Dr.-Ing. Sebastian Zickau

Senior Research Scientist & Innovation Architect

"Roads? Where we're going, we don't need roads."
Dr. Emmett Brown

Professional Experience

2021–present **IT-Architect for the Digital Identity R&D project IDunion (BMWK)**, Amt für Informationsverarbeitung, City of Cologne, Germany.

- Leading the R&D project IDunion funded by the BMWK, steering the team toward innovative digital identity solutions.
- Serving as a technical lead architect, pioneering the integration of digital verifiable credentials within the infrastructure of the City of Cologne.
- Conducting requirements engineering for various use cases, ensuring precise and actionable specifications.
- Facilitating communication with internal and external project partners, including ministries, fostering collaboration and alignment. Managed a team of four project members, pragmatically guiding the project direction and promoting a productive work environment.
- Overseeing the deployment and maintenance of server services, including container-based applications such as a Hyperledger Indy node, issuer and verifier agent software, and Postman API interface suites for internal and external developers.
- Performing security analyses and evaluations of protocols, formats, schemes, and containers, ensuring robust protection measures. Key areas included OpenID4VC, W3C verifiable credentials, SD-JWTs, Hyperledger AnonCreds, Aries, Indy.
- Reporting project progress to the ministry, maintaining transparency and accountability.
- Actively participating in national and international conferences, conventions, and meetings, contributing to and learning from the identity community.
- Authoring proposals for project extensions, securing continuedthe continuation of funding and support.
- Publishing articles and papers in national and international contexts, establishing leadership in the field.
- Recommending future applications for digital credentials within the City of Cologne, guiding technological advancement, by supporting the eIDAS 2.0, OZG, FIM, and EfA processes, ensuring compliance and alignment with regulatory standards.
- Delivering internal presentations on applied cryptography and quantum computing, sharing expertise and fostering knowledge growth within the organization.

2012–2020 **Research Assistant & Doctoral Candidate**, Technische Universität Berlin, Telekom Innovation Laboratories, Berlin, Germany.

- Successfully led and completed six research projects funded by German and EU sources, achieving notable outcomes:
  - Developed and implemented various research prototypes, including collaborations with the Telekom Innovation Laboratory (T-Labs).
  - Submitted and secured funding for six out of over thirty project proposals across Germany (BMBF, BMWi) and the EU (Horizon 2020, EIT), attracting over €2.56 million in funding. • Published twenty research papers in international conferences, national journals, and book chapters, and delivered presentations at more than ten international research conferences, including IEEE events. • Supervised and mentored a team of new researchers and assistants, enhancing project communication with national and international funders and partners, and overseeing the full project reporting lifecycle.
- Hold the research role in the completion of the following R&D projects: SSI4de (Self-Sovereign Identity for Germany), GRAVITY, CityBeamer, DIMS (Decentralized Identity Management System), IdentityChain, PARADISE (Privacy-enhancing And Reliable Anti-Doping Integrated Service Environment), Curcuma (Cloud Computing Location Metadata), and TRESOR (TRusted Ecosystem for Standardized and Open cloud-based Resources).
- Contributed to academic development by supervising over twenty theses (Master, Bachelor, and Diploma), conducting exams, and leading courses in Internet of Services Lab, Usable Privacy, and Business Processes and IT Services.
- Enhanced public engagement and knowledge exchange through organizing and presenting at national research meetups, international hackathons, and project presentations.

2008–2010 **Research Assistant**, University of Reading, Intelligent Media Systems & Services Research Centre (IMSS), School of Systems Engineering, Reading, England.

2003–2007 **Research Employee**, TU Berlin, tubIT - IT Service-Center.

2000–2002 **Student Assistant**, TU Berlin, PRZ - Prozessrechner Zentrale.

Education

2023 **SCRUM Master & Product Owner (Part I+II)**, ICO - International Certification Organization.

2022 **Doctorate (Dr.-Ing.)**, Technische Universität Berlin, Service-centric Networking, Thesis title: Privacy-preserving Geofencing.

2016 **Software Campus Graduate**, TU Berlin, Telekom Innovation Laboratories, BMBF, Including training courses: Leadership as a Lifestyle • Conflicts in Leadership Situations • Creativity & Innovation • Foundations of Scenario Planning • Intercultural Awareness • Reviving Creative Potentials .

