FD04A

Flexibot Driver

# User's Manual

V1.1

May 2009

Index

1. INTRODUCTION AND OVERVIEW

Flexibot Driver 4 Channels, FD04A is special designed to drive 4 DC brush motors. Since PR19, Flexibot – Using Transwheel (PR19) is using it as motor driver, it is being named after this bot. However, the application of FD04A is not limited to the DIY project, PR19. It offers low cost and easy to use DC motor driver capable of driving up 4 DC brush motor, and the current can goes up to 3-Ampere. With minimum interface the board is ready for driving motor with direction, start, stop and speed control. It has been designed with capabilities and features as below:

- Industrial grade PCB.
- Each component is soldered properly and tested.
- Able to drive 4 DC motor at 3A.
- Protection against over current.
- Bi-directional control for 4 DC motors.
- 2 LEDs as direction indicator for each motor.
- 1 LED as power indicator.
- Pluggable connector for more user friendly design.
- **Dimension** 12.4cm x 5.3cm
- Fully compatible with Cytron DIY project, Flexibot – Using Transwheel (PR19).

2. PACKING LIST

Please check the parts and components according to the packing list. If there are any parts missing, please contact us at sales@cytron.com.my immediately.
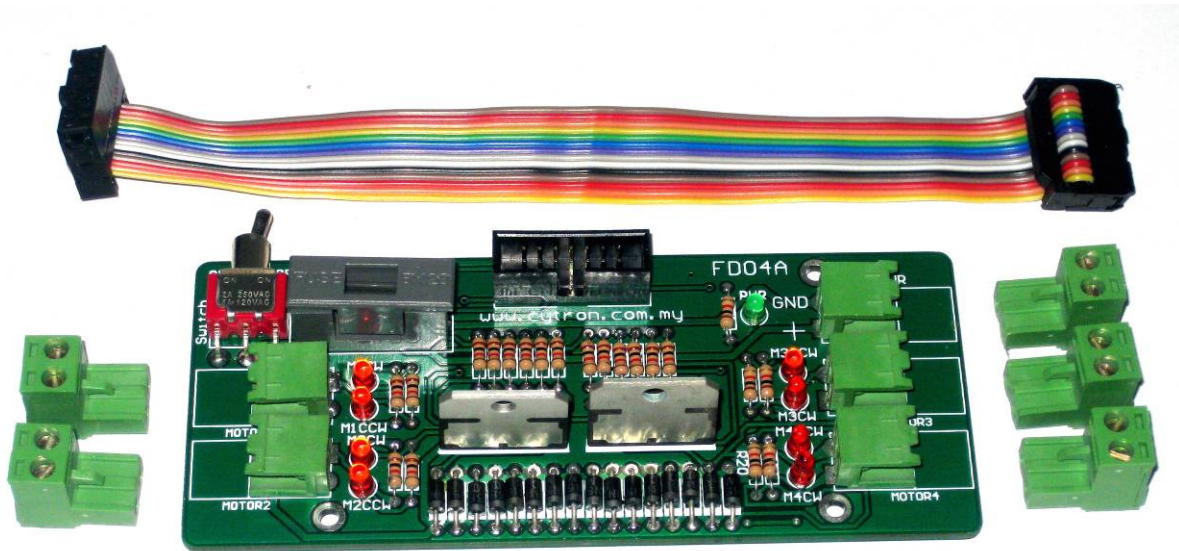
FD04A come with:

- 1 x FD04A board with every component soldered properly.
- 5 x Pluggable Terminal block
- 1 x 14 way IDE cable connector.
- 1 x 3A fast blow fuse

3. PRODUCT SPECIFICATION AND LIMITATIONS

Absolute Maximum Rating

Symbol	Parameter	Value	Unit
PWR	Voltage supply to motor	26	V
*I_{max}	Maximum Output Current (continuous) for FD04A.	3	A
F_{PWM}	Maximum PWM Frequency	40	KHz

* This I_{max} is limited by on board 3A fuse, changing the value of fuse will increase the I_{max}. However, it will not protect individual H-bridge.

