

## Skills

My interest is focused in developing performant and secure software for current and future computer architectures. I am experienced in *computer architecture, virtualization, binary exploitation, kernel programming, data compression, computer graphics and algorithm design*. Comfortable technologies for me include *C/C++, Python, gdb, x86-64/aarch64 assembly, graphics APIs*.

## Education

- **Technical University of Munich**, MSc Informatics 2018 - 2020, Germany  
Focus: Computer arch., Security, Compilers, Data Compression
- **University of Helsinki**, BSc Computer Science 2014 - 2017, Finland  
Focus: Computer graphics, parallel programming, algorithms

## Work Experience

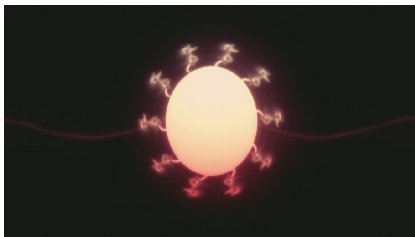
- **Fraunhofer AISEC** Sep 2019 - Feb 2021  
*Research assistant (part-time)* Munich, Germany
  - Discovered new attack vectors on the AMD SEV family of features.
  - Worked with various code bases: Linux kernel (boot code, device drivers, kvm), qemu, ovmf.
  - Worked on scientific papers.
  - Did vulnerability disclosures to the AMD PSIRT.
- **NVIDIA** June 2016 - May 2019  
*System engineering intern, Chips, 3D Graphics and Browser teams* Helsinki, Finland
  - Interned sporadically in various teams for a total of 21 months.
  - Initiated the implementation of the OpenGL ES 3.1 specification in Google's ANGLE project.
  - Designed and implemented the `GL_ANGLE_multiview` extension used for [WEBGL\\_multiview](#).
  - Improved the quality and Autosar code compliance of some Tegra drivers.
  - Extended test coverage for user and kernel gpu drivers.
  - Refactored few driver projects for support of future chip architectures.
- **Screenful Oy** Jan 2014 - Dec 2015  
*Software engineer (part-time)* Helsinki, Finland
  - Implemented services for automatic data retrieval from Jira, Google Analytics, Trello, etc.
  - Worked on performance optimizations for latency hiding and throughput increase.
  - Designed algorithms for efficient retrieval of metrics from obtained data.
  - Worked at the company from its early startup days.

## Publications

- Exploiting Interfaces of Secure Encrypted Virtual Machines  
Martin Radev and Mathias Morbitzer  
Proc. Reversing and Offensive-Oriented Trends Symposium (ROOTS), 2020
- SEVerity: Code Injection Attacks against Encrypted Virtual Machines  
M. Morbitzer, S. Proskurin, M. Radev, M. Dorfhuber, E. Quintanar  
WOOT 2021

## Highlighted Projects

- **”SE-Vault: an SEV-based TEE for protecting cryptographic keys”, M.Sc. Thesis**
  - The solution protects cryptographic keys against kernel memory disclosure vulnerabilities
  - Implemented PoCs based on Linux and seL4
  - Added SEV support to seL4
  - Developed correctness, security and performance tests
- **gdb-pt-dump**
  - GDB script to aid x86-64/aarch64/rv64 VM introspection and memory analysis
  - Primarily used to aid kernel exploitation, but also useful for kernel debugging
- **Win32-x86 exe packer**
  - Developed an executable packer for x86-32 Win32.
  - Researched and developed an entropy-aware LZ77 parser and arithmetic coder with an adaptive model.
  - Used in the development of the demo ”100% by Macau Exports” to compress from 165kb to 61kb.
  - Read about it in [my blog post](#)
- **Demoscene group projects**

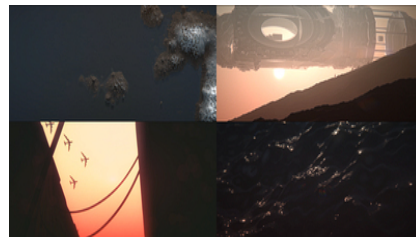


### **100% by Macau Exports**

Available on [youtube](#)

2<sup>nd</sup> in Assembly 2018 64k Demo Compo

Meteoriks 2019 award nominee



### **Guberniya by Macau Exports**

Available on [youtube](#)

6<sup>th</sup> in Revision 2017 64k Demo Compo

Meteoriks 2018 award winner for best direction

## Open-Source Contributions

- Apache Parquet and Apache Arrow: design and implementation of the BYTE\_STREAM\_SPLIT encoding
- Google ANGLE: patches for OpenGL ES 3.1 support and GL\_ANGLE\_multiview (OVR\_multiview2) implementation
- AMDESE: AMD SEV-ES security hardenings for the Linux kernel, build and launch scripts

## Teaching Experience

- TA in "Models of Computation", University of Helsinki  
The course focuses on regular languages, DFA, NFA, regular expressions, context free grammars, push-down automatas, Turing machines, NP completeness and similar topics.  
Led the international exercise group in the course.
- TA in "Game engine architecture", University of Helsinki  
Led the only exercise group, contributed to improving the exercise questions and provided exhaustive solutions in some of the weeks.

## Other Personal and Academic Achievements

- Participated in various CTF contests doing binary exploitation
- Contributed a Linux FG-KASLR-based pwn challenge for the HXP CTF 2020
- Contributed a reverse-engineering challenge for the 36C3 HXP CTF
- National Bulgarian Olympiad in Informatics 2013, 17th place, laureate
- National Bulgarian IT Olympiad 2013, 3rd place in Dekstop applications, laureate
- National Bulgarian Physics Olympiad 2013, finalist
- Owned a small online perfume shop during high school