Zöbelein Carolin

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Independent mathematical scientist

In short

Current project: Hunting for graduate studies in mathematics ☺

Research motivation: Designing of a new kind of censorship free, access to knowledge warranty, privacy and anonymity preserving internet by a Mathematical Computer Science approach for Distributed Network Structures & Protocols as well as Algorithms, Combinatorics & Optimization.

Areas of work:

Mathematics
Algorithms, Combinatorics, Optimization, Mathematical Computer Science, Number Theory, Algebra, Cryptography, Graph Theory, Geometry

Computer Science
Theoretical Computer Science, Distributed Network Structures & Protocols, Online privacy & anonymity, Online traffic obfuscation and ways for circumventing blocking and censorship, Reverse engineering, Computer forensics, Cryptography, Social engineering

Numbers:
- Research time: ≈ 3.25 years as independent research scientist, 3.25 years of student projects
- Projects: 4 large and several small as independent research scientist, 4 student projects
- Grants & Fellowships: 2, Total: 19 100 EUR
- Awards: 1
- Reviewer jobs: 1
- Exhibitions: 2
- Organized events: 1
- Teaching experience: ≈ 16 years
- Coding experience: ≈ 19 years
- Spoken languages: 7

Websites:
`https://research.carolin-zoebelein.de/`
`https://art.carolin-zoebelein.de/`

Practical experience

Primary work

Independent mathematical scientist   **Remote, Germany**
○ *Freelancer, Primary: Researcher, Secondary: Adviser and contractor*   *Since 2016/11*
Focus on Mathematical Computer Science of Distributed Network Structures & Protocols as well as Theoretical Computer Science like Algorithms, Combinatorics & Optimization, and Number Theory, with the aim of designing a new kind of censorship free, access to knowledge warranty, privacy and anonymity preserving internet
https://research.carolin-zoebelein.de

Secondary work

Artist   **Remote, Germany**
○ *Freelancer*   *Since 2015/05*
Connection and integration of scientific phenomena into artwork, as well as artwork about mathematics, online privacy and anonymity, digital security and human rights
https://art.carolin-zoebelein.de

Consulting   **Remote, Germany**
○ *Freelancer, For cross-subsidization*   *Since 2017/07*
https://consulting.carolin-zoebelein.de

Tor Project   **Remote**
○ *Volunteering*   *Since 2016/05*
https://www.torproject.org/

Former

Infineon Technologies AG München   **Germany**
○ *Student research project, Information Security - Cyber Defence Center*   *2018/11 - 2019/05*
Topic: *Evading detection and treatment*, Machine learning based malware detection

Friedrich-Alexander-University Erlangen-Nürnberg, Department for Mathematics   **Germany**
○ *Student assistant, IT-Support*   *2016/04 - 2016/09*

Siemens AG Forchheim   **Germany**
○ *Student assistant, Computer Tomography development*   *2015/03 - 2015/09*
Data analysis programming for research. Coding language: Matlab

Friedrich-Alexander-University Erlangen-Nürnberg   **Germany**
○ *Student assistant*   *2012/10 - 2016/09*
Tutor for exercise lessons and practical courses in physics and mathematics

High-Octane Motorsports e.V., University Erlangen-Nürnberg   **Germany**
○ *Student member, Society in terms of the competition Formula Student*   *2012/10 - 2013/07*
Tire simulation and data analysis. Coding language: Matlab

University medical centre Erlangen, ENT-hospital, Phoniatry and pedaudiology   **Germany**
○ *Student assistant, Group: Fluid physical principles of the human vocalisation*   *2011/01 - 2012/03*
Development and revision of simulation and data analysis programs for research: Simulation of human vocal folds oscillations, Revision and implementation of camera calibration software for recording of vocal folds oscillations of animals, DFG Research Group FOR 894
Coding languages: C/C++, C#, Python

Independent   **Germany**
○ *Volunteering*   *2004/03 - 2016/03*
Unpaid private lessons for socially disadvantaged pupils

