

VISHAL CHOURASIA

Ph.D. Scholar, Indian Institute of Technology Indore (IIT Indore)

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PROFILE

currently pursuing a ph.d. in hardware security under the supervision of prof. anirban sengupta in the department of computer science and engineering, indian institute of technology indore (iit indore). my research focuses on protecting intellectual property (ip) against piracy, unauthorized ownership claims, and trojan attacks in ip designs.

Education

- Ph.D. in Hardware Security | CSE, IIT Indore | 2025 - Present
 - Research Focus: Development of novel design methodologies for secured reusable hardware accelerators
 - Supervisor: Prof. Anirban Sengupta
- Master's Degree in Computer Science and Engineering | UIT RGPV Bhopal, M.P. | 2016-2018 | 8.54 CGPA
 - Bachelor's Degree in Computer Science and Engineering | P.C.S.T. Bhopal, M.P. | 2006-2010 | 70.12 %

PUBLICATIONS

JOURNAL

- Anirban Sengupta, Vishal Chourasia, Nabendu Bhui, Aditya Anshul "Hardware Watermarking of Transient Fault-Detectable IP Designs using Multivariate Encoded HLS Scheduling based Multi-Modal Security Methodology", *IET Computers & Digital Techniques*, 2025, DOI: <https://doi.org/10.1049/cdt2/5926846>.
- Anirban Sengupta, Vishal Chourasia, Nabendu Bhui "HLS Trojan Classification and its Detection Techniques for CAD based IP Designs", *IEEE Computer Society IT Professional*, vol. 27, no. 5, pp. 66-74, Sept.-Oct. 2025, doi: 10.1109/MITP.2025.3584043.
- Anirban Sengupta, Nabendu Bhui, Vishal Chourasia "Hardware IP Protection by Exploiting IP Vendor's Proteogenomic BioMarker as Digital Watermark during Behavioral Synthesis", *Nature Scientific Reports*, Volume 15, Article number: 12718, April 2025, DOI: <https://doi.org/10.1038/s41598-025-96495-5>.

- A. Sengupta, A. Anshul, V. Chourasia and N. Bhui, "Security Vulnerability (Backdoor Trojan) During Machine Learning Accelerator Design Phases" in ***IEEE Computer Society IT Professional***, vol. 27, no. 01, pp. 65-72, Jan.-Feb. 2025, DOI: 10.1109/MITP.2024.3519632.
- Anirban Sengupta; Nabendu Bhui; Aditya Anshul; Vishal Chourasia, "Bio-mimicking DNA Fingerprint Profiling for HLS Watermarking to Counter Hardware IP Piracy" in ***Nature Scientific Reports***, September 2024, DOI: doi.org/10.1038/s41598-024-73119-y.
- Anirban Sengupta; Aditya Anshul; Vishal Chourasia; Nitish Kumar, "M-HLS: Malevolent High-Level Synthesis for Watermarked Hardware IPs" in ***IEEE Embedded Systems Letters***, June 2024, DOI: 10.1109/LES.2024.3416422.

CONFERENCE

- Anirban Sengupta, Vishal Chourasia, Nabendu Bhui "Secure and Optimized IP Design Using Key-Driven Cipher-Based Multi-Layer Encrypted HLS Watermarking Integrated with FA Based Exploration", ***IEEE 37th International Conference on Microelectronics (ICM)***, Cairo, Accepted, 2025
- A. Anshul, A. Sengupta and V. Chourasia, "Secure Optimized Hardware IP Design using Key-driven Hash Slicing based HLS Watermarking Integrated with Krill-Herd DSE," ***IEEE 38th International System-on-Chip Conference (SOCC)***, Dubai, United Arab Emirates, 2025, pp. 1-6, doi: 10.1109/SOCC66126.2025.11235474.
- Anirban Sengupta, Vishal Chourasia "HLS based Hardware Watermarking using an Integrated Framework based on Encoded Dependency Matrix and Encrypted Load-Factor Signature", Proceedings of ***29th International Symposium on VLSI Design & Test (VDAT)*** 2025, Accepted, India, Aug 2025
- Anirban Sengupta; Vishal Chourasia, "HLS Based Rapid Pareto Front Search of Watermarked Convolutional Layer IP Design" Proceedings of ***IEEE 10th International Symposium on Smart Electronic Systems (IEEE – iSES)*** New Delhi, December 2024, pp. 255-260, DOI: 10.1109/iSES63344.2024.00061
- Anirban Sengupta; Vishal Chourasia; Nitish Kumar, "HLS Driven Hybrid GA-PSO for Design Space Exploration of Optimal Palmprint Biometric Based IP Watermark and Loop Unrolling Factor" Proceedings of ***IEEE 10th International Symposium on Smart Electronic Systems (IEEE – iSES)*** New Delhi, December 2024, pp. 134-139, DOI:10.1109/iSES63344.2024.00036
- Anirban Sengupta; Vishal Chourasia; Ayush Kumar Singh, "Gen-Sign: HLS Based Watermarking Using IP Vendor's Feistel Cipher Encrypted Genomic Signature for Protecting CNN and Image Processing Filter Cores Against Piracy" Proceedings of ***IEEE 10th International Symposium on Smart Electronic Systems (IEEE – iSES)*** New Delhi, December 2024, pp. 128-133, DOI: 10.1109/iSES63344.2024.00035
- Anirban Sengupta; Aditya Anshul; Vishal Chourasia, "HLS Based Hardware Watermarking Using IP Seller's Superimposed Facial Anthropometric Features" Proceedings of ***IEEE 10th International Symposium on Smart Electronic Systems***

(IEEE – iSES) New Delhi, December 2024, pp. 110-115, DOI: 10.1109/iSES63344.2024.00032.

