Pragya Sharma

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EDUCATION

University of California Los Angeles, Los Angeles, CA **GPA: 3.8/4.0** **Sept 2021 - Present**
Doctor of Philosophy in Electrical and Computer Engineering
Coursework: Embedded Systems, Wireless Communications, Secure and Trustworthy Edge Computing Systems

Carnegie Mellon University, Mountain View, CA **GPA: 3.8/4.0** **Dec 2018**
Master of Science in Electrical and Computer Engineering
Coursework: Foundations of Computer Systems, Wireless Device Architecture, Mobile and Pervasive Computing

VIT University, Vellore, India **GPA: 8.82/10** **May 2017**
Bachelor of Technology in Electronics and Communication Engineering
Coursework: Wireless and Mobile Communication, Information Theory and Coding, Computer Communication

RELEVANT PUBLICATIONS

- **P. Sharma**, B. Wang, X. Ouyang, R. Nanayakkara, B. Balaji, P. Tabuada, M.B. Srivastava "Towards a Performance-Driven Device-Edge-Cloud Relationship", Proceedings of the 26th International Workshop on Mobile Computing Systems and Applications, Feb 2025
- **P. Sharma**, M.B. Srivastava, "Impact of Delays and Computation Placement on Sense-Act Application Performance in IoT", IEEE MILCOM 2023, IoT for Adversarial Environments Workshop, Sept 2023
- M. Harishankar, S. Pilaka, **P. Sharma**, N. Srinivasan, C. Joe-Wong, and P. Tague, "Procuring Spontaneous Session-level Resource Guarantees for Real-time Applications: An Auction Approach", IEEE JSAC, Jul 2019

WORK EXPERIENCE

University of California Los Angeles, Los Angeles, CA
GRADUATE RESEARCH ASSISTANT **Sept 2021 - Present**

PROJECT: Performance-driven distributed model deployment in Autonomous Driving

- Analyzed the impact of model selection and deployment across the device-edge-cloud continuum on real-time CPS performance using leader-follower (closed-loop) and target interception (open-loop) applications.
- Demonstrated that closed-loop systems benefit from on-device deployment of lower-accuracy models that minimize sense-to-effect latency, whereas open-loop applications achieve superior performance with high-accuracy models deployed on the cloud, leveraging extended observational windows.
- Developed a custom testbed to evaluate perception-cognition-actuation pipelines for autonomous driving under realistic network conditions, systematically characterizing accuracy-latency trade-offs and informing optimal model placement strategies. Used tools such as CARLA, PyBullet, ROS, Mininet, PyTorch, TensorFlow.

PROJECT: Large Language Models for Autonomous Driving

- Exploring the integration of Vision-Language Models in robotic navigation to enhance perception-driven decision-making by leveraging multimodal reasoning capabilities. Investigating the efficacy of LLM-only (LLaMA, LLaVA) vs. NN+LLM pipelines in processing visual & textual cues for autonomous task execution.
- Analyzing the impact of model architecture and multimodal fusion strategies on overall navigation performance as well as system latency. Early findings indicate that while pure LLM-based pipelines enable high-level reasoning, NN+LLM hybrids provide superior real-time adaptability.

Amazon.com (Amazon Lab126), Sunnyvale, CA
EMBEDDED SOFTWARE ENGINEER **Feb 2019 - Aug 2021**

- Designed and developed Amazon Sidewalk IoT network for Amazon, Ring and 3P devices. Built 900 MHz based communication protocol and embedded systems firmware optimized for low-power devices.
- Increased flash memory efficiency by designing an end-to-end protocol configuration management system. Created an abstraction layer and associated APIs to moderate flash access by application layer.
- Responsible for creating low-latency firmware to support hardware and software interactions, independently debugging issues, and mentoring and coordinating with sister teams to achieve product timelines.

