



# Blinkenwalls, Electronic Windows, and other "magical" portals with Tox

<https://github.com/Zoxcore/ToxBlinkenwall>

zoff at Linuxwochen Wien 2019 04.05.2019



# About

Zoff

- Eletrotechnik
- IT Worker
- System Administrator  
(Linux, Solaris)
- Projectmanager



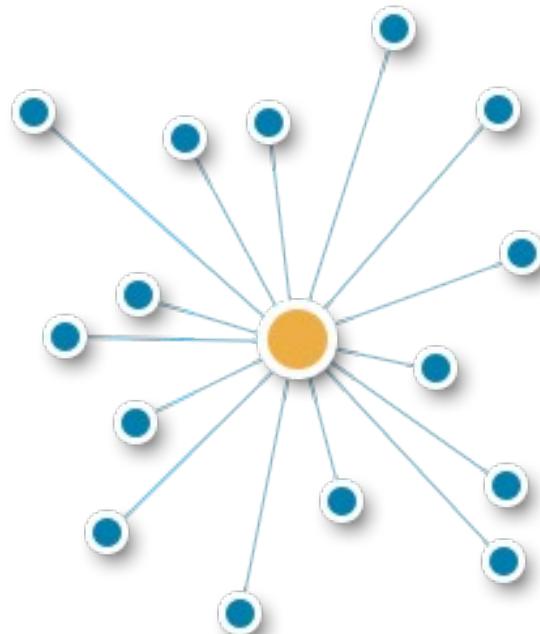
# Some basics

Let's start with some basics

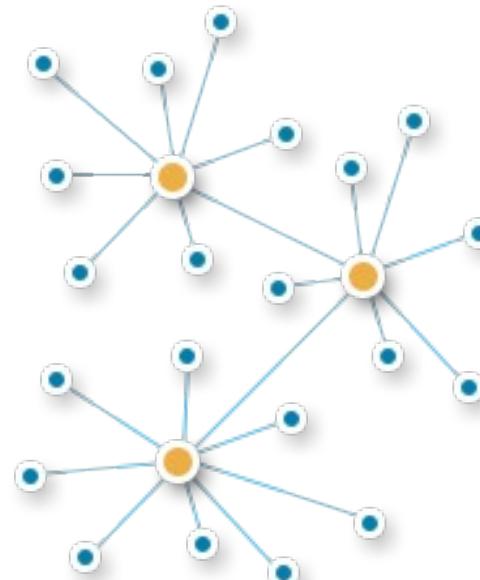


# different types of networks

Centralized



Decentralized



# Federated - Matrix

most users are on 1 central server

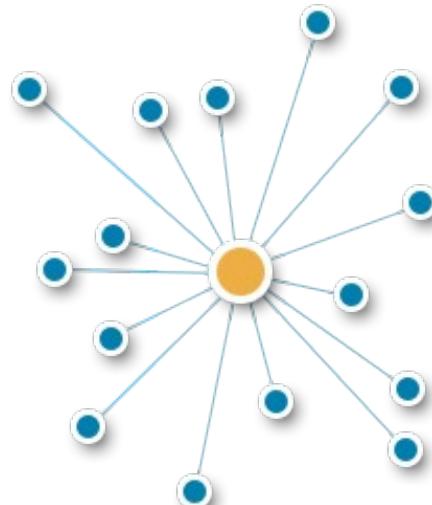
source:

[https://www.hello-matrix.net/public\\_servers.php](https://www.hello-matrix.net/public_servers.php)

Public Aliases shows the number of published aliases in that homeserver's public room directory and is based on the `total\_room\_count\_estimate` returned by the servers' APIs. We update this number once a day.