Pin Connections
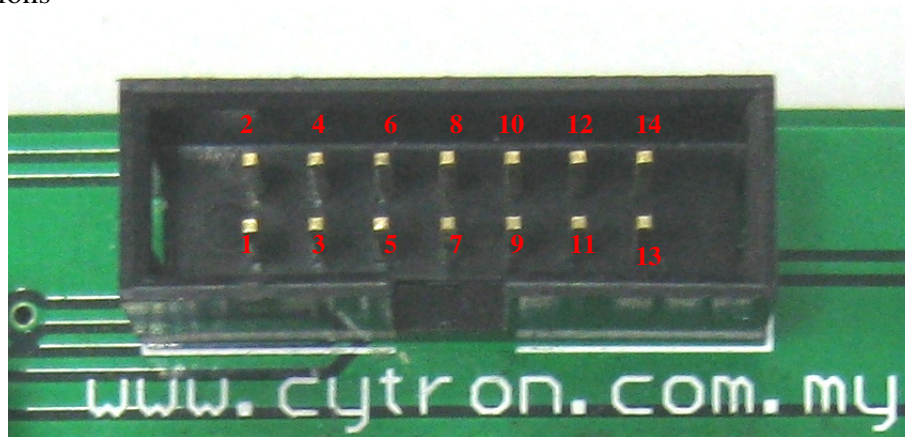
Figure show the pin orientation of the 2x7 IDE socket and the orientation is same for both PR19 and FD04A PCB. The function of each pin is described as below:

No	Name	Functions
1	Pin 1	Motor 1 pin 1
2	Pin 2	Motor 1 speed control
3	Pin 3	Motor 1 pin 2
4	Pin 4	Motor 2 pin 1
5	Pin 5	Motor 2 speed control
6	Pin 6	Motor 2 pin 2
7	Pin 7	Motor 3 pin 1
8	Pin 8	Motor 3 speed control
9	Pin 9	Motor 3 pin 2
10	Pin 10	Motor 4 pin 1
11	Pin 11	Motor 4 speed control
12	Pin 12	Motor 4 pin 2
13	Pin 13	5V
14	Pin 14	GND

Table 1

Referring to Table 1, there are 4 channels of FD04A and each channel has 3 control pins, which are pin 1, pin 2 and speed control. Pin 1 and pin 2 of each channel control the motor activation and direction, while speed control should be given the PWM if speed is needed. If speed is not necessary, the speed control pin is connecting to 5V. The motor will run with full speed. Maximum PWM frequency is 40K Hz.

True table for pin 1 and pin 2:

Pin 1	Pin2	Motor state
0	0	Brake to Ground
0	1	CW (relative)
1	0	CCW (relative)
1	1	Brake to V motor

