MiYbot Electronics

The MiYbot's electronics is designed around the Adafruit Pro Trinket circuit board. The ProTrinket is an Arduino compatible circuit board. It is programmed over the built-in USB port and is quite capable at a cost of ~$10. The documentation is extensive and excellent on this circuit board and can be found at https://learn.adafruit.com/introducing-pro-trinket/overview.

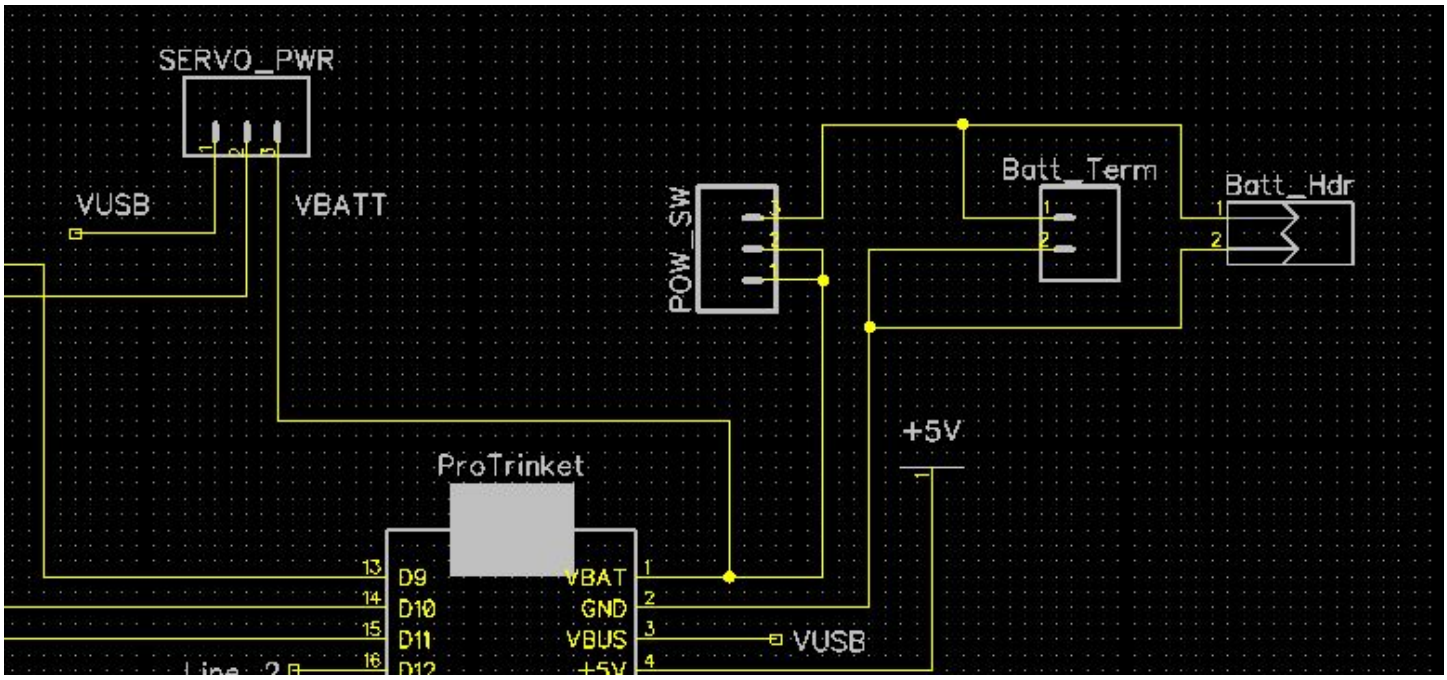
As an overview, the MiYbot circuit board connects the Pro Trinket to the various robot parts needed to make a functioning robot. Specifically, the board connects the Pro Trinket to the battery, via a power switch, an RGB LED indicator light, two general purpose pushbutton switches, a buzzer, headers to connect 3 servos, headers to connect 2 line sensors, headers to connect two HC-SR04 ultrasonic sensors and headers to connect to the Pro Trinket's I2C bus. This document will describe all of these components in detail.

Battery System

The battery system for the MiYbot is a battery pack consisting of 4 AA batteries. Alternatively, the MiYbot can be powered through USB port on the Pro Trinket.

