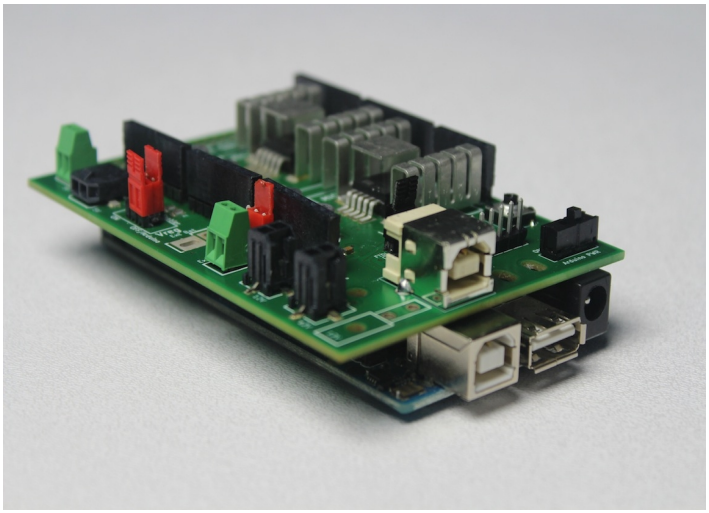
Engineering

TurtleBot Power Interface Shield

Includes

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



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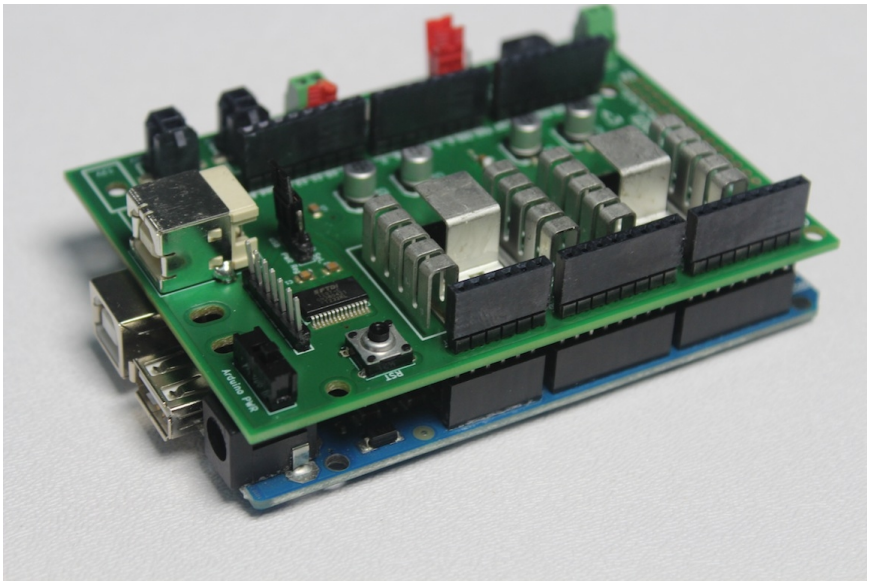
http://www.IHeartEngineering.com