4. BOARD LAYOUT
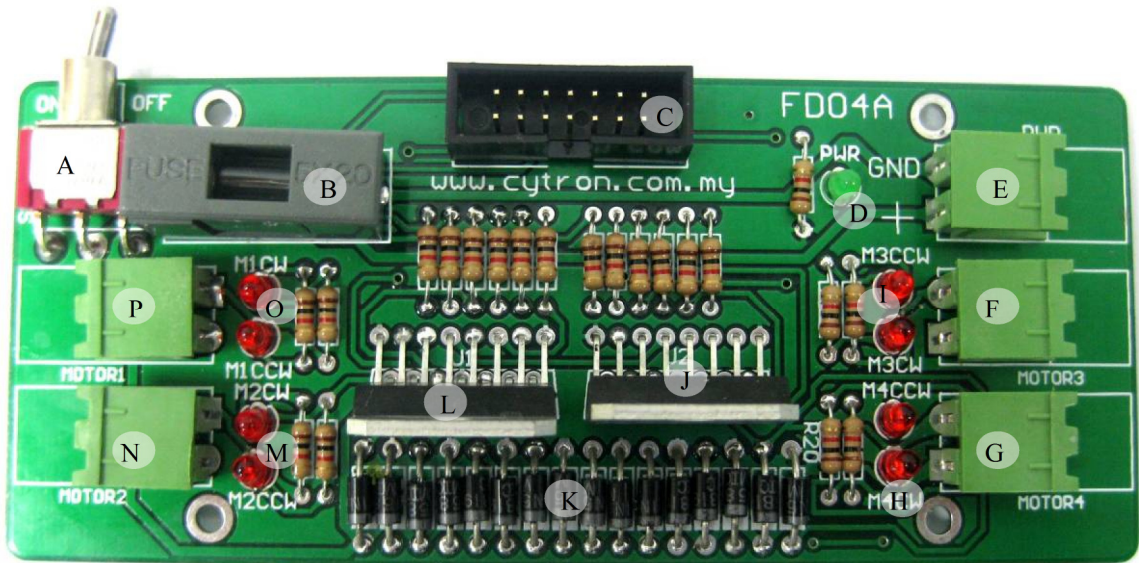
Label	Function	Label	Function
A	Horizontal toggle switch	I	Status indicator LED for motor 3
B	Fuse and fuse holder	J	Right L298 motor driver
C	7 x 2 IDE socket	K	Schottky diodes
D	Power indicator LED	L	Left L298 motor driver
E	Power supply pluggable terminal block	M	Status indicator LED for motor 2
F	Motor 3 pluggable terminal block	N	Motor 2 pluggable terminal block
G	Motor 4 pluggable terminal block	O	Status indicator LED for motor 1
H	Status indicator LED for motor 4	P	Motor 1 pluggable terminal block

A – Switch to ON or OFF FD04A board.

B – 3A fuse used as circuit protection.

C – Socket to connect FD04A driver to user circuit board or PR19 board.

D – Power supply indicator LED. It is green in color. Once motor power is inserted to the board, this LED will turn ON.

E – Connector for motor power supply

F – Connecter for motor 3.

G – Connecter for motor 4.

H – These are a pair of yellow LED. These LED are to indicate the direction of motor 4. If motor 4 run in clockwise direction, CW status LED for motor 4 will turn ON else if motor 4 run in counter clockwise direction, CCW status LED for motor 4 will turn ON.

I – These are a pair of yellow LED. These LED are to indicate the direction of motor 3. If motor 3 run in clockwise direction, CW status LED for motor 3 will turn ON else if motor 3 run in counter clockwise direction, CCW status LED for motor 3will turn ON.

J – Motor driver for FD04A. Each motor driver is capable of driving 2 DC brush motor.

K – Schottky diodes used to clamping diode.

L – Motor driver for FD04A. Each motor driver is capable of driving 2 DC brush motor.

M – These are a pair of yellow LED. These LED are to indicate the direction of motor 2. If motor 2 run in clockwise direction, CW status LED for motor 2 will turn ON else if motor 2 run in counter clockwise direction, CCW status LED for motor 2 will turn ON.

N – Connecter for motor 2.

O – These are a pair of yellow LED. These LED are to indicate the direction of motor 1. If motor 1 run in clockwise direction, CW status LED for motor 1 will turn ON else if motor 1 run in counter clockwise direction, CCW status LED for motor 1 will turn ON.

P – Connecter for motor 1.

5. INSTALLATION (HARDWARE)

5.1 Connecting Battery and Motor

In a typical application, the motor power supply (battery) should be soldered directly to PCB. However, user may choose to use pluggable terminal block to connect to the battery's cable. Same applied to motor terminal. The control pin come with connector and is ready for user to interface with wire.

