Journal of Engineering Sciences

Vol 11, Issue 11, NOV/2020
ISSN NO:0377-9254

SPEED AND DIRECTION CONTROL OF DC MOTOR USING BLUETOOTH

M. KRISHNA, EEE Dept, St. Peter's Engg College
G. ADITYA REDDY, EEE Dept, St. Peter's Engg College
R. SHIVA SAI, EEE Dept, St. Peter's Engg College
P. BHANU PRASAD, EEE Dept, St. Peter's Engg College

krishnam@stpetershyd.com adityareddy510@gmail.com shivasaipatel.radha@gmail.com hanuprasadeee1997@gmail.com

Abstract— In many industry such as paper mills, rolling mills, printing machine, machine tools, excavators and cranes etc the dc motor is used for waying a product from one place to another on the conveyer belt . So due to these the speed and direction control of the dc motor is very important. purpose. Motor speed controller is to take a signal representing the required speed and to drive a motor at that speed. For that purpose wireless speed and direction control of dc motor by radio frequency technique is very crucial with pulse width modulation and H-Bridge converter. The microcontroller AT89S51 is used to control the dc motor speed and Transistorised h-bridge converter is used for direction control. By adjusting the duty cycle of pulse from Pulse Width Modulation technique simultaneously the terminal voltage of motor is change and hence speed will be vary with terminal voltage. H-Bridge is a DC to DC converter used for direction and made by 4 transistor switch across it a diode are connected.

Keywords— DC motor, H-bridge, PWM, Bluetooth module

I .INTRODUCTION

The aim of this project is to control the DC motors with help of android mobile phone. In many applications, DC motor is required to be rotated in clockwise and counter clockwise directions. For this purpose H Bridge is designed. In this project L293D IC is used to drive one DC motor. Android is a software stack for mobile devices that includes an operating system, middleware and key applications. Android boosts a healthy array of connectivity options, including Wi-Fi, Bluetooth, and wireless data over a cellular connection (for example, GPRS, EDGE (Enhanced Data rates for GSM Evolution) and 3G). Android provides access to a wide range of useful libraries and tools that can be used to build rich applications. In addition, Android includes a full set of tools that have been built from the ground up alongside the platform providing developers with high productivity and deep insight into their applications. L293D IC is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoids, DC and stepping motors) and switching power transistors.This project makes use of an on board computer which is programmed with the help of embedded C instructions. This on board computer is capable of communicating with both the input and output modules. Depending upon the messages from android mobile phone wirelessly through Bluetooth which is interfaced with micro controller motor directions can be changes and the IR sensor is used to count the speed of the DC motor.

II. MICROCONTROLLER

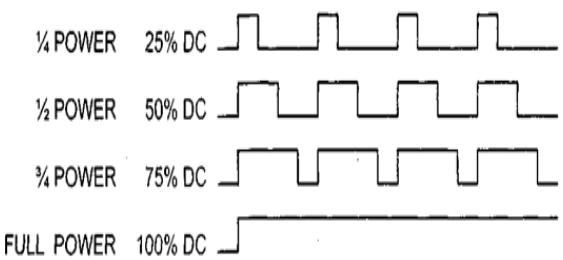
A Microcontroller is a programmable digital processor with necessary peripherals. Both microcontrollers and microprocessors are complex sequential digital circuits meant to carry out job according to the program / instructions. Sometimes analog input/output interface makes a part of microcontroller circuit of mixed mode (both analog and digital nature). PIC16F72 has a total of 28 pins. It is most frequently found in a DIP28 type of case but can also be found in SMD case which is smaller from

a DIP. DIP is an abbreviation for Dual In Package. SMD is an abbreviation for Surface Mount Devices suggesting that holes for pins to go through when mounting aren't necessary in soldering this type of a component. There are 28 pins on PIC16F72. Most of them can be used as an IO pin. Others are already for specific functions.

III. Pulse Width Modulation

PWM is an effective method for adjusting the amount of power delivered to the load. PWM technique allows a very smooth operation and reliable in nature. The microcontroller can generated PWM signal to adjusting the duty cycle of pulse simultaneously the motor terminal voltage can vary with duty cycle and also speed will be a vary. The ratio of on time to off time is called as duty cycle. The desired speed can be obtained by changing the duty cycle. The Pulse-Width-Modulation (PWM) in microcontroller is used to control duty cycle of DC motor drive.PWM is an entirely different approach to controlling the speed of a DC motor. Power is supplied to the motor in square wave of constant voltage but varying pulse-width or duty cycle. Duty cycle refers to the percentage of one cycle during which duty cycle of a continuous train of pulses. Since the frequency is held constant while the on-off time is varied, the duty cycle of PWM is determined by the pulse width. The figure shown below the change of duty cycle of the PWM microcontroller. The microcontroller having a 25% duty cycle then it provide a ¼ of power to the motor, when microcontroller having a 50% duty cycle then microcontroller provide a ½ of power to the motor, when microcontroller having a 75% duty cycle then microcontroller provide a ¾ of power to the motor and finally the microcontroller provide a 100% duty cycle then microcontroller provide a full power to the motor.

