Sidharth Kumar

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EDUCATION

2019–	**The University of Texas at Austin**, *Electrical and Computer Engineering*, Ph.D. Supervisor - Prof. Jonathan I. Tamir (Expected Graduation: May 2024)	CGPA: 4/4
2017–19	**Indian Institute of Technology, Delhi**, *Electrical Engineering*, M.S.(Research) Supervisor : Prof. Swades De	CGPA: 9.935/10
2013–17	**Indian Institute of Technology, Delhi**, *Electrical Engineering*, B.Tech Supervisor : Prof. Swades De	CGPA: 8.905/10

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", Magnetic Resonance in Medicine (2022)., ([*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

T2-Shuffling 3DFSE Reconstruction with Score Models
Supervised by Prof. Jonathan I. Tamir, UT Austin   *[Sep 2022 -]*

- Trained score model to provide prior for the knee MR images that can be used in posterior sampling
- Incorporated Physics driven signal model and low dimensional constraint in the Langevian dynamics inference

Improving Synthetic MRI Using Deep Learning
Supervised by Prof. Jonathan I. Tamir, UT Austin   *[Sep 2020 - Sep 2022]*

- 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 MR images 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 capacitive wireless power transfer for IoT devices at different geometrical configurations.
- Built an experimental setup to corroborate simulation results through proposed compensation network.

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 optimal UAV deployment under base station deployment constraints.
- Solved mixed-integer non-convex resource 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 6th, 7th, & 8th, 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:
- **UT Austin:-** Linear Systems and Signals (ECE313), Fall 2022,
- **IIT Delhi:-** 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, Siemens idea (basic), Ansys (Maxwell, Simplorer), Wireless InSite

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