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Required hardware

PiTap runs on the Raspberry Pi Zero2w, Pi3 and Pi4.

An interface is required to connect the Pi to the Commodore Datasette port.

If you wish to build your own interface see the schematic at the end of this document.

Download and install

The latest version is available from the home page at https://gp2x.org/pitap

Extract the zip file and copy all of the contents of the sdcard directory to your Raspberry Pi's SD card. The top level of the SD card should include files such as 'kernel8.img' and directories such as 'firmware'.

The zip file also includes browser.prg in the /pitap directory. This is the tapecart browser which is automatically mounted on startup. You should also find sidplay64.prg in the same directory which is used when you select .sid files.

Place your C64 files on the same card in whichever sub-directories you wish to organise them. This can include .tap, .tcrt, .prg, .t64, .p00 and .d64 files. Also include any data such as your .sid files.

WLAN config

Edit the file wpa_supplicant.conf at the root of the SD card with your wireless LAN details. The country code should be in upper case, eg. GB, DE.

PiTap should connect to your wireless LAN within about 10 seconds of starting up. Its IP address will be displayed on the OLED and HDMI displays. Put that address in your browser to access the web interface.

OLED display

The mini display on the adapter shows the list of directories and files on your SD card as you browse and select them. Below that the name of the mounted file is shown, the stopped/playing/recording status of the Datasette and the tape counter.

PCB buttons

The five buttons on the interface function as follows:

1 - Select
2 - Up
3 - Down
4 - Back
5 - Short press: play/stop
5 - Long press: mount the default /pitap/browser.prg file

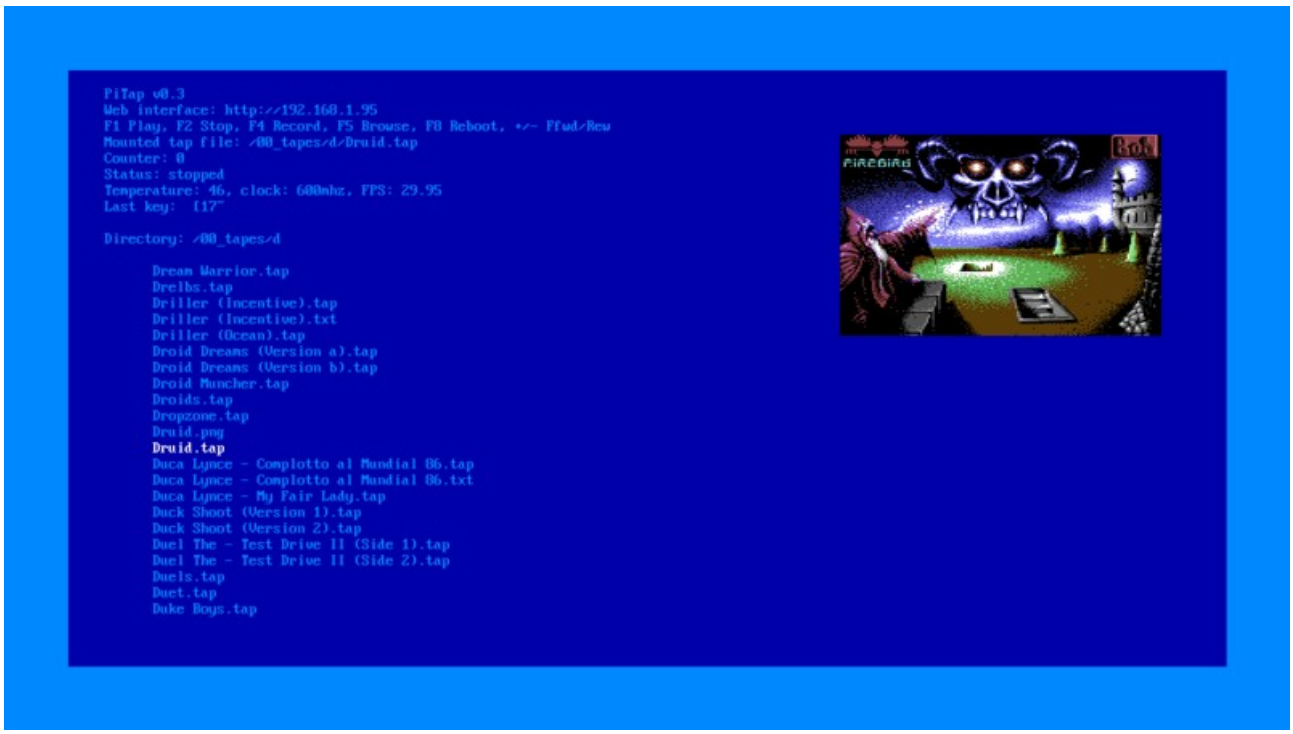
Web interface

The web interface is available on the IP address shown on the HDMI and OLED displays.

