SHAURYA PUROHIT

Ames, IA | 515-817-3915 | shaurya1@iastate.edu | linkedin.com/in/shaurya-purohit/

PROFESSIONAL SUMMARY

I am proficient and have good hands-on experience in the fields of Machine learning, Cybersecurity, Deep Learning, Data Analysis, Federated Learning, and Full Stack Development. My research focuses on developing advanced Artificial Intelligence and Machine Learning solutions for Anomaly and Intrusion Detection systems using state-of-the-art techniques to various use cases including Autonomous Vehicles, EV charging infrastructure, DER Communication. I have a strong foundation in data privacy, statistical modelling for large datasets, data preprocessing, feature engineering, and model evaluation, with practical experience in Python, TensorFlow, Keras, and other ML frameworks.

EDUCATION

Pursuing **PhD** in **Computer Engineering** August 2019 – Fall 2024
Iowa State University - Ames, Iowa *(Expected)*
CGPA: 3.86/4.00

Master of Engineering in **Computer Engineering (Minor in Statistics)** August 2019 - May 2022
Iowa State University - Ames, Iowa
CGPA: 3.84/4.00

Bachelor of Technology in **Information Technology**
Manipal University Jaipur - Jaipur, India August 2015 - May 2019
CGPA: 9.58/10.00

PROFESSIONAL EXPERIENCE

Iowa State University - Ames, Iowa
Graduate Research Assistant May 2020 – Present

- Starting Spring 2024, started working on two projects in collaboration with Argonne National Laboratory
  - The first project enhances real-time operations of distributed energy resources, providing cost-effective, real-time cybersecurity for individual DERs within an aggregation pool through Reinforcement learning and Game theory.
  - The second aims to bolster grid cybersecurity through a novel Machine and Federated Learning methodology. The project underscores a commitment to integrating Machine Learning to address complex energy and security challenges through threat intelligence and anomaly detection.
- Worked on Cybersecurity of DER communication protocols and EV Charging using Federated Learning.
  - Developed federated learning anomaly detection models enhancing data privacy and cybersecurity in DER and EV charging networks, achieving high accuracy and reduced loss on publicly available large datasets.
- Had the honor of being **selected as a senior PhD student to serve on a panel at the CAE-R Symposium 2023**, where I presented both my research and poster.
- Worked on Game-theoretic Optimization of Cybersecurity Investment Strategies for EV Charging Stations using Attack Defense Trees.
  - This framework integrates the CIA triad and MITRE ATT&CK framework to analyze attack paths, optimize resource allocation, and formulate robust defense strategies.
- Worked on cybersecurity of autonomous vehicles using Machine Learning & Deep Neural Networks
  - Developed a Hybrid Anomaly detection system for preventing cyber-attacks on intra-vehicular communication networks with the help of rule based and machine learning techniques. Achieved an accuracy of around 95%.
  - Submitted the enhanced journal version of this work using Deep Neural Networks and variety of datasets. Achieved an accuracy of more than 97% and better latency.
- Worked on a project titled Cloud-based multi-sensor remote data acquisition system.

Mutual of Omaha – Nebraska, USA May 2022 – December 2022
Information Technology Intern

- Worked as an I/S intern with Security and Data Communication team.
  - Worked on Deep Neural Networks for Forcepoint Framework.
  - Worked on complete automation and full stack management of an in-house project titled "Moonet" using Jenkins CI/CD pipeline architecture.

Iowa State University - Ames, Iowa
Graduate Teaching Assistant August 2021 - December 2021

- Worked as a TA for a 500-level course: Real-Time systems (**CPR E 558**)
- Responsibilities included: one-to-one interaction with students for solving queries, helping students in their final course project, providing feedback by grading assignments, quizzes, and exams.

Graduate Teaching Assistant August 2019 - May 2020

- Worked as a TA for courses: Introduction to Computer Engineering and Problem Solving (**CPR E 185**) & Problem Solving in Software Engineering (**S E 185**).
- Responsible for conducting labs every week to help students write programs in C, helping students in their final course project, holding office hours to facilitate one-to-one interaction for resolving queries, grading homework, lab reports, exams and providing appropriate feedback.

