

# MIHIRRAJ DIXIT

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## OVERVIEW

Seasoned professional with 5+ years in software and security research, including 2+ years as a full-time Software R&D Engineer for cloud-native telecom applications and 3+ years as a part-time researcher in cybersecurity for Industrial IoT/Smart Grids and LTE/5G. Proven expertise in privacy, security, and software, with a track record of solving complex challenges in cloud, AI, and big data platforms to develop innovative solutions. Published 8+ patents (with 3 granted) and 4+ research papers in top conferences in the past 4 years. Highly ambitious and seeking impactful roles in research, software, and security engineering.

## EDUCATION

**Master of Science in Computer Science (Focus: Cybersecurity)** Oct 2021 - Jul 2024

Universität des Saarlandes, Saarbrücken, Germany

*Thesis: Evaluating Privacy Leaks in Smartphones through Multi-Protocol Linkage*

**Bachelor of Technology in Electronics & Telecommunication Engineering** Jul 2015 - Jun 2019

Veermata Jijabai Technological Institute (VJTI), Mumbai, India (NIRF Rank: 71<sup>st</sup>, 2020)

*Thesis: Securing Critical Infrastructure Using Blockchain*

## TECHNICAL SKILLS

**Programming:** *Python* (4+ years), Bash/Shell Scripting (3+ years), MATLAB, C, C++,

**Cloud & Networking:** Docker, Kubernetes, Apache Airflow, Apache Spark, Swagger, Apache Kafka, RedFish API, OpenStack, Helm, RabbitMQ, Keycloak, Virtual Switches/Routers, NFV/SDN, Git

**Web & Databases:** HTML, CSS, Javascript, NodeJS, MySQL, Redis, MongoDB, Flask, Django, FastApi, Socket programming

**Security Tools:** Nessus, Burpsuite, Wireshark, Metasploit, Nmap, Netcat, Ettercap, GNU Debugger, Scapy, Aircrack, Hashcat

**IoT & Wireless:** USRP B210/X310, Amarisoft Callbox/Simbox, srsRAN, open5GS, Mitsubishi Melsec iQ-F PLC, PMU

**Operating Systems:** Linux (Ubuntu, Kali, ParrotOS, ArchLinux), Windows OS, MacOS, Android

## ACHIEVEMENTS

2018 - 2019: WRC Blockchain Hackathon (**Winner**); Siemens Hackathon (**1<sup>st</sup> Runner-up**); 3<sup>rd</sup> Mitsubishi Electric Cup (**5<sup>th</sup> rank**).

2010 - 2019: International FIDE Rated Chess Player with **ELO Rating: 1713**; Achieved victories in 50+ chess tournaments.

2009 - 2011: State Talent Search Exam (**Special Prize**) 2011; National Drawing Exam (**Grade A**) 2009 & 2011.

## WORK EXPERIENCE

**RPTU Kaiserslautern, Germany (Research Assistant)** Feb 2023 - ongoing

Chair of WiCON: Guide - Prof. Dr. Hans Schotten

- Investigating vulnerabilities in the O-RAN Y1 interface and **proposing a secure architecture** as per the ETSI Standards.
- Surveyed various physical layer authentication mechanisms to propose authentication schemes that surpass existing 5G schemes.

**CISPA Helmholtz Center, Germany (Thesis Researcher)** Aug 2023 - Jul 2024

Chair of Wireless Security: Guide - Dr. Mridula Singh

- Reverse engineering the LTE/5G, WiFi, and Bluetooth protocols to demonstrate multiple security & privacy vulnerabilities.
- Designed and developed a python-based application** to analyze the privacy leakage of users utilizing these wireless protocols.

**DFKI & Saarland University, Germany (Research Assistant)** May 2022 - Dec 2022

Chair of Business Informatics: Guide - Prof. Dr. Wolfgang Maaß

- Conducted literature reviews to guide architecture, identify key issues, develop business models, & analyze MaaS use cases in Saarland.