2002 **Diploma in Computer Science (Dipl.-Inform.)**, TU Berlin.

1995 **Abitur**, Oberstufenzentrum für Elektro- und Energietechnik, Berlin.

Publications

2024 Batz, M. and Zickau, S. (2024). Towards Functions for Verifiable Credentials in a 2-Holder Model, International Workshop on Emerging Digital Identities (EDId), ARES 2024.

2023 Zickau, S. (2023). Privacy-preserving Geofencing. Technische Universität Berlin.

2022 Zickau, S. (2022). Digitale Selbstbestimmte Identitäten. Vitako aktuell 01|2022.

2020   Lux, Z. A., Thatmann, D., Zickau, S. and Beierle, F. (2020). Distributed-Ledger-based Authentication with Decentralized Identifiers and Verifiable Credentials. 2nd conference on Blockchain Research and Applications for Innovative Networks and Services (BRAINS'20).

2019   Plass, J. and Zickau, S. (2019). PARADISE - Wie Ortungstechnologien den Datenschutz im Anti-Doping verbessern können. Kritik des Anti-Doping - Eine konstruktive Auseinandersetzung zu Methoden und Strategien im Kampf gegen Doping.

Raschke, P. and Zickau, S. and Kröger, J. L. and Küpper, A. (2019). Towards Real-Time Web Tracking Detection with T.EX - The Transparency EXtension. Privacy Technologies and Policy.

Lux, Z. A. and Beierle, F. and Zickau, S. and Göndör, S. (2019). Full-text Search for Verifiable Credential Schemas on Distributed Ledgers. Proceedings of the International Symposium on Blockchain Computing and Applications (BCCA 2019).

Rodriguez Garzon, S. and Pöllabauer, T. and Zickau, S. and Küpper, A. (2019). Interactive Design of Geofences for Proactive Location-based Services in Smart Cities. Proceedings of the 16th IEEE International Conference on Ubiquitous Intelligence and Computing (UIC 2019).

2018   Victor, F. and Zickau, S. (2018). Geofences on the Blockchain: Enabling Decentralized Location-based Services. BlockSEA 2018, The 1st Workshop on Blockchain and Sharing Economy Applications.

2017   Schanzenbach, M. and Zickau, S. (2017). Identity and Access Management in a Doping Control Use Case. Datenschutz und Datensicherheit.

Herber, T. and Jentsch, M. and Zickau, S. (2017). Datenschutz und Dopingkontrollen. Datenschutz und Datensicherheit.

2016   Zickau, S. (2016). privGardens - Semantic Privacy Areas in Location-based Data Protection Policies. 13. GI/KuVS-Fachgespräch "Ortsbezogene Anwendungen und Dienste".

Zickau, S. and Thatmann, D. and Butyrtschik, A. and Denisow, I. and Küpper, A. (2016). Applied Attribute-based Encryption Schemes. Proceedings of the 19th IEEE International Conference Innovation in Clouds, Internet and Networks (ICIN 2016).

2015   Thatmann, D and Zickau, S. and Förster, A and Küpper, A. (2015). Applying Attribute-based Encryption on Publish Subscribe Messaging Patterns for the Internet of Things. Proceedings of the 8th IEEE International. Conference on Internet of Things (iThings 2015).

Zickau, S. (2015). Semantic Location Information in Access Control Policy Models. Proceedings of the Location-based Applications and Services (LBAS 2015).

Denisow, I. and Zickau, S. and Beierle, F. and Küpper, A. (2015). Dynamic Location Information in Attribute-based Encryption Schemes. Proceedings of the 9th International Conference on Next Generation Mobile Applications, Services and Technologies (NGMAST 2015).

El-Sobhy, J. and Zickau, S. and Küpper, A. (2015). Proximity-based Services in Mobile Cloud Scenarios using Extended Communication Models. Proceedings of the 4th IEEE International Conference on Cloud Networking (IEEE CloudNet).

Sharhan, S. and Zickau, S. (2015). Indoor Mapping for Location-based Policy Tooling using Bluetooth Low Energy Beacons. Proceedings of the 8th IEEE International Workshop on Selected Topics in Wireless and Mobile computing (STWiMob 2015).

Roos, A. and Drüsedow, S. and Hosseini, M. I. and Coskun, G. and Zickau, S. (2015). Trust Level Based Data Storage and Data Access Control in a Distributed Storage Environment. Proceedings of the 3rd IEEE International Conference on Mobile Cloud Computing, Services, and Engineering.

