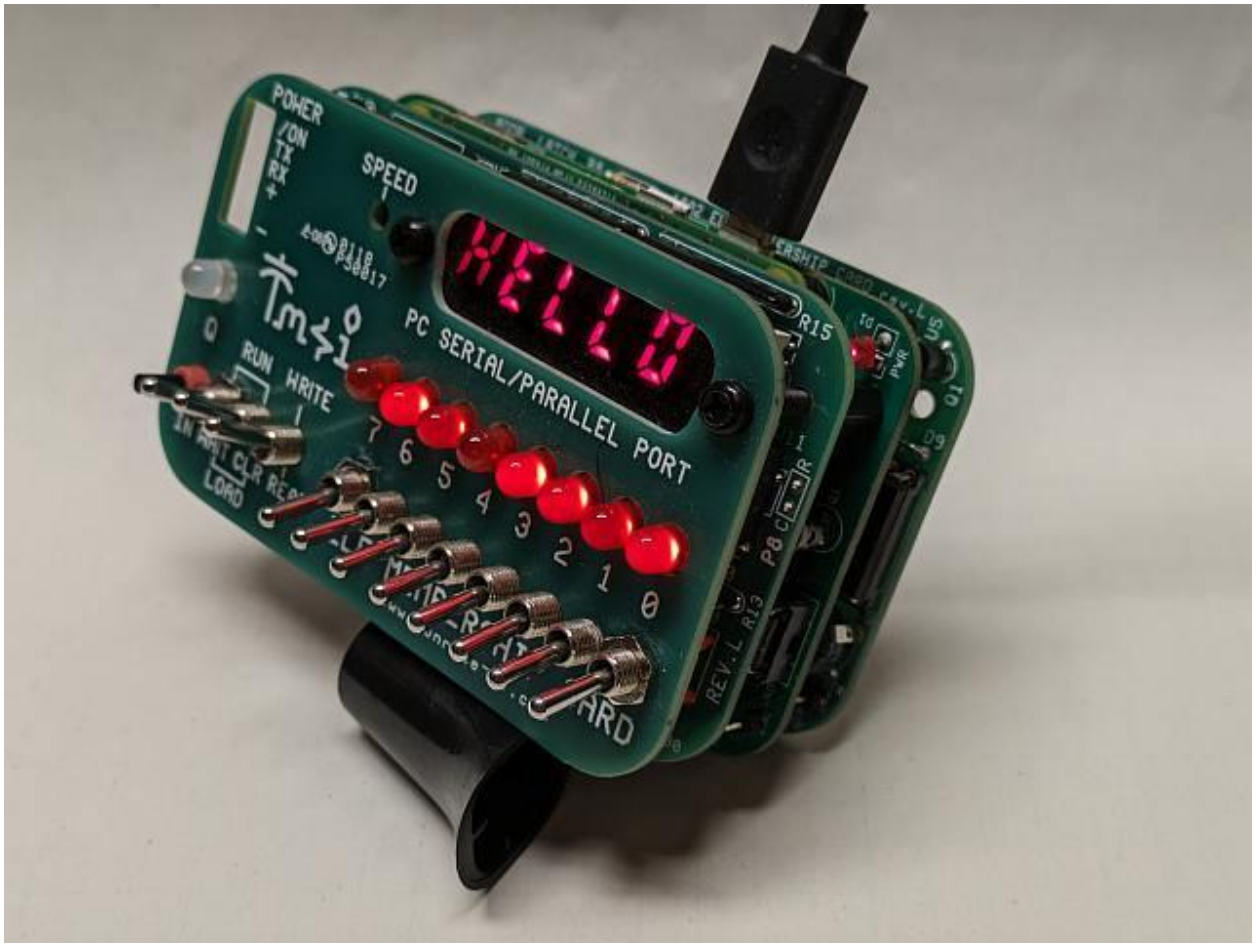
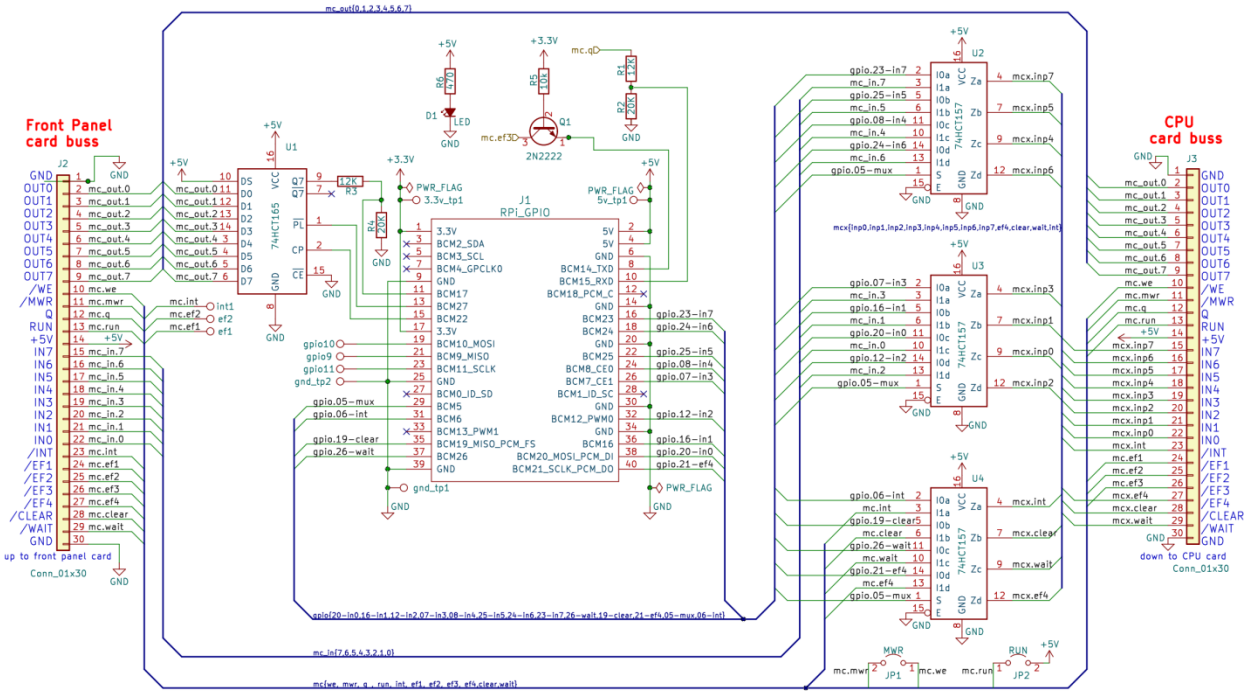
PiLoader