- Vishal Chourasia; Anirban Sengupta; Rahul Chaurasia, “HLS Based Hardware Watermarking of Blur, Embossment and Sharpening Filters Using Fused Ocular Biometrics and Digital Signature”, Proceedings of **IEEE 37th International System-on-Chip Conference (SOCC)** -Dresden, Germany, June 2024, pp.143-148, DOI: 10.1109/SOCC62300.2024.10737813.
- Anirban Sengupta; Vishal Chourasia; Nilesh Kumar; Praveen Dawar, “Designing Optimal Secure Hardware IPs for Consumer Electronics using Fingerprint Watermark and Evolutionary Algorithm Framework”, Proceedings of **IEEE International Conference on Future Technologies for Smart Society (ICFTSS)**- Kuala Lumpur, Malaysia, June 2024, pp. 123-127, DOI: 10.1109/ICFTSS61109.2024.10691365.
- Anirban Sengupta; Vishal Chourasia; Aditya Anshul; “HLS Scheduling Driven Encoded Watermarking for Secure Convolutional Layer IP Design in CNN”, Proceedings of **IEEE 11th International Conference on Consumer Electronics - Taiwan (ICCE-Taiwan)**, 30 April 2024, DOI: 10.1109/ICCE-Taiwan62264.2024.10674266.
- Anirban Sengupta; Vishal Chourasia; Aditya Anshul; Nitish Kumar, “Robust Watermarking of Loop Unrolled Convolution Layer IP Design for CNN using 4-variable Encoded Register Allocation” Proceedings of IEEE 11th International Conference on Consumer Electronics - Taiwan (ICCE-Taiwan), 30 April 2024, DOI: 10.1109/ICCE Taiwan62264.2024.10674385.

BOOK CHAPTER

- Anirban Sengupta, Vishal Chourasia "Trojan Attacks via Malicious HLS Framework", **Institution of Engineering and Technology (IET) Book** "High-Level Synthesis Hardware Trojan Attacks and Countermeasures", To appear, 2026.
- Anirban Sengupta, Vishal Chourasia "Trojan Attacks on HLS-based Machine Learning Accelerators", **Institution of Engineering and Technology (IET) Book** "High-Level Synthesis Hardware Trojan Attacks and Countermeasures", To appear, 2026.

WORK EXPERIENCE

- Senior Research Fellow (SRF) in Computer Science Department, Indian Institute of Technology (IIT) Indore (M.P.) under CSIR project since 16 Oct 2023 to till Now.
- An Assistant professor in Computer Science Department, Sagar Institute of Science and Technology (SISTec) Gandhinagar, Bhopal (M.P.) since 12 Jan 2019 to 11 Oct 2023.

TEACHING ASSITANSHIP

- CS 209: Logic Design in Computer Science Department, Indian Institute of Technology (IIT) Indore (M.P.) Autumn semester 2025.
- CS 305: Computer Architecture and Lab in Computer Science Department, Indian Institute of Technology (IIT) Indore (M.P.) Autumn semester 2024.

PROFESSIONAL ACTIVITIES

INTERNATIONAL CONFERENCES

- Presented a paper at the *IEEE 37th International System-on-Chip Conference (SOCC)*, Dresden, Germany on September 17, 2024.
- Presented a paper at the *IEEE International Conference on Future Technologies for Smart Society (ICFTSS)*, Kuala Lumpur, Malaysia on August 7, 2024.
- Presented two papers at the *IEEE 11th International Conference on Consumer Electronics - Taiwan (ICCE-Taiwan)*, 30 April 2024.

NATIONAL CONFERENCES

- Presented a paper at the *29th International Symposium on VLSI Design & Test (VDAT)* 2025, Chandigarh, India, August 2025.
- Presented four papers at the *IEEE 10th International Symposium on Smart Electronic Systems (IEEE – iSES)* New Delhi December 2024.

PROFESSIONAL MEMBERSHIP

- IEEE Membership # 99903310
Current Status - Active | Total years - 3
- IEEE Consumer Technology Society Membership
Current Status - Active | Total years - 3

REVIEWER IN PEER-REVIEWED JOURNALS

1. Paper title: “CRESS: Quantifying Vulnerabilities of Attack Scenarios in Hardware Reverse Engineering”, *IEEE Transactions on Dependable and Secure Computing (TDSC)* 2025.

