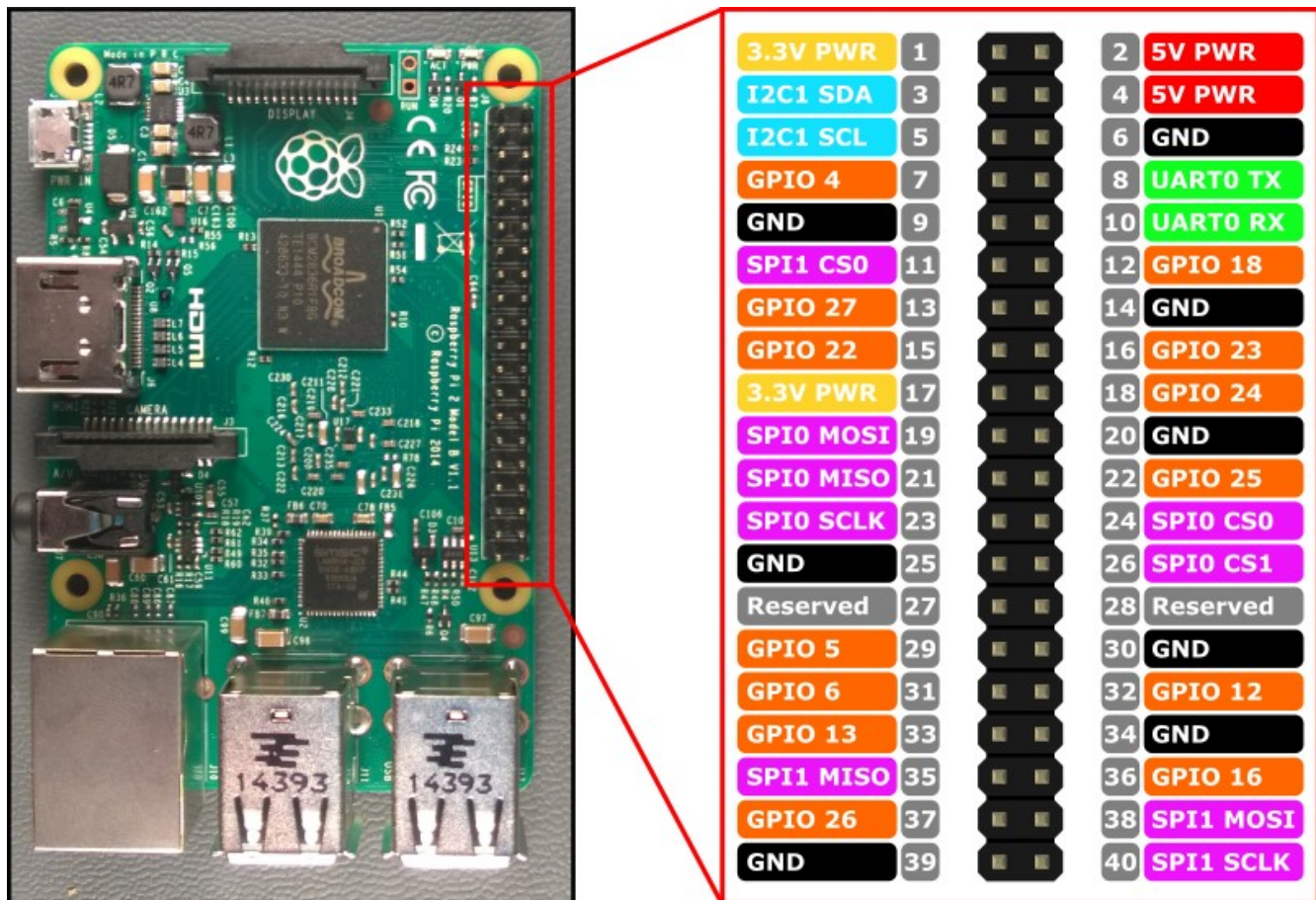


Hardware interfaces for the Raspberry Pi 2 are exposed through the 40-pin header **J8** on the board. Functionality includes:

- 17x - GPIO pins
- 1x - SPI bus
- 1x - I2C bus
- 2x - 5V power pins
- 2x - 3.3V power pin
- 8x - Ground pins

