MANVEEN KAUR

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Earned Ph.D. from Clemson University's School of Computing in August 2022. Assistant Professor at California State University, Los Angeles (CSULA), in the Computer Science Department since August 2022. 5+ years of teaching experience, including undergraduate and graduate Network and Systems courses at Clemson University and courses on Networks and Cybersecurity, Programming Paradigms, and Functional Programming at CSULA. Launched the Internet-of-Things (IoT) Lab at CSULA in November 2022 with a research focus on Software and Systems Engineering for IoT systems; interests include systems and application design, implementation, testing, cloud and edge computing, cyber-security, and machine learning for IoT systems and applications. Highly motivated to provide a holistic learning experience and growth opportunities to students through engaged, interactive, and hands-on teaching practices, and identifying and promoting students' talents.

EDUCATION

Ph.D., Computer Science, Clemson University, Clemson, SC   *Aug 2022*
Dissertation on "SNAP : A Software-Defined & Named-Data Oriented Publish-Subscribe Framework for Emerging Wireless Application Systems"
M.S., Electrical Engineering, Ohio State University, Columbus, OH   *May 2012*
B.Tech., Electrical and Communication Engineering, Rajasthan Technical University, Rajasthan, India   *May 2010*

TEACHING EXPERIENCE

Assistant Professor, Computer Science Department, California State University Los Angeles   *Aug 2022 - present*
- Course Details:
  - ***CS 5035 Topics in Functional Programming (Spring, 2023)*** - Study of functional programming and paradigms within it using the Kotlin programming language
  - ***CS 3035 Programming Language Paradigms (Fall, 2022 and Spring, 2023)*** - Capabilities and styles of various programming languages including imperative, functional, and object-oriented languages.
  - ***CS 2470 Fundamentals of Network Systems and Cybersecurity (Fall, 2022)*** - Study of network communication systems and cybersecurity, including computer network communications, Internet architecture, and Cybersecurity fundamentals such as data security, web security, system security and network security.
  - ***CS 4961 and CS 4962 Software Design Lab (Fall, 2022 and Spring, 2023)*** - Design advisor for 2 groups of 10 students each working on a software design and implementation project with industry parters.

Graduate Teacher of Record, School of Computing, Clemson University, South Carolina   *May 2021/22 - July 2021/22*
- Course Details:
  - ***CPSC 3600 Networks and Network Programming (Summer, 2021 and Summer, 2022)*** - Introduction to basic concepts of computer network technologies and network programming including network socket programming, layered protocol architectures, local and wide area networks, internetwork and intranetwork concepts, and security.

Graduate Teaching Assistant, School of Computing, Clemson University, South Carolina   *Aug 2017 - May 2021*
- Course Details:
  - CPSC 8510 (Software Systems for Data Communication), Graduate-level, Fall 2020
  - CPSC 3600 (Networks and Network Programming), Undergraduate-level, Spring 2020
  - CPSC 8520 (Internetworking) , Graduate-level, Spring 2021, Spring 2019
  - CPSC 6240 (System Administration and Security), Undergraduate-level, Fall 2018
  - CPSC 3950 Honors Seminar, Undergraduate-level, Spring 2018
  - CPSC 3990 Advanced Creative Inquiry: CyberTiger Systems, Undergraduate-level, Fall 2017

RESEARCH EXPERIENCE

Airport Patrol Rover project, IoT Lab, CSULA   *Nov 2022 - present*
- Objective of the self-navigating rover application is to identify and mitigate airspace conditions that impede safe take-off and landing of aircrafts.

- Work involves developing a self-navigating rover (or drone) application that can be used by drones to patrol airspace above airport runways
- This project is currently in development with collaborators associated with the IoT Lab.

