# DC motor interfacing with PIC18F4550

## Overview of DC Motor

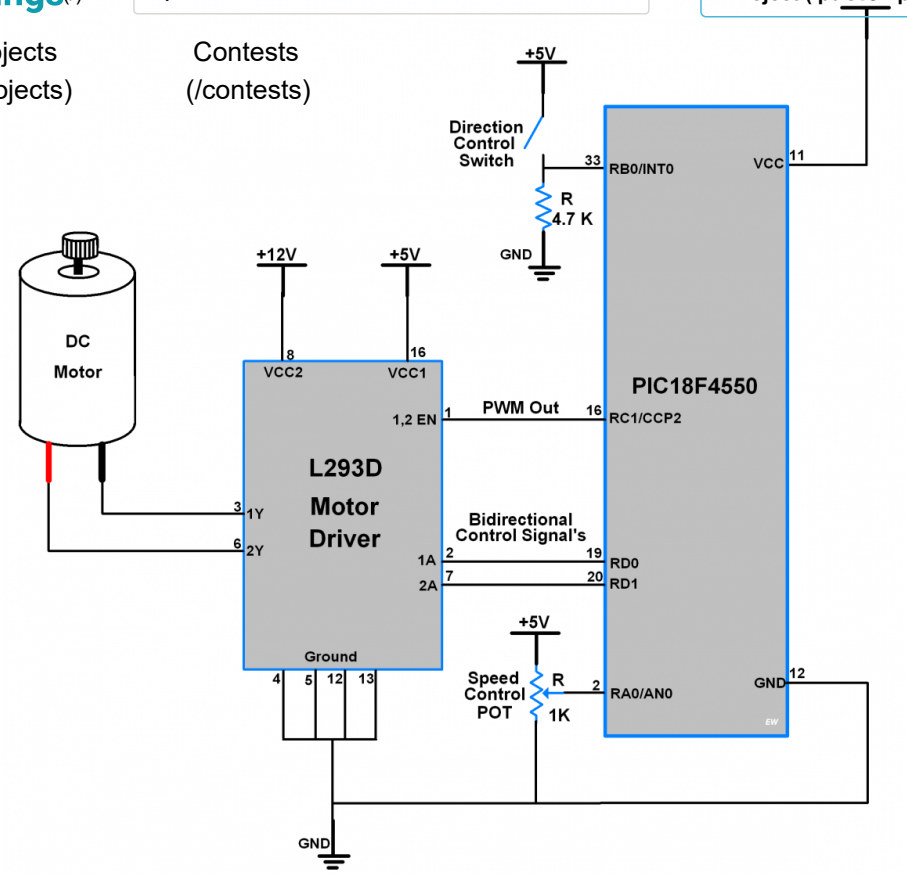
DC Motor

DC motor converts electrical energy in the form of Direct Current into mechanical energy.

- In the case of the motor, the mechanical energy produced is in the form of a rotational movement of the motor shaft.
- The direction of rotation of the shaft of the motor can be reversed by reversing the direction of Direct Current through the motor.
- The motor can be rotated at a certain speed by applying a fixed voltage to it. If the voltage varies, the speed of the motor varies.
- Thus, the DC motor speed can be controlled by applying varying DC voltage; whereas the direction of rotation of the motor can be changed by reversing the direction of current through it.
- For applying varying voltage, we can make use of the PWM technique.
- For reversing the current, we can make use of H-Bridge circuit or motor driver ICs that employ the H-Bridge technique or other any other mechanisms.

For more information about DC motors and how to use them, H-Bridge circuit configuration, PWM technique, refer to the topic DC Motors (http://electronicwings.com/sensors-modules/dc-motor) in the sensors and modules section as well as refer Working Principle of DC motor (http://www.electrical4u.com/working-or-operating-principle-of-dc-motor/).

## Connection Diagram of DC Motor to PIC18F4550




DC Motor Interfacing with PIC18F4550

## Control the speed of the DC Motor using PIC18F4550

Here, we are going to interface the DC motor with a PIC18F4550 microcontroller. In which we will control the DC motor speed by using POT connected to ADC of PIC18F4550 (http://electronicwings.com/pic/pic18f4550-adc) and direction by using a switch.

We are going to use the L293D motor driver IC to control the DC motor movement in both directions. It has an in-built H-bridge motor drive.

- As shown in the above figure we have connected 1KΩ Potentiometer at ADC channel 0 of PIC18F4550 to change the speed of the DC motor.
- One toggle switch is connected to the INT0 pin which controls the motor rotating direction.
- PORTD is used as an output control signal port. It provides control to motor1 input pins of the L293D motor driver which rotates the motor clockwise and anticlockwise by changing their terminal polarity.