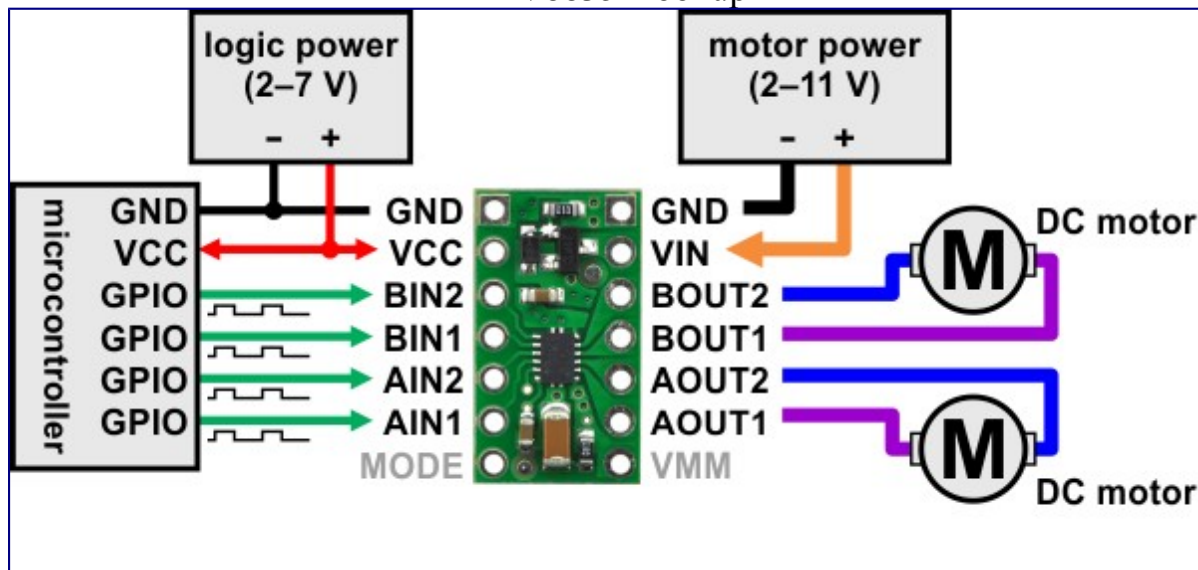
Raspberry Pi 2 Header Pin Mappings



Motor Control

The PiBot uses a DRV8835 based motor driver board to control the drive motors.

DRV8835 Hookup



When the MODE pin is disconnected or low, the following truth table shows how to achieve drive/coast/brake operation using the IN/IN control interface:

Drive/coast or drive/brake operation with MODE=0 (IN/IN)

xIN1	xIN2	xOUT1	xOUT2	operating mode
L	L	OPEN	OPEN	coast (outputs off)
PWM	L	PWM	L	forward/coast at speed PWM %
L	PWM	L	PWM	reverse/coast at speed PWM %
H	PWM	PWM	L	forward/brake at speed 100% – PWM %
PWM	H	L	PWM	reverse/brake at speed 100% – PWM %
H	H	L	L	Full brake (outputs shorted to ground)

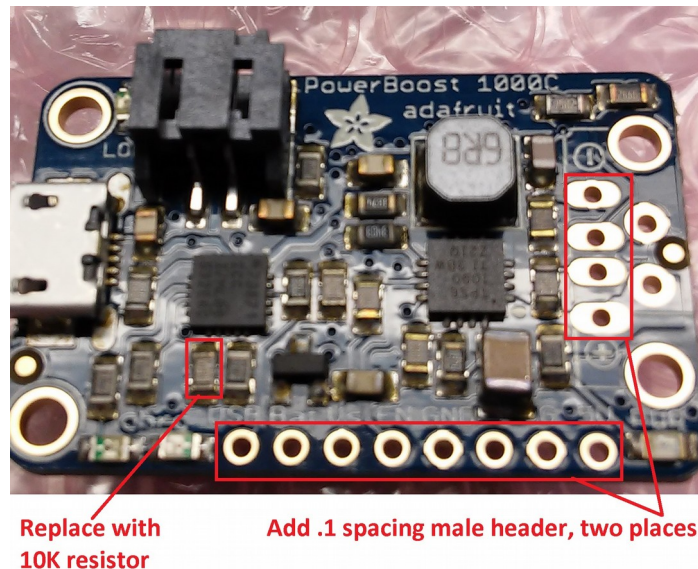
A program called “Servoblaster” is used to generate the PWM signals needed to control the motors. GPIOs #18,23,24,25 are used to control the DRV8835

Power Supply

The PiBot uses an Adafruit Boost1000 to supply power to the robot from a single LiPo battery. It can also charge the battery from a standard cell phone “wall wart” charger.