Network and Compute System Requirements for Ultra-reliable, Low Latency Applications Systems *, MIT Lincoln Labs and Clemson University*
(Research Team Member)

Aug 2022 - present

- Part of research team investigating the efficacy of new communication technologies like 5G New Radio in Unmanned Aerial Systems (UAS).
- This work is part of a multi-year project, currently within year 4, and is a continuation of work done by me during my Ph.D.
- Current role included defining the scope and timeline of work for year 4, mentoring a team of 2-3 undergraduate students and at least 1 graduate student

Network and Compute System Requirements for Ultra-reliable, Low Latency Applications Systems , *MIT Lincoln Labs*
(Graduate Research Assistant)

Aug 2019 - Aug 2022

- Lead Ph.D. student on project to design and evaluate wireless and computation systems that support ultra-reliable low latency communication and fault tolerance for emerging wireless systems, e.g. unmanned aerial vehicle (UAV)/drone swarms.
- Conducted measurement-based performance analysis and comparison of various transmission methods suitable for low-latency, reliable communication in a drone swarm. Methods included unicast, broadcast, multicast, and Information-Centric Networking.
- Developing an Information-Centric Networking system design for efficient low latency communication in drone swarms motivated by findings from performance analysis.
- Exploring efficacy of different wireless standards (802.11 variants, 5G) in drone swarms.

Uncertainty Quantification of Cyber Attacks on Intelligent Traffic Signals
US DOT, Regional Center for Connected Multimodal Mobility
(Graduate Research Assistant)

May 2018 - Aug 2019

- Project objective was to evaluate design modalities that utilize vehicle-to-everything (V2X) communication enabled edge infrastructure to detect cyber-attacks aimed at connected vehicle applications.
- Developed and evaluated a distributed edge-centric strategy for detection of Denial-of-Service (DoS) attack in the connected vehicle application of Cooperative Adaptive Cruise Control (CACC).
- Evaluated strategy using simulations in NS-3 discrete event network simulator. Empirical results indicate successful attack detection by this strategy.

CPS Synergy: Security of Distributed Cyber-Physical Systems with Connected Vehicle Applications *National Science Foundation (NSF)*
(Graduate Research Assistant)

Jan 2016 - Present

- Project objective is to develop cyber-attack detection and control countermeasure methodologies for distributed network and computation systems supporting connected vehicle applications.
- Evaluated CACC application system performance under network security attack comparative to established application performance baseline.
- Evaluation conducted using a connected vehicle applications' testing platform, Vehicle-in-the-Loop, developed in collaboration with project stakeholders within Clemson University's Automotive Engineering and Human-Centered Computing departments. Vehicle-in-the-Loop testing platform incorporates hardware based real-world driving data into the CACC application simulation to create realistic testing conditions.
- Developed middleware to enable real-world driving data stream from a test vehicle to be input into the Vehicle-in-the-Loop testing platform via the experimental connected vehicle testbed in Clemson University.

- Developed IP and DSRC standards based performance measurement tools to conduct performance evaluation of ensuing end-to-end communication system. Results indicated successful adherence to the testing platform's stringent performance requirements, especially for latency and reliability.
- Designed and implemented a Denial-of-Service based threat model for the CACC application system intended to affect the CACC platoon stability. Testing was based on novel strategy to send two application data communication streams, impaired and non-impaired, simultaneously from a single DSRC unit placed in a real vehicle into the CACC simulation and observe the platoon's string stability.

US Ignite: Enabling Connected Vehicle Applications through Advanced Network Infrastructure, *Jan 2016 - Dec 2017*
National Science Foundation (NSF)
(Graduate Research Assistant)

- Developed and evaluated an experimental connected vehicle testbed, South Carolina Connected Vehicle Testbed (SC-CVT), intended to provide a hardware based, edge computing enabled testing environment for research within the connected vehicles domain. SC-CVT currently consists of four vehicular standards based edge nodes providing DSRC, Wi-Fi, and LTE coverage for V2X operations in connected vehicles applications.
- Developed a system framework, ThinGs In the Fog (TGIF), that supports connected vehicle applications running on the SC-CVT testbed. TGIF provides C++ service interfaces to CV applications for basic functions and services such as geolocation, messaging, and connectivity.
- Successfully evaluated TGIF through a safety critical connected vehicle application, Queue Warning, operating in SC-CVT.

RESEARCH PUBLICATIONS

M. Kaur (2022) "SNAP: A Software-Defined & Named-Data Oriented Publish-Subscribe Framework for Emerging Wireless Application Systems."

