

Raj Mani Shukla

PH.D. CANDIDATE · UNIVERSITY OF NEVADA, RENO

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Education

Ph.D. in Computer Science and Engineering

University of Nevada, Reno

NV, USA

Aug. 2015 - PRESENT

- Advisor: Dr. Shamik Sengupta

M.Tech. in Instrumentation Engineering

National Institute of Technology, Kurukshetra

India

Aug. 2011 - May 2013

- Advisor: Dr. J.K. Quamara, Dr. Pardeep Kumar (Kurukshetra University)

B.Tech. in Electronics and Communication Engineering

Bundelkhand Institute of Engineering and Technology, Jhansi

India

Aug. 2007 - May 2011

Research Interest

Data Science: Anomaly/Fault Detection, Forecasting, Predictive Analytics

Machine Learning: Deep Neural Network, Adversarial Networks, Clustering, Federated Learning

Internet of Things: PEV Charging, Cloud/Edge computing, Sensor Deployment

Professional Experience

Research Assistant, University of Nevada, Reno

Aug. 2015 - PRESENT

- Execute research on multiple projects.
- Publish papers in relevant venues.
- Assist writing research grant proposals.

Teaching Assistant, University of Nevada, Reno

Aug. 2015 - PRESENT

- Give lab lectures, grade homeworks, programming projects, and hold office hours on “Introduction to Computing” and “Introduction to Computer Science I” courses.
- Managed submission system and developing auto-grader for programming and lab assignments.
- Designed novel course content on “Cyber-security in Smart and Connected Autonomous Infrastructure”.
- Provided training to Nevada school teachers on “Hardware-based Security in Biometric Systems”.

In contract, M2 Medical Intelligence

Jun. 2016 - Jul. 2016

- Created modules for fitting disease count data and forecast the future disease count values.

Junior Research Fellow, Indian Institute of Technology, Kanpur

Jun. 2014 - Jul. 2015

- Developed Automatic Test Case Generation tool.
- Mentored two undergraduate summer interns.

Lecturer, Dr. A.P.J. Abdul Kalam Technical University

Aug. 2013 - June 2014

- Taught undergraduate course “Electronics Engineering”.

Research Projects

Data analysis for anomaly detection

- Machine Learning Security using data analysis from heterogeneous sources.
- Accident detection and verification for smart transportation system using data analysis.
- Developed techniques to classify anomalies arising from different sources.
- Investigated an scalable outlier detector for IoT.
- Analyzed the performance of traffic prediction application under Data-falsification attack.

Plug-in Electric Vehicle (PEV) Charging

- Developed an integrated Communication, Optimization, and Prediction (COP) unit for providing charging service to en-route PEVs.
- Developed scheduling policy for providing charging service to parked vehicles.

Cloud and Edge Computing Systems

- Developed an application placement architecture for Cloud-Edge hierarchical system.
- Proposed parameter tuning based computation offloading for IoT.
- Surveyed the importance and open research issues of Edge computing, Cloud-Edge collaboration, and Software-defined networks.

Scheduling and sensor placement for IoT

- Investigated scheduling policy for smart home appliances under the scenario of dynamic electricity pricing environment.
- Developed sensor placement module to improve the coverage area for uneven event density distribution.

Automatic test case generation for improved MCDC coverage

- Improved the robustness of concolic tester.
- Integrated the concolic test case generation software with Frama-C.
- Developed algorithm to enhance coverage of C programs in CREST.

Student Supervision

- Watson Jia, Undergraduate student, Summer 2019
- Aastha Sharma, Undergraduate student, Summer 2015
- Jayant Agarwal, Undergraduate student, Summer 2015
- Shirshak Raja Maskey, Masters student, Spring 2020

Leadership and Committee Services

- Elected twice as a council member representative of Graduate Students Association (GSA), UNR, served from Aug. 2017-June 2019.
- Events committee representative at GSA, UNR, from Aug. 2017-June 2019.
- Served as the Vice-President of CSE Graduate Students Club from Sep. 2016 to Aug. 2015.
- Worked as the Cultural Secretary of Indian Students Organization (ISO), UNR from Sep. 2015 to Aug. 2016.