Centralized

\* October 2018

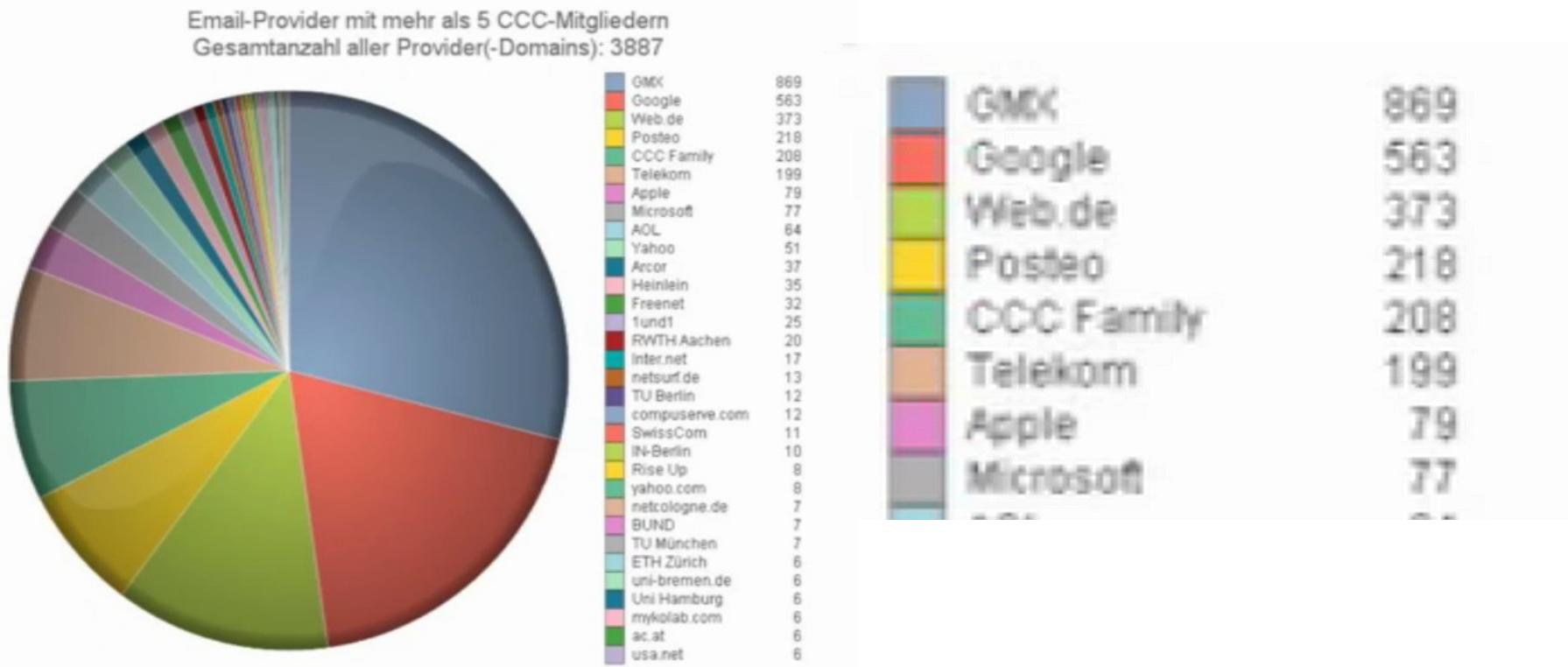


# Office CCC - EMail providers

most users are on a few providers

source:

[https://media.ccc.de/v/eh16-68-how\\_to\\_ccc\\_office](https://media.ccc.de/v/eh16-68-how_to_ccc_office)



# Can we do better?

Can we do some things better?

with less effort, less dependencies?



# Tox?



## A New Kind of Instant Messaging

Whether it's corporations or governments, digital surveillance today is widespread. Tox is easy-to-use software that connects you with friends and family without anyone else listening in. While other big-name services require you to pay for features, Tox is completely free and comes without advertising — forever.

 Download

 Learn more



# What is Tox?

Tox began in the wake of Edward Snowden's leaks regarding NSA spying activity.

The idea was to create an instant messaging application that ran without requiring the use of central servers, with no way to disable any of the encryption features.

The application would be easily usable by the layperson with no practical knowledge of cryptography or distributed systems.

During the Summer of 2013 a small group of developers from all around the globe formed and began working on a library implementing the Tox protocol.



## Encrypted

Everything you do with Tox is encrypted using open-source libraries. The only people who can see your conversations are the people you're talking with.



## Distributed

Tox has no central servers that can be raided, shut down, or forced to turn over data — the network is made up of its users. Say goodbye to server outages!



## Free

Tox is free software. That's [free as in freedom](#), as well as in price. This means Tox is yours — to use, modify, and share — because Tox is developed by and for the users.



# Toxcore - Features

- Distributed (No Central Servers)
- End-to-end encryption (always, everything)
- No Registration (no Email, no Phonenumber)
- No Username
- No Setup
- No Hostname
- works over any Port
- UDP and **TCP** supported (even **for A/V Calls**)
- Proxy support (e.g. **Tor**, even **for A/V Calls**)
- Password protect your Private-Key



\* as of October 2018 10

# Basic features of Tox?



## Instant messaging

Chat instantly across the globe with Tox's secure messages.



## Voice

Keep in touch with friends and family using Tox's completely free and encrypted voice calls.



## Video

Catch up face to face, over Tox's secure video calls.



## Screen sharing

Share your desktop with your friends with Tox's screen sharing.



## File sharing

Trade files, with no artificial limits or caps.



## Groups

Chat, call, and share video and files with the whole gang in Tox's group chats.



# Tox in your language ...

## Language bindings

- Bash
- C#
- Go go-tox
- Go go-toxcore
- Go gtox
- Haskell
- Java
- Java/Scala
- JavaScript
- Node.js (Node.js addon)
- Julia (Attempt to make Toxcore accessible in Julia)
- Objective C objcTox
- Objective C ToxController
- Pascal
- Python
- Racket
- Ruby
- Rust tox-rs
- Rust rstox
- Vala



# Fun things with Tox ...

some very fun things to check out:

- VPN over Tox

<https://github.com/cleverca22/toxvpn>

<https://github.com/gjedeer/tuntox/blob/master/VPN.md>

- SSH over Tox

<https://github.com/gjedeer/tuntox>

- VNC over Tox

<https://github.com/gjedeer/tuntox>



# Source and compiling

A Look at the source code and dependencies for compiling.