For battery health and safety reasons we recommend raising the charging shutdown current from 10ma to 100ma by doing the modification shown below. Also headers should be installed to connect the board to the bot.

Modifications for PowerBoost1000 board



Optional Reset Switch

The Raspberry Pi2 board also features a reset header. This can be used to reset the board in an emergency, or to start-up the system after a shutdown command. Simply short the two pins together.



Hooking Up The PiBot Boards

The connections used by the Explorers PiBot are shown in the table below

PiBot Header Connections							
Pin	Signal	Pull	Connection	Pin	Signal	Pull	Connection
1	3.3V			2	5V		5V from Boost1000
3	I ² C SDA			4	5V		
5	I ² C SCL			6	GND		Console cable Gnd
7	GPIO 4	Up	Menu switch Input	8	UART TX		Console cable TX
9	GND		Menu switch Gnd	10	UART RX		Console cable RX
11	SPI1 CS0	Down		12	GPIO 18	Down	DRV8835 AIN1
13	GPIO 27	Down	LED Control	14	GND		Gnd from Boost1000
15	GPIO 22	Down		16	GPIO 23	Down	DRV8835 AIN2
17	3.3V		DRV8835 VCC	18	GPIO 24	Down	DRV8835 BIN1
19	SPI MOSI			20	GND		DRV8835 Gnd
21	SPI MISO			22	GPIO 25	Down	DRV8835 BIN2
23	SPI SCLK			24	SPI0 CS0		
25	GND			26	SPI0 CS1		
27	Reserved			28	Reserved		
29	GPIO 5	Up		30	GND		
31	GPIO 6	Up		32	GPIO 12	Down	
33	GPIO 13	Down		34	GND		
35	SPI1 MISO	Down		36	GPIO 16	Down	
37	GPIO 26	Down		38	SPI1 MOSI	Down	
39	GND			40	SPI1 SCLK	Down	

To make the connections use F-F jumpers and connect them according to the wiring list below:
Where (cut/solder) is shown, one end of the jumper is cut off and the wire is soldered to the connection.

PiBot Jumper List

Con#	From	To	Len	Signal
1	Pi J8 pin 2	Boost 5V on USB	3"	5V supply
2	Pi J8 pin 7	Menu Switch (cut/solder)	6"	Menu switch input
3	Pi J8 pin 9	Menu Switch (cut/solder)	6"	Gnd
4	Pi J8 pin 12	DRV8835 AIN1	6"	Motor control signal
5	Pi J8 pin 14	Boost Gnd on USB	3"	Gnd
6	Pi J8 pin 16	DRV8835 AIN2	6"	Motor control signal
7	Pi J8 pin 17	DRV8835 VCC	6"	3.3V
8	Pi J8 pin 18	DRV8835 BIN1	6"	Motor control signal
9	Pi J8 pin 20	DRV8835 Gnd	6"	Gnd
10	Pi J8 pin 22	DRV8835 BIN2	6"	Motor control signal
11	Boost1000 Gnd	DRV8835 Gnd	3"	Gnd
12	Boost1000 Bat	DRV8835 VIN	3"	Battery +
13	Boost1000 Gnd	Power Switch (cut/solder)	6"	Gnd
14	Boost1000 EN	Power Switch (cut/solder)	6"	Power Enable
15	DRV8835 AOUT1	RH Motor Top (cut/solder)	6"	Motor drive
16	DRV8835 AOUT2	RH Motor Bot (cut/solder)	6"	Motor drive
17	DRV8835 BOUT1	LH Motor Top (cut/solder)	6"	Motor drive
18	DRV8835 BOUT2	LH Motor Bot (cut/solder)	6"	Motor drive