# SANA HABIB

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## Professional Summary

Applied Security-Privacy Researcher and Computer Science PhD student with 2+ years of industry and 4+ years of research experience. Demonstrated professional skills in building open-source tools and developing techniques that solve real-world problems in the field of Networks and Android systems security. Experienced in reverse engineering real-world systems and Android apps to identify and (if possible) fix technical issues motivated by security and privacy to enhance digital freedom and human rights.

## Education

**Arizona State University (ASU)** *Tempe, Arizona, United States*
PHD IN COMPUTER SCIENCE Spring 2025 (Expected)
Advisor: Jedidiah R. Crandall.

**National University of Sciences and Technology (NUST)** *Islamabad, Pakistan*
MASTER'S IN ELECTRICAL ENGINEERING Spring 2017
Advisor: Syed Ali Hassan.
Dissertation: "Novel Insights for Smart Cell Search in Millimeter Wave Cellular Networks."

**National University of Sciences and Technology (NUST)** *Rawalpindi, Pakistan*
BACHELOR'S IN ELECTRICAL ENGINEERING Fall 2011
Advisor: Shoab Ahmed Khan.
Undergraduate Project: "Network Management System for Frequency Hopped Tactical Radios."

## Research Experience

**Biodesign Center for Biocomputation, Security, and Society, ASU** *Tempe, Arizona, United States*
VPN Security-Privacy, GRADUATE STUDENT RESEARCHER Jan 2022 - Present

- Identifying threat classes and designing experiments to unravel novel attacks to Virtual Private Networks (VPN)s.
- Reverse engineering local Pakistani Android apps for personal data leakage, code-injection vulnerabilities, and insecure network updates to understand how they can compromise the benefits of VPN.

EUNOMIA, GRADUATE SERVICES ASSISTANT Jan 2021 – Present

- Designed and developed the Eunomia framework for evaluating the security and privacy risks of real-world COVID-19 Contact Tracing (CT) apps,
- Analyzed 60 CT apps using the framework, and documented the research findings in a research paper.
- Working on writing a fuzzer for automated security assessment of CT apps and using angr for symbolic and concolic execution of source code.

**Security Engineering for Future Computing (SEFCOM) Lab, ASU** *Tempe, Arizona, United States*
ODIN, GRADUATE SERVICES ASSISTANT Aug 2020 – Present

- Developed an SDN vulnerability-resilience rating framework, Odin, and used it to evaluate the strength, robustness, cost, and prominence of 20+ real-world SDN attacks and defenses.
- Currently, working on making the tool open-source.

EIRENE, GRADUATE STUDENT RESEARCHER Aug 2018 – Nov 2022

- Developed an Authentication, Authorization, Accountability, and Conflict Handling (AAAC) Java application, Eirene, on OpenDayLight controller.
- Tested its security and performance using real-world complicated cases of rules conflicts and 50k+ attack rules.

**Information Processing and Technology (IPT) Lab, NUST** *Islamabad, Pakistan*
MILLIMETER WAVE CELL SEARCH, GRADUATE STUDENT RESEARCHER Oct 2016 - Apr 2017

- Designed a hybrid algorithm for cell search for millimeter wave cellular networks with a performance lying midway between exhaustive and iterative algorithms.

**Cognitive Radio Networks (Cognet) Lab, NUST** *Islamabad, Pakistan*
TRANSPORT-LAYER MULTIPATH, GRADUATE STUDENT RESEARCHER Jun 2015 - Sep 2016

- Performed a comparative study of multipath transport-layer protocols.

## Teaching Experience

TEACHING ASSISTANT

- CSE 536: "Advanced Operating Systems" Spring 2024
- CSE 468: "Computer Network Security" Fall 2023
- CSE 355: "Introduction to Theoretical Computer Science" Fall 2023
- CSE 180: "Computer Literacy" Summer 2023
- CSE 355: "Introduction to Theoretical Computer Science" Spring 2023

## Industry Experience

**Center for Advanced Research in Engineering (CARE)** *Islamabad, Pakistan*
REGISTER TRANSFER LEVEL DEVELOPER/RESEARCH ASSOCIATE Dec 2011 - Sep 2014

- Collaborated with multiple teams including Digital Signal Processing team, Field Programmable Gate Arrays (FPGA) team, and Radio Frequency team on Software Defined Radio.
- Implemented algorithms on FPGA using Verilog.
- Tested/verified the design using exhaustive test benches and automated checks including ChipScope Pro.
- Maintained internal technical documents, coordinated among teams, wrote two patents, and coordinated with patent agents.

## Skills

- **Languages**: Java, C, C++, Python, Verilog.
- **Tools**: Android Studio, Anaconda, ChipScope Pro, Eclispe, Ghidra, Github, JADX, LaTeX, Mininet, Virtual Box, OpenDayLight, Spring Model View Controller, Masm, MATLAB, Mobile Security Framework (Mob SF), Model Sim, MPLab, MultiSim, NS2, Proteus, PSpice, Xilinx, Frida.
- **Notable Courses**: Advanced Computer and Network Security, Software Security, Applied Cryptography, Mobile Computing, Foundations of Algorithms, Natural Language Processing, Data Structures.

## Publications

- **[Workshop]** Habib, Sana, Tiffany Bao, Yan Shoshitaishvili, and Adam Doupé. "Mitigating Threats Emerging from the Interaction between SDN Apps and SDN (Configuration) Datastore." In Proceedings of the 2022 on Cloud Computing Security Workshop, pp. 23-39. 2022. (Acceptance Rate: 5/8, Research Impact Score: 0.7)
- **[Conference]** S. Habib, S. A. Hassan, A. A. Nasir, H. Mehrpouyan, "Millimeter Wave Cell Search for Initial Access: Analysis, Design, and Implementation", 13th International Wireless Communications & Mobile Computing Conference (IWCMC), pages 922-927, June 2017. (Acceptance Rate: 36%)
- **[Journal]** S. Habib, J. Qadir, A. Ali, D. Habib, M. Li, A. Sathiaseelan. The Past, Present, and Future of Transport-Layer Multipath. Journal of Network and Computer Applications, 75, pages 236-258, Nov 2016. (Research Impact Score: 4.59)

## Honors & Awards

- Information Controls Fellowship Program (Jan 2024 – Dec 2024).
- Nominated for the 2022 Google PhD Fellowship Program (Sept 2022).
- GPSA Outstanding Research Award (Apr 2022).
- Fulbright Scholarship (Aug 2017 – May 2022).
- Cyber Security Fellowship (Aug 2019 – Dec 2020).
- Congratulatory Letters from ASU President (Michael M. Crow) (Aug 2019), The White House (Aug 2017).
- Research Award by National University of Sciences and Technology (NUST), Islamabad, Pakistan (Nov 2016).
- Grace Hopper Celebration (GHC) Scholarship (Oct 2014); Travel Grant for Poster Presentation by Korean Women in Science and Engineering (KWSE) (Aug 2014); UNESCO Travel Grant (Nov 2013).
- Patent Filling Grant of USD 6,000 (Nov 2012), Application US13/676,705, by Higher Education Commission (HEC), Pakistan.

## References

- Upon request.