Can Video chat be done without WebRTC?

Can we reduce the dependencies to a minimum?



# Toxcore - Source Stats

• toxcore	files: <b>61</b>	C: <b>25</b>	SLOC: <b>21.333</b>
• toxav	files: <b>38</b>	C: <b>16</b>	SLOC: <b>8.512</b>
• toxencryptsave	files: <b>24</b>	C: <b>8</b>	SLOC: <b>1.696</b>
• toxutil	files: <b>4</b>	C: <b>1</b>	SLOC: <b>1.005</b>
• <b>Total</b>	<b>files: 127</b>	<b>C: 50</b>	<b>SLOC: 32.546*</b>

\* measured October 2018



# libjingle\_peerconnection

- **Total** C++: 446 SLOC: 164.358\*
- cmp. c-toxcore ~ x9 ~ x5

\* measured October 2018

## Languages

Language	Lines
cpp	158676 (96.54%)
ansic	5244 (3.19%)
python	438 (0.27%)

## Totals

Total Physical Lines of Code (SLOC): 164,358

Estimated development effort: 38.65 (463.75) person-years (person-months)

Schedule estimate: 1.44 (17.22) years (months)

Total estimated cost to develop: \$ 5,220,534

Please credit this data as "generated using 'SLOCCount' by David A. Wheeler."



# Web-RTC

- Total
- cmp. c-toxcore

C++: 2150  
~ x43

SLOC: 664.070\*  
~ x20

Language	Lines
cpp	559367 (84.23%)
ansic	49022 (7.38%)
java	29225 (4.40%)
python	12120 (1.83%)
objc	9241 (1.39%)
sh	1980 (0.30%)
javascript	1618 (0.24%)
xml	1142 (0.17%)
asm	355 (0.05%)

\* measured October 2018

## Totals

Total Physical Lines of Code (SLOC): 664,070

Estimated development effort: 165.69 (1,988.25) person-years (person-months)

Schedule estimate: 2.80 (33.55) years (months)

Total estimated cost to develop: \$ 22,382,128

Please credit this data as "generated using 'SLOCCount' by David A. Wheeler."



# Toxcore - Dependencies

- toxcore + toxencryptsave

- libsodium

<https://github.com/jedisct1/libsodium>

Libsodium v1.0.12 and v1.0.13 Security Assessment in 2017

<https://www.privateinternetaccess.com/blog/2017/08/libsodium-v1-0-12-and-v1-0-13-security-assessment/>



- toxav

- libvpx <https://github.com/webmproject/libvpx>
  - libopus <https://github.com/xiph/opus>

- x264\* <https://git.videolan.org/?p=x264.git;a=shortlog;h=refs/heads/stable>
  - libav\* <https://github.com/libav/libav>

\* c-toxcore Research branch (experimental H.264 support and other upgrades)  
<https://github.com/Zoxcore/c-toxcore>



# Toxcore - Dependencies (2)

- libvpx <https://github.com/webmproject/libvpx>
- libopus <https://github.com/xiph/opus>
  - yasm <https://github.com/yasm/yasm>
- x264\* <https://git.videolan.org/?p=x264.git;a=shortlog;h=refs/heads/stable>
- libav\* <https://github.com/libav/libav>
  - nasm <https://www.nasm.us/pub/nasm/releasebuilds/2.13.02/nasm-2.13.02.tar.bz2>
  - yasm <https://github.com/yasm/yasm>



\* c-toxcore Research branch (experimental H.264 support and other upgrades)  
<https://github.com/Zoxcore/c-toxcore>

# Toxcore - Platform Support

- Windows (32bit?, 64bit) H.264 HW Acceleration\*
- Linux (Debian, Ubuntu, Suse, Alpine, ...) H.264 HW Acceleration\*
- BSD (open BSD, free BSD)
- OSX
- IOS (IPhone)
- ARM (Android, Raspberry PI) H.264 HW Acceleration\*
- Solaris (open Solaris)

\* c-toxcore Research branch

<https://github.com/Zoxcore/c-toxcore>

\* as of October 2018



# Toxcore - Features

## What Tox does not:

- Does NOT guarantee to hide your IP address  
→ (use Tor as Proxy)
- NO offline Messages (yet)  
→ (some proposals discussed)
- NO Multidevice support (yet)  
→ (early beta testing, tweaking specification)



\* as of October 2018

# Want to get involved?

for more information about Tox please visit these links:

<https://tox.chat/faq.html>



<https://toktok.ltd/integrations.html>



# my first Tox client

# Echobot, just 100 lines of C code

([https://wiki.tox.chat/developers/client\\_examples/echo\\_bot](https://wiki.tox.chat/developers/client_examples/echo_bot))



