EVEN MORE
USB HACKING WITH USB-TOOLS

KATE TEMKIN • MIKAELA SZEKELY

TOORCON-21 2019

Katherine/Kate Temkin (@ktemkin):

- software lead, Great Scott Gadgets
- glitch witch & open-source-tool-builder
- educational (reverse) engineer
- lauded by the Daily Mail as a “cyber criminal”

Mikaela Szekely (@Qyriad):

- student, and yet master*
- got a bit too deep in some open-source USB stuff
- apparently better at cybercrime (not caught by the Daily Mail)

SO, WHO *ARE* YOU?

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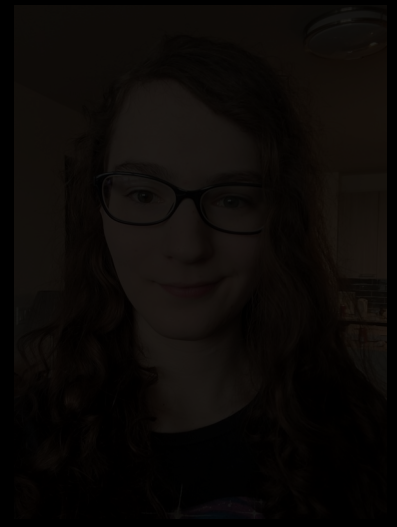
WE DON'T HAVE TIME!



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← Kate

Mikaela →

SO: WHAT ARE USB-TOOLS?

USB Hacking Tools

A set of USB hacking tools from **@ktemkin**, **@Qyriad**, **@greatscottgadgets**, and co. See also **@hacking-usb** for educational materials..

https://discord.gg/HKAhHub usb@ktemkin.com

Find a repository… Type: **All** Language: **All** Customize pins **New**

ViewSB

open-source USB analyzer toolkit with support for a variety of capture hardware

Python 9 77 7 0 Updated 3 hours ago

nu-map

Forked from nccgroup/umap2

nü-map: a somewhat-more-modern (expeirmental) derivative of umap2 for modern FaceDancer