From here you can upload, browse and mount files from the SD card, control the datasette functions such as play, record, rewind amd fast-forward, and see the tape counter.

From the options menu you can change how various file formats are converted and enable/disable the tapecart sense mode.

HDMI display



The HDMI display provides an alternate interface for browsing and mounting files.

The border flashes to visualise pulse activity when the tape is playing or recording.

USB keyboard

The keyboard controls browsing and selection of files on the HDMI and OLED screen.

Cursor keys – navigate file system
Enter – select file/directory
Backspace – directory up
F1 – Play
F2 – Stop
F4 – Record
+ - Fast forward
- - Rewind

USB keyboard numeric keypad

To save desk space you could use a separate numeric keypad instead of a whole keyboard. Ensure numlock is in the correct mode.

Cursor keys – navigate file system
Enter – select file/directory
Home – directory up
* - Play/stop
+ - Fast forward

- - Rewind
/ - Mount the default /pitap/browser.prg file

C64 interface

By default Tapecart SD browser is mounted on startup. Load it by pressing shift/run-stop, then press play as usual. This allows you to browse and select files on the PiTap from the C64 itself.

If you select a TAP file it will be mounted and the C64 will reset to allow you to press shift/run-stop and then press play. The browser will run Tapecart files directly. If you select a PRG file it will be converted and run automatically. T64 and D64 files will also be converted and Tapecart Browser will be run for file selection.

Command line interface

PiTap's web interface can be controlled from the command line with curl. Included with the binary files there is a shell script pitap.sh which simplifies this. Usage:

pitap.sh -g
This will generate a file called pitap-index.txt which contains an index of all the files on your SD card. This might take a while to run if you have many files but you will then be able to use pitap.sh to do fast searching and mounting of your files. Run it again whenever your files change and you want to update the index.

pitap.sh -s wizball
This will search for all files and give you a numbered list of matches. Enter the number of your choosing to mount that file.

pitap.sh -s wizball -n 3
Searches and automatically mounts the third entry.

pitap.sh -u wizball.tap -d /tapes/w
Uploads the given file to your SD card and places it in the directory /tapes/w.

Datasette and Tapecart modes

PiTap is normally in datasette mode. When a tapecart image is mounted PiTap will also mount a short tap file which contains the tapecart loader. This allows the C64 to automatically switch PiTap into tapecart mode when needed.

Tapecart supports a loader mode for fast loading of data and a command mode for two-way communication and features such as directory browsing as used by Tapecart SD Browser.

For tapecart mode switching to work PiTap has to keep the sense line enabled on the datasette interface. This means it will always look to the C64 as though a tape is playing so when you press

shift and run/stop the screen will blank immediately, even though you have not yet pressed play on PiTap.

If this is annoying you can switch tapecart sense mode off in the options, but then tapecart features will not function as expected.

Source code

PiTap is GPL licensed. The source code is available from the home page.