# TRIfA - on the „north pole“

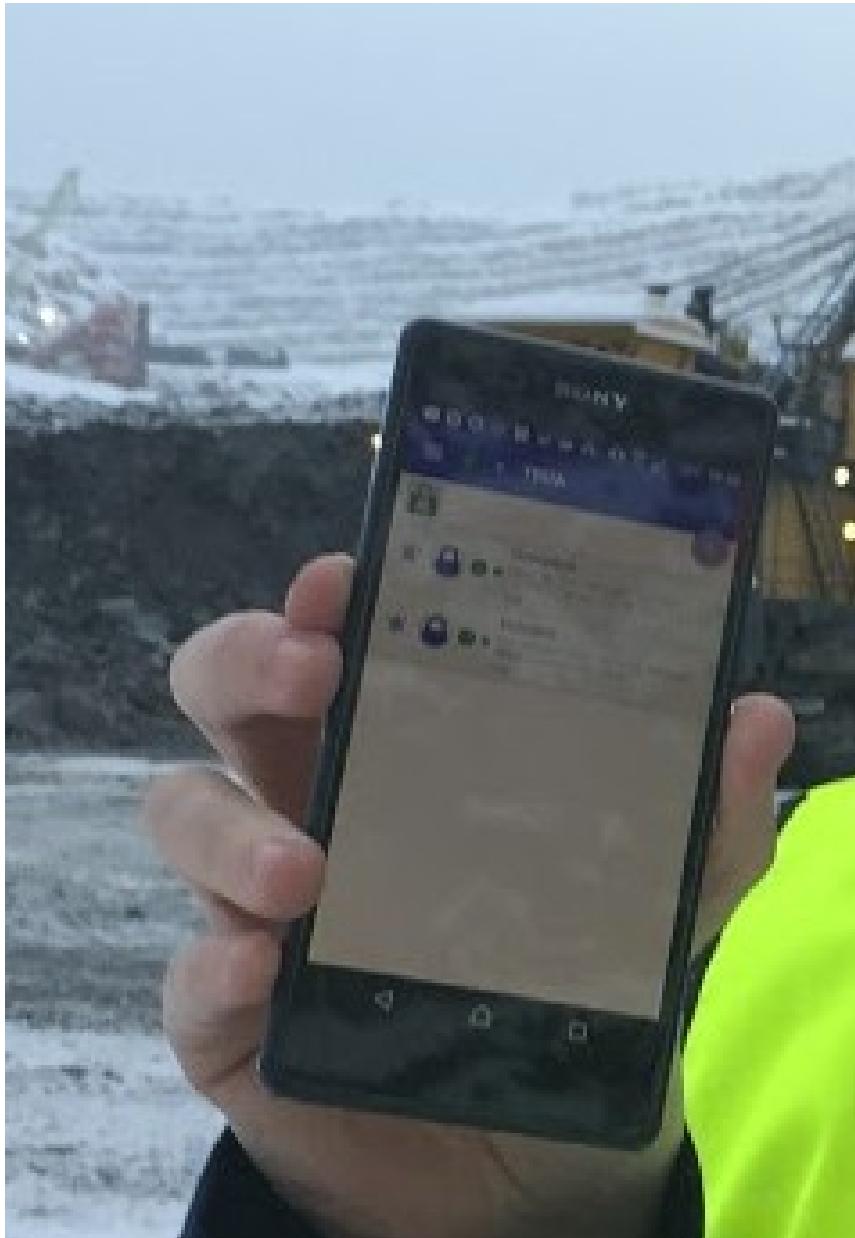


Photo credit: <a href="https://s3.amazonaws.com/lowres.cartoonstock.com/weather-smartphone-cold\_weather-wintery\_condition-cold-blizzard-amrn839\_low.jpg">Amazonaws.com</a>



# Blinkenwall

- What can you do if you have a large room and some LED Panels?

