

The MINI robocontroller
V1.0 for Rev E Boards
User Manual

Introduction

The MINI robocontroller is a small (2.4"x2.4") general-purpose robot controller. It is Arduino compatible, and includes dual 1A motor drivers, LDO power regulator, and easy to use servo-style headers on most IO ports.

Required Accessories:

- FTDI serial cable or In-System Programmer to load code onto your MINI.
- A power supply, 6-16V, typically a 7.2V battery.

Optional accessories:

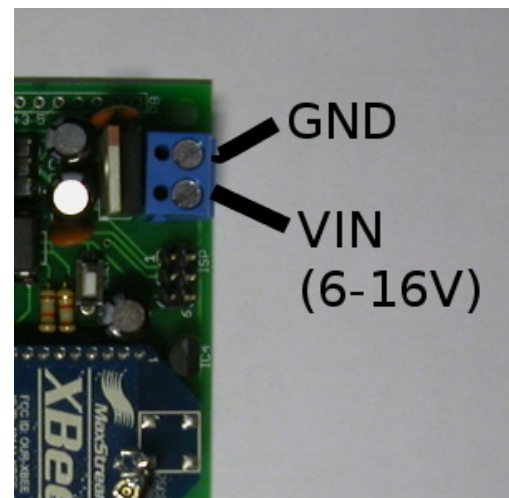
- XBEE Radios

Applying Power

Power can be supplied from a 7.2V battery, or any other source that is capable of sourcing sufficient current at 6-16V. It is recommended that you add a switch in series with the VIN line, as the Mini has no power switch. If servos are tied directly to VIN, be sure that VIN is low enough so as not to hurt your servos.

Be sure to connect the power supply with the correct polarity, reverse polarity may damage your robocontroller.

NOTE: The voltage regulator may become hot during operation, especially if VIN is high. Care should be taken to avoid the possibility of burns.



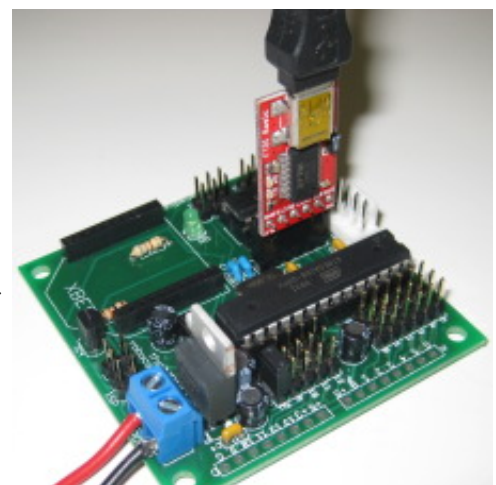
Loading Code

The MINI has two ways to load programs:

