

Building the PiWiBot

Basic Circuit Board Assembly

J.Brett BCIT TTED Jan. 2025

The PiWiBot is designed to have a minimal basic function as a WiFi Controlled Two-Motor robot with “headlights”. Additional expansions, to include additional motors, servos, encoders, displays, rangefinders, line follower/edge detector board, or other components have been contemplated and space has been provided for these future expansions. It is recommended to build the basic board, become familiar with the code, and proceed from there.

As usual you should begin assembly with the shortest (lowest to the board) components first. Install:

R1, R2	82R – 150R	These resistors limit current flow to the “headlight” LEDs
R5	820R – 1K2	This resistor limits current flow to the “Power Indicator” LED
R8	82K – 120K	This resistor allows for the pushbutton switch inputs to work
D1	Standard rectifier diode	This diode prevents the Pico from applying a reverse bias to the voltage regulator when the Pico is plugged in to USB, but the battery power switch is turned off.
D2	Standard rectifier diode	This diode prevents voltage spikes from the motors from affecting the main power supply. (In retrospect, it may not be necessary... you could probably just put a jumper here. Let me know how it goes if you do.)
S2 (button #4)	Momentary pushbutton SPST switch	Technically an option that you can leave off, this switch, combined with R8, allows you to configure your PiWiBot to either connect to a home wifi network, or establish its own hotspot, if the button is held at startup. To enable all four buttons, install them as well as R3, R4, R6 and R7 (1K each)
IC1 Socket	16 Pin DIP Socket	Make sure you install this the correct way around. Note the small dot on the board indicating Pin 1. If you are planning to run four motors install a DIP socket for IC3 at this time, too. Do NOT install the L293d motor driver chips until assembly is complete. Solder one pin, and check for flush fit to start.
LED1 and LED2	Super bright LEDs if available	These are the “headlights” so choose colours and brightness to match the bling on your robot. Personally, I like to bend the LED leads so that they point forward. 
S1	Main Power Switch	While a 2.54mm pitch SPDT switch fits on the board, it is also possible to install a header to connect to an off-board power switch if the robot chassis design requires a remote switch.
LED3	Main Power Indicator	This LED is on when the robot is powered up, so choose a colour that you like.

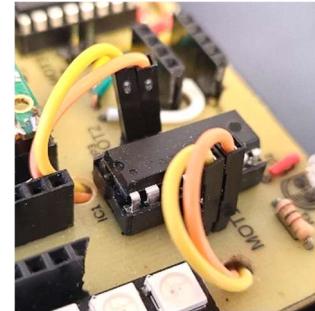
PicoW Headers	2x20 pin sockets	Take a 1x40pin header socket and align it with the holes on the board. Trim it to be 20 pins long, and solder it in place. This way you will be able to insert, remove and replace your Raspberry Pi Pico W. For reduced frustration solder one pin and check for a square and flush alignment before soldering all 20 pins. One pin is very easy to adjust... 20 are not! 😊
JP1, JP2, JP3	2 pin headers	These are the connections for the main battery, motor 1 and motor 2. There are several options for connecting them, as described below.
Pico W Headers	2 x 20 pin headers	Solder these to your Raspberry Pi PicoW so that it will fit into the PicoW headers on the board with the USB, chip and shiny metal WiFi module facing "up". Remember to solder one pin first and check for fit before soldering the rest.

Battery and Motor Wiring Options

Header Pins Above the Board

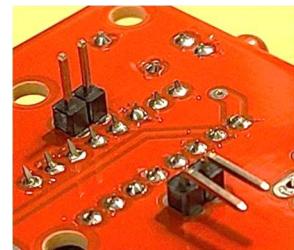
This should work for most boards, but leaves the wires visible from the top of the board. Install 2-pin headers as usual. I like to use [pre-crimped DuPont Breadboard Wires](#) as shown. Just tear two wires away from the cable, cut them in half (actually a 60/40 length split is fine, as one motor needs slightly longer wires), **route them through the hole on the board and then** solder them to the motor. This arrangement makes it easy to change how your wires are connected to the board to adjust which direction the robot is driving in and save you having to make those changes in code.

If you have designed your robot to allow the wires to be routed around the outside of the circuit board, then you do not have to route the wires through the holes in the board.



Header Pins Below the Board

This allows the flexibility of adjusting motor wiring and changing motors easily, but also hides the wires from view resulting in a cleaner appearance and less risk of tampering if the top side of the board is exposed to the user. It does require that the robot design leaves adequate open space below the board for the header connections to be made. It may be necessary to use header pins with a 90 degree bend in order to fit the headers into place.



Solder Motor and Battery Wires Direct to Board

This is an option, but one I do not recommend unless absolutely necessary. It reduces the flexibility of changing motors and battery packs, and without adequate strain relief will likely cause the wires to fatigue and break at the solder joint.

PiWiBot Basic Two-Motor Components

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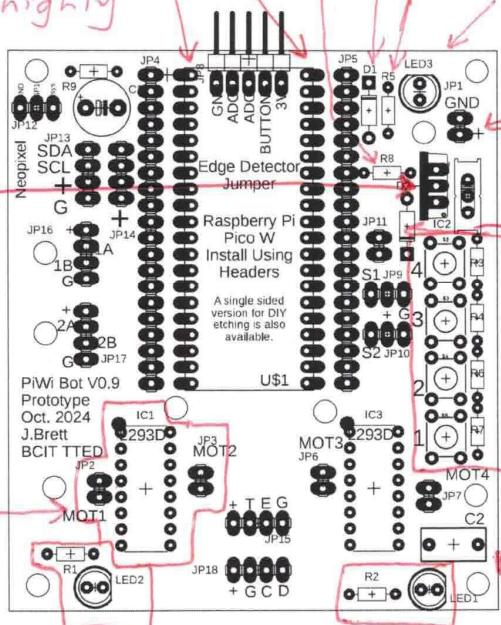
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2x20 pin header
sockets for Pi Pico W
You can solder the pico
directly to the board,
but headers are highly
recommended

7805
Voltage regulator
(or equivalent)

16 pin socket
with L293D
motor driver.
JP2 and JP3
connect to motors
the wires can
be connected
above the board
OR below the board
depending on
robot design.