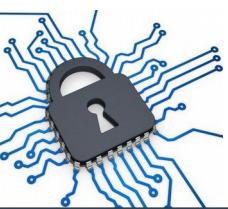
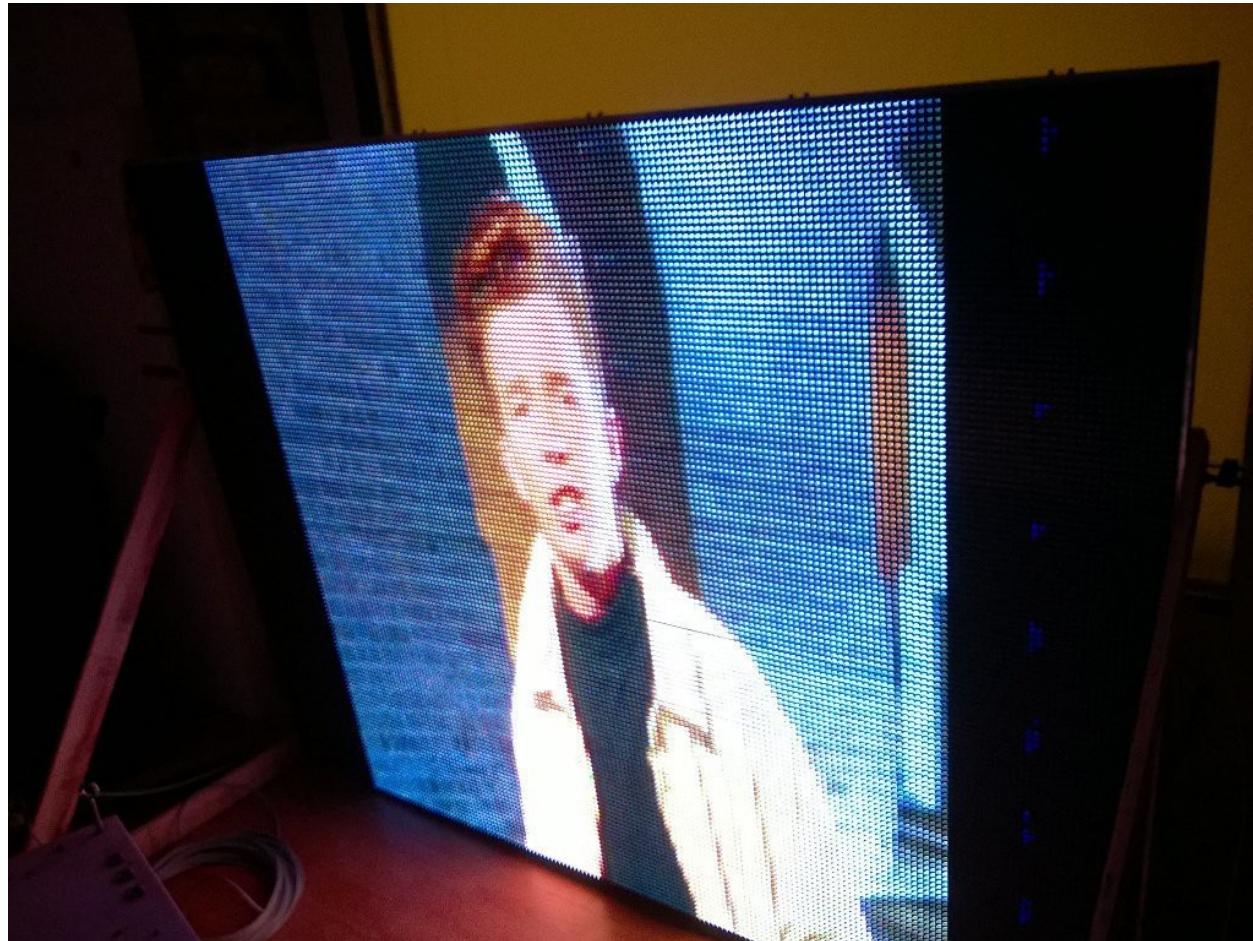


# Blinkenwall



# Blinkenwall

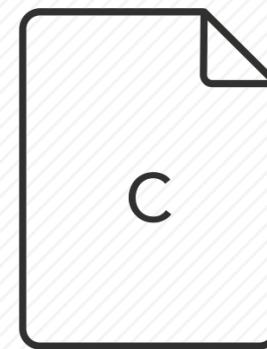
<https://metalab.at/wiki/Blinkenwall>



# ToxBlinkenwall

<https://github.com/zoff99/ToxBlinkenwall>

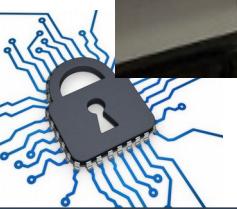
- A nice little Software to transform your Huge LED Wall into a video conferencing system