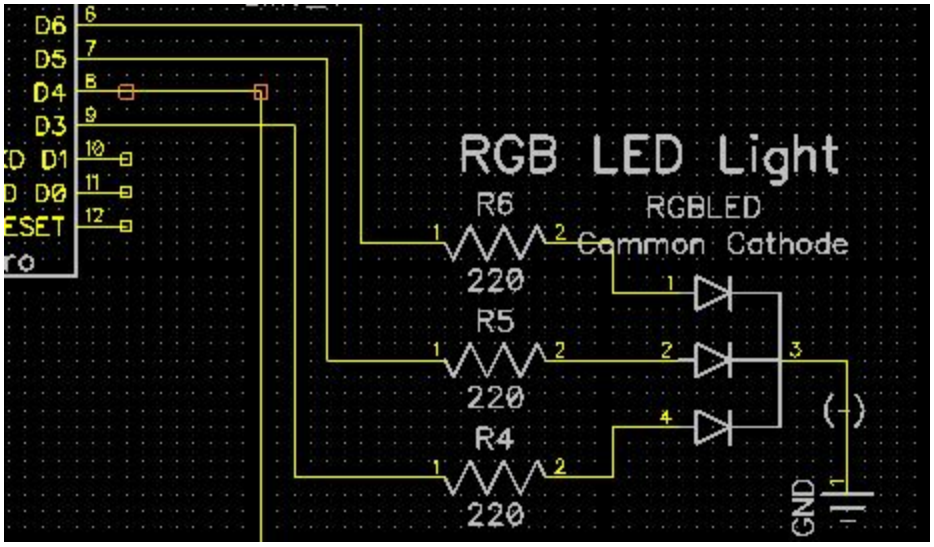
When the MiYbot is being powered by the AA battery pack, there is a switch that will turn on the circuit. It is labeled POW_SW. The other switch on the circuit board is labeled SERVO_PWR. This switch chooses where the power to the servos comes from, the USB or the AA battery pack.

One of the nice features of the MiYbot circuit board is that it can be powered using a battery powered, rechargeable USB cell phone charger and a micro USB cable. If this is the case, be sure to set the SERVO_PWR switch to power the servos using USB power.



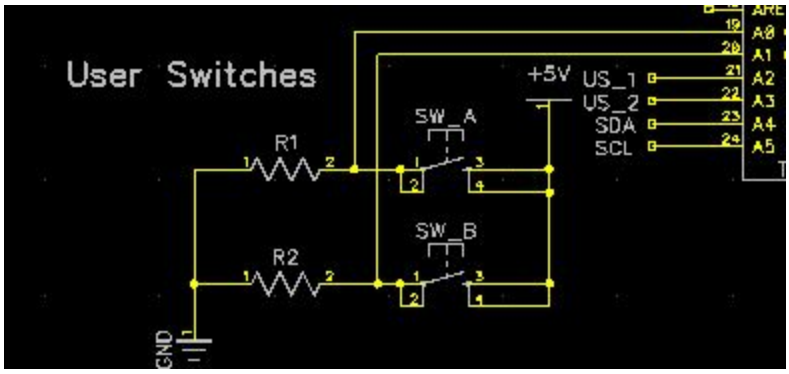
RGB Indicator Light

The MiYbot circuit board features a common cathode RGB LED light that can be programmed to create any color. This light actually has 3 different LEDs in one package, red, green and blue. Pins D3, D5 and D6 of the Pro Trinket connect these colors via a current limiting 200 ohm resistor. The common cathode to all the LED's is connected to ground. The pulse width modulating (PWM) command analogWrite() command is used to make the diodes light.



Pushbutton switches

The two pushbutton switches are connected as inputs to the Pro Trinket on pins A0 (D14) and A1 (D15). The circuit for the switches uses 10K ohm pull-up resistors for a stable circuit.

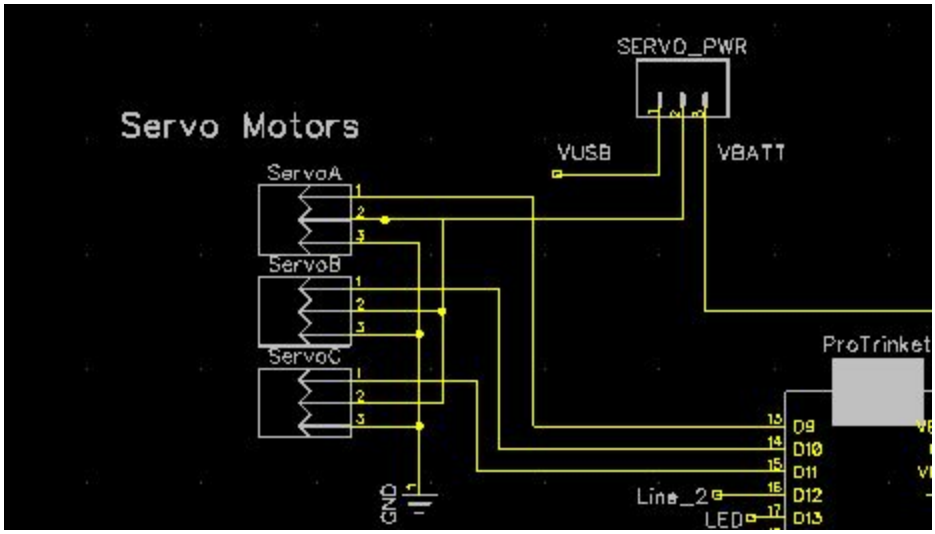


Buzzer

The buzzer is connected to pin D4 and can be controlled using the Arduino tone library.