A PiZero Adapter for Lee Hart's Membership Card

BOM and Instruction Rev 1.1





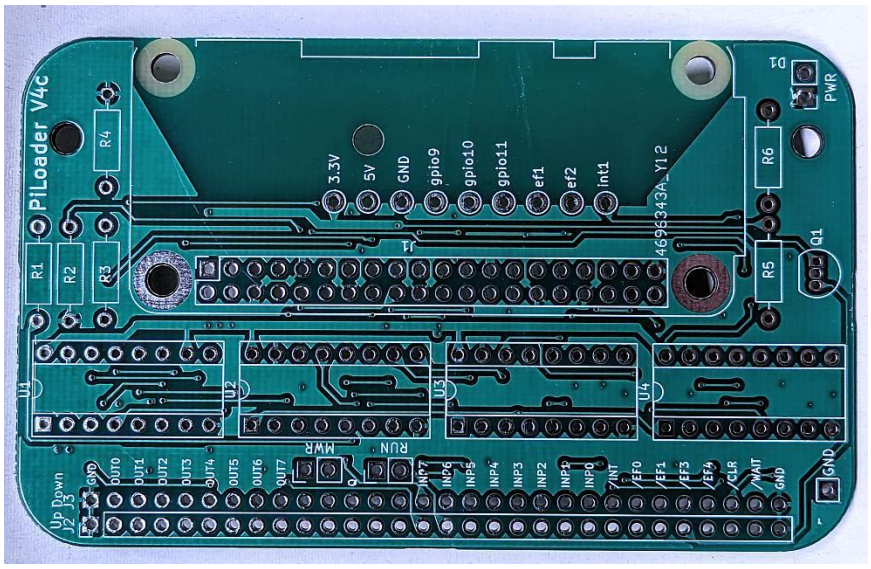
	Component	Manufacturers Part #	Description	Notes
1	J1	Adafruit part # 2243	Raspberry Pi GPIO header	https://www.adafruit.com/product/2243
2	U1	74HCT165	8 bit shift register	must be HCT
3	U2, U3, U4	74HCT157	quad 2:1 mux	must be HCT
4	J2	1x30 pin header	0.1” spacing, 11.25mm height	up to front panel card
5	J3	Molex 22-18-2101	30 female connector	down to CPU card
6	Q1	2N2222	Small signal NPN transistor	could use 2N3094 or equivalent
7	R1,R3	12K ohm	Resistor – any wattage and precision	5V to 3.3V level shift
8	R2,R4	20K ohm	Resistor – any wattage and precision	5V to 3.3V level shift
9	R5	10K ohm	Resistor – any wattage and precision	3.3V to 5V level shift
10	R6	470 ohm 1/8 watt	Resistor – any wattage and precision	LED current limit – adjust value to change brightness
11	D1	T-1 $^{3}/_{4}$	LED Power indicator	optional
12	JP1, JP2	2.54mm 2 pin header	jumper	jumper for Front Panel Power Switch and Memory Protect
13	-	2×20 Pin Male Header	GPIO header for Raspberry Pi	see instructions before soldering
14	-	Nylon standoffs	Assorted 10mm M3 male & female	look for a Jucoan 380 piece kit