Python AGPL-3.0 39 5 1 2 Updated 14 days ago

pyfwup

Python FirmWare UPloader -- a DFU (and similar) utility for python

Python 0 2 0 0 Updated 19 days ago

Facedancer

modern FaceDancer core for multiple devices-- including GreatFET

Python BSD-3-Clause 32 227 8 0 Updated on Sep 21

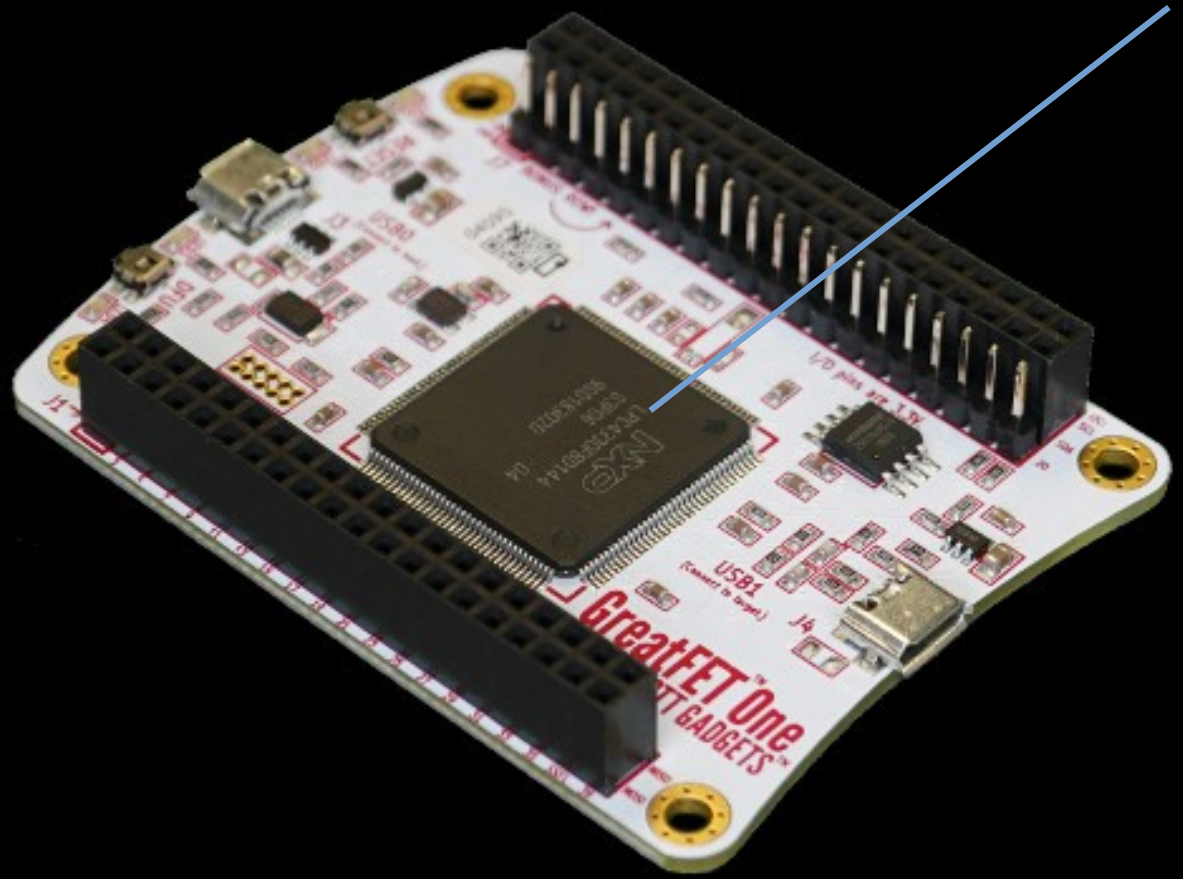
Top languages

Python C++ C HTML

People 4 >

Invite someone

https://github.com/usb-tools