toxblinkenwall.c



# ToxBlinkenwall

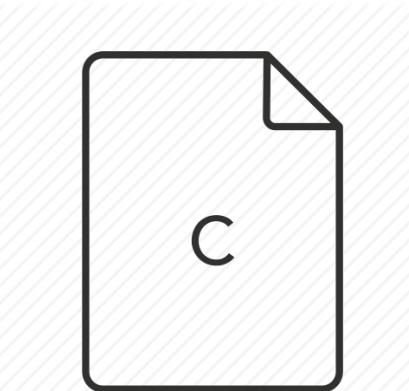


# What else?



# ToxPhone

<https://github.com/zoff99/ToxPhone>

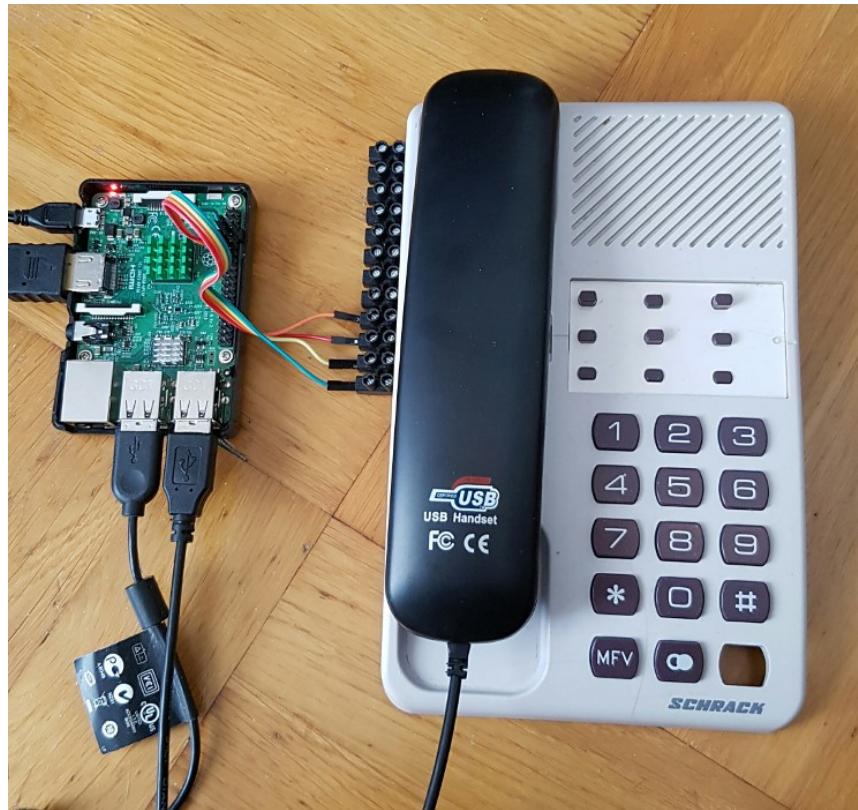


toxblinkenwall.c



31

# ToxPhone v1.0



32

# ToxPhone updates ...

## **some hardware updates made:**

- make a 3D printable case, to make it reproducible
- use a keypad, to make it reproducible
- use Python script to check the keys

## **some software updates made:**

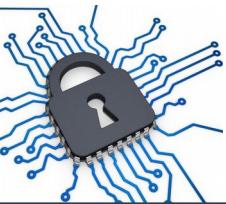
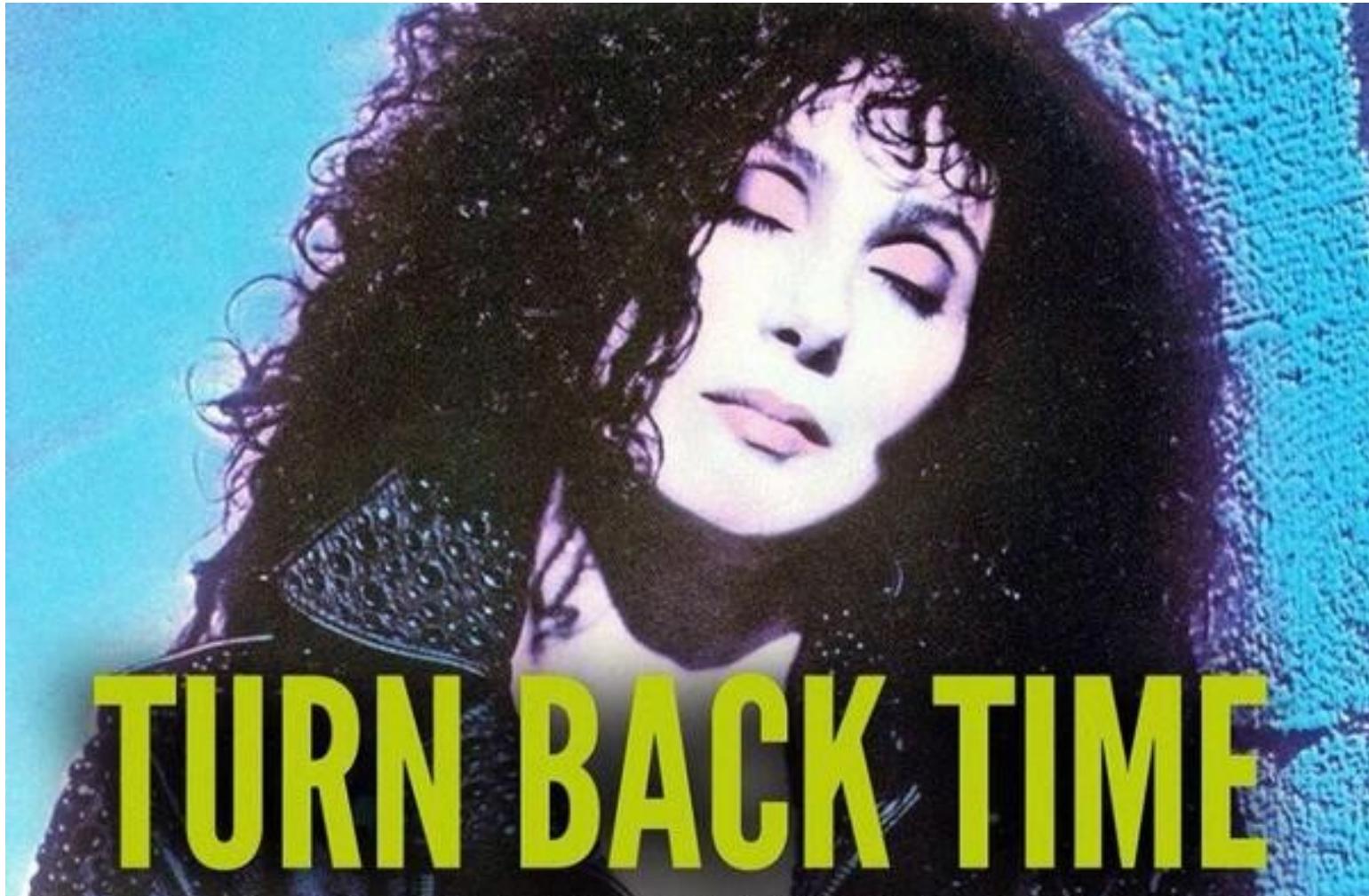
- openGL acceleration for Video output
- H264 Video codec for better Video quality