For addition motors
connect IC3



optional → required only if using push buttons

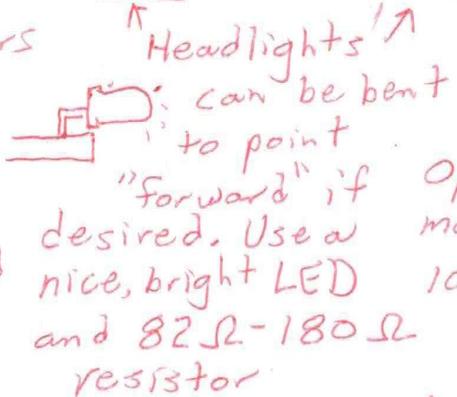
standard silicon rectifier diode
1N400X
470R-1K2 resistor for main power LED
Power indicator LED

Main power battery connection (6v-12v)

Main power switch

standard silicon rectifier diode

Buttons (optional)
For one button add S2 (#4) and R8. For 4 buttons add R3, R4, R6, R7 1KΩ each.



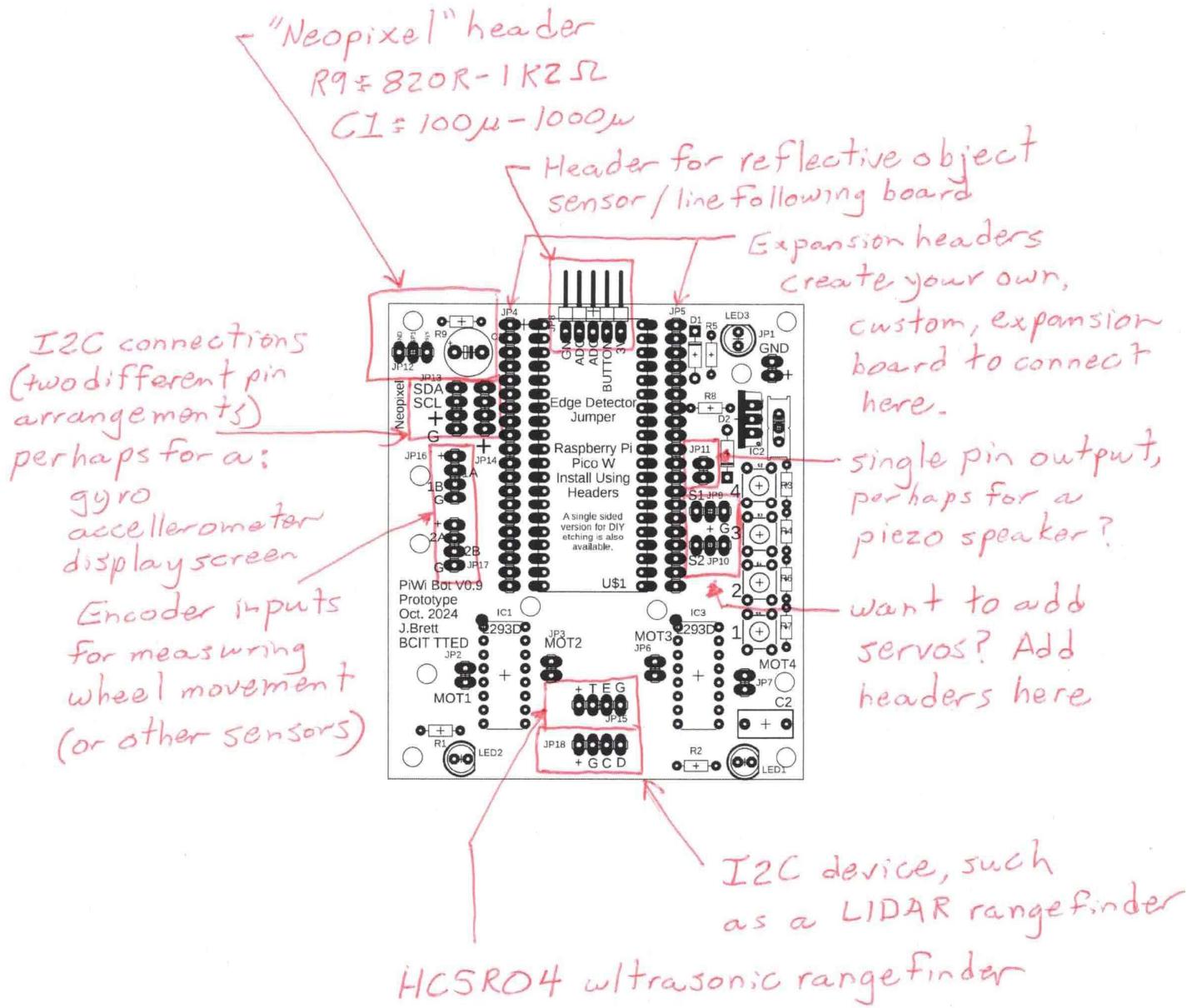
Optional to reduce motor electronic noise 100n-1μ

* code for basic two motor "tank" drive is on GitHub as of Jan 2025

Primo Bot Optional Accessories

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* code for these extensions has not been developed as of Jan. 2025 check back on GitHub for future upgrades... or fork and contribute!