Fig.1: Pulse Width Modulation



IV. H-Bridge

H-Bridge is used for the purpose of the direction control of dc motor. It is made up from four transistor switches. The four transistor are connected in bridge type manner that's why it is called as H-Bridge. The four switches are S1,S2,S3 and S4 switches. Out of this four switches two switches are at a time are on and two are off. When switch s1 and s4 are ON the motor moves clockwise in direction, when switch s2 and s3 are ON then motor moves anticlockwise direction, when the switches s1 and s3 are ON then the supply can flow through the motor hence motor will be breaks, also when switches s2 and s4 are on motor then the supply does not flow through the motor and it will be breaks.

S1	S2	S3	S4	Operation of motor
1	0	0	1	Motor moves right
0	1	1	0	Motor moves left
1	0	1	0	Motor breaks
0	1	0	1	Motor breaks

H-Bridge Truth table

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Vol 11, Issue 11, NOV/2020
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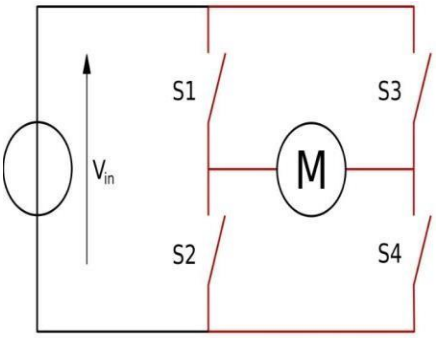


Fig. 2: Circuit diagram H-Bridge

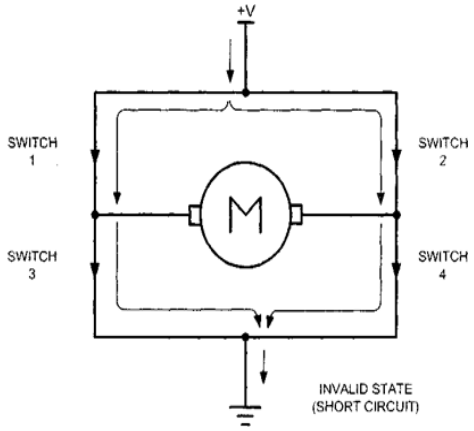


Fig.3: H-Bridge in an Invalid Configuration

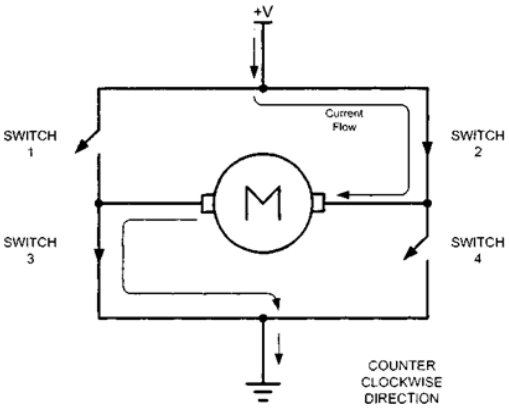


Fig.4: H-Bridge Motor Counter clockwise Configuration

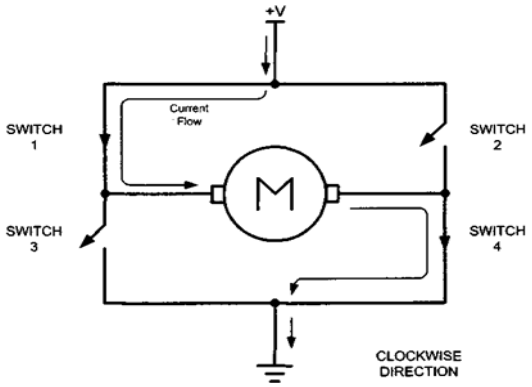
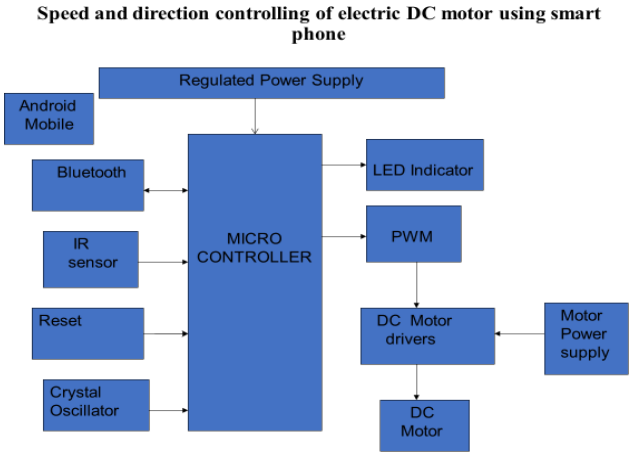
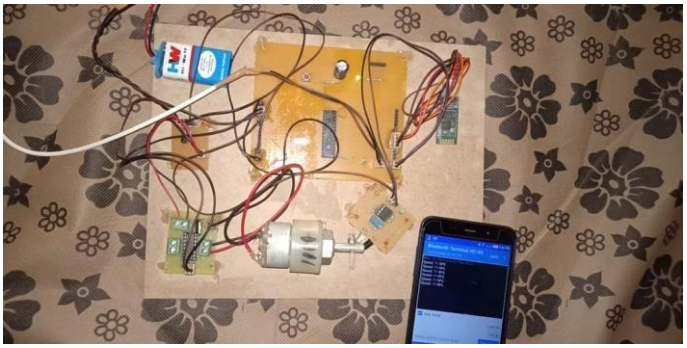


Fig.5:H-Bridge Motor Clockwise Configuration



Block Diagram

Experimental Set-up:



Conclusion:

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

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