# ToxPhone v2.0



# let's go back to 2015 ...

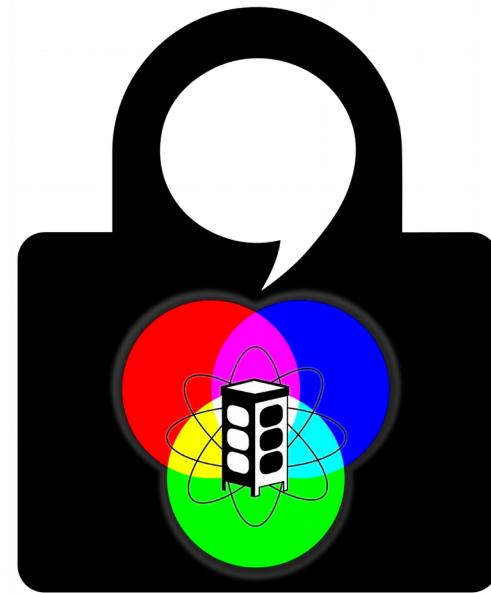


# eWindow

- connect places (Hackers and Makers) and work closer together
- use cheap accessible hardware
- use open and free software



# ToxBlinkenwall eWindow



[https://github.com/Zoxcore/ToxBlinkenwall\\_raspi\\_lite\\_image](https://github.com/Zoxcore/ToxBlinkenwall_raspi_lite_image)