Before the battery (power) is plugged in, make sure the polarity is correct to prevent the explosion. User **MUST** follow the overlay on FD04A PCB to make sure the correct polarity of battery.
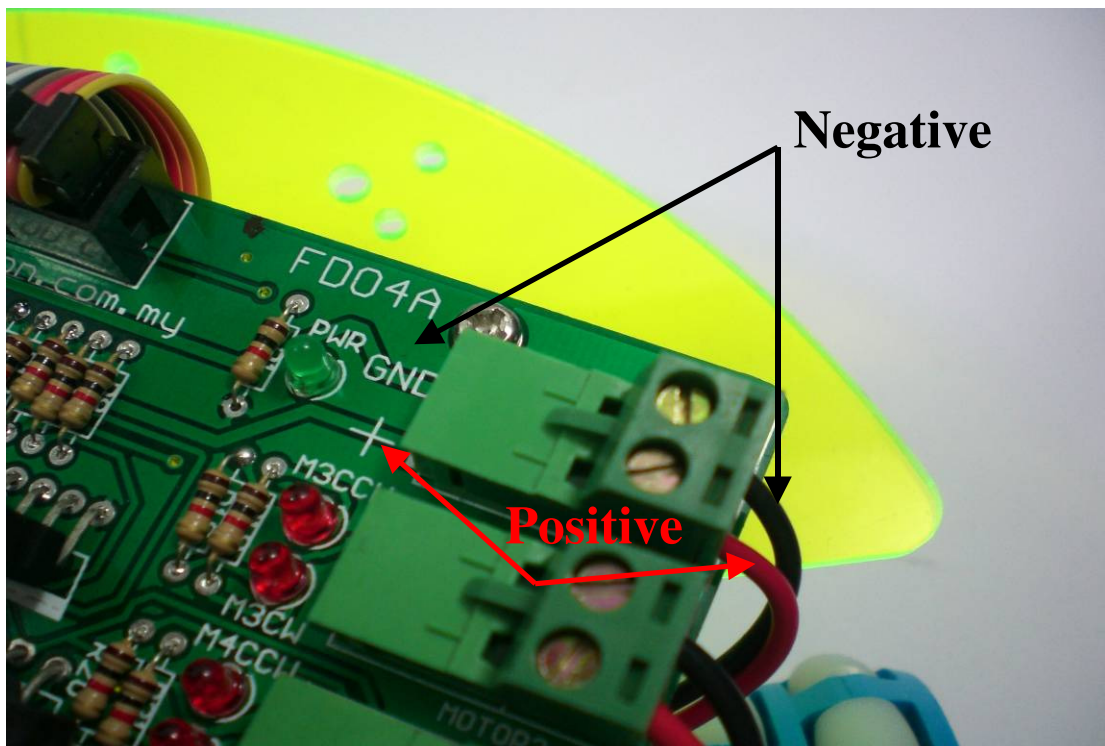
Caution: Make sure the motor power source wires do not contact with each other while the process of connecting power source wire with green terminal. The contacted wire will caused fire spark if the power supply is connected and these will cause damage to power supply or battery.

Create the power supply to terminal block according to the order shown in figure 8 below:
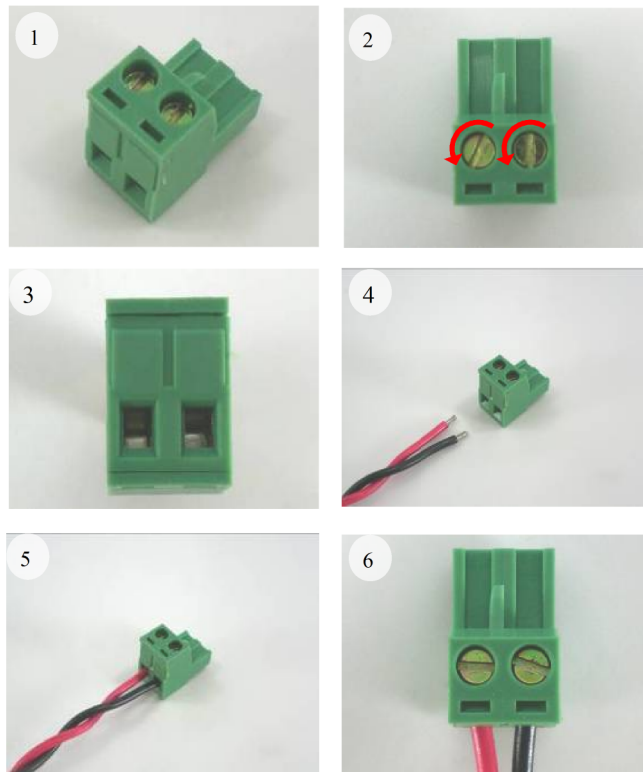
For motor connecting, cut the red and black wire into 18cm length each. Solder the red wire on the positive pin of motor while solder black wire on the negative pin of motor. There is a - sign beside the negative pin of motor as shown in following figures.