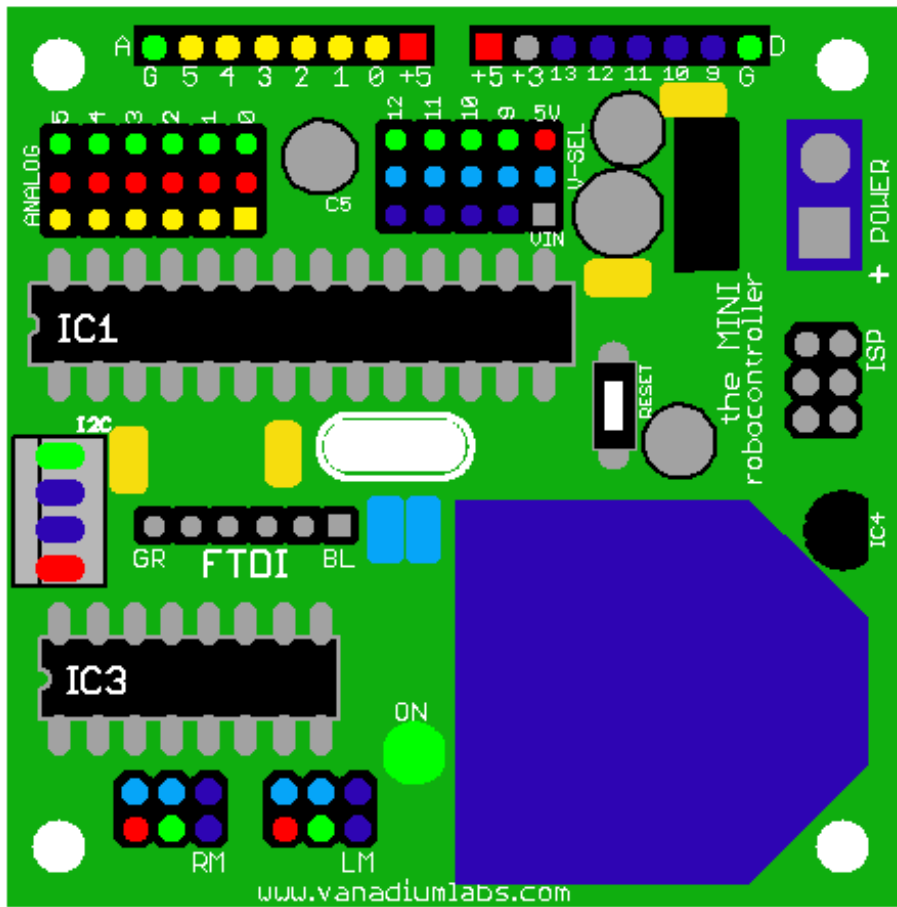
- with an FTDI cable, using the FTDI header. Note: We recommend the Sparkfun FTDI Basic Breakout (P/N: DEV-09115) over the regular FTDI cable because it uses DTR rather than RTS for the reset circuit.
- with an In-System Programmer, using the ISP header

The ISP header is located between the XBEE port and the power terminals, the FTDI header is located near the AVR chip, above the motor controller, as pictured at right.

The MINI ships with the Arduino bootloader installed, so that you can use an FTDI port. *NOTE: When using an FTDI cable, you will have to remove the XBEE, for this reason, we recommend using an ISP to program the chip.*



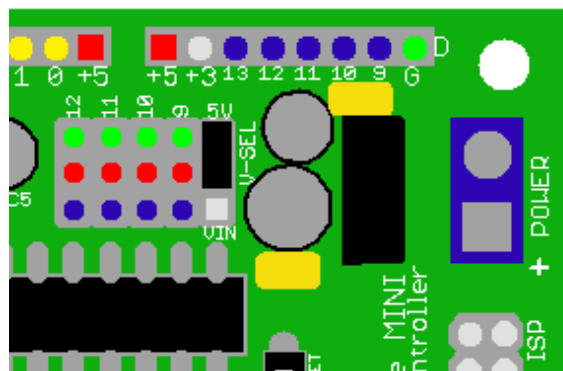
Digital/Analog Headers



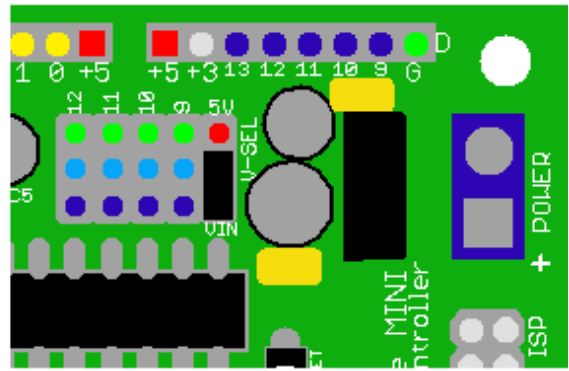
- +5 Volts
- Ground
- Var. Voltage
- Analog
- Digital

The MINI has a total of 10 servo-style I/O headers, 6 of which can be used as analog inputs. Each three pin header provides a signal, ground, and regulated 5V power pin. This makes it very easy to connect sensors and other electronic devices to your MINI.

The digital IO headers have a selectable voltage level. The VSEL jumper allows the user to choose either 5V or VIN as the voltage level. Choosing VIN allows up to 4 hobby servos to be connected to the MINI.



