the devices. This signal will be represented by a single letter which denotes the speed and direction of the motor. There are three different direction of rotation: clockwise, anti-clockwise and stopping of the motor and these will be represented by different letters. This letter will vary the speed with reference to the arduino code. For forward direction the transistor Q1 and Q4 will be ON and for the reverse direction Q2 and Q3 will ON. Q1 and Q2 are PNP transistors which becomes ON wh en low signal is sent and Q3 and Q4 are NPN transistors which becomes ON when high signal. PWM pins 5 and 6 are used to control the speed of the in both directions, they use the concept of varying the duty cycle (PWM Technique). Duty cycle varies from 0 - 225. So by choosing different duty cycle speed can be varied.

IV. HARDWARE COMPONENTS

1) BLUETOOTH MODULE

Bluetooth serial communication module has two work modes: order-response work mode and automatic connection work mode. And there are three work roles at the automatic connection work mode. When the module is at the automatic connection work mode, it will follow the default way set lastly to transmit the data automatically. When the module is at the order response work mode, user can send the AT command to the module to set the control parameters and sent control order. The work mode of this Module can be switched by controlling the module PIN (PIO11) input level. In this project Bluetooth module is used to send signals from the ARDUINO UNO.

2) ARDUINO UNO

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. The ATmega328 on the Uno comes pre programmed with a boot loader that allows you to upload new code to it without the use of an external hardware programmer.

3) DC MOTOR

Almost every mechanical movement that we see around us is accomplished by an electric motor. Electrical machines are used for the converting energy. Motors take electrical energy and produce mechanical energy. Electric motor is used to power hundreds of devices we use in everyday life. The system gives the developer the opportunity for different device types such. B. Tablets to create optimized versions of the app. Theme editor Android Lint It is possible to configure Google services like Google Cloud Messaging within the IDE and apply it directly to the app Support for Pro Guard and automatic app signing The source code of Android Studio is freely available.

4)MOTOR DRIVER

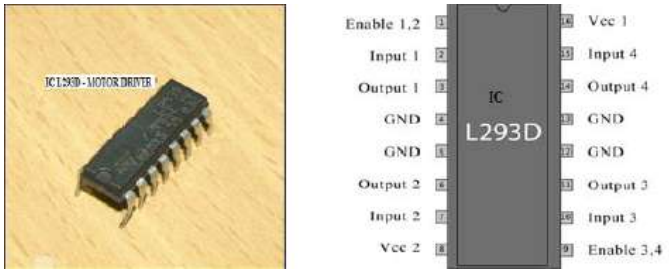

Fig 2 pin diagram

A motor driver Integrated circuit (L293D) chip is designed to control and regulate motors .It is a dual H-bridge motor driver Integrated Circuit. They are generally used in robotics. It acts as an interface between motor and Arduino microprocessor in the circuit. L293D are most commonly used motor driver Integrated circuits from L293 series. L293D is designed to control up to maximum of two direct current motors simultaneously when they are integrated with Arduino Uno. It helps to regulate the flow of current before it finally reaches the motor. It becomes a necessity and need to use IC L293D due to different requirement of current and voltages by microprocessors (low) and 5V DC motor (high) as it acts as a moderator and balances the flow of current. It protects the circuit from overload current and provides protection against overload temperature..Current should not be directly supplied to the motor because it can damage the motor or even the microcontroller. It has an output capability and provides bidirectional current of 600 mA per channel. The maximum or peak current which can flow through per channel as output is 1.2 Amp. It has Enable facility and internal clamp diodes. Input voltage is up to 1.5V-36V which is also high noise immunity (logical "0"). Various and un-similar PWM signal are received because a motor driver IC interfaces with the microcontroller. A motor driver IC is also responsible for achieving required outputs for the speed variation of the DC motor.

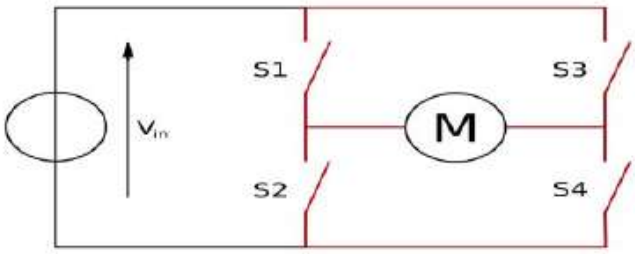

Fig 3 H -Bridge circuit diagram

It is composed with two H-bridge which are basic circuits. It is a simple circuit for regulating a rated motor with low current. L293D comprises of 16 pins which includes 4 (ground, input and output) pins and 2 (Enable and Voltage) pins Because of it the DC motors can operate in both reverse and
forward motion. To rotate it in forward and reverse directions logic function '01' and '00'are used respectively. 1 and 9 are two enable pins for two motors respectively and they should be of high value to start operating. The

drivers are enabled in pairs [5, 17, 18] Bipolar stepping motors, loads in high positive power supply applications, relays and solenoids which are fabricated to run various inductive loads. TTL compatible inputs along with totem-pole circuit (present with pseudo-Darlington source and sink) which are also enabled in pairs. It is suitable for various motor applications or solenoid with reversible drive. L293D IC first receives signals send by the microcontroller and then emanates the response signal to the motor. Input signal received from the input helps to switch the outputs accordingly.

5)RELAY

Fig 4 relay

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

V. ADVANTAGES

- Bluetooth consumes less power than other devices.
- Android application is user-friendly.
- Technically expert persons are not required.
- Wireless communicaton is enhanced.
- Programming issimpler.

VI. DISADVANTAGES

- Usage of Bluetooth module makes the usage only within a short range.
- Usage of android app in smart phones consumes battery.

VII.CONCLUSION

Thus the speed and direction control of the DC motor is achieved with the help of Android mobile application with the help of Bluetooth technology. In this way wireless communication is also achieved.

FUTURE SCOPE

- In future, apart from controlling the speed and direction of DC motors, the same technique can be implemented in both single phase and three phase AC motors as well.
- For long range wireless communication WIFI-module can be used.
- Touch screen technology can also be implemented

APPLICATIONS

speed control of dc motor has many applications like industrial applications, escalators, elevators, Robotic applications, and security systems application. The user needs to install an android application on his/her Android smartphone

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