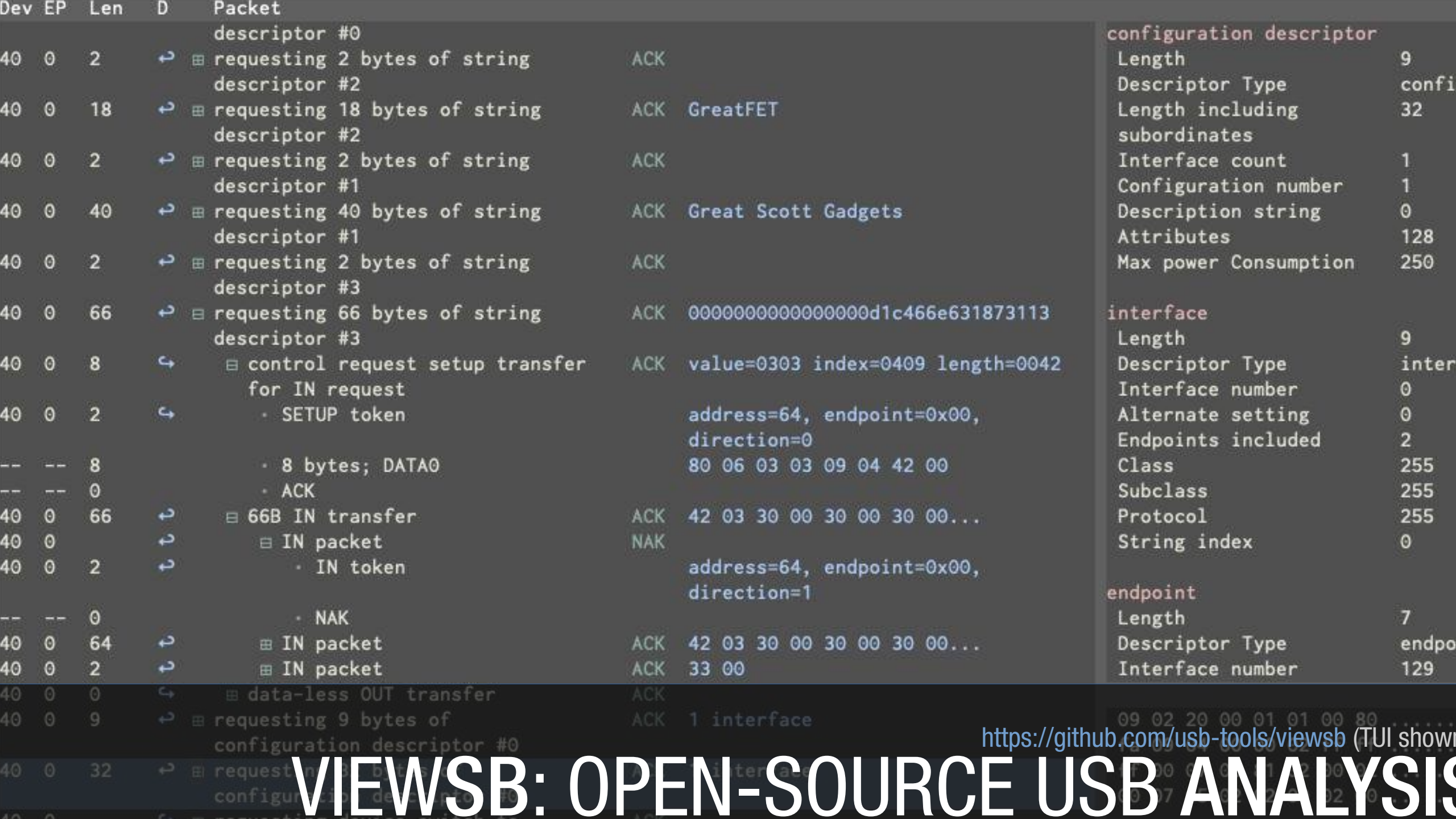


What's new with FaceDancer?

- Not too much – mostly that more hardware platforms are available.

What's coming down the line?

- Soon enough™: new asyncio-driven model
- Mid-term: support for Linux UDC backends
- Longer term: FPGA-based extensions



https://github.com/usb-tools/viewsb (TUI shown

VIEWSB: OPEN-SOURCE USB ANALYSIS

BUT ISN’T THAT
EXPENSIVE?

See also our open course materials:

https://usbc.tf
https://mini.usbc.tf

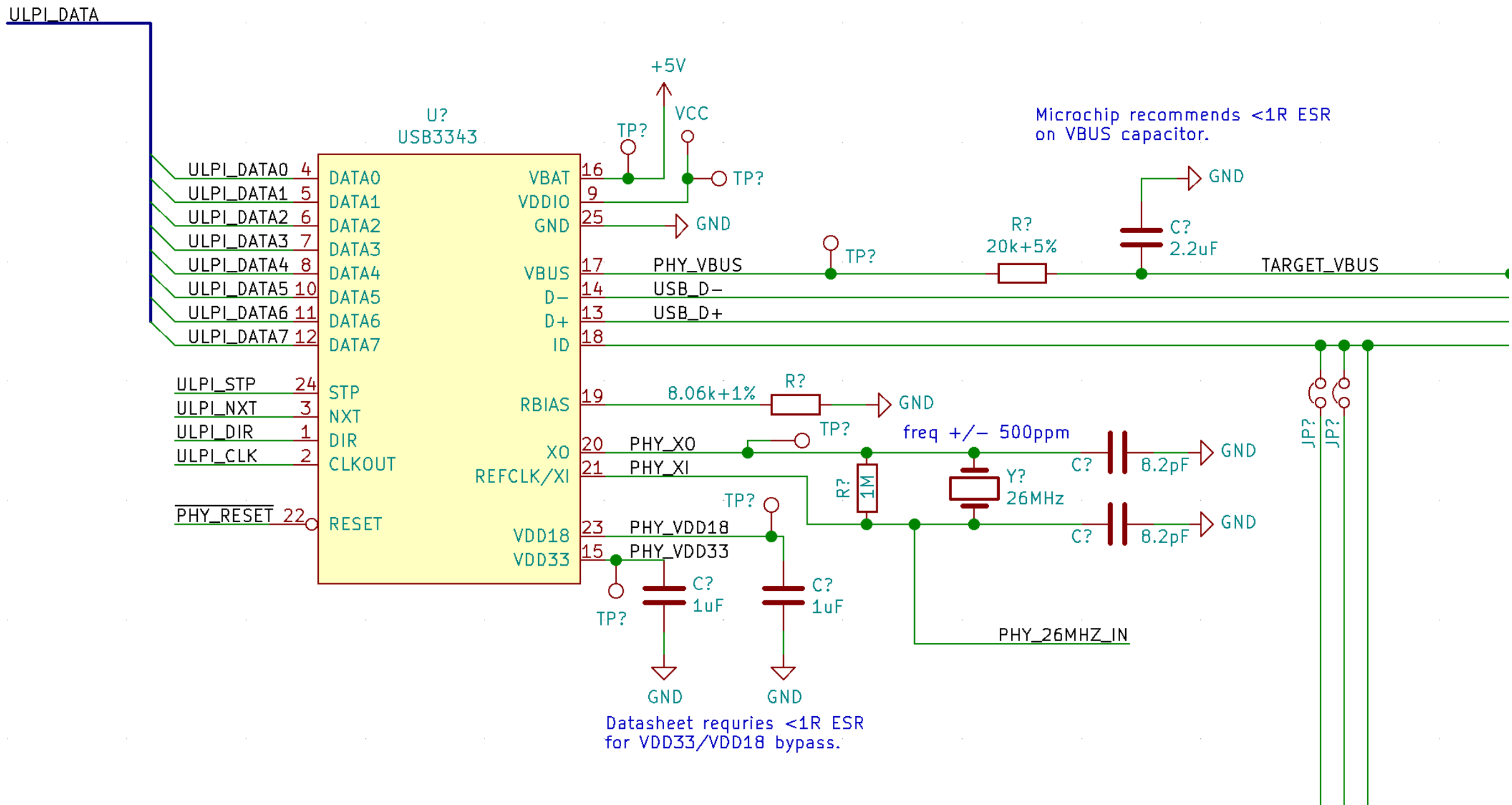
https://github.com/hacking-usb

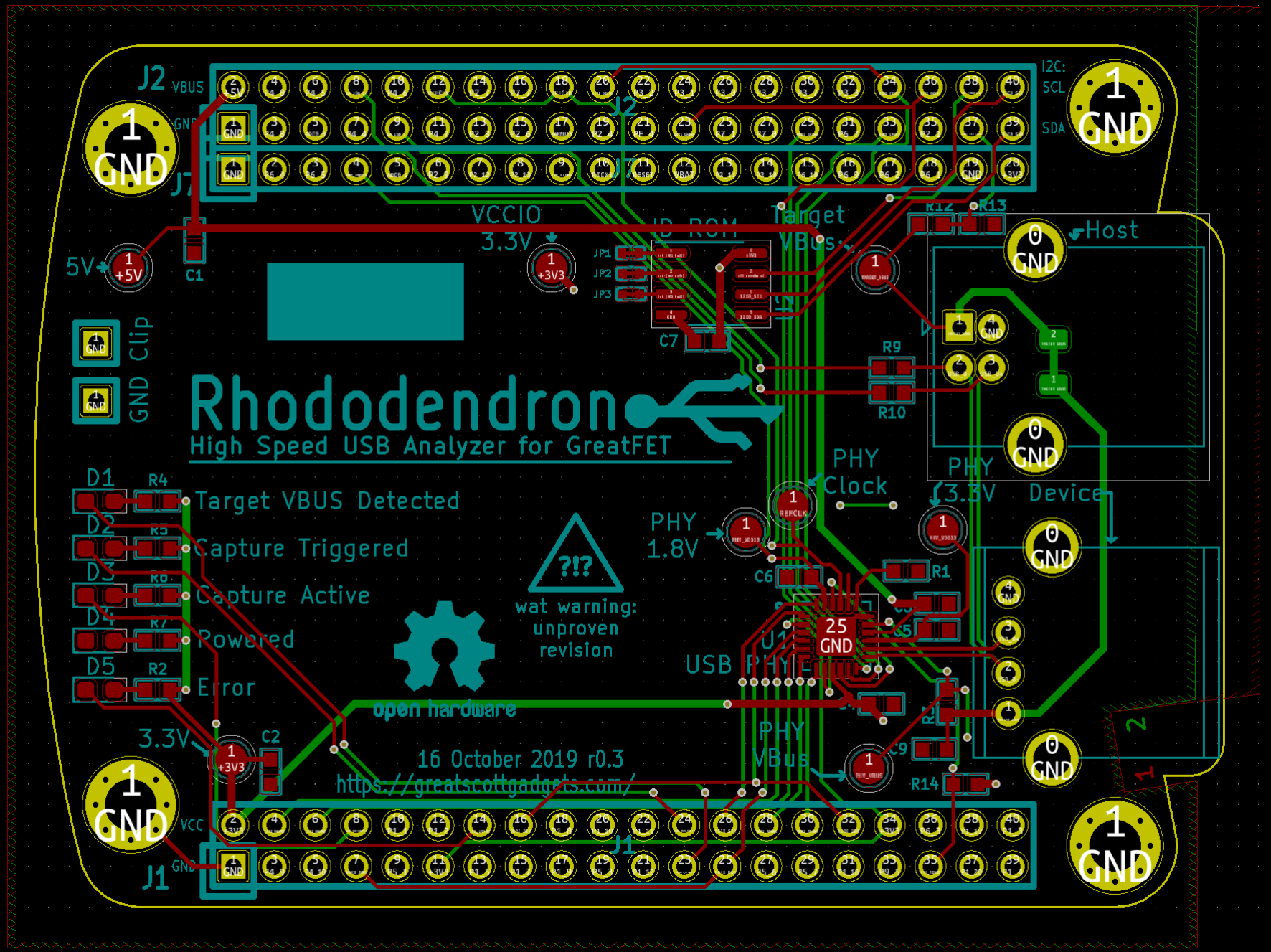
OKAY, BUT THAT'S
KINDA LIMITED

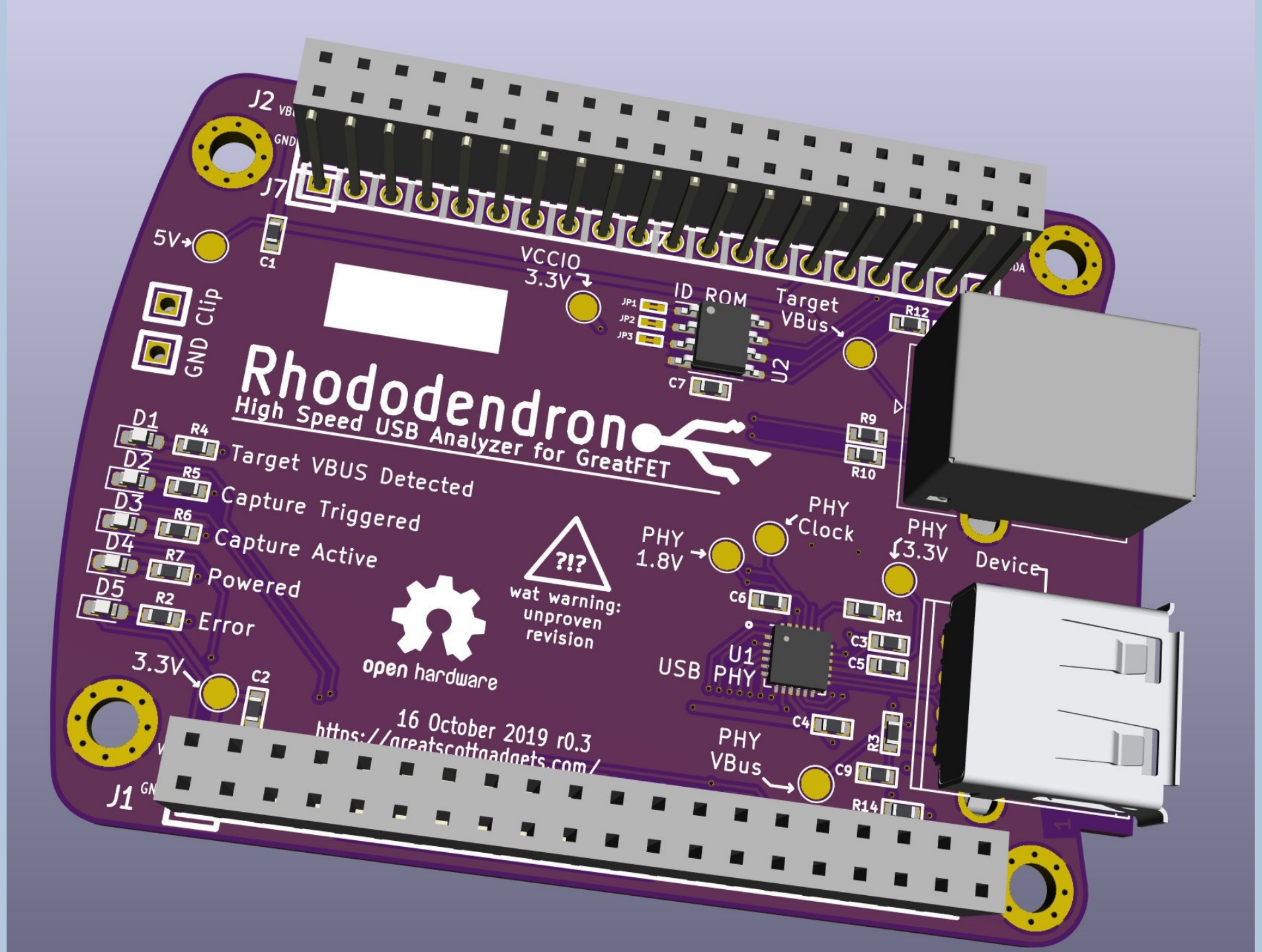
RECIPE FOR A **HIGH SPEED ANALYZER**

Components:

- LPC43xx; or similar, [or an ultra-cheap FPGA like the ECP5-12F]
- SDRAM for packet buffering*