Zickau, S. and Beierle, F. and Denisow, I. (2015). Securing Mobile Cloud Data with Personalized Attribute-based Meta Information. Proceedings of the 3rd IEEE International Conference on Mobile Cloud Computing, Services, and Engineering (Mobile Cloud 2015).

2014   Zickau, S. and Thatmann, D. and Ermakova, T. and Repschläger, J. and Zarnekow, R. and Küpper, A. (2014). Enabling Location-based Policies in a Healthcare Cloud Computing Environment. Proceedings of the 3rd IEEE International Conference on Cloud Networking (IEEE CloudNet).

Raschke, P. and Zickau, S. (2014). A Template-Based Policy Generation Interface for RESTful Web Services. On the Move to Meaningful Internet Systems: OTM 2014 Workshops.

Zickau, S. and Slawik, M. and Thatmann, D. and Uhlig, S. and Denisow, I. and Küpper, A. (2014). TRESOR - Towards the Realization of a Trusted Cloud Ecosystem. Trusted Cloud Computing.

2013   Graf, T. and Zickau, S. and Küpper, A. (2013). Enabling Location-based Services on Stationary Devices using Smartphone Capabilities. Mobile Web Information Systems.

Thatmann, D. and Slawik, M. and Zickau, S. and Küpper, A. (2013). Deriving a Distributed Cloud Proxy Architecture for Managed Cloud Service Consumption. Proceedings of the 6th Intl. Conference on Cloud Computing (CLOUD 2013).

2012   Thatmann, D. and Slawik, M. and Zickau, S. and Küpper, A. (2012). Towards a Federated Cloud Ecosystem: Enabling Managed Cloud Service Consumption. Economics of Grids, Clouds, Systems, and Services, GECON 2012.

Slawik, M. and Zickau, S. and Thatmann, D. and Repschläger, J. and Ermakova, T. and Küpper, A. and Zarnekow, R. (2012). Innovative Architektur für sicheres Cloud Computing: Beispiel eines Cloud-Ecosystems im Gesundheitswesen. Proceedings of the 42th Annual Conference of the Gesellschaft für Informatik e.V. (INFORMATIK 2012).

Zickau, S. and Küpper, A. (2012). Towards Location-based Services in a Cloud Computing Ecosystem. Ortsbezogene Anwendungen und Dienste - 9. Fachgespräch der GI/ITG-Fachgruppe Kommunikation und Verteilte Systeme.

Awards

2018   Best paper award, Victor, F. and Zickau, "Geofences on the Blockchain: Enabling Decentralized Location-based Services", BlockSEA 2018, The 1st Workshop on Blockchain and Sharing Economy Applications.

Research Topics & Interests

Privacy-enhancing technologies ● digital verifiable credentials ● location-based services ● positioning and geo encoding systems ● applied cryptography ● attribute-based encryption ● cryptographic hash functions ● zero-knowledge proofs ● multi-party computation ● quantum computing ● distributed ledger technologies ● private set intersection ● linked data, semantics and ontologies

Computer Skills

Algorithms	Zero-knowledge proofs, attribute-based encryption, multi-party computation, cryptographic hashing, homomorphic encryption, accumulators, private set intersection, bloom filter, OpenID connect, OAuth, and UMA
Concepts	Positioning, Geohash, S2, MapCode, Open Post Code, personal identifiable information, Authentication, and Authorization
Languages	(Geo)XACML, Python, REST, (Geo)JSON, Java, Kotlin, Javascript, Django, Ruby, LaTeX, and HTML
Programs	PostGIS, QGIS, Docker, Gitlab, Postman, Eclipse, OmniGraffle, Office, Slack, and Rocketchat
Miscellaneous	GDPR, MacOS, iOS, Android, Windows, Linux, Homebrew, and Bluetooth

Communication Skills

2010   Certificate in English Language Teaching to Adults (Cambridge CELTA), Thames Valley University, Reading, England.

2009   Certificate of Proficiency in English (Cambridge ESOL), Reading, England.

Languages

German	**Mother tongue**	
English	**Certificate of Proficiency in English (CPE)**	*Business fluent*

Personal Interests

- Traveling
- Sailing
- Cinema
- Board games
- Indoor sports
- Volleyball
- Juggling
- Lego