Fatima Ahsan

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Summary

Ph.D. researcher with **12+ years of experience** in signal processing, data science, and multi-physics modeling. Authored **7+ first-author papers** and received competitive awards, including the **Fulbright and Rice Graduate Fellowships**. Secured **$70K for research commercialization**, **$12.5K in discretionary research funding**, and multiple travel grants. Presented at **70+ academic forums** and **mentored 150+ students** through teaching, research, and outreach. **Developed end-to-end engineering systems** by integrating signal processing, data science, and physics-based modeling with practical hardware–software implementations. Currently transitioning into the research and innovation ecosystem in Switzerland following my Ph.D. and relocation.

Education

Ph.D., Electrical and Computer Engineering, Rice University, Houston, USA   *2024*
- **Thesis:** Minimally invasive deep brain stimulation using temporally interfering electromagnetic waves
- Awarded Rice Innovation Fellowship

M.S., Electrical and Computer Engineering, Rice University, Houston, USA   *2018*
- **Thesis:** Leveraging massive Multiple-Input Multiple-Output spatial diversity in random access

M.S., Electrical Engineering, Lahore University of Management Sciences (LUMS), Lahore, Pakistan   *2015*
- **Thesis:** Stalkers: A physical-layer solution towards co-existence with WiFi
- Awarded Gold Medal

B.S., Electrical Engineering, University of Engineering and Technology (UET), Lahore, Pakistan   *2013*
- **Thesis:** Self-reconfigurable and transformable robot
- Awarded Best Senior Thesis Award

Skills

Programming: Python, MATLAB, C/C++, PyTorch, NumPy, Pandas, scikit-learn, SQL, ROS, GNU Radio, Librosa, Assembly, VerilogHDL

Computing & Simulation: GPU Programming (CUDA, NVIDIA GPUs), COMSOL Multiphysics, Ansys, PSpice, PCB Express, LaTeX

Hardware & Embedded Systems: Microcontroller Programming (Arduino, PIC, Atmel), Universal Software Radio Peripherals (USRPs), Vector Network Analyzer (VNA), Digital Signal Processing Chain Design, Analog Circuit Prototyping, PCB Fabrication

Electrophysiology & Neurotechnology: Stimulating, recording, and analyzing calcium imaging data from the *Hydra vulgaris*; Wide-field imaging of HEK cells, neuronal cell culture, and head-mounted mice cortex.

Experience

Led various projects through the entire scientific lifecycle, from hypothesis, research methodology, experiments, data acquisition, statistical analysis, validation, and documentation, resulting in **7+ first-author publications** and **1 US patent**. Several projects resulted in funding and recognition from the NSF, M-Tech, and McNair Foundation.

Postdoctoral Researcher & Independent Researcher   *Houston, TX, USA & Geneva, Switzerland*
Aazhang Lab, Rice University   *Apr 2024 – Present*
- **Advanced EMvelop stimulation research** building on my Ph.D. work during a postdoctoral appointment at Rice University.
- **Concluded appointment early**, foregoing multiple U.S.-based offers, to **relocate to Switzerland to reunite with family**.

– Continued **postdoctoral-level research independently** in Switzerland, focusing on neurostimulation, machine learning, and signal processing for biomedical applications.

– **Preparing three manuscripts** on data-driven electric-field estimation for EMvelop stimulation, pseudo supervision of diffusion models, and phonocardiogram heart sound segmentation for bruit detection.

– Advanced **French language proficiency to A2 level** and continue training toward full professional fluency.

Graduate Research Assistant _Houston, TX, USA_
Aazhang Lab, Rice University _Jan 2019 – Mar 2024_

○ **Multi-physics Modeling and Optimization**

– Led a multi-year research project that demonstrated **improvement in the stimulation targeting strength by** $\times 700$ over the SOTA methods while **observing IEEE safety limits**, applicable to the goal of developing intense yet safe neuro-rehabilitation protocols.

– Developed **finite-element modeling in COMSOL** and **optimization framework in Matlab** to optimize **electromagnetic field propagation and heat transfer** in brain tissue, applicable to the goal of using advanced signal-processing techniques in designing high-performance biomedical systems.

– **Presented research findings** at **50+ lab meetings** and **20+ national/international conferences**, effectively communicating complex data to diverse scientific audiences.

