

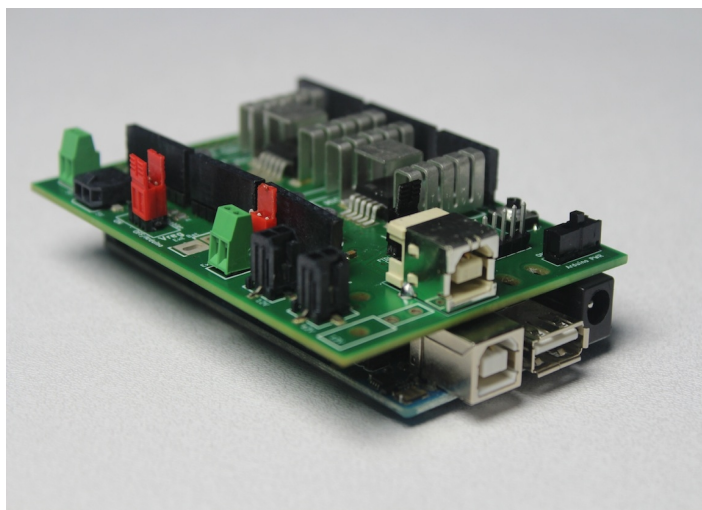


Engineering

TurtleBot Power Interface Shield

Includes

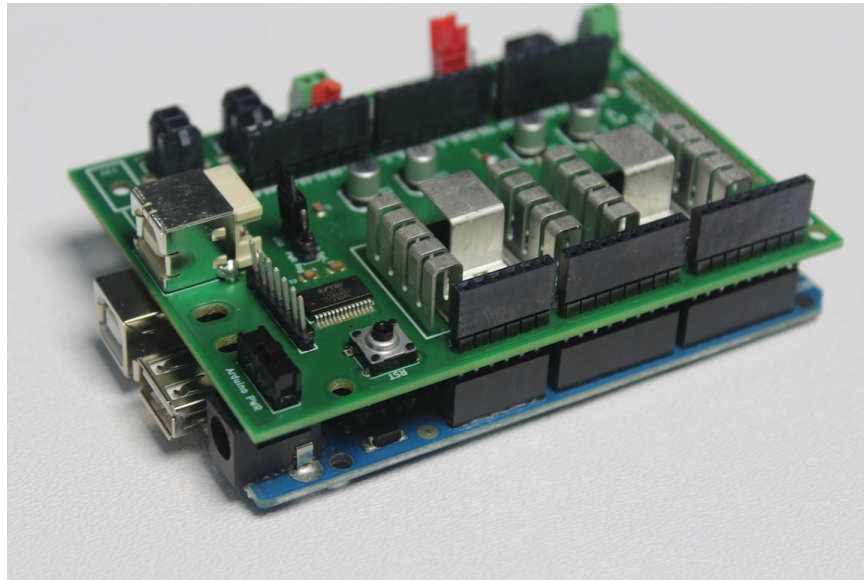
- 1x Mini-Din 7 to MTA100 Cable
- 1x Turtlebot Power Interface Shield
- Stacking Headers sold separately





TurtleBot Power Interface Shield User Manual

<http://www.IHeartEngineering.com>



Description

The Power Interface Shield is a board made for PC to Roomba (or iCreate) communication using an integrated FTDI chip and power regulator for Turtlebot devices.

The Arduino board RX and TX pins are tied to the Roomba's TX and RX respectively when the shield is stacked to an Arduino Uno or Mega board.

The board has two voltage regulators, 5V and 12V, that can be controlled by an Arduino board. If no Arduino board is present, the voltage regulators can be enabled and disabled with shunts.



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Power Supply Input

Select between using the Roomba's internal battery or an external battery to supply power to the 5V and 12V voltage regulators. There are two different external battery connector: a Deans connector and a 2-pin Screw Terminal block.

WARNING: Not using the proper power supply to turn on the Arduino board may cause damage to the Arduino Board. Use a power supply within the recommended input voltage range (recommended input voltage for the Arduino Uno is between 7V and 12V).

Voltage Regulator Enabler

Enable the 5V and 12V voltage regulators independently with a shunt. There are two positions on the jumpers: always on, and off or Arduino-controlled if an Arduino board is present. The Arduino board digital pin 6 enables the 5V regulator and pin 7 enables the 12V regulator. Pins 6 and 7 are tied to ground through a 1k-Ohm pull down resistor.

