


IPSITA KOLEY

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I completed my Ph.D. under the supervision of Dr. Soumyajit Dey from the Department of Computer Science and Engineering at the Indian Institute of Technology Kharagpur (thesis defended). My primary research objective has been vulnerability analysis and designing resource-aware yet performance-preserving security frameworks for real-time safety-critical cyber-physical systems. As a postdoctoral fellow in GE Aerospace Research Bangalore, my primary responsibility at GE involved rule-based validation of LLM and ML-based anomaly detection. I am actively looking for postdoctoral research opportunities in academia.

EDUCATION

Indian Institute of Engineering Science and Technology, Shibpur, <i>M.Tech. in Information Technology</i> GPA: 86.67/100	June 2018
MCKV Institute of Engineering, Howrah, <i>B.Tech in Computer Science & Engineering</i> GPA: 8.84/ 10	June 2012
Belur High School (H.S.), <i>Higher Secondary Examination (Class XII)</i> GPA: 86/100	June 2008
Patha Bhavan Dankuni, <i>Madhyamik Examination (Class X)</i> GPA: 90/100	June 2006

EXPERIENCE

Program Committee

- 15th ACM/IEEE International Conference on Cyber-Physical Systems: Poster/Demo
- 16th ACM/IEEE International Conference on Cyber-Physical Systems: Artifact Evaluation

Postdoctoral Fellow at GE Aerospace Research

Mar'24 – Dec'24

- Developing a rule-based validation framework for an LLM-based test case generator.
- ML-based anomaly detection on engine health data for better maintenance guideline prediction.

Indian Institute of Technology Kharagpur

Jul'18 - Feb'24

- *Research Scholar* with primary research focus on exploiting control-theoretic approaches, and learning-based methods to explore vulnerabilities and design lightweight attack detection techniques with formal guarantees for securing real-time cyber-physical systems like automotive.
- *Teaching Assistant* of Formal Language and Automata Theory, Foundation of Cyber-Physical Systems, Programming, and Data Structures Lab, Design & Analysis of Algorithms Lab, etc.
- *Reviewer* for Euromicro Conference Series on Digital System Design (DSD), ACM Transactions on Cyber-Physical Systems (TCPS), IEEE Transactions on Information Forensics and Security (TIFS), Journal of Cryptographic Engineering (JCEN), International Conference on Security, Privacy, and Applied Cryptographic Engineering (SPACE), International Conference on VLSI Design (VLSID)
- *Sub-reviewer* for IEEE Real-Time Systems Symposium (RTSS), Design Automation Conference (DAC), ACM Transactions on Embedded Computing Systems (TECS)
- *Research Project* on *Robustness Analysis for Automotive Software System* in collaboration with Robert Bosch Engineering and Business Solutions Private Ltd. We have developed a tool using a formal method technique that takes as input vehicle parameters, a maneuver, attack detection rules, and specific performance criteria and generates stealthy deceptive attack vectors that violate the performance criteria by bypassing the detection rules.

Indian Institute of Engineering Science and Technology Shibpur

Aug'16 - Jun'18

- *Research Project* on *Mobile Sink-Based Data Collection for Energy Efficient Coordination in Wireless Sensor Network Using Cooperative Game Model*. We addressed the un-proportionate energy consumption in a wireless sensor network and proposed an energy-efficient data collection protocol by multiple mobile sinks based on cooperative game theory with non-transferable utility.
- *Teaching Assistant* of Database Management Systems, Computer Graphics, Programming and Data Structures Lab, etc.

RS Software India Ltd., Kolkata, India Associate Software Engineer

Jun'14 - Jul'16

- As *Automation Test Engineer*, my primary responsibility includes writing automated test scripts for web applications using QTP and Selenium.

Tata Consultancy Services Ltd., Pune, India Assistant System Engineer

Jan'13 - Jun'14

- As *Automation Test Engineer*, my primary responsibility includes writing automated test scripts for web applications using C#.

SKILLS & TRAININGS

Coding	C/C++/embedded C, C#, Java, VB, Python
Tools & Technology	Z3, CBMC, Matlab, ETAS LabCar, IPG CarMaker, Arduino, QTP, Selenium, SQL, VB.Net
Certifications	Microsoft Programming in C# (70-483) Training on JEE organized by Globsyn Finishing School Workshop on Application Of Advance Algorithm organized by the Department of Information Technology at Indian Institute of Engineering Science and Technology, Shibpur Summer School on Algorithms and Optimization at Indian Statistical Institute, Kolkata Training program on Application Security at RS Software, Kolkata
Workshops	
Languages	Bengali, English, Hindi

PUBLICATIONS

Journal Articles

- S. Adhikary, **I. Koley**, S. K. Ghosh, S. Ghosh, and S. Dey, *Revisiting dynamic scheduling of control tasks: A performance-aware fine-grained approach*, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, (accepted as part of EMSOFT), vol. 43, no. 11, pp. 3662-3673, 2024.
- **I. Koley**, S. Dey, D. Mukhopadhyay, S. Singh, L. Lokesh, and S. V. Ghotgalkar, *CAD support for security and robustness analysis of safety-critical automotive software*, ACM Transactions on Cyber-Physical Systems, vol. 7, no. 1, pp. 1-26, 2023.