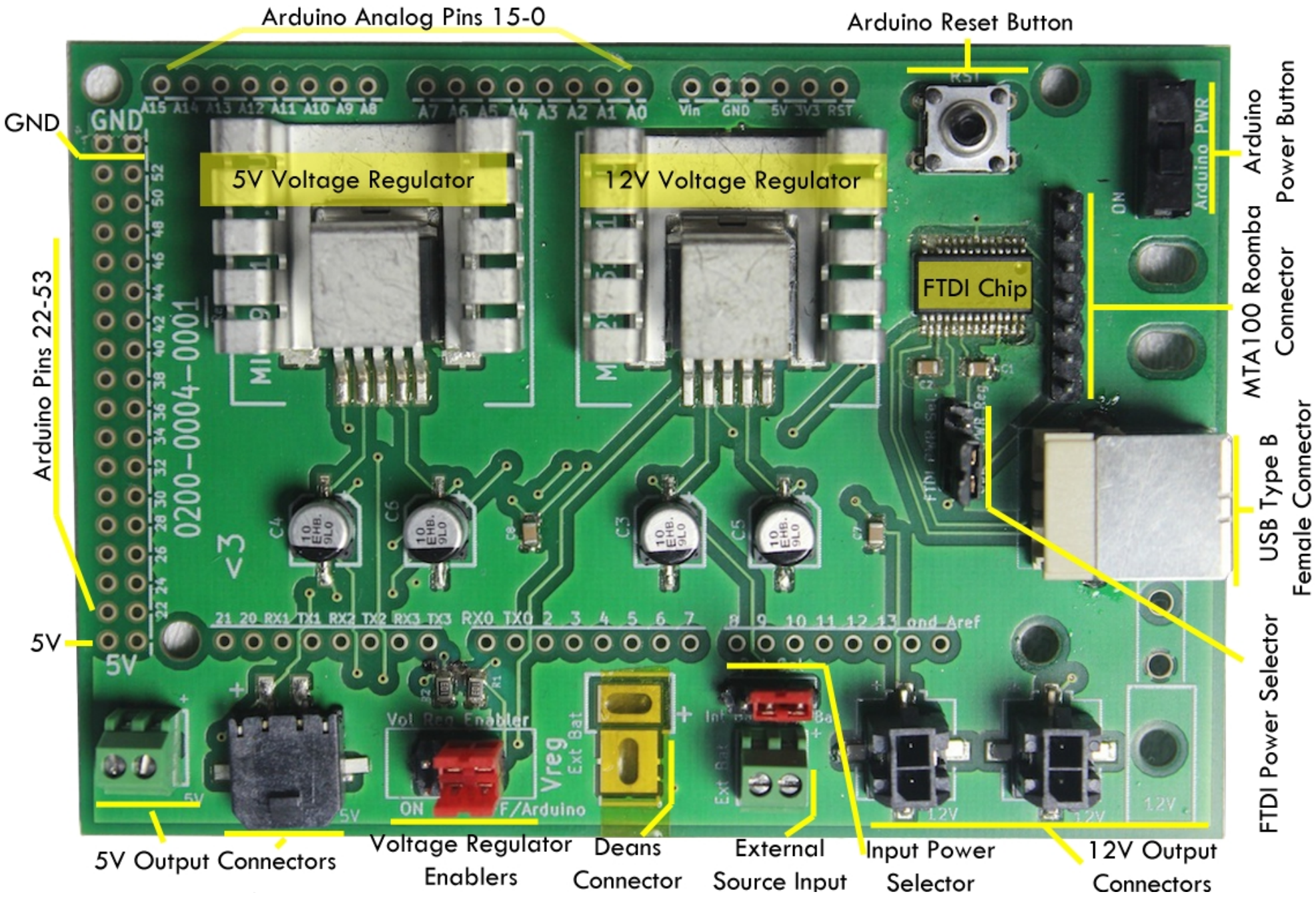


Description

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.


Arduino Analog Pins 15-0
Arduino Reset Button
GND
5V Voltage Regulator
12V Voltage Regulator
FTDI Chip
Arduino Power Button
MTA100 Roomba Connector
Arduino Pins 22-53
USB Type B Female Connector
5V
FTDI Power Selector
5V Output Connectors
Voltage Regulator Enablers
Deans Connector
External Source Input
Input Power Selector
12V Output Connectors