Power Supply Output

The TurtleBot Power Interface Shield Rev. 01 has three 12V output connectors and two 5V output connectors. Rev. 02 has only two of each voltage output.

FTDI Power Select

Using a shunt select how to power the FTDI chip; using the USB 5V power supply or the output 5V from the shield's 5V regulator. Both supplies have a common ground.



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Arduino Power Switch

A slide switch turns on or off the Arduino board. The input power (Internal or External battery depending on the selector) is connected to the Arduino board's Vin pin.

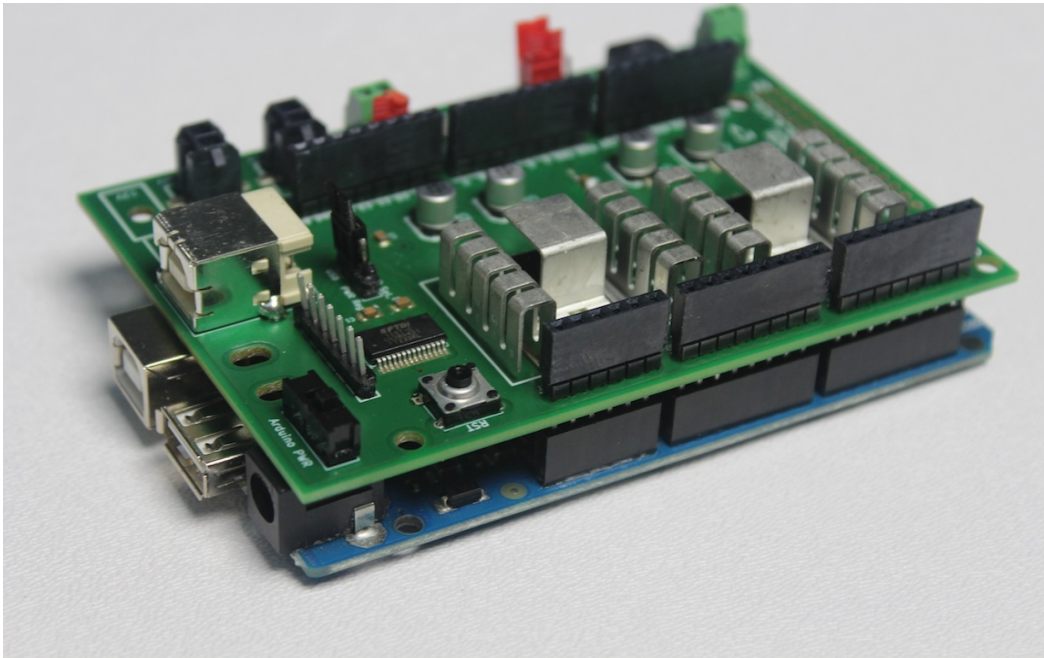
WARNING: Not using the proper power supply to turn on the Arduino board may cause damage to the Arduino Board. Use a power supply within the recommended input voltage range (recommended input voltage for the Arduino Uno is between 7V and 12V).

LED Indicators **for Rev. 02 and above*

Two LEDs attached to the FTDI chip indicate data transmission. They are properly labeled RX and TX. There is a LED that turns on when the Arduino Power Switch is turned on. Two LEDs light up individually when the 5V and 12V regulators are enabled.



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Shield Stacking

The TurtleBot Power Interface Shield can be stacked on the Arduino Uno, Arduino Mega, Arduino Duemilanove, and other Arduino boards with similar specifications.