**Rakuten Mobile, Japan (Software Research & Development - Tech Lead)** Oct 2019 - Oct 2021

- Designed and developed cloud-native RAN/OSS applications** for production systems, conducting rigorous performance and scalability tests, which led to accelerated deployments and high-performance applications.
- Led the creation of an ETSI-ZSM-compliant **cloud-native data stream processing engine** with complex event processing (CEP) and multi-hierarchical closed-loop feedback for correlation and policy enforcement. Utilized an event bus for data partitioning and an in-memory database with fast caching, along with efficient Python and Rust libraries, to create a fault-tolerant, stateless, and scalable system handling 5k events/sec/core, scaling to 110,000 events/sec in tests.
- This solution, combined with a designed hierarchical life-cycle manager, enabled **closed-loop automation** for cloud-native 5G components, facilitating **real-time threat intelligence, intrusion detection & prevention, and fault management**.
- Constructed Helm charts and Docker images for production-ready systems, integrating them with CI/CD pipelines for 5G slicing.
- Created Python & shell scripts** for streamlined management of bare metal servers, covering provisioning, configuration, and lifecycle management while automating rule-based server detection and hardening OS for secure cloud deployment.
- Key contributor to the core development** of Internal Virtual Network Function Manager (IVNFM) for 4G vRAN, reducing deployment time from days to 5 minutes with a multi-tier system and implementing Keycloak for enhanced IAM security to bolster cloud-native apps.

- **Configured** network devices/firewalls/switches/routers and set up a test bed for cyber-physical critical infrastructure, significantly reducing research setup time. Conducted **penetration tests** on Industrial Control Systems (SCADA & DCS) using various security frameworks and custom scripts, showcasing security expertise to research organizations, investors, and vendors.
- **Formulated** a custom voting-based blockchain consensus algorithm for accurate decision-making in decentralized environments, enhancing threat prevention for Smart Grid and energy-efficient systems.
- **Implemented deep packet inspection** and created custom protocol decoders/Python scripts for analyzing vulnerabilities in IEEE C37.118, DNP3, and Modbus Protocol, revealing 0-day attacks in the system protocols.
- Contributed to **developing an artificial immune system** for anomaly detection in SCADA/DCS networks.

**PriceWaterhouseCoopers (PWC), India (Technical Consulting Intern)**

May 2018 - Jul 2018

- Engineered a Xamarin Android app with swift registration and one-tap login, and a .NET ticketing tool, enhancing client efficiency.

**Bharat Petroleum Co. Ltd., India (Security Analyst Intern)**

Dec 2017 - Jan 2018

- Conducted risk assessments and vulnerability discovery, and investigated SIEM systems, fostering security awareness across the organization.

**INNOVATIONS****Relevant Patents:**

1. Non-deterministic finite automata tree structure application, **US Patent Grant No. 12040945**, 16<sup>th</sup> Jul 2024.
2. Event-driven Enhancement of Event Messages, **US Patent Grant No. 12020197**, 25<sup>th</sup> Jun 2024.
3. Static and dynamic non-deterministic finite automata tree structure application, **US Patent Grant No. 11563625**, 24<sup>th</sup> Jan 2023.
4. Correlation engine and policy manager, method and product, US Patent App No. 17575975, 20<sup>th</sup> Jul 2023.
5. Policy-driven event transformation, US Patent App No. 17574552, 13<sup>th</sup> Jul 2023.
6. Data Storage System with Power Consumption Efficiency and Methods, US Patent App No. 17455921, 25<sup>th</sup> May 2023.
7. Logic-gate based non-deterministic finite automata tree structure application, US Patent App No. 17511558, 06<sup>th</sup> Apr 2023..
8. Multi-layered correlation policy management apparatus and method, US Patent App No. 17505631, 26<sup>th</sup> Jan 2023.

**Relevant Publications:**

1. CrossLink: Breaking Location Privacy by Linking Device Identifiers Across Protocols (Submitted to **A\* Conference 2025**)
2. Survey on Hardware-based Physical Layer Authentication in Next Generation Networks, VDE-ITG MKT, 2024.
3. Blockchain and Anomaly Detection based Monitoring System for Enforcing Wastewater Reuse, ICCCNT, **IEEE** 2019.
4. Blockchain-based Distributed Consensus for Byzantine Fault Tolerance in PMU Network, ICCCNT, **IEEE** 2019.
5. A Computational Intelligence Approach for Cancer Detection Using Artificial Immune System, **Springer** 2018.

**RELEVANT COURSEWORK**

**Graduate Coursework:** Security, System Security, Data Networks, Security Testing, Cryptography, Web Security, IT Forensics, Physical Layer Security, Distributed Systems, Machine Learning Security, Blockchain & Decentralized Finance

**Undergraduate Coursework:** Computer Programming, Data Structures, Statistical Theory, Digital Signal Processing, Wireless Sensor Networks, Pattern Recognition, Mobile Communication, Satellite Communication, Embedded Systems

**Other Courses/Certifications:** 5G Specialization, Hardware Security, Cloud Platform Fundamentals, Penetration Testing & Ethical Hacking, Machine Learning, Blockchain Specialization

**LANGUAGES**

English (C1, Native) • Japanese (N4) • German (A1.1) • Hindi (Native) • Marathi (Native) • Sanskrit (Basic)