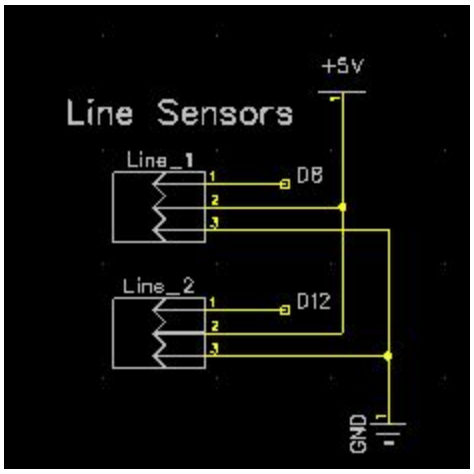
SERVO Headers

The servo headers are connected to pins D9, D10, and D11. Using these pins for the servos allows analogWrite to be used for the RGB LED. The power for the servos is controlled from the SERVO_PWR switch and it feeds the center pin. The outside pins are GND and Sig (D9, D10, D11). Often the Sig wire for a servo is yellow and should be connected accordingly. If it does not work it can be reversed without damaging the servo. The servos used for the MiYbot are the Feetech FS90R continuous rotation micro servos, but any continuous rotation servo should work.



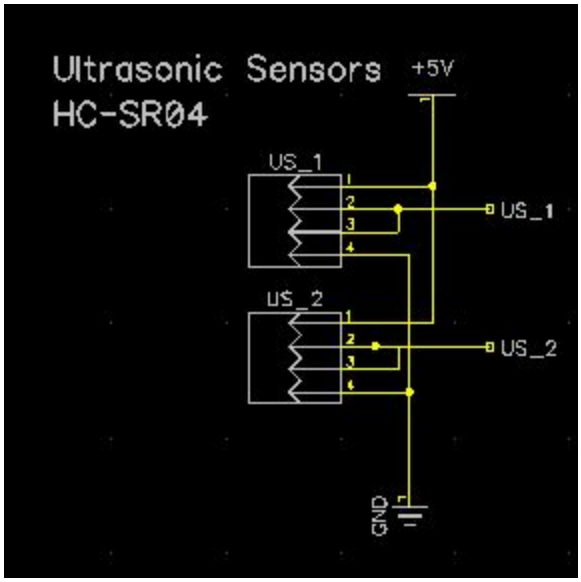
Line Sensor Headers

The line sensor used by MiYbot are the QTR-1RC line sensors from pololu.com (https://www.pololu.com/product/2459). They are attached to pins D8 and D12. The Pololu QTR line sensor library is used to operate these sensors. Make sure they are attached with GND and Sig connected to GND and OUT on the board. 5V is connected to the center pin on the QTR Sensor.



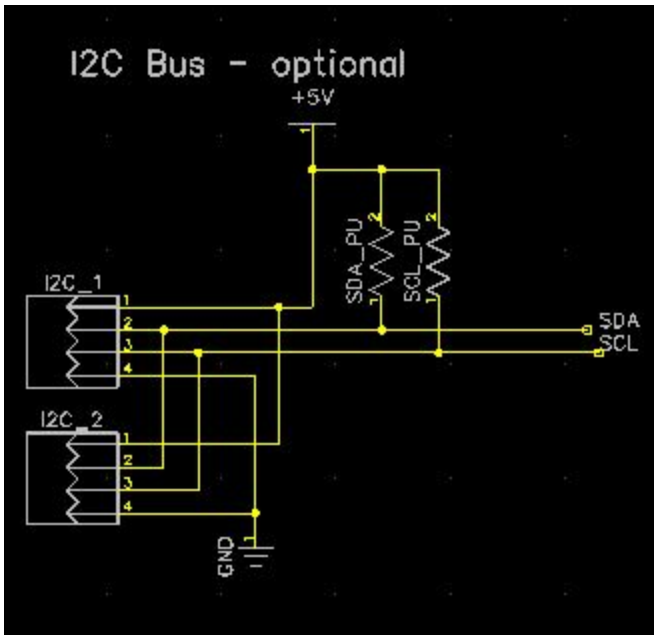
Ultrasonic Sensor Headers

The ultrasonic sensor headers used by MiYbot are the HC-SR04 easily obtained from ebay.com and other sources. They are connected to pins A2 (D16) and A3 (D17). They are controlled using the NewPing library by Tim Eckel (http://playground.arduino.cc/Code/NewPing). Since these headers connect to analog pins, they could also be used to monitor analog sensor signals such as thermistors, resistive light sensors, or other analog distance sensors.



I2C Bus Headers

The I2C headers and I2C pull-up resistors on the board are connected to A4 (SDA) and A5 (SCL). These were designed on the board for advanced users to connect I2C devices (such as OLED displays) to the Pro Trinket and are an optional feature of the MiYbot rbot. The square pads on the header are +5V.



Pro Trinket Pin D13

Pin D13 on the Pro Trinket is connected to a red LED on the Pro Trinket itself. It can be programmed and used for the MiYbot. The example program in the Arduino programming environment “Blink” will blink this red LED.