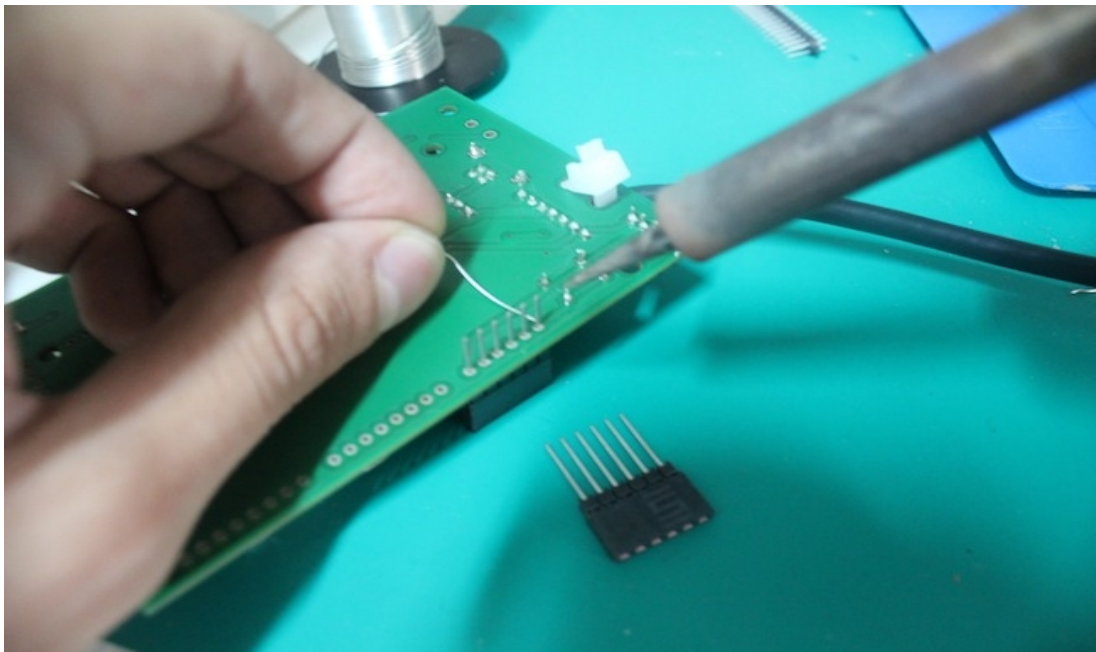


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Soldering

Solder stacking headers to stack the shield to an Arduino board. Place the stacking headers from top to bottom and turn the shield upside down as seen on the picture. Solder one pin at a time applying enough heat and solder. Repeat process for Deans connector (not supplied).

If using regular header pins (non-stacking), place the pins on the Arduino Board, stack the shield on top and solder from the top side. That way the pins remain aligned with the Arduino Board.



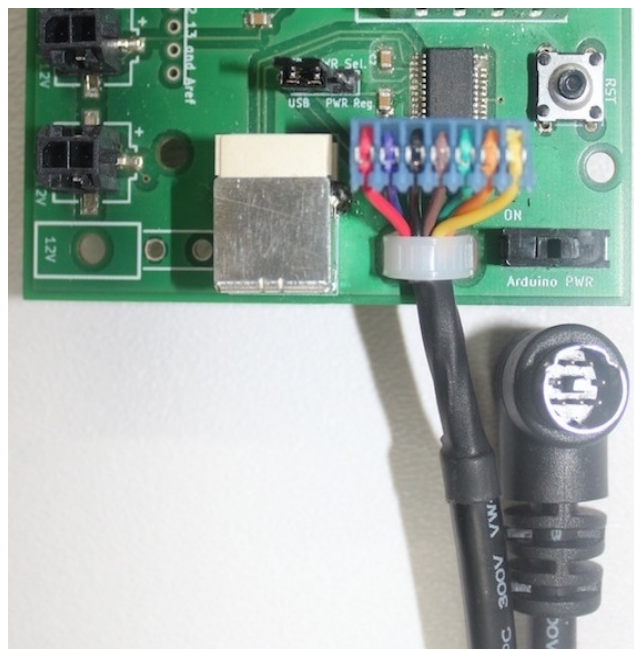


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USB Cable

The TurtleBot Power Interface Shield Rev. 01 board uses a Type B USB connector.
The TurtleBot Power Interface Shield Rev. 02 board uses a Micro B USB connector.

Use a zip tie to securely attach the cable to the board.

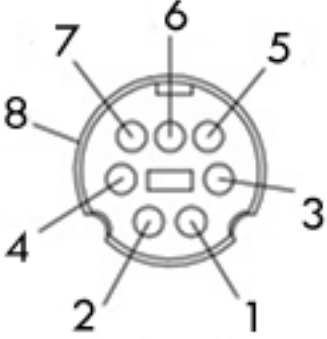




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Mini-Din 7 Cable Pinout

A Mini-Din 7 to MTA 100 cable (provided) connects the Roomba with the board.

