Sidharth Kumar

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Education

2019– **The University of Texas at Austin**, *Electrical and Computer Engineering*, Ph.D. CGPA: 4/4
Supervisor - Prof. Jonathan I. Tamir (Expected Graduation: May 2024)

2017–19 **Indian Institute of Technology, Delhi**, *Electrical Engineering*, M.S.(Research) CGPA: 9.935/10
Supervisor : Prof. Swades De

2013–17 **Indian Institute of Technology, Delhi**, *Electrical Engineering*, B.Tech CGPA: 8.905/10
Supervisor : Prof. Swades De

Research Interests

Machine Learning, Computational Imaging, Signal processing

Publications

- **Sidharth Kumar**, and Jonathan I. Tamir, "Correcting Synthetic MRI Contrast-Weighted Images using Deep Learning", Nov, 2022, Journal in preparation.
- Kalina P. Slavkova, Julie C. DiCarlo, Viraj Wadhwa, **Sidharth Kumar**, Chengyue Wu, John Virostko, Thomas E. Yankeelov and Jonathan I. Tamir, "An untrained deep learning method for reconstructing dynamic magnetic resonance images from accelerated model-based data", Journal accepted for publication in MRM, (*Link)
- Ali Lotfi Rezaabad, **Sidharth Kumar**, Sriram Vishwanath and Jonathan I. Tamir, "Few-Max: Few-Shot Domain Adaptation for Unsupervised Contrastive Representation Learning", June, 2022, Under submission for conference, (*Link)
- Brett Levac[†], **Sidharth Kumar**[†], Sofia Kardonik and Jonathan I. Tamir, "FSE Compensated Motion Correction for MRI Using Data Driven Methods", MICCAI'22, Singapore, 18-22 Sept., 2022, (*Link) ([†] Co-primary authors)
- **Sidharth Kumar**, Suraj Suman, and Swades De, "Dynamic Resource Allocation in UAV-enabled mmWave Communication Networks", IEEE Internet of Things Journal, vol. 8, no. 12, pp. 9920-9933, June. 2021, (*Link)
- Suraj Suman, **Sidharth Kumar**, and Swades De, "Impact of Hovering Inaccuracy on UAV-aided RFET", *IEEE Communication Letter*, vol. 23, no. 12, pp. 2362 - 2366, Dec. 2019, (*Link)
- Suraj Suman, **Sidharth Kumar**, and Swades De, "UAV-assisted RFET: A Novel Framework for Sustainable WSN", IEEE Transactions on Green Communications and Networking, vol. 3, no. 4, pp. 1117 - 1131, Dec. 2019, (*Link)
- Chi Zhang[†], **Sidharth Kumar**[†] and Dinesh Bharadia, "Capttery: Scalable Battery-like Room-level Wireless Power", ACM MobiSys'19, Seoul, South Korea, 17-21 June, 2019, (*Link) ([†] Co-primary authors)
- Suraj Suman, **Sidharth Kumar**, and Swades De, "Path Loss Model for UAV-assisted RFET", *IEEE Communication Letter*, vol. 22, no. 10, pp. 2048-2051, Oct. 2018, (*Link),
- **Sidharth Kumar**, Swades De and Deepak Mishra, "RF Energy Transfer Channel Models for Sustainable IoT", IEEE Internet of Things Journal, vol. 5, no. 4, pp. 2817-2828, Aug. 2018, (*Link)
- Suraj Suman, **Sidharth Kumar** and Swades De, "UAV-assisted RF Energy Transfer", IEEE International Conference on Communications (ICC), Kansas City, USA, 20-24 May, 2018, (*Link)
- **Sidharth Kumar**, Suraj Suman, and Swades De, "Backhaul and Delay-aware Placement of UAV-enabled Base Station", *IEEE INFOCOM Workshop on Wireless Sensor, Robot and UAV Networks (WiSARN)*, Honolulu, USA, 15-19 April, 2018, (*Link)
- **Sidharth Kumar**, Deepak Mishra and Swades De, "An Accurate Channel Model for Optimizing Effect of Non-LOS Component in RF Energy Transfer," in Proceedings Twenty Third National Conference on Communication (NCC), pp. 1–6, Chennai, India, Mar. 2017, (*Link).