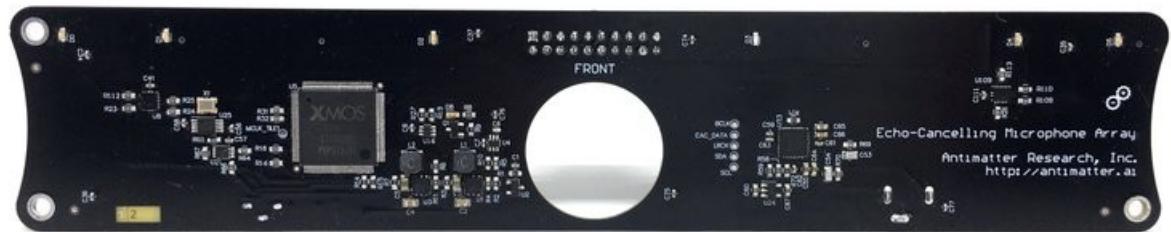


# Audio configurations



USB sound card  
in the shape of a phone  
speaker

Acusis (DSP)  
by Antimatter Research



<https://www.crowdsupply.com/antimatter-research/acusis>

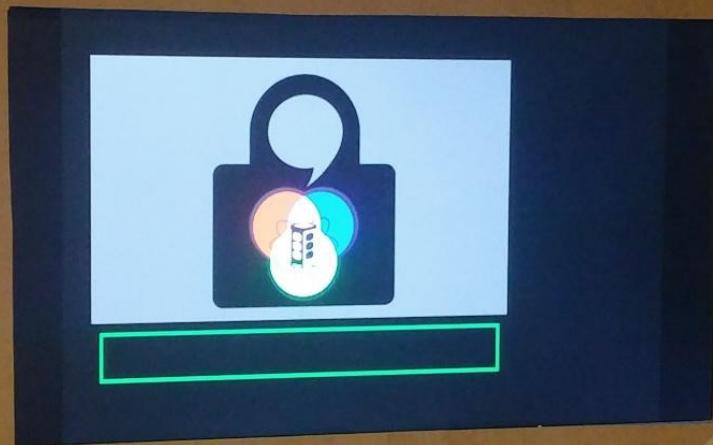






ToxBlinkenwall

eWindow



BINSCH VON  
ROLLSTRAßE

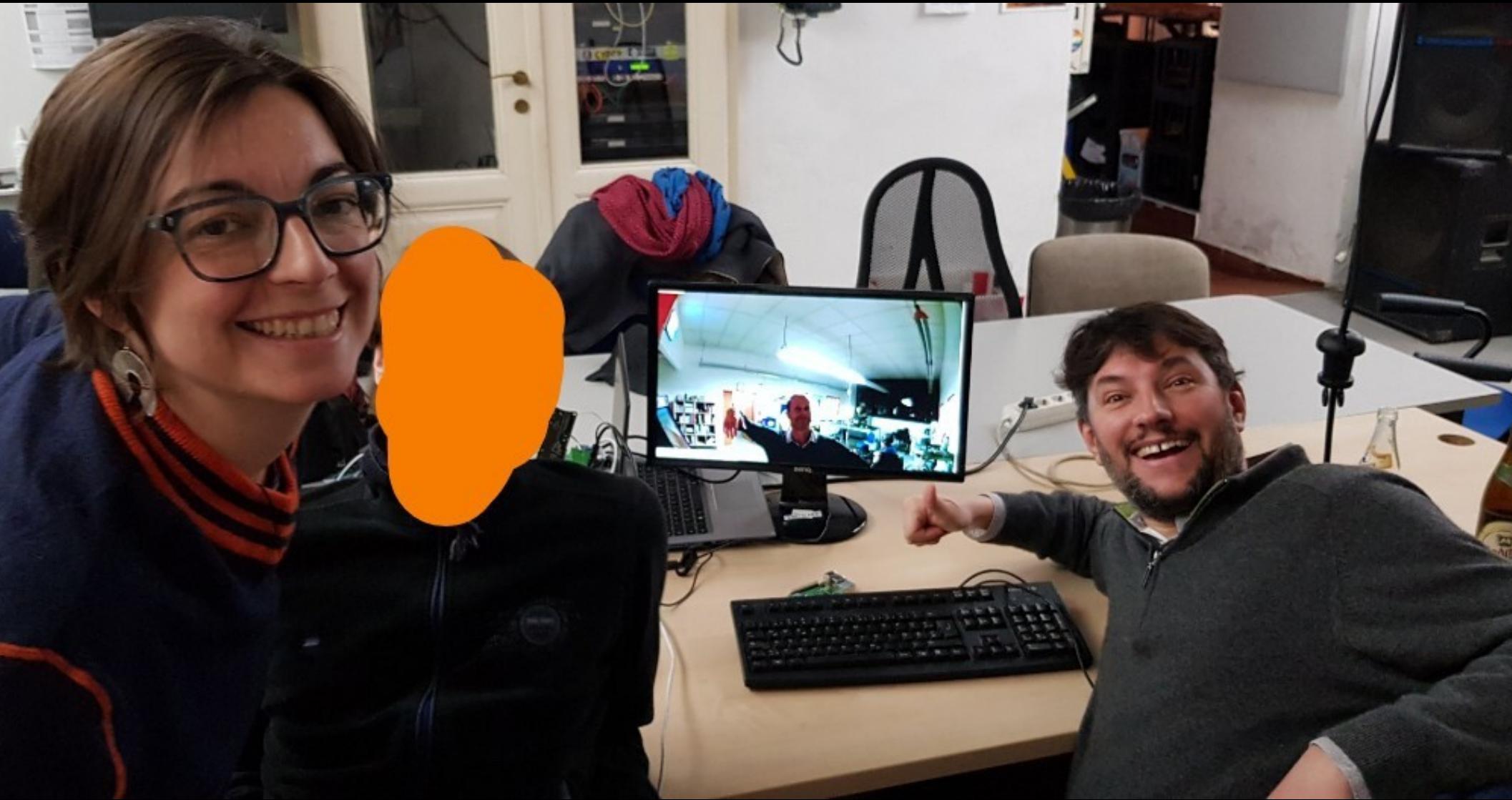
MATERIAL RÜCKFÜHR



2'000.00  
Tim Bannen Wall

VDE Bedienung: OFF / ON  
Vol: 00





ToxBlinkenwall



eWindow





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- Kreativ

# We need your help

We are looking for help with these:

- Graphics design (icons, flyer, logos ...)
- C Development (c-toxcore, toxblinkenwall)
- Case design (3D printed case, buttons, input devices ...)
- RaspberryPI Images (Custom Raspian, Alpine ...)

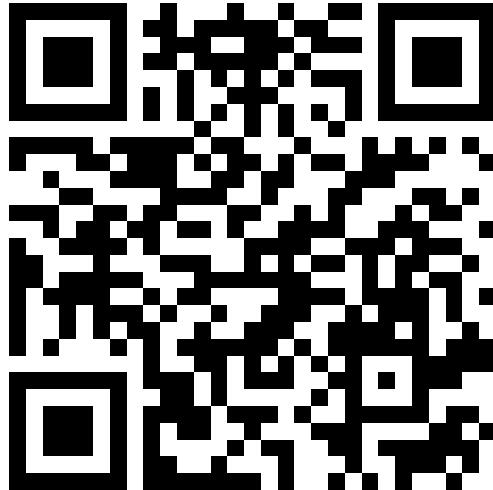
talk to us on Matrix:

[https://matrix.to/#/#freenode\\_#ewindow:matrix.org](https://matrix.to/#/#freenode_#ewindow:matrix.org)

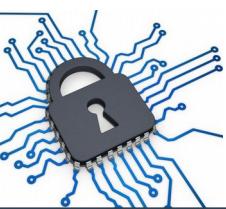


# getting in touch ...

- Github  
<https://github.com/Zoxcore>
- Matrix  
[https://matrix.to/#/#freenode\\_#ewindow:matrix.org](https://matrix.to/#/#freenode_#ewindow:matrix.org)
- Email  
[zoff@zoff.cc](mailto:zoff@zoff.cc)



# Live Demo ...



50