Mini-Din 7 to MTA100 Cable pinout	
 Front Side View	<ol style="list-style-type: none">1. Red wire2. Purple wire3. Black wire4. Brown wire5. Orange wire6. Yellow wire7. Green wire8. Drain wire

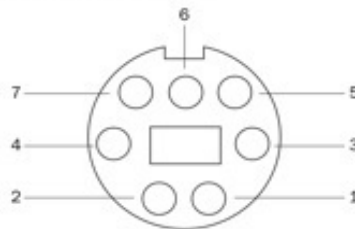


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Roomba Mini-Din 7 pinout

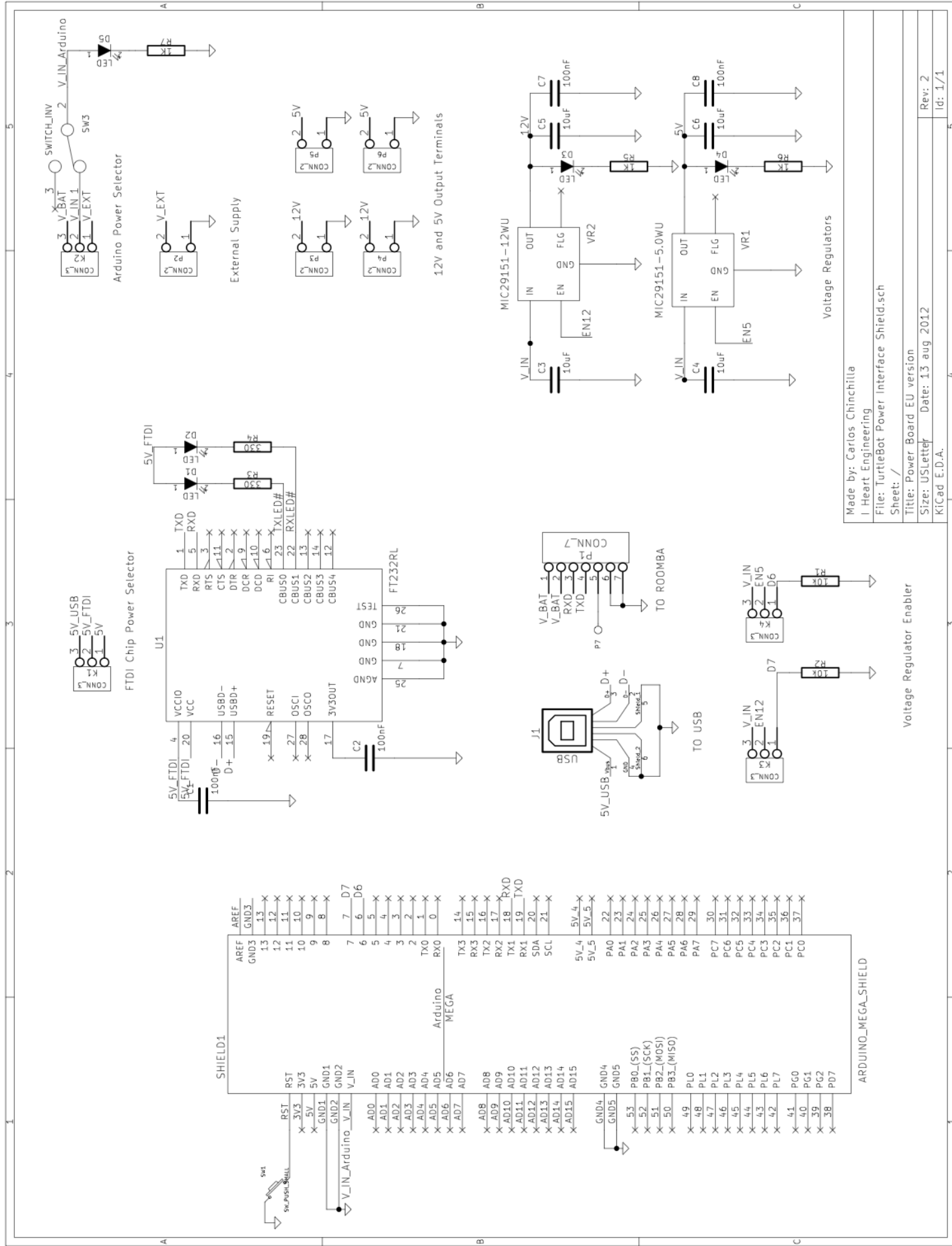
ROOMBA'S EXTERNAL SERIAL PORT MINI-DIN CONNECTOR PINOUT

This diagram shows the pin-out of the top view of the female connector in Roomba. Note that pins 5, 6, and 7 are towards the outside circumference of Roomba.



