Abbas Khalili Olam

Contact Information	NYU Tandon School of Eng., ECE Department, 370 Jay Street, Brooklyn, NY, 11201	Cell. Phone: (+1) 917-915-2429 E-mail: ako274@nyu.edu https://abbas-khalili.github.io/

Professional Experience

3+ years research experience with wireless systems

- MmWave Systems, OFDM, LTE, MIMO, TDD Massive MIMO, FDD Massive MIMO, Full Duplex, One-bit ADC, low resolution DAC, Beamforming, Analog Beam Alignment, Machine Learning, Deep Neural Networks
- Performance analysis and evaluation
- Research on quantized MIMO (3 years)
- Research on analog beam alignment (1 year)
- MmWave and microwave systems for 5G (3 years)

Education

Ph.D. Candidate, Electrical Engineering, **GPA**: 3.98/4.0   2018 - present
NYU Tandon School of Engineering, New York, USA
Advisor: Prof. Elza Erkip

- **Research topics**:
    - Communication over MIMO Channels with Quantization Constraints
    - Optimal beam design for analog beam alignment.

M.Sc. Electrical Engineering, **GPA**: 3.975/4.0   2016 - 2018
NYU Tandon School of Engineering, New York, USA
Advisor: Prof. Elza Erkip

- **Thesis Title**: On MIMO Channel Capacity with Output Quantization Constraints.

Research Interests

Wireless Communications, Information Theory, Machine Learning, Low Resolution Quantization, Beam Alignment, Signal Processing, Data Analysis

Professional Experiences

NYU WIRELESS, NYU Tandon School of Engineering, New York

- Performance bounds and achievability schemes on analog beam alignment under the supervision of Prof. Elza Erkip, [2019- present]
    - Provided upper and lower bounds on the performance of multi-user non-interactive along with optimality achieving beam alignment method.
    - Provided upper and lower bounds on the performance of single-user interactive along with optimality achieving beam alignment method.
    - Developed novel Deep neural network based beam alignment for noisy single-user interactive that outperforms state-of-the art.
- Capacity bounds and achievability schemes for mmWave channels under quantization constraints, under the supervision of Prof. Elza Erkip, [Summer 2017-present]
    - Developed two receiver architectures that achieve optimal transmission rates under low resolution quantization at the receiver.
    - Provided a new linear quantization model for OFDM systems that accurately models the effect of quantization on capacity and spectral power distribution of the system.

– Provided capacity bound and achievablity scheme for linear SISO OFDM
systems under quantization constraint at both transmitter and receiver and
spectral power mask constraint.s

– Working on developing new modulation schemes using deep neural network
for quantized constraint mmWave systems.

Technical skills	Python, Pytorch, C++, Tensor Flow, MATLAB, CVX, Simulink, Machine learning, Numerical Optimization, Massive MIMO

Selected Course Projects

• Implementation of a deep compression algorithm on a fully connected neural network in Tensor Flow, Advanced Machine Learning (class project). [2017]

• Simulation of a communications system with a distorted channel using PCs sound card, Summer Internship, University of Tehran (summer internship). [2015]

• Research on visible light communication including channel model simulation and study of modulation schemes under supervision of Prof. Farshad Lahouti. [2015]

• Built and programmed a line-tracking robot (class project) [2015].

Publication

A. Khalili, S. Rini, L. Barletta, E. Erkip and Y. C. Eldar, "On MIMO Channel Capacity with Output Quantization Constraints," IEEE International Symposium on Information Theory (ISIT), 2018.

A. Khalili, F. Shirani, E. Erkip and Y. C. Eldar, "Tradeoff Between Delay and High SNR Capacity in Quantized MIMO Systems" IEEE International Symposium on Information Theory (ISIT), 2019.

A. Khalili, F. Shirani, E. Erkip and Y. C. Eldar, "On Multitermial Communication over MIMO Channels with One-bit Quantizers at the Receiver", IEEE International Symposium on Information Theory (ISIT), 2019.

A. Khalili, S. Shahsavari, F. Shirani, E. Erkip and Y. C. Eldar, "On Throughput of Millimeter Wave MIMO Systems with Low Resolution ADCs", IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2020.

A. Khalili, S. Shahsavari, M. A. (Amir) Khojastepour, and E. Erkip, "On Optimal Multi-user Beam Alignment in Millimeter Wave Wireless Systems", IEEE International Symposium on Information Theory (ISIT), 2020.

S. Dutta, **A. Khalili**, E. Erkip, and S. Rangan, "Capacity Bounds for Communication Systems with Quantization and Spectral Constraints", IEEE International Symposium on Information Theory (ISIT), 2020.

Submissions and Preprints

P. Skrimponis, N. Hosseinzadeh, **A. Khalili**, E. Erkip, M. J. W. Rodwell, J. F. Buckwalter, and S. Rangan, "Towards Energy Efficient Mobile Wireless Receivers Above 100 GHz", Accepted to 2020 IEEE Access.

M. A. (Amir) Khojastepour, S. Shahsavari, **A. Khalili**, and E. Erkip, "Multi-user Beam Alignment for Millimeter Wave Systems in Multi-path Environments", Accepted to 2020 IEEE conference on signals, systems and computers (ASILOMAR).

A. Khalili, S. Shahsavari, M. A. (Amir) Khojastepour, and E. Erkip, "A General Framework on Single-User Interactive Beam Alignment in Millimeter Wave Systems", Submitted to 2021 IEEE International Conference on Communications (ICC).

A. Khalili and E. Erkip, "On Single-User Interactive Beam Alignment in MmWave Systems: A Deep Learning Viewpoint", Submitted to 2020 IEEE Information Theory Workshop (ITW).

Awards

- Ernst Weber Fellowship at NYU Tandon [2018]
- Certificate of Merit for Academic Achievement from New York University Tandon School of Engineering [2017].
- Samuel Morse fellowship from New Your University [2016].

Selected Courses   Principles of Massive MIMO, Numerical Optimization, Advance Machine learning, Digital Communications, Information Theory, Stochastic Calculus, Methods of Applied Math, Probability and Stochastic Processes, Detection and Estimation, Digital Signal Processing.