### Programming steps

- Enable ADC and map its output into 0-255 range.
- Enable Global interrupt, INT0 external interrupt with a rising edge-triggered mode.
- Set PWM mode.
- Vary Duty cycle with ADC value and in an interrupt routine, we are toggling motor direction.

- Now continuously check for an interrupt for direction and read the ADC value for speed control.
- A switch will produce interrupt which causes to change in motor direction.

## DC Motor Speed Control Code using PIC18F4500

```
/*
 * DC Motor Speed & Direction control using PIC18F4550
 * http://www.electronicwings.com
 */


#include <math.h>
#include <stdio.h>
#include <pic18f4550.h>
#include "ADC_Header_File.h"
#include "Configuration_header_file.h"

#define MINTHR            8000
#define RESOLUTION        488

#define InternalOsc_8MHz    8000000
#define InternalOsc_4MHz    4000000
#define InternalOsc_2MHz    2000000
#define InternalOsc_1MHz    1000000
#define InternalOsc_500KHz  500000
#define InternalOsc_250KHz  250000
#define InternalOsc_125KHz  125000
```

## Video DC Motor Speed Control using PIC18F4550

## Components Used

| | | |
|---|---|---|
| **PICKit 4 MPLAB**<br>PICKit 4 MPLAB | X 1 | (https://www.mouser.in/ProductDetail/Microchip-Technology/PG164140?qs=r5DSvlrkXmLKDuYNJlmLWw%3D%3D&utm_source=electronicswings&utm_medium=display&utm_campaign=mouser-componentslisting&utm_content=0x0)<br>Datasheet (/components/pickit-4-mplab/1/datasheet) |
| **PIC18f4550**<br>PIC18f4550 | X 1 | (https://www.mouser.in/ProductDetail/Microchip-Technology/PIC18F4550-I-P?qs=oKK8NaWdAJs8nLDXBGwMXw%3D%3D&utm_source=electronicswings&utm_medium=display&utm_campaign=mouser-componentslisting&utm_content=0x0)<br>Datasheet (/components/pic18f4550/1/datasheet) |

## Components Used

| | | |
|---|---|---|
| **Breadboard**<br>Breadboard | X 1 | (https://www.mouser.com/ProductDetail/BusBoard-Prototype-Systems/BB830?qs=VEfmQw3KOauhPeTwYxNCaA%3D%3D&utm_source=electronicswings&utm_medium=display&utm_campaign=mouser-componentslisting&utm_content=0x0)<br>Datasheet (/components/breadboard/1/datasheet) |
| **L293D Driver**<br>L293D Driver | X 1 | (https://www.mouser.com/ProductDetail/STMicroelectronics/L293D?qs=gr8Zi5OG3MgMJ1ICDzLQbg%3D%3D&utm_source=electronicswings&utm_medium=display&utm_campaign=mouser-componentslisting&utm_content=0x0)<br>Datasheet (/components/l293d-driver/1/datasheet) |

Downloads

PIC DC Motor Interface Project File

Download (/api/download/platform-attachment/348)

## Comments

Comment

Isteward
(/users/Isteward/profile)
2018-01-28 21:29:55

Do you xc8 code for pic18f4550controlling ESCs and brushless motor control ?

Reply Like

lokeshc
(/users/lokeshc/profile)
2018-10-12 22:43:05

you can use servo motor's program to control brushless dc motor.

Reply Like

Isteward
(/users/Isteward/profile)
2018-10-12 15:12:27

Hi
OSCCON = ((clockSelectBits & 0x07) << 4) | 0x02;
I am interested in the effects of the above statement in my project. If I am also controlling some additional device eg. I have a gps module that stops working when I use the setPeriod() function. Forgive my lack of knowledge on pic controllers but are you changing the internal oscillator value (8 MHz) to a slower rate?

Reply Like 1

lokeshc
(/users/lokeshc/profile)
2018-10-12 22:52:26

Yes, you are absolutely right. setPeriod() function is changing the frequency of an oscillator (8 MHz) to generate the desired PWM frequency.

Reply Like

Isteward
(/users/Isteward/profile)
2018-10-13 06:17:22

So it is correct to say that I would need two pics in order to read gps data and control a dc motor. This issue must be a problem for many AGV enthusiasts - Is there any other obvious way to resolve this issue?

Reply Like

lokeshc
(/users/lokeshc/profile)
2018-10-14 23:51:12

No. You can use another device too while using pwm. Just dont use setperiod function. You can directly generate pwm.

For that you should refer, PWM in PIC18f4550.

Reply Like

ulfathussain

(/users/ulfathussain/profile)
2022-11-29 21:30:26

Hey bro.can i get the circuit diagram to run to simulation first?

Reply Like