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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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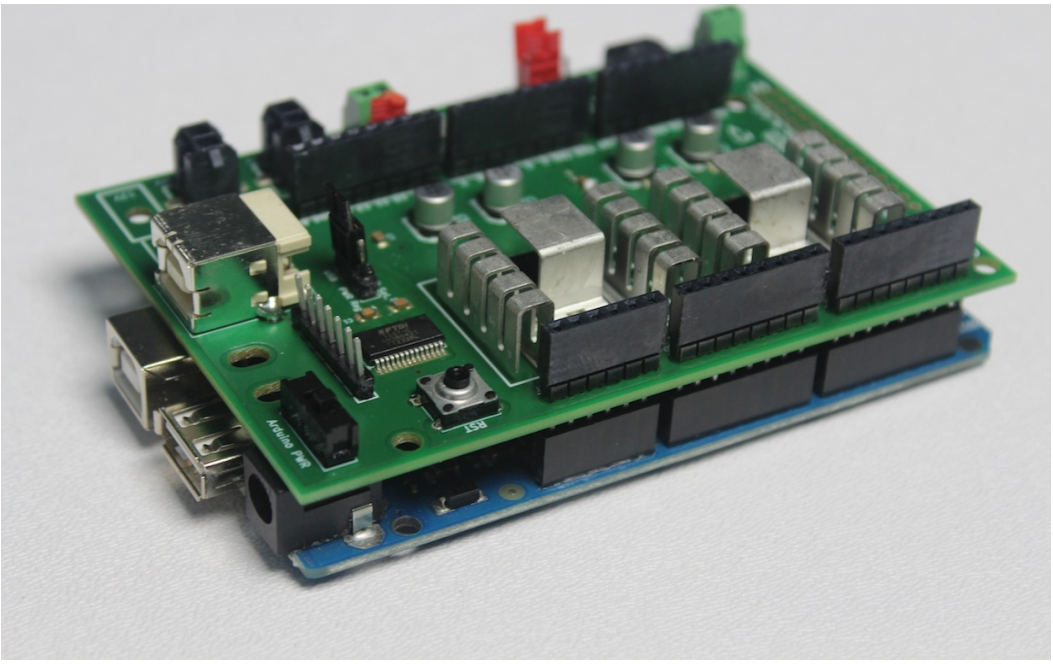

Shield Stacking

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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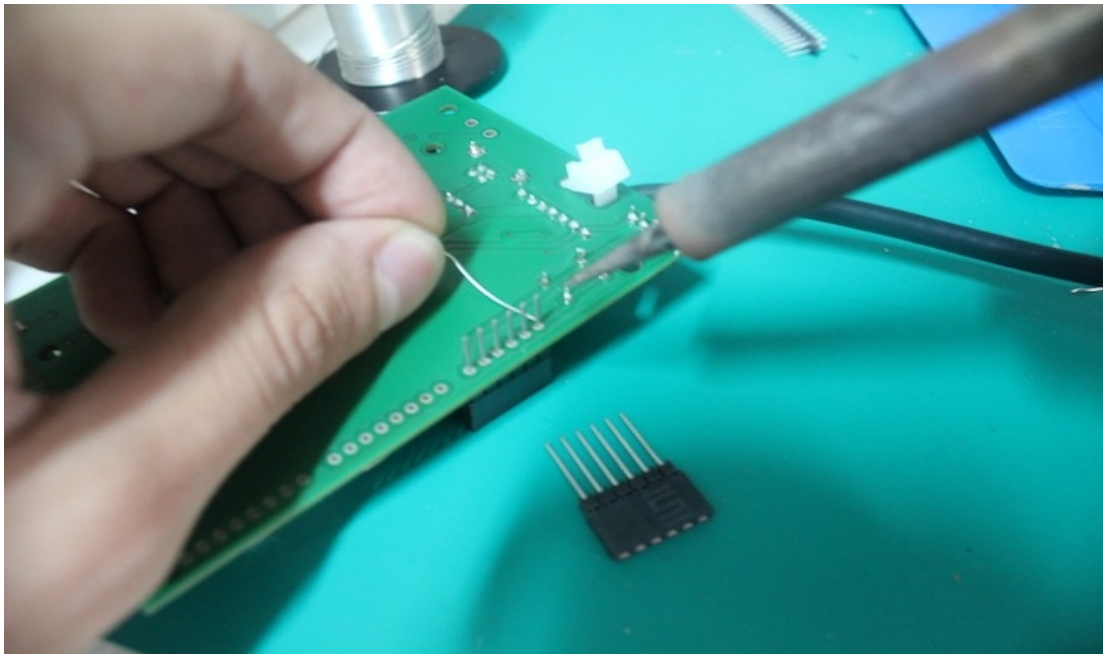
Soldering