Education

Studies

Friedrich-Alexander-University Erlangen-Nürnberg **Germany**
Bachelor of Science Computer Science, Paused *2017/10 - 2019/03*
Major interests: Cryptography, IT-Security, Theoretical Computer Science

Friedrich-Alexander-University Erlangen-Nürnberg **Germany**
Master of Science Physics, Aborted *2013/04 - 2016/09*

Friedrich-Alexander-University Erlangen-Nürnberg **Germany**
Bachelor of Science Physics, 2013/09 *2008/10 - 2013/09*
Bachelor thesis: *Dirac-Observablen in der Kosmologie* (Dirac observables in cosmology)
Chair for Theoretical Physics III: Institute for Quantum Gravity, Supervisor: Prof. Dr. Kristina Giesel
Major interests: Quantum Gravity, Mathematical Physics, Influence of Number Theory on Physics

School education

Peter-Vischer-School Nürnberg **Germany**
Department Gymnasium, Mathematic, natural scientific focus *2004/09 - 2008/06*
Abitur 2008/06 (University entrance qualification)

Peter-Vischer-School Nürnberg **Germany**
Department Realschule, Mathematic, natural scientific, technical focus *2000/09 - 2004/07*
School leaving certificate 2004/07

Ludwig-Uhland-School Nürnberg **Germany**
Department Hauptschule *1998/09 - 2000/07*

Training courses

Friedrich-Alexander-University Erlangen-Nürnberg **Germany**
Training center for academic teaching (FBZHL) *2017/11*
Didactics for tutors of the Faculty of Engineering - Basic course II

Friedrich-Alexander-University Erlangen-Nürnberg **Germany**
Training center for academic teaching (FBZHL) *2017/10*
Cross-cultural sensitization for tutors

Projects

Research

MfDN-Protocol
Mathematical & Theoretical Computer Science research and design work. *Since 2019/12*
A mathematical forced decentralized network protocol.
Id: project_0058

Project info: https://research.carolin-zoebelein.de/Projects/2019/MfDN-Protocol.html

Combsee
Mathematical & Theoretical Computer Science research and design work. *Since 2019/12*
Theoretical research and implementation of a decentralized, privacy preserving, search engine.
Former: *Decentralized privacy preserving search by mathematical design*
Id: project_0055
Related Funding: NGI Zero Discovery (Id: funding_0003)

Combsee Search: https://www.combsee.org/
Project info: https://research.carolin-zoebelein.de/Projects/2019/Combsee.html

○ **Prior Knowledge MLT**
Mathematical & Theoretical Computer Science research and design work. Since 2020/01
Prior Knowledge Machine Learning Translation (MLT) uses advanced mathematical descriptions for language groups to reduce maximal error bounds and the number of free parameters of machine learning based translation.
Id: project_0059

Project info: `https://research.carolin-zoebelein.de/Projects/2020/Prior-Knowledge-MLT.html`

○ **LittleBee**
Research, design and implementation work. Since 2019/11
LittbleBee is a Python based research library for decentralized Machine Learning (ML).
Id: project_0056

Project info: `https://research.carolin-zoebelein.de/Projects/2019/LittleBee.html`

Art

○ **#Hashtag**
Digital art short film series Since 2019/08
Making fully computer generated short films related to hashtags.
Id: project_0056art

Grants & Fellowships

○ **NGI Zero Discovery** **Netherlands, EU**
NLnet Foundation *Since 2019/12*
Grant, 12 months, 19 100 EUR, Related project: project_0055

NLnet manages the NGI0 Discovery Fund, a fund dedicated to search technologies which creates an open, trustworthy and reliable internet for all. The fund was established with financial support from the European Commission's Next Generation Internet programme, under the aegis of DG Communications Networks, Content and Technology.