Refereed Conference Abstracts

- **Sidharth Kumar**, Asad Aali, and Jonathan I. Tamir, "Multi-Contrast 3D Fast Spin-Echo T2 Shuffling Reconstruction with Score-Based Deep Generative Priors", ISMRM 2023, Toronto, ON, Canada.
- **Sidharth Kumar**, and Jonathan I. Tamir, "Improving Synthetic MRI from Estimated Quantitative Maps with Deep Learning", ISMRM May, 2022, London, England, UK.

Research Projects

Improving Synthetic MRI Using Deep Learning
Supervised by Prof. Jonathan I. Tamir, UT Austin *[Sep 2020 -]*

- Proposed physics inspired deep learning model to account for unmodeled effects of synthetic MRI.
- Implemented a Style GAN network with perceptual loss for correcting synthetic MRI contrasts.

Motion correction for MRI using data driven methods
Supervised by Prof. Jonathan I. Tamir, UT Austin *[Sep 2021 - March 2022]*

Summer Internship: Link Error Prediction for Terrestrial Broadcast
Manager:- Alberto Rico Alvarino, Mentor:- Ayan Sengupta, Qualcomm, San Diego *[June 2020 - Aug 2020]*

Millimeter-Wave Multicasting with Low-resolution transceivers
Supervised by Prof. Robert W. Heath Jr., UT Austin *[Sep 2019 - May 2020]*

- Designed frequency domain precoding for multicasting with low resolution digital to analog convertors (DACs).
- Numerically evaluated proposed beamforming algorithm for different mmWave channel realizations.

System Design for wireless power transfer using capacitive coupling methods
Supervised by Prof. Dinesh Bharadia, UC San Diego *[May 2018 - Dec 2018]*

- Investigated the feasibility of capacitive power transfer for IoT devices by conducting extensive simulations in Ansys Maxwell and Simplorer for different geometrical configurations.
- Proposed compensation network topologies for both the transmitter and receiver to maximize power transfer. Built an experimental setup to corroborate simulation results.

Wireless communication and networking system design for UAV-enabled base station
Supervised by Prof. Swades De, IIT Delhi *[Dec. 2017 - July 2019]*

- Proposed framework for evaluating the optimal UAV deployment altitude satisfying the coverage, load traffic constraints and backhaul limitations.
- Solved the mixed-integer non-convex power and subcarrier allocation problem using Lagrangian dual decomposition method.

UAV based wireless energy transfer to make sensor networks sustainable
Supervised by Prof. Swades De, IIT Delhi *[July 2017 - July 2019]*

Wireless Channel Propagation Model for RF Energy Transfer
Supervised by Prof. Swades De, IIT Delhi *[August 2016 - July 2017]*

Scholastic Achievements

- UT **Engineering Fellowship Award** from Cockrell School of Engineering (UT Austin) *[2019]*
- Awarded **SN Bose fellowship** for pursuing research internship at University of California San Diego *[2018]*
- Awarded **Rajiv Bambewale award** for best project work in B.Tech Thesis *[2017]*
- Recipient of **BOSS award, IIT Delhi** for best experimental project in B.Tech Thesis *[2017]*
- Recipient of **IIT Delhi Semester Merit Award** in 6^{th}, 7^{th}, & 8^{th}, semester for making it to **top 7%** *[2016-17]*
- Awarded Alumni Association IIT Delhi Award for **best academic improvement** *[2014-2015]*
- Secured **All India Rank 295** (GE) in JEE Advanced given by 150,000 students *[2013]*
- Awarded merit certificate in NSEP (Physics Olympiad) for ranking among **national top 1%** *[2012]*
- Awarded merit certificate in NSEC (Chemistry Olympiad) for ranking among **state wise top 1%** *[2012]*

Miscellaneous

Teaching Assistantship:

- Linear Systems and Signals (ECE313), Fall 2022
- Microwaves Laboratory (ELP719), Fall 2018
- Digital Signal Processing (ELL319), Fall 2017
- Signal and Systems (ELL205), Spring 2017
- Introduction to Electrical Engineering (ELL100), Fall 2016

Technical Skills:

- **Programming Languages:** Python, MATLAB, C++
- **Packages and Tools:** Pytorch, Seimens idea (basic), Ansys (Maxwell, Simplorer), Wireless InSite

Relevant Coursework:

- Advanced Topics in Computer Vision, Data Mining, Online Learning, Machine Learning, Computational MRI, Biomedical Imaging Modalities, Optimizations in Communication Networks, Digital Signal Processing.
- Wireless Communication, Digital Communication, Antenna Theory & Techniques, MIMO wireless communication, Computer Communication, Signal Theory.