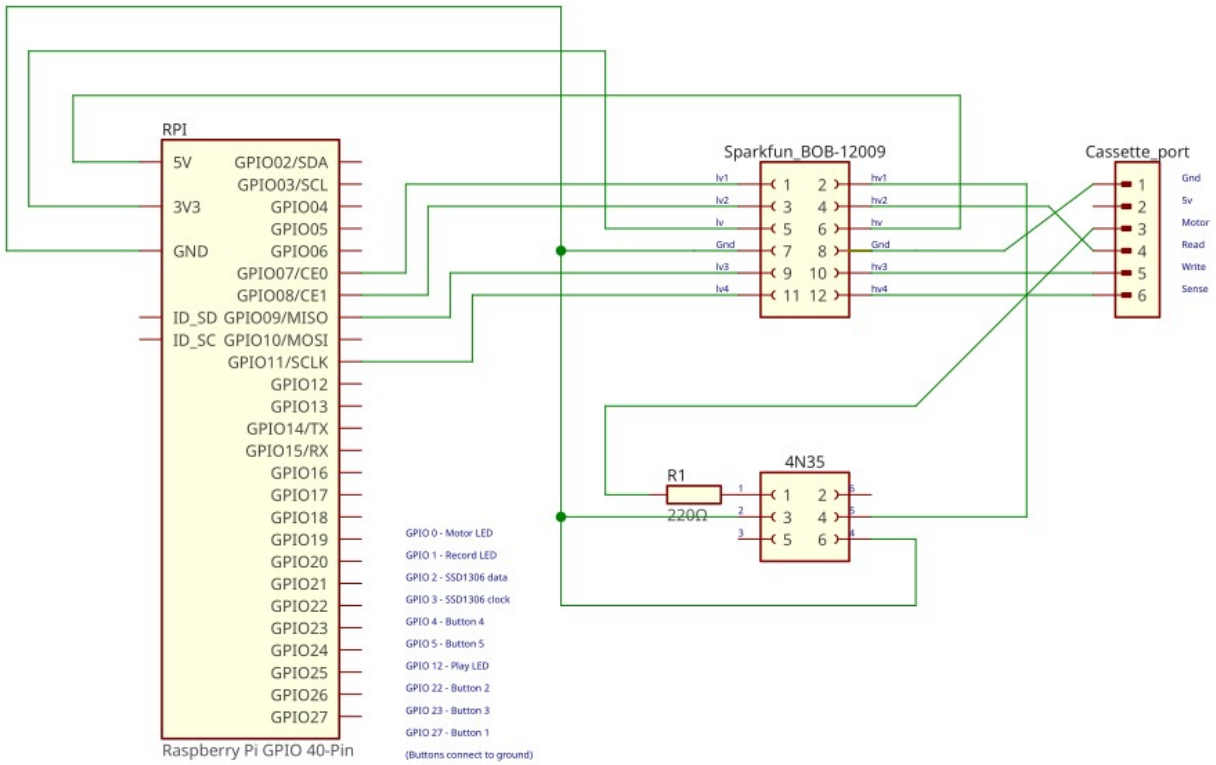
See build.sh for the steps needed to build it. It requires an Arm GCC toolchain and the Circle Rpi library.

Links

PiTap home page - https://gp2x.org/pitap/

Circle Raspberry Pi bare metal programming environment - https://github.com/rsta2/circle
Pottendo's Circle port of Pi1541 - https://github.com/pottendo/pottendo-Pi1541
Pi1541 disk drive emulator - https://cbm-pi1541.firebaseapp.com/
Tapuino Arduino Datsette emulator - https://github.com/sweetlilmre/tapuino
C64 Tap file generator - https://github.com/ThKattanek/c64_tap_tool
Enthusi's Turbotape 64 loader -
https://codebase.c64.org/doku.php?id=base%3Aturbotape_loader_source
Tapecart - https://github.com/ikorb/tapecart
Tapecart SD - https://github.com/KimJorgensen/tapecart
Tapecart Browser - https://github.com/alexkazik/tapecart-browser
Sidplay64 Tapecart SD Edition - https://csdb.dk/release/?id=215008

Hardware schematic


RPI
5V
3V3
GND
ID_SD
ID_SC
GPIO02/SDA
GPIO03/SCL
GPIO04
GPIO05
GPIO06
GPIO07/CE0
GPIO08/CE1
GPIO09/MISO
GPIO10/MOSI
GPIO11/SCLK
GPIO12
GPIO13
GPIO14/TX
GPIO15/RX
GPIO16
GPIO17
GPIO18
GPIO19
GPIO20
GPIO21
GPIO22
GPIO23
GPIO24
GPIO25
GPIO26
GPIO27
Raspberry Pi GPIO 40-Pin
GPIO 0 - Motor LED
GPIO 1 - Record LED
GPIO 2 - SSD1306 data
GPIO 3 - SSD1306 clock
GPIO 4 - Button 4
GPIO 5 - Button 5
GPIO 12 - Play LED
GPIO 22 - Button 2
GPIO 23 - Button 3
GPIO 27 - Button 1
(Buttons connect to ground)
Sparkfun_BOB-12009
lv1
lv2
lv
Gnd
lv3
lv4
hv1
hv2
hv
Gnd
hv3
hv4
Cassette_port
Gnd
5v
Motor
Read
Write
Sense
R1
220Ω
4N35