Sign beside the negative pin of motor
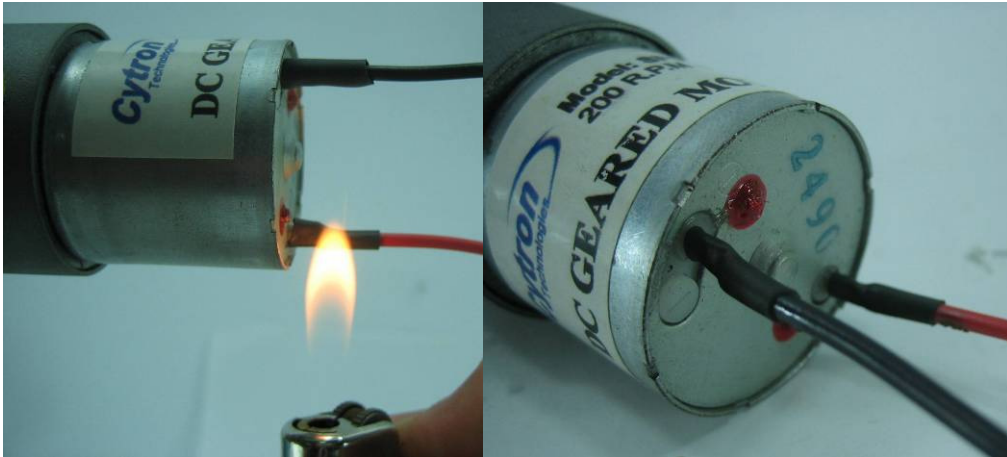
Cut black shrink tube into 1cm each. Place the heat shrink tube over electricity conduction joint between motor pin and wire. Supply heat to the black shrink tube and it will cover the joint neatly as shown in figure above.

Following step is to connect the other end of motor wires to pluggable terminal block. Choose which ever motor port to connect. For more detail about motor connecting to FD04A and PR19, user may obtain the steps from PR19 (Flexibot-Using Transwheel) User's Manual at our website www.cytron.com.my

For motor cable connection to FD04A driver, negative black cable is connect to CCW and positive red cable is connect to CW. User is required to ensure the connection of motor cable with FD04A is correct. Wrong connection of motor to FD04A driver will result in different direction of motor rotation.