– **Mentored 10+ graduate students** in experimental troubleshooting, data analysis, manuscript writing, and thesis defense preparation, contributing to their academic and professional development.

– Organized **80+ weekly lab meetings** over 2 years, managing speaker rotations, arranging upskilling workshops, and overseeing event logistics.

○ **PyTorch-Based Machine Learning Framework for Electromagnetic Field Estimation**

– Developed data-driven models for **high-frequency complex electromagnetic field estimation** using PyTorch with a **correlation coefficient of 0.978** with the ground truth.

– **Increased estimation speed by** $\times 1200$ through effective machine learning modeling, contributing to using data-driven approaches for optimizing stimulation parameters.

○ **Biophysical Circuit Modeling of Neurons**

– Modeled **neuronal response to amplitude-modulated GHz EM waves** using the Hodgkin-Huxley framework and cable theory in COMSOL.

– Demonstrated that **only modulated GHz stimulation**, and not continuous GHz, **elicits action potentials**, matching low-frequency stimulation patterns.

– Showed feasibility of a **non-invasive mechanism** for deep brain stimulation by leveraging wave interference to **spare cortical regions**.

Graduate Research Assistant _Houston, TX, USA_
RENEW (Reconfigurable Eco-system for Next-generation End- _Jan 2017 – Dec 2018_
to-end Wireless) Lab, Rice University

○ **Leveraging Massive-Input Massive-Output (MIMO) Antenna Array Spatial Diversity in Random Access**

– Devised a novel strategy for reducing access delays in **ultra-dense cellular networks by spatially resolving user collisions** during the LTE random access phase using Massive **MIMO array signal processing**.

– Modeled realistic 5G environments using **3GPP-standard channel models** and applied **stochastic geometry** to evaluate performance under large user densities.

– Achieved up to **13$\times$ reduction in access delay**, relevant to the goal of **designing efficient multiplexing algorithms** using Massive MIMO systems.

Graduate Research Assistant and Team Lead _Lahore, Pakistan_
AdCom (Advanced Communication) Lab, LUMS _Jan 2014 – Jun 2016_

○ **Design of Cooperative and Cognitive Communication Networks**

– Led a **research team of 10+ members** as team lead; **coached 3 undergraduate students** in

wireless communication theory and experimental design; performed lab management duties such as keeping lab website up-to-date, organized weekly seminars on cutting-edge wireless communication innovations, and oversaw procurement and maintenance of lab equipment.

– Designed and deployed **full baseband architecture** including time and frequency synchronization, OFDM frame detection, MIMO channel estimation, and interference cancellation encoding/decoding.

– Showed we can **introduce a secondary wifi network in-band with a primary wifi network** without effecting its performance and without the primary network *even being aware* of the presence of a secondary network.

– Developed the **physical layer of Stalkers according to IEEE 802.11a standard**, facilitating cognitive coexistence with existing wireless networks and mitigating self-interference.

– Demonstrated theoretical gains by **over-the-air experiments using software defined radios (SDRs)** emitting wifi signals via **C++ programming** in GNU Radio. This **advanced lab's capabilities in real-time MIMO prototyping**, laying groundwork for future physical-layer SDR research.

Undergrad Research Assistant *Lahore, Pakistan*
SUPCON (Super Control and Automation) Lab, UET, Lahore *Sept 2011 – May 2013*

○ **Self-reconfigurable and transformable robot**

– Designed Chaser, a self-reconfigurable robot with terrain-aware gait generation and locomotion modes (walk, wheel, swim).

– Achieved 95% success rate across 70+ real-world trials in diverse terrain scenarios.

– Received Best Final Year Project (FYP) Award $+ 3^{rd}$ position in IEEE Lahore section FYP evaluations.

○ **Autonomous maze-solving and ball-potting robot**

– Built Seeker, an autonomous robot that navigates mazes using infra-red sensors and pots color-matched balls in real time.

– Designed a precision control algorithm (70 cm/s) and sensor linearization algorithm (correlating distance vs light intensity), implementable on an 8-bit microcontroller.

– Achieved 98% success across 40 trials.

Selected Projects

Image & Audio processing projects:

○ **Acoustic Image Segmentation:** Contributed to U-Net-based boundary estimation system (U-COTANS) for reverberant acoustic environments, improving robustness under low SNRs and enabling accurate 2D scene reconstruction from real-world wave tank data.