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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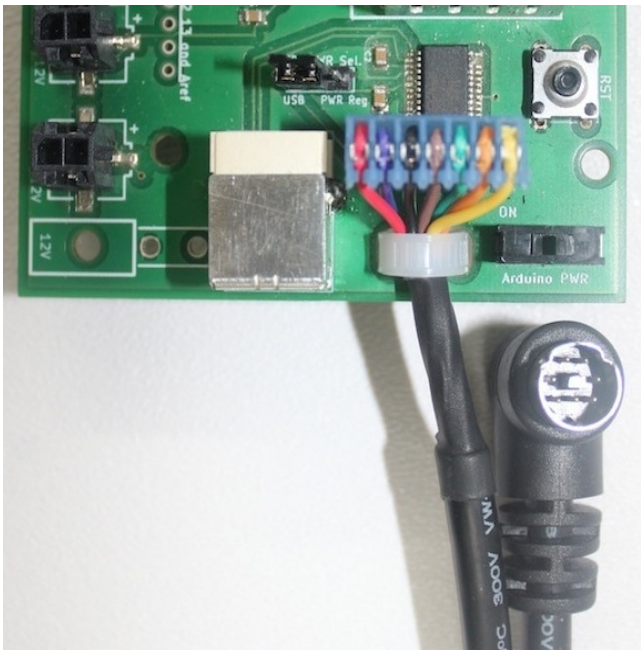
USB Cable

The TurltleBot Power Interface Shield Rev. 01 board uses a Type B USB connector.
The TurltleBot 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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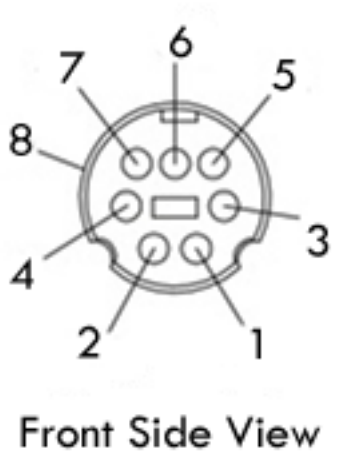
Mini-Din 7 Cable Pinout

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	1. Red wire 2. Purple wire 3. Black wire 4. Brown wire 5. Orange wire 6. Yellow wire 7. Green wire 8. Drain wire

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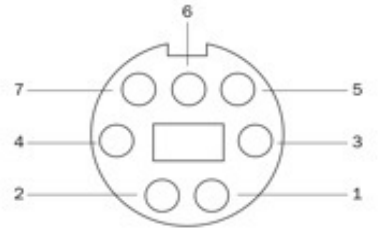
Roomba Mini-Din 7 pinout

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 TurltleBot Power Interface Shield Rev. 02 board.

