Akash Deep Singh

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Education

University of California, Los Angeles (UCLA) — Los Angeles, CA
Ph.D. (& MS) in Electrical and Computer Engineering, 3.975/4.0 — *Sep. 2018 – Present*

IIIT-Delhi — New Delhi, India
B.Tech in Electronics and Communication Engineering, 8.81/10 — *Aug. 2014 – May 2018*

Research Interests

Multi-modal Fusion, Human-computer Interaction, RF Sensing, Computer Vision, mmWave

I design and build hardware and software frameworks that allow agents (machines and humans) to better perceive their environments. My Ph.D. research aims to combine radio-frequency (RF) sensing with vision to create richer, robust and ubiquitous sensing paradigms. Through my thesis, I aim to bridge the gap between RF sensing hardware and machine learning frameworks in mobile systems and, more recently, the Internet of Things.

Experience

Research Intern — June 2021 – August 2021
Nokia Bell Labs — *Virtual*

- Developed a self-supervised framework for extracting features from RF+camera data using contrastive learning. The framework outperformed its supervised counterpart on downstream tasks even with less training data – accepted at IEEE ICC 2022.
- Tech Stack: Python, PyTorch, Scikit-learn

Graduate Student Reseacher — Sep. 2018 – Present
University of California, Los Angeles — *Los Angeles, CA*

- Developed a framework to detect, identify and localize hidden wireless sensors such as cameras, motion sensors and RF sensors in a space.
- Developed a framework for Human Activity Recognition (HAR) using mmWave radar.
- Exploring ways to fuse sensors such as camera and radar for richer understanding of scenes.

Selected Publications (Google Scholar)

Top tier venues – USENIX Security, ACM SenSys, ACM TOPS, IEEE ICC, IEEE RadarCon, JAMIA

- **I Always Feel Like Somebody's Sensing Me! A Framework to Detect, Identify, and Localize Clandestine Wireless Sensors** - USENIX Security 2021 **[Acceptance Rate 16%]**
- **Dense Depth Estimation via the Fusion of mmWave Radar Point Cloud with a Camera Image** - (Under Review)
- **RadHAR: Human Activity Recognition from Point Clouds Generated through a Millimeter-wave Radar** - mmNets 2019 (MobiCom 2019)
- **UWHear: through-wall extraction and separation of audio vibrations using wireless signals** - ACM SenSys 2020 **[Acceptance Rate 20%]**
- **On collaborative reinforcement learning to optimize the redistribution of critical medical supplies throughout the COVID-19 pandemic** - Journal of the American Medical Informatics Association **[Impact Factor 4.11]**
- **InkFiltration: Using Inkjet Printers for Acoustic Data Exfiltration From Air-Gapped Networks** - ACM Transactions on Privacy and Security **[Impact Factor 1.91]**
- **Self-Supervised Radio-Visual Representation Learning for 6G Sensing** - IEEE International Conference on Communications (ICC) 2022

Projects

Reinforcement Learning based redistribution of supplies during the COVID-19 pandemic 2020-21
Under the supervision of ***Dr. Mihaela Van der Schaar*** *Los Angeles, CA*

- Designed and developed a reinforcement learning agent that can facilitate near-optimal collaborative exchange of equipment between states in real-time to bolster the public health response to future diseases.
- Published in Journal of the American Medical Informatics Association (JAMIA) – IF 4.11.

Smart MarketPlace (Selected among the top 6 projects in IoT course) 2017-18
Under the supervision of ***Dr. Juhi Ranjan*** *New Delhi, India*

- Created a smart marketplace that automatically adds the items picked by a customers to their cart and presents the bill during checkout.
- Used computer vision methods to identify faces and items being picked.

Project AVA: Smart backpack for preventing child abduction 2017-18
Under the supervision of ***Dr. Aman Parnami*** *New Delhi, India*

- Designed and developed an augmented backpack - along with an accompanying Android application - for school-going children to help prevent child abduction.
- Project Website

OFDMA based D2D Communication using USRP 2017
Under the supervision of ***Dr. Vivek Ashok Bohara*** *New Delhi, India*

- Used USRPs as nodes of a cellular network as well as a D2D pair. The performance of Cellular link was calculated in the presence of a D2D pair(source of interference) in both overlay and subcarrier sharing mode.

Technical Skills

Languages: [Proficient: C, Matlab, Python]; [Prior Experience: Embedded C, Spice, JavaScript]
Frameworks: PyTorch, TensorFlow, Keras
Tools: [Proficient: Git, GNU Radio, Wireshark, LabView, AngularJS, Bootstrap]; [Prior Experience: Cadence Virtuoso, Eldo Spice, Advanced Design System, LTSPice, Hostapd, iPerf, NodeJS]

Awards and Achievements

- Amazon Doctoral Fellowship**, 2021-22** – Tuition and Stipend
- Electrical and Computer Engineering (ECE) Departmental Fellowship**, 2018-19** – Tuition and Stipend
- Graduate Student Association (GSA) Presidential Service Award**, 2020-21**
- Semi-finalist, UCLA Grad Slam**, 2020**
- Served as the Elections Commissioner / Attorney General for the GSA, 2 terms**, 2020-22**
- Founding committee, ECE mentor of the year award that is awarded to the best mentors in the department**, 2021**
- Dean's List for academic achievement, IIIT-D**, 2017**
- First Prize, Innovation Challenge, Innovation Challenge (IIIT-D)**, 2017**
- National Talent Search (NTSE) Scholar, Government of India**, 2010**