○ **Wavelet-Based Audio Compression:** Designed and implemented a MATLAB GUI to record, compress, and reconstruct audio using discrete wavelet transforms (DWT). Gained experience in time-frequency signal analysis, wavelet basis selection, and energy-based coefficient compression.

○ **Adaptive Filtering and Interference Cancellation:** Implemented LMS, normalized LMS, and RLS algorithms for real-time system identification in time-varying channels. Designed adaptive filters for audio interference cancellation and evaluated convergence behavior.

○ **Image Compression and Alignment using PCA:** Applied PCA for global and block-wise image compression, analyzing reconstruction quality and dimensionality trade-offs. Compared eigen-block expressiveness in localized compression. Used PCA for alignment correction by rotating images to principal axes.

Wireless Communication Projects:

○ **Digital Transceiver Designs:** First implementation of 802.11a OFDM Transceiver in MATLAB in the Adcom lab. Also, implemented the complete DSP chain of a baseband discrete-time modem in MATLAB.

○ **Error Correction Coding:** Implemented BCH Encoder and Decoder for (63,36) 5-error Correcting BCH Code, BJCR Decoder for (2,1,6) WiFi Encoder in MATLAB, Convolutional Decoder for (2,1,6) WiFi Encoder in MATLAB.

○ **Software Defined Radio Implementations:** Implemented OFDM-MIMO Beamforming Transceiver in GNU Radio and OFDM-MIMO Zero-Forcing Transceiver in GNU Radio and demonstrated wireless transmission and reception.

Microwave Engineering Projects:

- **Microwave Coupler & Divider Fabrication:** Design and fabrication of rat-race quadrature hybrid coupler on a PCB (FR4 substrate). Fully characterized the S-parameters and insertion loss using a Vector Network Analyzer (VNA). Did the same with Wilkinson Power Divider.
- **Microwave Filter & LNA Design:** Low-pass and band-pass filter design using stubs and stepped-impedance methods in microwave range. Also designed and fabricated a low-noise amplifier on a PCB.
- **Microwave Amplifier & TX/RX Circuit Design:** Microwave amplifier design for specified gain and maximum gain and TX/RX switch design using PIN diodes.

Robotics & Embedded Engineering Projects:

- **Lightening-bolt robot:** Led a 5-member all-women team to build Lightning Bolt, a fighting robot for Pakistan's largest science Olympiad (PsiFi), applying electric machines theory to real-world motor control and embedded design; overall, secured 3rd place in the competition.
- **PID Motor Control & PLC Programming:** Digitized DC Motor control and implemented PID control technique using Arduino micro-controller. Programmed industrial automation logic with Siemens Sematic STEP 7 Basic.
- **Line-Following Robot & H-Bridge Design:** Implemented automatic steering of a line following robot using multiple infra-red sensors. Designed H-Bridge circuitry with discrete components for effective robotic motor steering.

Electronics Projects:

- **Multi-Stage Analog Amplifier Design:** Designed and implemented an analog audio amplifier with gain > 2000 using multi-stage BJTs; also built a single-stage MOSFET amplifier.
- **Digital Dice with Xilinx FPGA:** Developed an electronic game-playing dice using Xilinx platform and programmable logic design.
- **Power Electronics Buck Converter & Inverter:** Designed and implemented a buck DC-DC converter and a single-phase inverter for efficient power conversion.

Patent

[1] **Fatima Ahsan**, Taiyun Chi, Raymond Cho, Sameer Anil Sheth, Wayne Goodman, and Behnaam Aazhang, **"Minimally Invasive Deep Brain Stimulation using Electromagnetic Waves"**, US Patent App. 18/051,778, *November 2023*

Publications

[1] **Fatima Ahsan**, Lorenzo Luzi, Richard G. Barainuk, Sameer A. Sheth, Wayne Goodman, and Behnaam Aazhang, **"EMulator: Rapid Estimation of Complex-valued Electric Fields using a U-Net Architecture"**, https://arxiv.org/abs/2505.02095, May 2025.

[2] Toros Arikan, Luca Chackalackal, **Fatima Ahsan**, Konrad Tittel, Andrew Singer, Gregory Wornell, and Richard G. Barainuk, **"Estimating the number and locations of reflective boundaries in reverberant environments with deep learning"**, IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), April 2025.