- ULPI USB PHY
- SPI Flash


ULPI_DATA
U?
USB3343
ULPI_DATA0 4
ULPI_DATA1 5
ULPI_DATA2 6
ULPI_DATA3 7
ULPI_DATA4 8
ULPI_DATA5 10
ULPI_DATA6 11
ULPI_DATA7 12
DATA0
DATA1
DATA2
DATA3
DATA4
DATA5
DATA6
DATA7
ULPI_STP 24
ULPI_NXT 3
ULPI_DIR 1
ULPI_CLK 2
STP
NXT
DIR
CLKOUT
PHY_RESET 22
RESET
VBAT 16
VDDIO 9
GND 25
VBUS 17
D− 14
D+ 13
ID 18
RBIAS 19
XO 20
REFCLK/XI 21
VDD18 23
VDD33 15
+5V
VCC
TP?
TP?
GND
PHY_VBUS
TP?
R?
20k+5%
C?
2.2uF
GND
TARGET_VBUS
Microchip recommends <1R ESR
on VBUS capacitor.
USB_D−
USB_D+
8.06k+1%
R?
GND
TP?
PHY_XO
PHY_XI
freq +/− 500ppm
R?
1M
Y?
26MHz
C?
8.2pF
GND
C?
8.2pF
GND
TP?
PHY_VDD18
PHY_VDD33
PHY_26MHZ_IN
TP?
C?
1uF
C?
1uF
GND
GND
JP?
JP?
Datasheet requries <1R ESR
for VDD33/VDD18 bypass.