Figure below show motor connecting to FD04A driver and Robot base. For the tidiness of Flexibot, user may place Flexibot's battery under the PR19 PCB. User may refer to PR19 User's Manual for more details for battery connecting. One 12V Li-Po battery is enough to supply voltage to both of the PR19 circuit and FD04A.
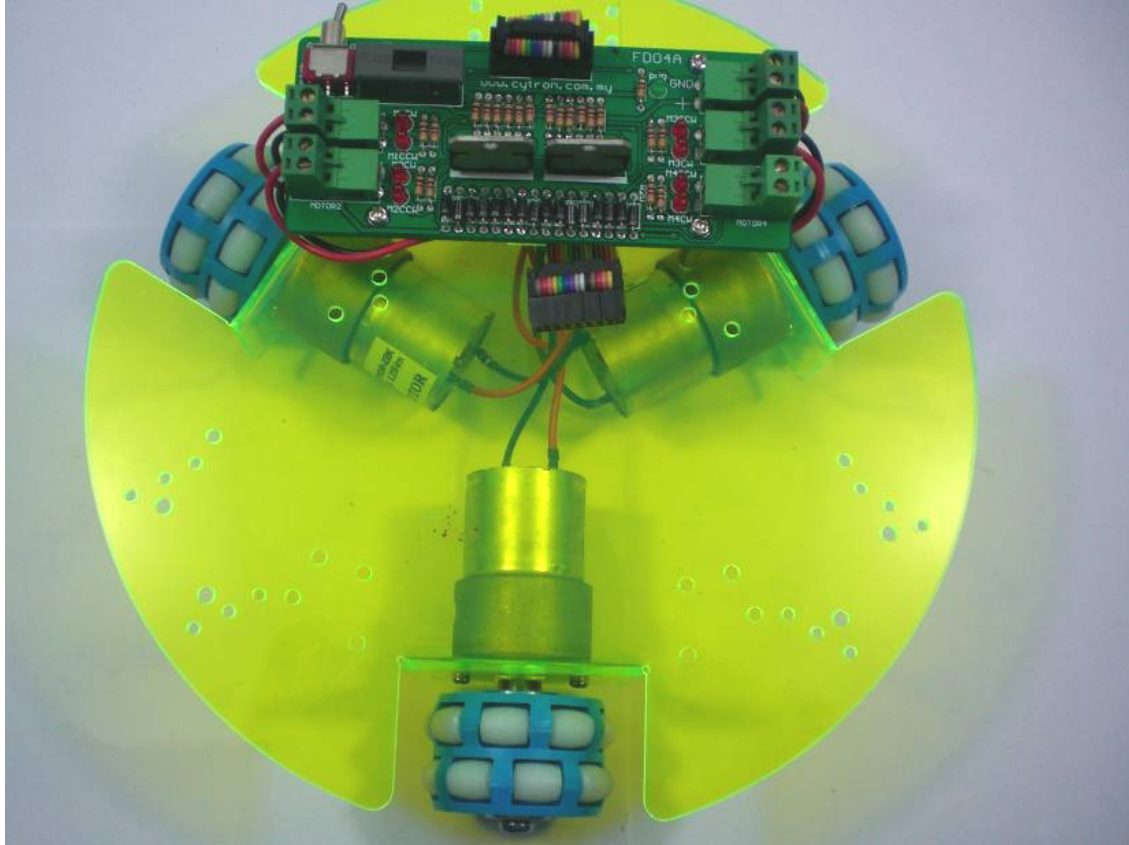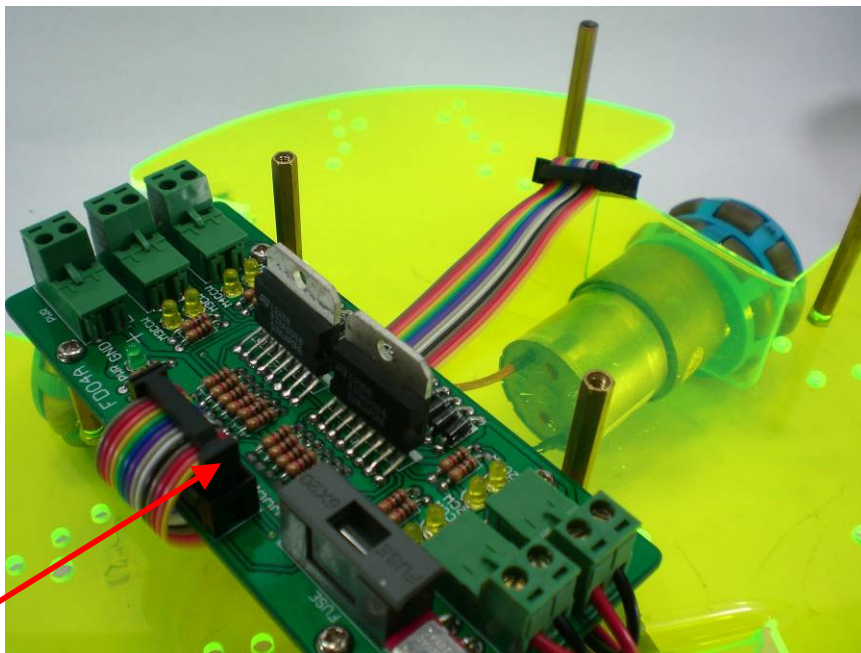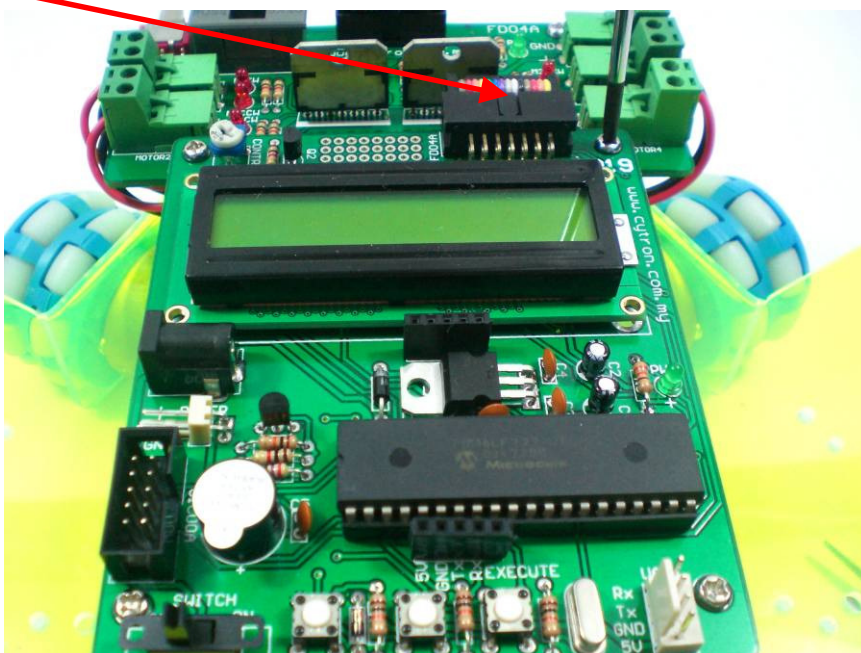
5.2 Connecting to Microcontroller