Honors & Awards

2019	Outstanding International Graduate student , GSA, UNR	NV, USA
2016	ISVLSI travel grant , IEEE iNIS (awarded to 3 students)	Gwalior, India
2014	Student travel grant , Embedded System Week	Noida, India
2011-'13	GATE Scholarship , MHRD (Top 1.4% among ≈180000 students)	NIT KKR

Peer review

- **Journals:** IEEE Communication Magazine, IETE Technical Review, Journal of Computing, Journal of Computer Networks and Communications, Elsevier Computer Communication
- **Conferences:** IEEE International Symposium on Nanoelectronic and Information Systems, IEEE Military Communications

Skills

Programming languages: C, C++, Python, R, Java, OCaml
Tools: TensorFlow, Keras, MATLAB, CIL, CREST, Frama-C
Platforms: Linux, Windows, MacOS

Publications

Book chapters

1. **Raj Mani Shukla**, Shahriar Badsha, Deepak Tosh, and Shamik Sengupta, “Robust Machine Learning using Diversity and Blockchain”, Book Chapter (under review), in Adversary-aware Learning Techniques and Trends in Cyber-security.
2. **Raj Mani Shukla** and Shamik Sengupta, “Towards Robust Outlier Detector for Internet of Things Applications”, Book chapter, in Modeling and Design of Secure Internet of Things, Eds. Charles A. Kamhoua, Laurent L. Njilla, Alexander Kott, Sachin S. Shetty, Wiley-IEEE Press, February 2020 (accepted and to appear).

Journals

1. **Raj Mani Shukla** and Shamik Sengupta, “Classification of Anomalies arising from Multiple Sources using Ensemble inspired Learning”, working paper.
2. Shirshak Raja Maskey, **Raj Mani Shukla**, Shahriar Badsha, and Shamik Sengupta, “Blockchain based Accident Detection and Validation in Connected Vehicles with Miner Node Selection”, working paper
3. **Raj Mani Shukla** and Shamik Sengupta, “Scalable and Robust Outlier Detector using Hierarchical Clustering and Long Short Term Memory (LSTM) Neural Network for Internet of Things”, in Elsevier Internet of Things Journal, January 2020 (accepted and to appear).
4. **Raj Mani Shukla** and Shamik Sengupta, “COP: An integrated Communication, Optimization, and Prediction unit for smart Plug-in Electric Vehicle Charging”, Elsevier Internet of Things Journal, March 2019 (accepted and to appear).

Conferences

1. Watson Jia, **Raj Mani Shukla** and Shamik Sengupta, “Anomaly Detection using Supervised Learning and Multiple robust Statistical Methods ”, Accepted and to appear in special topics on Machine and Deep Learning in Cyber Security and Privacy Issues, IEEE International Conference on Machine Learning and Applications (ICMLA-2019) Boca Raton, Florida, December 2019.
2. **Raj Mani Shukla** and Shamik Sengupta, “Analysis and Detection of Outliers due to Data Falsification Attacks in Vehicular Traffic Prediction Application”, In Proceedings IEEE Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON), New York, USA, November 2018.
3. **Raj Mani Shukla**, Shamik Sengupta and Amar Nath Patra, “Software-defined Network Based Resource Allocation in Distributed Servers for Unmanned Aerial Vehicles”, In Proceedings of IEEE Annual Computing and Communication Workshop and Conference (CCWC) Las Vegas, Nevada, January 2018.
4. **Raj Mani Shukla**, Shamik Sengupta and Amar Nath Patra, “Smart Plug-in Electric Vehicle Charging to Reduce Electric Load Variation at a Parking Place”, In Proceedings of IEEE Annual Computing and Communication Workshop and Conference (CCWC). Las Vegas, Nevada, January 2018.
5. **Raj Mani Shukla**, Shamik Sengupta and Mainak Chatterjee, “Software-Defined Network and Cloud-Edge Collaboration for Smart and Connected Vehicles”, In Proceedings of International Conference on Distributed Computing and Networking (ICDCN). Varanasi, India, January 2018.
6. **Raj Mani Shukla** and Shamik Sengupta, “A Novel Software-defined Network Based Approach for Charging Station Allocation to Plugged-in Electric Vehicles”, In Proceedings of 16th IEEE International Symposium on Network Computing and Applications (NCA 2017). Boston, USA, November 2017.
7. **Raj Mani Shukla** and Arslan Munir, “An Efficient Computation Offloading Architecture for the Internet of Things (IoT) Devices”, In Proceedings of IEEE Consumer Communications & Networking Conference (CCNC), Las Vegas, Nevada, January 2017.
8. **Raj Mani Shukla**, Prasanna Kansakar, and Arslan Munir, “A Neural Network-based Appliance Scheduling Methodology for Smart Homes and Buildings with Multiple Power Sources”, In Proceedings of IEEE International Symposium on Nanoelectronic and Information Systems (iNIS), Gwalior, India, December 2016.
9. **Raj Mani Shukla** and Arslan Munir, “A Computation Offloading Scheme Leveraging Parameter Tuning for Real-time IoT Devices”, In Proceedings of IEEE International Symposium on Nanoelectronic and Information Systems (iNIS), Gwalior, India, December 2016.