Rhododendron
High Speed USB Analyzer for GreatFET
Target VBUS Detected
Capture Triggered
Capture Active
Powered
Error
wat warning:
unproven
revision
open hardware
16 October 2019 r0.3
https://greatscottgadgets.com/
VCCIO
3.3V
5V
PHY
1.8V
PHY
Clock
PHY
3.3V
PHY
VBus
Target
VBUS
Host
Device
I2C:
SCL
SDA
GND Clip
USB PHY
J1
J2
GND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VBus
PHY
1.8V
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Clock
PHY
3.3V
PHY
VBus
USB PHY
Device
J1
J2
J7
U1
U2
C1
C2
C3
C4
C5
C6
C7
C9
R1
R2
R3
R4
R5
R6
R7
R9
R10
R12
R14
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D2
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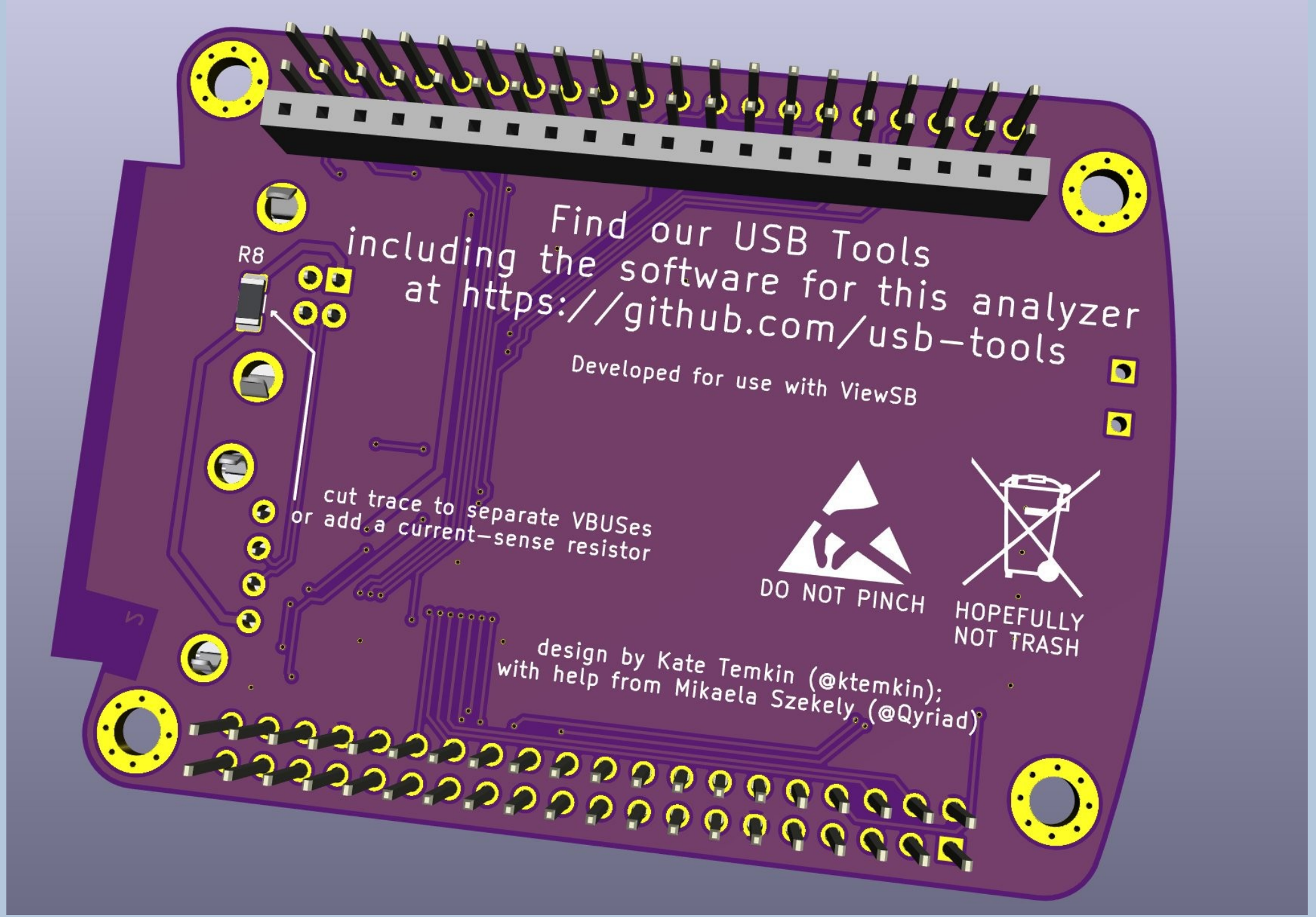
D4
D5
JP1
JP2
JP3