Conference Proceedings

- B. Anjana, S. Adhikary, **I. Koley**, A. R. Hota, and S. Dey, *Poster: Adaptive protection of power grids against stealthy load alterations*, in Proceedings of the ACM/IEEE 15th International Conference on Cyber-Physical Systems (with CPS-IoT Week 2024), 2024.
- **I. Koley**, S. Adhikary, and S. Dey, *Thinking beyond bus-off: Targeted control falsification in can*, in Proceedings of the ACM/IEEE 15th International Conference on Cyber-Physical Systems (with CPS-IoT Week 2024), 2024, (accepted).
- S. Maiti, B. Anjana, S. Adhikary, **I. Koley**, and S. Dey, *Targeted attack synthesis for smart grid vulnerability analysis*, in Proceedings of the Proceedings of the 30th ACM Conference on Computer and Communications Security (CCS), 2023, pp. 1-15.
- **I. Koley**, S. Adhikary, A. Sain, and S. Dey, *Design and deployment of resilient control execution patterns: A prediction, mitigation approach*, in Proceedings of the ACM/IEEE 14th International Conference on Cyber-Physical Systems (with CPS-IoT Week 2023), 2023, pp. 166-176.
- **I. Koley**, S. Adhikary, R. Rohit, and S. Dey, *A framework for evaluating connected vehicle security against false data injection attacks*, in 2022 25th Euromicro Conference on Digital System Design (DSD), IEEE, 2022, pp. 913-920.
- **I. Koley**, S. Adhikary, and S. Dey, *Catch me if you learn: Real-time attack detection and mitigation in learning enabled cps*, in 2021 IEEE Real-Time Systems Symposium (RTSS), IEEE, 2021, pp. 136-148.
- **I. Koley**, S. K. Ghosh, S. Dey, et al., *Formal synthesis of monitoring and detection systems for secure cps implementations*, in 2020 Design, Automation & Test in Europe Conference & Exhibition (DATE), IEEE, 2020, pp. 314-317.
- A. Roy, **I. Koley**, S. Adhikary, and S. Dey, *Optimizing RSU placements for securing vehicle platoon against false data injection attacks*, in Proceedings of the ACM/IEEE 14th International Conference on Cyber-Physical Systems (with CPS-IoT Week 2023), 2023, pp. 251-252.
- S. Adhikary, **I. Koley**, S. Maity, and S. Dey, *Work-in-progress: Control skipping sequence synthesis to counter schedule-based attacks*, in 2022 IEEE Real-Time Systems Symposium (RTSS), IEEE, 2022, pp. 491-494.
- P. Kremer, **I. Koley**, S. Dey, and S. Park, *State estimation for attack detection in vehicle platoon using VANET and controller model*, in 2020 IEEE 23rd International Conference on Intelligent Transportation Systems (ITSC), IEEE, 2020, pp. 1-8.
- S. Adhikary, **I. Koley**, S. K. Ghosh, S. Ghosh, S. Dey, and D. Mukhopadhyay, *Skip to secure: Securing cyber-physical control loops with intentionally skipped executions*, in Proceedings of the 2020 Joint Workshop on CPS&IoT Security and Privacy, 2020, pp. 81-86.
- A. Sain, S. Adhikary, **I. Koley**, and S. Dey, *MAARS: Multi-Rate Attack-Aware Randomized Scheduling for Securing Real-time Systems*, in Proceedings of the ACM/IEEE 16th International Conference on Cyber-Physical Systems (with CPS-IoT Week 2025), 2025. (accepted)
- B. Anjana, S. Adhikary, **I. Koley**, A. R. Hota, and S. Dey, *Poster: Adaptive protection of power grids against stealthy load alterations*, in Proceedings of the ACM/IEEE 15th International Conference on Cyber-Physical Systems (with CPS-IoT Week 2024), 2024.
- A. Bhattacharya, S. Adhikary, **I. Koley**, A. Majumder, and S. Dey, *Adaptive CUSUM-based residue analysis for stealthy attack detection in cyber-physical systems*, in Proceedings of the ACM/IEEE 14th International Conference on Cyber-Physical Systems (with CPS-IoT Week 2023), 2023, pp. 270-271.
- A. Sain, S. Singh, S. Adhikary, **I. Koley**, and S. Dey, *Work-in-progress: Securing safety-critical control tasks with attack-aware multi-rate scheduling*, in 2023 IEEE 29th Real-Time and Embedded Technology and Applications Symposium (RTAS), IEEE, 2023, pp. 345-348.

Book Chapter

- S. Dey, **I. Koley**, and S. Adhikary, *Chapter 6: Resource aware synthesis of automotive security primitives*, in Machine Learning and Optimization Techniques for Automotive Cyber-physical Systems, V. K. Kukkala and S. Pasricha, Eds., Springer, 2023.

ACHIEVEMENTS

- *Winner of ACM SIGBED Frank Anger Memorial Award* (2024)
- *Awarded 'Impact Award' by GE Aerospace Research India.* (2024)
- *Invited for a talk on our publication in Academic Research and Careers for Students (ARCS) organized by ACM India* (2023)
- *Secured 1st runner-up position in Ph.D. forum organized by IEEE WINTeCHCON* (2022)
- *Received UGC NET JRF Scholarship* (2018)
- *Awarded 'Star of the Month' by RS Software India Ltd.* (2015)
- *Awarded 'On Spot Award' by Tata Consultancy Services Ltd.* (2013)
- *Placed 3rd in Regional Student Convention, organized by Computer Society of India, Region II, held at ISI, Kolkata.* (2011)
- *Awarded under Scheme of Scholarship for College & University student's reg. of Government of India on the result of Higher Secondary examination held by WBCHSE.* (2008)
- *Awarded under National Merit Scholarship Scheme of Government of India, for the result of Madhyamik, Examination held by WBBSE.* (2006)