Pin	Name	Description
1	Vpwr	Roomba battery + (unregulated)
2	Vpwr	Roomba battery + (unregulated)
3	RXD	0 – 5V Serial input to Roomba
4	TXD	0 – 5V Serial output from Roomba
5	DD	Device Detect input (active low) – used to wake up Roomba from sleep
6	GND	Roomba battery ground
7	GND	Roomba battery ground

NOTE: pin 5, used for the baud rate selector on the iCreate, is broken out in the TurtleBot Power Interface Shield Rev. 02 board.



SHIELD1		ARDUINO_MEGA_SHIELD		ARDUINO_MEGA	
AREF	GND3	AREF	GND3	AREF	GND3
13	13	13	13	13	13
12	12	12	12	12	12
11	11	11	11	11	11
10	10	10	10	10	10
9	9	9	9	9	9
8	8	8	8	8	8
7	7	7	7	7	7
6	6	6	6	6	6
5	5	5	5	5	5
4	4	4	4	4	4
3	3	3	3	3	3
2	2	2	2	2	2
1	1	1	1	1	1
TXD	TXD	TXD	TXD	TXD	TXD
RXD	RXD	RXD	RXD	RXD	RXD
TX3	TX3	TX3	TX3	TX3	TX3
RX3	RX3	RX3	RX3	RX3	RX3
AD0	AD0	AD0	AD0	AD0	AD0
AD1	AD1	AD1	AD1	AD1	AD1
AD2	AD2	AD2	AD2	AD2	AD2
AD3	AD3	AD3	AD3	AD3	AD3
AD4	AD4	AD4	AD4	AD4	AD4
AD5	AD5	AD5	AD5	AD5	AD5
AD6	AD6	AD6	AD6	AD6	AD6
AD7	AD7	AD7	AD7	AD7	AD7
AD8	AD8	AD8	AD8	AD8	AD8
AD9	AD9	AD9	AD9	AD9	AD9
AD10	AD10	AD10	AD10	AD10	AD10
AD11	AD11	AD11	AD11	AD11	AD11
AD12	AD12	AD12	AD12	AD12	AD12
AD13	AD13	AD13	AD13	AD13	AD13
AD14	AD14	AD14	AD14	AD14	AD14
AD15	AD15	AD15	AD15	AD15	AD15
5V_4	5V_4	5V_4	5V_4	5V_4	5V_4
5V_5	5V_5	5V_5	5V_5	5V_5	5V_5
PA0	PA0	PA0	PA0	PA0	PA0
PA1	PA1	PA1	PA1	PA1	PA1
PA2	PA2	PA2	PA2	PA2	PA2
PA3	PA3	PA3	PA3	PA3	PA3
PA4	PA4	PA4	PA4	PA4	PA4
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PA98	PA98	PA98	PA98	PA98	PA98
PA99	PA99	PA99	PA99	PA99	PA99
PA100	PA100	PA100	PA100	PA100	PA100



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Serial Communication Test

To test for PC-Roomba communication, use the C-Kermit terminal or any preferred terminal. Turn off the Roomba, connect it to the shield and the shield to the computer, and type the following in kermit.

```
SET LINE /dev/ttyUSB0 # or respective location
```

```
SET PARITY NONE
```

```
SET FLOW NONE
```

```
SET CARRIER-WATCHDOG OFF
```

```
SET SPEED 115200
```

```
CONNECT
```

Turn on the Roomba. If there is a proper connection, the terminal will print information about the Roomba on screen. If there is no readable text or no text is printed on screen, try changing the baud rate, checking the cable connections, and battery status of the Roomba. If the problem persists, reset the Roomba and use the default baud rate (115200 bsp) or contact tech support.

Tech Support

For any problems, questions, or comments feel free to contact an I Heart Engineering representative via email at support@iheartengineering.com or phone.



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