Though FD04A is designed for PR19, user may connect to any circuit as long as the connection of control pin is correct. However to ease the explanation, the example installation of connecting the FD04A to Microcontroller circuit board will mainly refer to the connection to PR19 circuit board.

FD04A comes with 14 way IDE cable connector. This cable is used to connect FD04A driver to microcontroller. For microcontroller connecting, connect the IDC connector with the FD04A driver and then connect the other end of IDC connector to PR19 PCB. Following figure shows the connection between FD04A driver and microcontroller.

Connection

Connect the end of IDC connector to PR19 PCB

6. GETTING STARTED

This section will show the example on method to operate FD04A. FD04A driver has been designed to work with interface to microcontroller.

For this section, FD04A will be interface with PR19 (Flexibot-Using Transwheel). Please refer PR19, DIY project from Cytron website for details example of interfacing to FD04A. Please refer to http://www.cytron.com.my/usr_attachment/PR19_DD.pdf

Notes: CW and CCW LED will turn ON when FD04A connect to Flexibot (PR19). It is because of PWM. The motor will stop for off duty cycle but the back EMF from motor will drive another LED.

7. WARRANTY

- ➢　Product warranty is valid for 6 months.
- ➢　Warranty only applies to manufacturing defect.
- ➢　Damage caused by mis-use is not covered under warranty.
- ➢　Warranty does not cover freight cost for both ways.

Prepared by
Cytron Technologies Sdn. Bhd.
19, Jalan Kebudayaan 1A,
Taman Universiti,
81300 Skudai,
Johor, Malaysia.

Tel:　　+607-521 3178
Fax:　　+607-521 1861

URL:　www.cytron.com.my
Email: support@cytron.com.my
sales@cytron.com.my