2. Paper title: “CADetect: Anomaly detection for Linux kernel configuration options”, *IEEE Transactions on Dependable and Secure Computing (TDSC)* 2025.

3. Paper title: "A Multi-Device Password Manager with Hardware-Backed DE-PAKE and Secure Device Provisioning", *IEEE Transactions on Dependable and Secure Computing (TDSC)* -2025-04-0534.

4. Paper title: "Securing COTS Binaries Against Data-oriented Attacks Through Intel SGX Escorted Data Integrity", *IEEE Transactions on Dependable and Secure Computing (TDSC)* -2023-12-1357

5. Paper title: "Towards Tamper-Resistant Live Patching in Linux-Based Hypervisor via Arm Hardware Features" *IEEE Transactions on Dependable and Secure Computing (TDSC)* -2025-09-1599 "

6. Paper title: "Trident: Securing SDN Switches with Hardware-accelerated Control Flow Integrity and Data Flow Integrity", *IEEE Transactions on Dependable and Secure Computing (TDSC)*-2025-05-0734,

7. Paper title: "High-Performance SM4 S-Box Design Based on Linear Matrix Extension and Nonlinear Modules Series-Connection" *IEEE Transactions on Very Large-Scale Integration (TVLSI)* -00540-2025.

8. Paper title: "Defending Side-Channel Attacks in Convolutional Neural Networks and Transformers with Channel-Level Parallelization" *IEEE Transactions on Very Large-Scale Integration (TVLSI)* -00670-2025.

TRAINING

- Major Training: Linux basics & Servers from Linux Solution Bhopal.
- Minor Training: Training course on RDMS from Netlink Institute, Bhopal.
- Served as the Lead Trainer for Front-End Web Development Training in the CSE & AIDS Department at SISTEC College, Bhopal.

TECHNICAL TALK

- Attended the technical talk on "Hardware Security and Side Channel Attacks" by Dr. Urbi Chatterjee, Assistant Professor in the Department of Computer Science and Engineering, Indian Institute of Technology Kanpur on November 17th, 2025.
- Participated in the IEEE CTsoc chapter- MP section, expert talk on "Personalized OS experience- Artificial Intelligence perspective" by Mr. Anand Singh, Senior Software Engineer at Microsoft, India on April 11th, 2025.
- Attended the technical talk on "Hardware Security: Research Challenges and Directions" by Prof. Wei Hu, Professor, School of Cybersecurity, Northwestern Polytechnical University, China on December 5, 2024.
- Attended the IEEE Hyderabad section technical talk on "High-Level Synthesis-Based Hardware Security and IP Core Protection (IPP)" presented by Prof. Anirban Sengupta from IIT Indore on October 4, 2024.
- Participated in the IEEE CTSoc MP Chapter expert technical talk on "High-Level Synthesis: Adoption and Key Advantages" by Prof. Benjamin Carrion Schaefer, Associate Professor and Assistant Dean for Graduate Student Success in the

Department of Electrical and Computer Engineering at The University of Texas at Dallas, USA, on June 4, 2024.

- Participated in an expert talk on “Hardware Security” organized by IIT Indore, by Prof. Gu on 25th March at 2.30 pm.
- Participated in a technical talk on “Emerging Memory Technologies- Into the Third Dimension” organized by the IEEE CTSoc MP Chapter, featuring Prof. Preeti Ranjan Panda, Professor in the Department of CSE and Dean of Corporate Relations at IIT Delhi on October 25, 2023.

CERTIFICATE / WORKSHOP / FDP

- Received a certificate of completion for “Ethical Hacking & Cyber Security Training” on November 30, 2022.
- Completed a Faculty Development Program (FDP) on “Competitive Coding” from July 12 to July 17, 2021 (1 week), organized by the E & ICT Academy, IIT Kanpur.
- Completed a 7-Day Bootcamp workshop on “Basics of Web Development” in collaboration with Microsoft Learn and GDG Ranchi in April 2021.
- Received a certificate of completion for “Intel Distribution of Open VINO™ Toolkit” online training on April 16, 2021.
- Participated in a Short-Term Training Program (STTP) on “Mozilla Add-Ons” organized by the Department of Computer Science and Engineering at UIT RGPV in collaboration with Mozilla Club, Coherent@UIT on March 22, 2018.
- Attended a workshop on “IoT Using Arduino” at UIT, RGPV on August 17-18, 2017.
- Participated in a workshop on “Cyber Security” organized by the Department of Computer Science & Engineering at the University Institute of Technology – Rajiv Gandhi Prodyogiki Vishwavidyalaya, Bhopal (M.P.) on February 17, 2017.

COMPUTER PROFICIENCY

- | | |
|---------------------------------|--------------------|
| • Hardware Security and VHDL | • C Programming |
| • Computer Architecture and Lab | • Cloud Computing |
| • Logic Design | • Network Security |

DECLARATION

I hereby declare that the information provided above is true and accurate to the best of my knowledge and belief.

Place: Indore

Date:

Vishal Chourasia