M. Kaur, A. Razi, L. Cheng, R. Amin, J. Martin, "Design and Evaluation of an Application-Oriented Data-Centric Communication Framework for Emerging Cyber-Physical Systems.", *Proceedings of IEEE Consumer Communications & Networking Conference 2023*

J. Martin, M. Kaur, A. Razi, L. Cheng "Towards Connecting the Disconnected Internet.", *Proceedings on 2022 International Conference on Computer Communications and Networks (ICCCN). IEEE, 2022*

M. Kaur, R. Amin, J. Martin, "The Design and Validation of ICN-Enabled Hybrid Unmanned Aerial System", *Proceedings of MILCOM Conference,* December 2021

M. Kaur, G. Ali, A. Rayamajhi, B. Ayalew, J. Martin, "Network Driven Performance Analysis in Connected Vehicular Networks*", Proceedings of the IEEE VTC Conference*, September 2019

V. Rastogi, R. Merco, M. Kaur, A., Rayamajhi, M. Gavelli, G. Papa, P. Pisu, S. Babu, A. Robb, and J. Martin, "An Immersive Vehicle-in-the-loop VR Platform for Evaluating Human-to-Autonomous Vehicle Interactions," *Proceedings of WCX: SAE World Congress Experience*, 2019.

A. Rayamajhi, M. Rahman, M. Kaur, J. Liu, M. Chowdhury, H. Hu, J. McClendon, K.Wang, A. Gosain, J. Martin, "ThinGs In a Fog: System Illustration with Connected Vehicles", *Proceedings of the IEEE Vehicular Technology Conference (VCT'17)*, (Sydney, AU, June 2017).

M. Kaur, H. Hu, J. Martin, "Comprehensive View of Security in Vehicular Networks", *Proceedings of the International Conference on Connected Vehicles and Expo (ICCVE'16)*, (Seattle, WA, Sept 2016).

A. Sharma, M. Kaur, Z. Koradia, R. Nishant, S. Pandit, A. Raman, A. Seth, "Revisiting the state of cellular data connectivity in india", *Proceedings of the 2015 Annual Symposium on Computing for Development (pp. 149-157). ACM ,* December 2015

RESEARCH PRESENTATIONS/TALKS

"Design and Evaluation of an Application-Oriented Data-Centric Communication Framework for Emerging Cyber-Physical Systems.", *Presented at IEEE Consumer Communications & Networking Conference 2023*

"The Design and Validation of ICN-Enabled Hybrid Unmanned Aerial System", *Presented at MILCOM 2021, December 2021*

"Towards Secure-Infrastructure-based Cooperative Adaptive Cruise Control", *Presented at The USDOT Center for Connected Multimodal Mobility (C2M2) Fall Conference, October 2018*

"Comprehensive view of security practices in vehicular networks", *Presented at 2016 International Conference on Connected Vehicles and Expo (ICCVE), September 2016*

INDUSTRY EXPERIENCE

DIRECTV, El Segundo, California   *Dec 2012 – Dec 2015*
(Network Engineer)

- Conducted network monitoring, analysis, and reporting for media streaming services deployed in DIRECTV network.
- Responsible for network capacity planning for new services and applications based on predictive capacity analysis.
- Oversaw and coordinated proofs of concept and deployment of new networking monitoring tools.

SERVICE ACTIVITIES

- ***Chair of the Industry Advisory Board (IAB) 2022- 2023 (Computer Science department, CSULA)*** — organized the annual meeting of the industry advisory board, facilitated discussion on potential improvements in the current Computer Science curriculum to promote students' industry-readiness

- ***Member of the Lecturer Evaluation Taskforce 2022-2023 (Computer Science department, CSULA)*** — performed the lecturer evaluation for 3 lecturers in Spring, 2023.

- ***Organized a workshop activity during the 18th Annual ECST Open House at CSULA*** — organized a workshop activity introducing middle- and high- school students to cybersecurity and cryptography.

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

- *Member of Institute of Electrical and Electronics Engineers (IEEE)*
- *Member of Association for Computing Machinery (ACM)*
- *Past member of Association for Computing Machinery - Women (ACM-W) student chapter in Clemson University*