R8
Find our USB Tools
including the software for this analyzer
at https://github.com/usb-tools
Developed for use with ViewSB
cut trace to separate VBUSes
or add a current-sense resistor
DO NOT PINCH
HOPEFULLY
NOT TRASH
design by Kate Temkin (@ktemkin);
with help from Mikaela Szekely (@Qyriad)

[rhododendron demo]

[rhododemodron]

IN-PROGRESS TOOLS: **NUMAP**

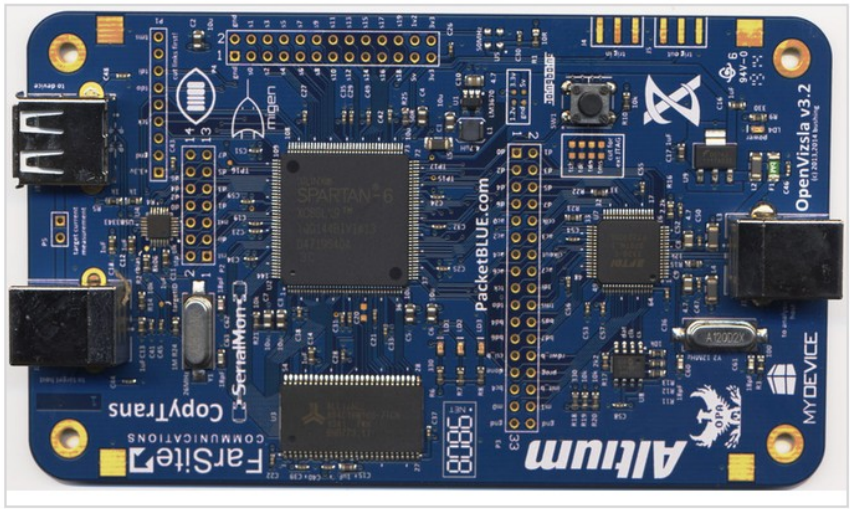
What is it now?

- port of umap2 to the modern FaceDancer backend; which provides some fancy host-fuzzing via FaceDancer emulation
- very much a work in progress
- ~~a subtle dig at Dominic's röck döts~~

What should it be?

- a much more comprehensive tool for host and device fuzzing
- a tool with original-umap style host identification; and host driver ID'ing
- ~~functional~~

IMPORTANT NOTE: No orders will be handled from June 25, 2019 until July 7, 2019. Orders placed until 10:00am German local time (CEST) on June 24th will still be handled+shipped before this period of absence.



OpenVizsla v3.2 USB Protocol Analyzer PCBA

This is fully assembled and tested OpenVizsla v3.2 USB protocol analyzer.

OpenVizsla is a bus sniffer/analyzer for USB. It allows you to passively monitor the communication between a USB host and USB periheral. It supports USB low-speed, full-speed and high-speed.

The product is shipped as a bare printed circuit board assembly, without any enclosure.

For more information about OpenVizsla, see https://openvizsla.org/

PRICE

119.00 € (inc. VAT)

1 | Add To Cart

LOOK FOR SIMILAR ITEMS

Development Boards

OTHER USB-TOOLS:

Primary tools:

- FaceDancer (and USBProxy)
- ViewSB

Supporting tools:

- pyfwup – a tool for upgrading device firmware in pure python
- pyopenvizsla – properly-pythonic OpenVizsla support drivers
  - ...openvizsla?

QUESTIONS?

[software analysis demo]