NLnet Discovery: `https://nlnet.nl/discovery/`
Next Generation Internet: `https://www.ngi.eu/`
Funding info:
`https://research.carolin-zoebelein.de/Funding/2019/NGI-Zero-Search-and-Discovery-Fund.html`

○ **Private Donors** **Worldwide**
Financial support from private donors *Since 2018*

○ **YOLANTE** **Germany**
Siemens AG *2013*
Mentorship program for female students, Mentee

Awards

○ ***Mädchen für Technik Preis* (Girls for Technology award)** **Germany**
Siemens AG *2005/07*
Pupil award for extraordinary achievements in mathematical, natural scientific and technical subjects

Reviewer

○ Member of the PoPETs 2020 artifact review committee

Publications

You can find an up-to-date list of my public work on my website `https://research.carolin-zoebelein.de/public.html#Publications`.

Apps

○
Cool Down
Health & Fitness *v01: 2018/09/09*
Includes advertising, Coding language: Java
App for your mental health which wants to help you to conquer bad emotional times.
`https://play.google.com/store/apps/details?id=com.pertpony.cooldown`

○
Catchy Balls
Casual Game *v01: 2018/06/04*
Includes In-App purchases, Coding language: Java
Catch all the balls which have the shown color and get points.
`https://play.google.com/store/apps/details?id=com.pertpony.catchyballs`

Exhibitions

○
'Concept' - International Exhibition on Conceptual Art **Korea**
Group exhibition *2016/05/06 - 2016/05/29*
CICA Museum, 196-30, Samdo-ro, Yangchon-eup, Gimpo-si, Gyeonggi-do, Korea 415-843
Artworks: Photo with title *'I was here'*, Photo with title *'Signing'*
`https://cicamuseum.com/concept-2016-5-6-29`
`https://cicamuseum.com/wp-content/uploads/2016/05/Concept_catalog.pdf`

○
#TwitterArtExhibit: NYC - 2016 **USA**
Group exhibition *2016/03/31 - 2016/04/21*
Trygve Lie Gallery, 317 E 52nd St., New York, NY 10022
Artwork: Postcard (Acrylic paint) with title *'All is public - No secrets'*
`http://twitterartexhibit.org`

Organized Meetups & Workshops

○
Why you should study Number Theory! **Germany**
A friendly together for talking about Number Theory studies with coffee and tea. *2018/10*
Friedrich-Alexander-University Erlangen-Nürnberg, Department for Mathematics

Teaching

Non academic
- o Remote teaching about online anonymity, privacy and encryption tools
- o Private lessons for pupils of fifth year and above, from all kinds of Bavarian school types.
  Subjects: Mathematics, Physics, Chemistry, Technology, Computer Science, French, Spanish

Bachelor courses (Tutor)
- o Mathematics for engineers 1 & 2
- o Experimental physics for natural scientists 1 & 2
- o Experimental physics for engineers 1 & 2
- o Experimental physics 5: Nuclear and particle physics
- o Theoretical physics 4: Statistical physics
- o Practical basis courses 1 in physics for physicists part 1 & 2
- o Practical courses in physics for engineers

Master courses (Tutor)

- Advanced experimental physics: Particle and astroparticle physics
- Advanced theoretical physics: Advanced quantum mechanics

Skills

Technical

Coding: C, C++, C#, Java, LabView, NASM, Perl, PHP, Python, Rust

Mobile Dev.: Android apps (Java)

Debugging: gdb, pdb, Valgrind

Database: MySQL, PostgreSQL, SQLite

Math: GNU PSPP, GNU Octave, Maple, Matlab, R, SageMath, Scilab

Virtualization: Docker, KVM, QEMU, VirtualBox

Cloud Comp.: AWS, Docker Cloud, Microsoft Azure

Networking: Ettercap, netcat, netstat, nmap, scapy, tcpdump, traceroute, Wireshark, ...

WebServer: Apache HTTP Server, nginx

Monitoring: Munin, Nagios, Zabbix

SCM: Puppet

VC: Git, SVN

CAD - **Basics**: Solid Edge, Pro/ENGINEER Wildfire

Languages

First: German

Good: English

Basics: Modern Standard Arabic, Standard Chinese, French, Spanish, Swahili

A few words: German Sign Language, Hausa, Modern Hebrew, Italian, Japanese, Kinyarwanda, Russian, Standard Tibetan

Free time activities

- Every kind of language (spoken, coding, math, ...)
- Hanging around on irc

April 8, 2020