5V Supply for Digital IO



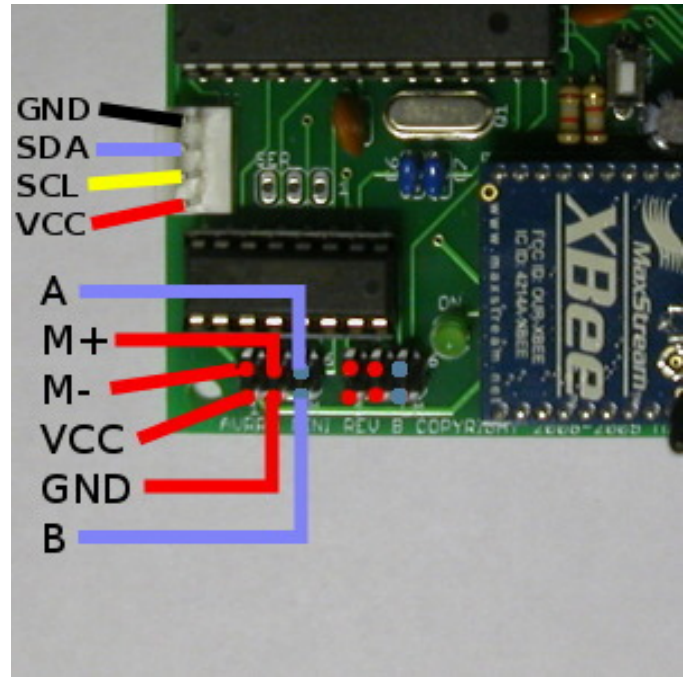
VIN as Supply for Digital IO

Motor/Encoder Headers

The MINI robocontroller has a two-channel 1A motor driver. This is most often used on a differential drive rover, and thus the channels are named left motor (LM) and right motor (RM).

The motor and encoder outputs are brought out to a 6-pin header. A and B are the encoder inputs, M+/- are the wires you would connect to your motors, and VCC and GND can be used to power your encoders.

The motors library from roboControllerLib can be used to control the motor direction and speed. The encodersAB library can be used with encoders that give off an A and a B channel, encodersCD is for encoders that output a decoded clock and direction signal.



I2C Header

The I2C header has power, ground, SDA, and SCL pins. Note that there are no pull-up resistors, you'll have to mount them elsewhere.

XBEE Connection

The MINI supports a wireless connection via an XBEE serial connection. The on-board 3V regulator can only power regular XBEE models, *it cannot power an XBEE PRO module.*

A connection to your computer requires 2 XBEE radios, one on the MINI and one connected to your PC, and an XBEE Explorer to connect the XBEE to your PC, P/N from Trossen Robotics are:

- XBEE Radio: C-200-WLXBEE
- XBEE Explorer: C-200-WRL-08687

Prototyping Headers

Along the edge of the robocontroller there is space for several prototyping headers that are not installed. These can be plugged as either female headers, for use beside a breadboard, or as male headers, for plugging directly into a breadboard. Both configurations are shown below. Neither type of header is included with the robocontroller, they are available nearly everywhere.