ValueLabs – Hyderabad, India January 2019 - April 2019
Software Engineer Intern

- Worked as a Full-Stack Developer on a real time client project titled MfExpert (Micro- Finance Expert) and designed a web application using Angular 7, Node.js and PostgreSQL.

IIT BHU – Varanasi, India May 2018 - July 2018
Machine Learning Intern

- Worked on a project titled Autonomous Car Detection using Deep Learning under the guidance of Dr. Tanima Dutta.
- Implemented Car Detection in images and videos using Machine Learning and Deep Learning and achieved a high accuracy of 98%.

CERTIFICATIONS

- Machine Learning
  Issued by: Stanford University (via Coursera)
- Cybersecurity Specialization
  Issued by: IBM (via Coursera)
- Cybersecurity Fundamentals
  Issued by: IBM
- AWS Machine Learning
  Issued by: Amazon Web Services (via Coursera)
- Programming in Java
  Issued by: NIIT Technologies

PUBLICATIONS

- S. Purohit and M. Govindarasu, "ML-based Anomaly Detection for Intra-Vehicular CAN-bus Networks," 2022 IEEE International Conference on Cyber Security and Resilience (CSR), Rhodes, Greece, 2022, pp. 233-238, doi: 10.1109/CSR54599.2022.9850292. (***Published***)
- S. Purohit and M. Govindarasu, "Cybersecurity Investment Analysis for Electric Vehicle Charging Infrastructures," 2023 Resilience Week (RWS), National Harbor, MD, USA, 2023, pp. 1-6, doi: 10.1109/RWS58133.2023.10284670. (***Published***)
- S. Purohit and M. Govindarasu, "FL-EVCS: Federated Learning based Anomaly Detection for EV Charging Ecosystem," 2024 33rd International Conference on Computer Communications and Networks (ICCCN), Kailua-Kona, HI, USA, 2024, pp. 1-9, doi: 10.1109/ICCCN61486.2024.10637543. (***Published***)
- S. Purohit and M. Govindarasu, "Federated Learning based Anomaly Detection for Distributed Energy Resource Communication," 2024 IEEE Power & Energy Society General Meeting (PESGM), Seattle, WA, USA, 2024, pp. 1-5, doi: 10.1109/PESGM51994.2024.10688634. (***Published***)
- B. Blakely, S. Purohit, K. Ogbuefi, I. Prieto, and M. Govindarasu. "A Federated Intrusion Response Network for Grids (FIRNet-G)." IECON 2024. (***Accepted***)
- S. Purohit and M. Govindarasu, "HAVEN: A Hybrid Anomaly Detection System for Intra-Vehicular CAN-bus Communication using Rule-based and Neural Networks" , IEEE TDSC Journal . (***Submitted- Under Review***)
- S. Purohit, M. Govindarasu and B. Blakely, "FL-ADS: Federated Learning Anomaly Detection System for Distributed Energy Resource Networks", IET CPS Journal. (***Submitted- Under Review***)

TECHNICAL SKILLS

- **Programming Languages:** Python, Java, C, R
- **Web Based Technologies:** HTML, CSS, Angular, Node.js, PHP, JavaScript, jQuery, Ajax, XML, DHTML
- **ML Frameworks:** Tenser flow, Keras, Sckit-learn, PyTorch, Flower
- **Subject specific software:** Docker**,** RStudio**,** Rational Rose Enterprise, STAR UML, AutoCAD
- **Databases:** MySQL, PostgreSQL

ACHIEVEMENTS & AWARDS

- Secured **1st Rank in B. Tech (IT) 3rd year** & **4th year** for the academic year 2017-18 and 2018-19 respectively.
- Secured **Statewide Ranking 1st** & **India Wide Ranking 3rd** in the Wheebox Employability Skills Test in 2017.
- Published article for e-magazine **EasyShiksha** in 2018.