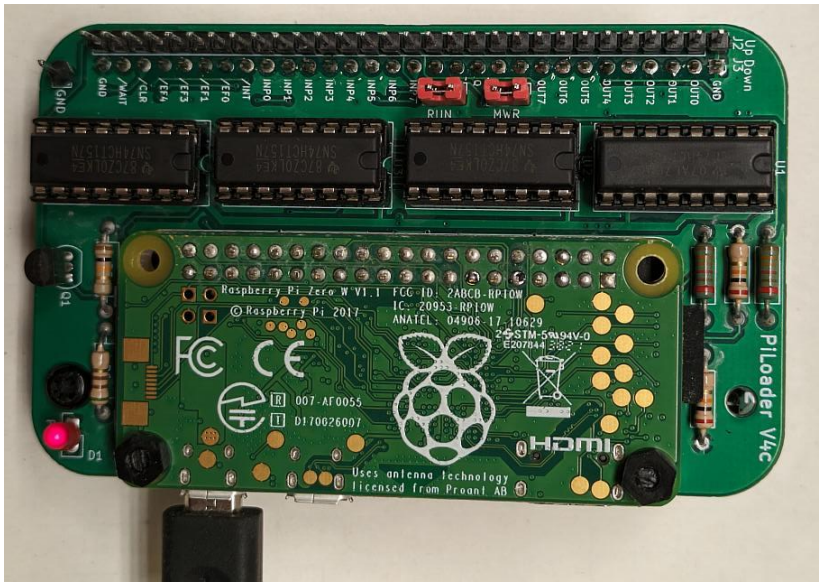
Assembly Instructions

1. Read and follow all construction instructions in the Membership Card manual (see note 1).
2. Attach a 2x20 pin header to Raspberry PI (see note 3).
3. Solder the 30 pin male header (J2) to the PiLoader PCB (see note 2).
4. Solder the 2 pin headers JP1 and JP2 to PiLoader PCB
5. Solder the three 10 pin female headers to the bottom of the PiLoader PCB (see note 2).
6. Solder four 16 pin DIP sockets for U1 to U4 to PiLoader PCB (see note 4)
7. Solder J1 to PiLoader PCB.
8. Solder R1 to R5 to PiLoader PCB.
9. Solder Q1 to the PiLoader PCB.
10. Optional : solder D1 & R1 to PiLoader PCB if you want a power indicator.
11. Insert U1 to U4 into their sockets (if you did not solder them directly to the PiLoader PCB)
12. Connect the Raspberry Pi Zero to J1 ("upside down")
13. Attach a jumpers to the MWR 2 pin headers if you want to bypass the front panel Read/Write switch and always use Write functionality.
14. Attach a jumpers to the RUN 2 pin headers if you want to bypass the front panel /ON power switch function and a let the MC run whenever power is connected.
15. Assemble the PiLoader PCB in between the MC Front Panel and CPU card. Nylon 10mm M3 standoffs are useful here to secure the three PCB's together.
16. Plug a 5V USB power supply (wall wart) with a microUSB connector into the USB port closest to the PiLoader's power LED (see photo below).

Notes:

1. Follow these assembly instructions in order. It will make clearances for soldering easier.
2. Follow the Membership Card assembly instructions for installing card interconnection header and sockets. Use "***A. The EASY way:"*** instructions for the male pins - do **NOT** install the male pins by following the "B. The HARD way:" instructions. It does not matter which instructions you followed when you built your CPU card.
3. To fit Raspberry Pi between the adapter card and the front panel card, the GPIO 2x20 pin header soldered to the Raspberry Pi should be inserted from the rear so that only 5 mm extends in front. Trim the plastic carrier and excess pin flush with the back of the Raspberry Pi.
4. If you are brave, solder U1 to U4 directly to card. The height doesn't matter either way. I prefer sockets for testing and troubleshooting and have never had a problem using the cheap ones. But I'm very careful with how I lead form my IC's and how I insert them into a socket and then check for bent pins. YMMV.


PiLoader V4c
3.3V
5V
GND
gpio9
gpio10
gpio11
ef1
ef2
int1
Y1 2
R1
R2
R3
R4
R5
R6
Q1
D1
PWR
U1
U2
U3
U4
RUN
MWR
Up Down
J2 J3
GND


Raspberry Pi Zero W V1.1
© Raspberry Pi 2017
FCC ID: 2ABCB-RP1OW
IC: 20953-RP1OW
ANATEL: 04906-17-10629
HDMI
Uses antenna technology
licensed from Proant AB
PiLoader V4c
RUN
MWR
J2 J3
U1
D1

Software

There are two programs written in standard C provided. The first is a program for loading assembled code binary files from the Pi to the 1802's memory. The second program is a demonstration of how to read the data displayed on the 1802 Front Panel card LED's from the Pi.

There are currently at least seven libraries available to access GPIO pins from a C program running on a Raspberry PI. See https://elinux.org/RPi_GPIO_Code_Samples

Currently only the PIGPIO library method is supported. You probably need to install the packages:

- `sudo apt install pigpio`

To compile, use

- `cc –Wall -o 1802load 1802load.c –lpigpio`
- `cc –Wall -o 1802scan 1802scan.c –lpigpio`

To run, use :

- `sudo 1802load <binary file>`

or

- `sudo 1802scan`