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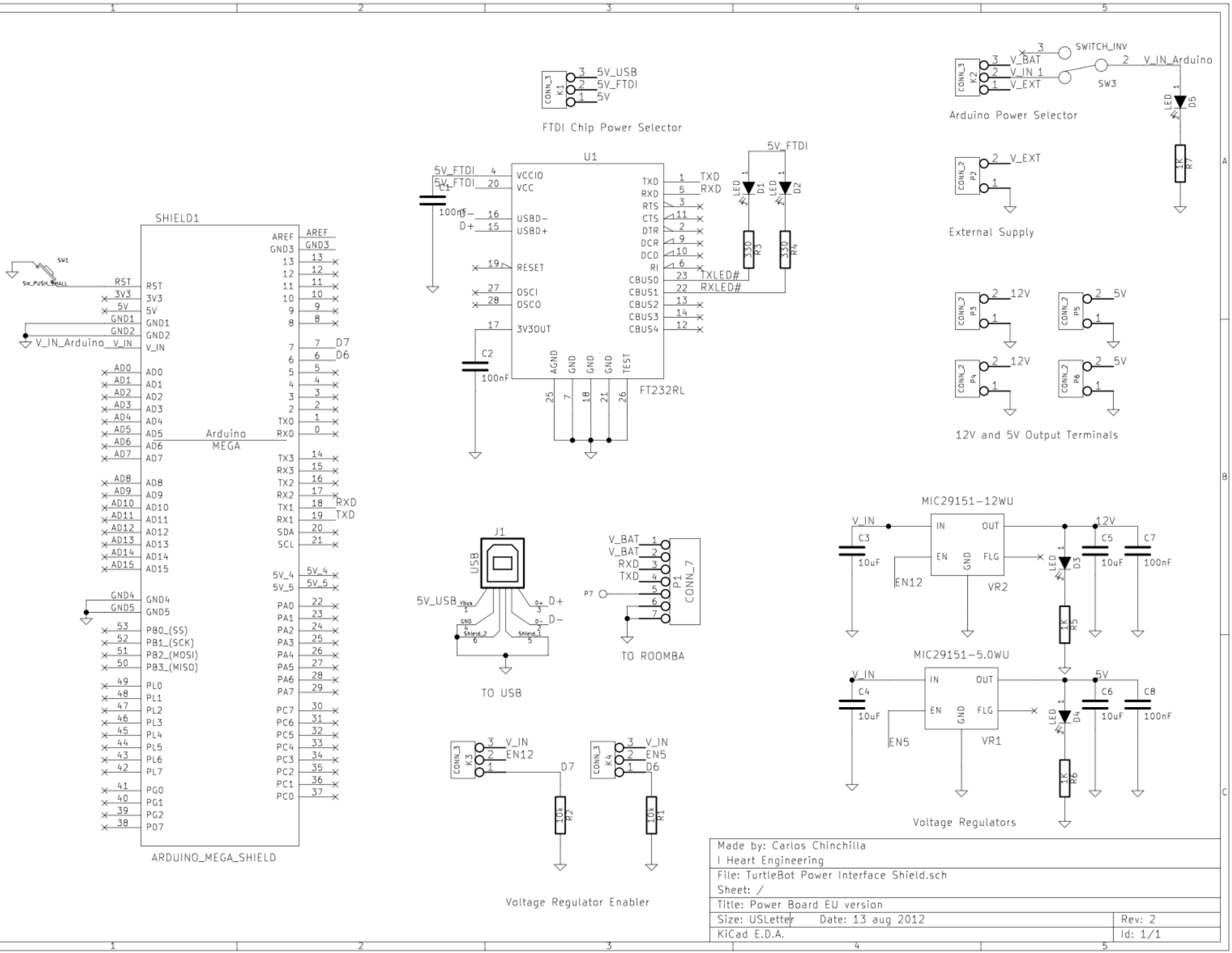
Resetting Roomba

To reset the Roomba and bring it to default values, press and hold the SPOT and DOCK buttons for 12 seconds. When reset, the Roomba plays a melody about a second after releasing the buttons. The Roomba 500 Series default baud rate is 115200 bps.


SHIELD1
Arduino
MEGA
ARDUINO_MEGA_SHIELD
FTDI Chip Power Selector
U1
FT232RL
Arduino Power Selector
SWITCH_INV
External Supply
12V and 5V Output Terminals
MIC29151-12WU
MIC29151-5.0WU
VR1
VR2
Voltage Regulators
TO USB
TO ROOMBA
Voltage Regulator Enabler
Made by: Carlos Chinchilla
I Heart Engineering
File: TurtleBot Power Interface Shield.sch
Sheet: /
Title: Power Board EU version
Size: USLetter Date: 13 aug 2012
Rev: 2
KiCad E.D.A.
Id: 1/1

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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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