Software Setup

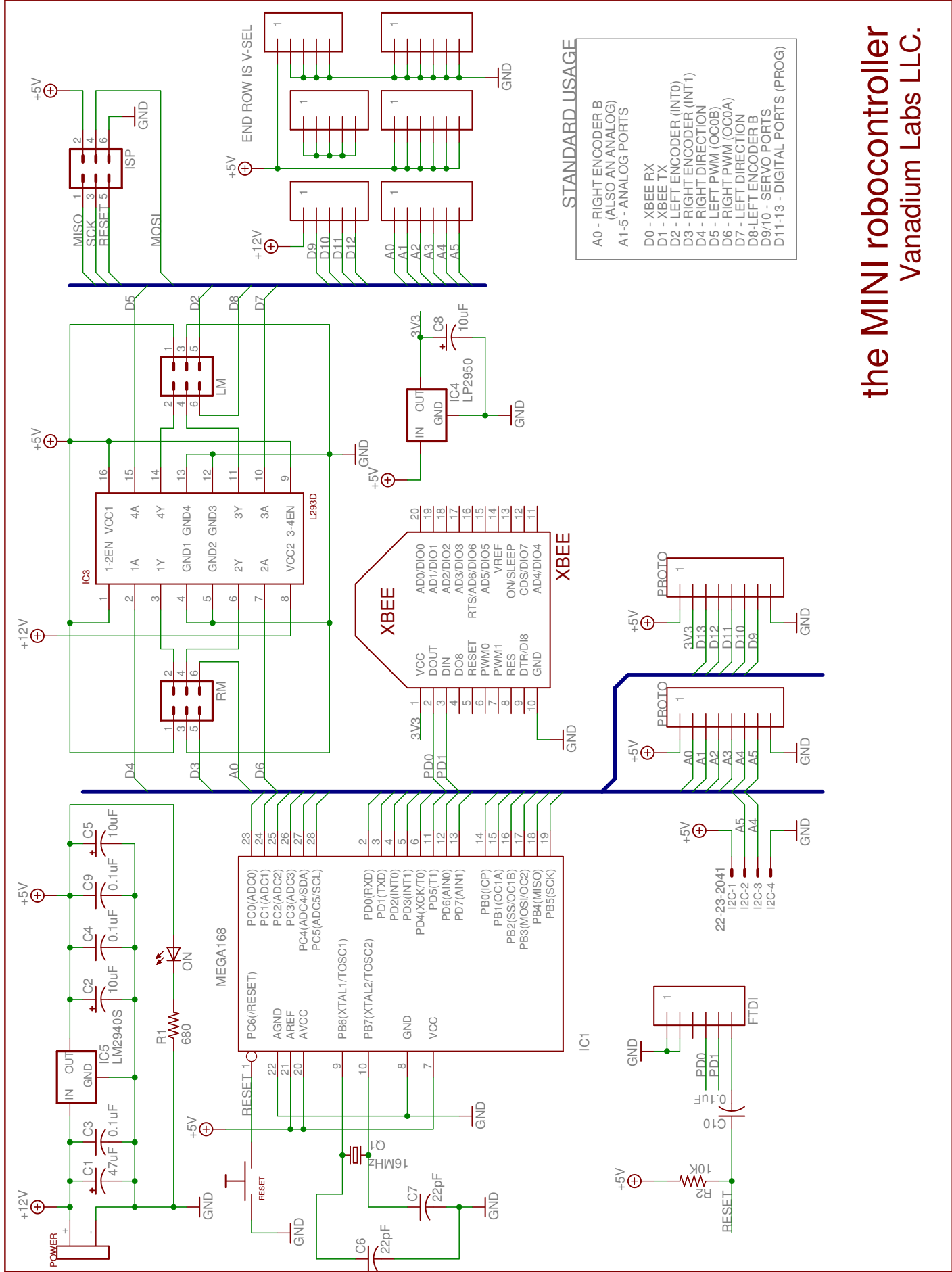
Setup for the MINI is very easy:

- Install the Arduino IDE, following the instructions at <http://arduino.cc/en/Guide/HomePage>
- Download roboControllerLib, copy each library into <arduino>/hardware/libraries/

That's it! We're up and running. There are examples on the download site for roboControllerLib, and examples inside the library directories which you can open up right inside your Arduino IDE. When you create a sketch, select **Arduino Diecimila, Duemilanove, or Nano w/ Atmega168** for the board type

Using an In-System Programmer

See <http://www.arduino.cc/en/Hacking/Programmer> for details on using an In-System programmer.



STANDARD USAGE

- A0 - RIGHT ENCODER B (ALSO AN ANALOG)
- A1-5 - ANALOG PORTS
- D0 - XBEE RX
- D1 - XBEE TX
- D2 - LEFT ENCODER (INT0)
- D3 - RIGHT ENCODER (INT1)
- D4 - RIGHT DIRECTION
- D5 - LEFT PWM (OC0B)
- D6 - RIGHT PWM (OC0A)
- D7 - LEFT DIRECTION
- D8 - LEFT ENCODER B
- D9/10 - SERVO PORTS
- D11-13 - DIGITAL PORTS (PROG)

the MINI robocontroller
 Vanadium Labs LLC.