Bosch LLC, R&D Department, Sunnyvale, CA
WIRELESS SYSTEMS INTERN   **May 2018 - Aug 2018**
- Collaborated with the Wireless Connectivity Group to implement the <u>Perfectly Keyless</u> project with the objective of making car locking/unlocking a seamless experience for the user.
- Helped engineer the hardware for the localization of the user using Ultra-Wide Band nodes on the car and modeled new localization algorithms to further the accuracy (~30cm) and security of the system.

Carnegie Mellon University, Mountain View, CA
GRADUATE RESEARCH ASSISTANT   **Aug 2018 - Dec 2018**
- Helped devise a novel admission control algorithm to control congestion and allocate sufficient resources for interactive video sessions while accommodating background traffic.
- Acting as wireless lead, designed the testbed for experiments over 802.11g (WiFi) to implement this algorithm. The system showed 47% improvement with respect to network throughput over traditional routers. Findings have been published in IEEE JSAC 2019 - Special Issue on Multimedia Economics.

GRADUATE TEACHING ASSISTANT   **Aug 2018 - Dec 2018**
- Oversaw a class of 30 students for Wireless Networks and Applications taught by Prof. Peter Steenkiste. Helped create and grade assignments, coordinated hardware projects across campuses, and held open hours.

GRADUATE RESEARCH ASSISTANT   **Jan 2018 - May 2018**
- Principal Investigator for Passive Entry - Passive Start (PEPS) Car Security project sponsored by Ford R&D.
- Designed and implemented the infrastructural firmware and hardware using Software-Defined Radios to demonstrate a man-in-the-middle attack on passive keyless entry systems over a line-of-sight range of 300ft.

ACADEMIC PROJECTS

Launching MITM attack on Sigfox Radios   **Sept 2021 - Dec 2021**
- Illustrated the security vulnerabilities of the Sigfox (900MHz) radios by demonstrating an indoor MITM attack.
- Successfully circumvented the message encryption using a combination of RSA tool and GNU Radio.

Mitigating Authentication Vulnerabilities in V2V Communication   **Aug 2018 - Dec 2018**
- Sponsored by Argonne National Labs, Chicago with the aim to develop an open source implementation of vehicle-to-vehicle communications along with analyzing its security vulnerabilities.
- Engineered the DSRC/WAVE stack on BladeRF (SDR) to emulate vehicles exchanging information.

Retuning the LoRa Radio   **Sept 2017 - Dec 2017**
- Evaluated the characteristics of the LoRa radio of an environmental sensor board, TrafficDot v2.0, deployed over the city of Palo Alto.
- Redesigned the filter components to allow the radio to operate in TV white space spectrum instead of the original noisy 900MHz band, considering the power consumption and the physical board restrictions.

LEADERSHIP EXPERIENCE

- Mentor to 3 undergraduate and 1 graduate ECE students for research projects
- Mentor, <u>The Women of Color Project</u>
- Graduate Instructor, Los Angeles Computing Circle (CS Bootcamp 2022, 2023)
- Software Engineering Mentor, Amazon Mentorship Program
- Head, Women in ECE (WinECE), Carnegie Mellon University, Silicon Valley
- Campus Ambassador, Carnegie Mellon University, Silicon Valley
- Program Representative, Student Council, ECE batch of 2017, VIT University

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TECHNICAL SKILLS

- **Programing Languages**: C, Python, C++, HTML/CSS/JavaScript, Assembly, Verilog/VHDL
- **Technologies**: LoRa, FSK, WiFi, Bluetooth, BLE, DSRC, Matter, Free RTOS, Matter, ROS, UWB
- **Hardware Platforms**: Arduino, AWS DeepRacer, Nordic, NVIDIA GPUs, Raspberry Pi, Semtech, SiLabs, TI
- **Software Platforms**: AWS Suite, Docker, GNURadio, Iperf, MATLAB, Mininet, Wireshark
- **AI/ML**: PyTorch, TensorFlow, TensorRT, OpenCV, NCNN, LLMs, VLMs, Quantization