[3] **Fatima Ahsan**, **"EMvelop Stimulation: Minimally Invasive Deep Brain Stimulation using Temporally Interfering Electromagnetic Waves."**, *Ph.D. Dissertation, Rice University, 2024*

[4] **Fatima Ahsan**, Aravind M. Govindaraju, Robert M. Raphael, Taiyun Chi, Sameer A. Sheth, Wayne Goodman, and Behnaam Aazhang, **"Biophysics of amplitude-modulated giga-hertz electromagnetic waves stimulation"**, *IEEE Asilomar Conference on Signals, Systems & Computers, Oct. 2023, Monterrey, USA.*

[5] **Fatima Ahsan**, Taiyun Chi, Raymond Cho, Sameer A. Sheth, Wayne Goodman, and Behnaam Aazhang, **"EMvelop stimulation: minimally invasive deep brain stimulation using temporally interfering electromagnetic waves"**, *Journal of Neural Engineering, June 2022.*

[6] **Fatima Ahsan**, Taiyun Chi, Raymond Cho, Sameer A. Sheth, Wayne Goodman, and Behnaam Aazhang, **"Non-invasive Deep Brain Stimulation using Electromagnetic Waves"**, *IEEE Asilomar Conference on Signals, Systems & Computers 2020, Monterrey, USA.*

[7] **Fatima Ahsan**, **"Leveraging Massive MIMO Spatial Diversity in Random Access"**, *MS Thesis, Rice University, 2018*

[8] **Fatima Ahsan** and M. Uppal, **"Stalkers: Co-existing Nodes within Unlicensed WiFi Band"**, *IEEE Wireless Communications and Networking Conference (WCNC) 2018, Barcelona, Spain.*

[9] **Fatima Ahsan** and Ashutosh Sabharwal, **"Leveraging Massive MIMO Spatial Degrees of Freedom to Reduce Random Access Delay"**, *IEEE Asilomar Conference on Signals, Systems & Computers, Nov 2017, Monterrey, USA.*

[10] **Fatima Ahsan** and K. M. Hasan **"Seeker: Autonomous Maze-Navigating and Ball Potting Robot"**, *IEEE International Conference on Open Source Systems and Technologies (ICOSST) 2015, Lahore, Pakistan.*

[11] **Fatima Ahsan** and K. M. Hasan, **"Gait Generation and Terrain Navigation Algorithm Design for a Self-Reconfigurable Robot"**, *IEEE Conference on Recent Advances in Electrical Engineering (RAEE) 2015, Islamabad, Pakistan.*

Under-preparation:

[12] **Fatima Ahsan**, Lorenzo Luzi, Richard G. Barainuk, Sameer A. Sheth, Wayne Goodman, and Behnaam Aazhang, **"EMulator: Rapid Estimation of Complex-valued Electric Fields using a U-Net Architecture"**, under preparation, to be submitted to Brain Stimulation, Aug 2025

[13] **Fatima Ahsan**[*], Ali Siahkoohi[*], Lorenzo Luzi[*], Richard G. Barainuk, and Behnaam Aazhang, **"Mitigating the effects of over-parametrization by the pseudo-supervision of diffusion models"**, under preparation, to be submitted to TMLR, Aug 2025

[14] **Fatima Ahsan** and Behnaam Aazhang, **"Comparison of deep-learning approaches for heart sound segmentation using phonocardiograms"**, under preparation, to be submitted to ICASSP, Sept 2025

Research commercialization & clinical translation

Led **100+ customer discovery interviews**, developed a viable business model canvas, and presented findings on our brain stimulation neurotech to **10+ National Science Foundation (NSF) instructors** and **100+ entrepreneurs**.

Entrepreneurial Lead @ NSF I-Corps Program, $50,000 *Houston, TX, USA*
Rice University *Jul 2023 – Aug 2023*

- Wrote proposal for the NSF I-Corps program to secure funding of $50,000 to explore research commercialization and translation
- Conducted 100+ customer discovery interviews to develop viable business canvas model for our novel brain stimulation technology.
- Explored the full medtech lifecycle, including FDA approval, coverage, reimbursement, and distribution.
- Presented my findings to a panel of 10 National Science Foundation instructors and 100+ entrepreneurs; presentation praised for its clarity, story-telling, and impact.
- Led the team for participation in Napier Rice Launch Challenge pitch competition.

Funded proposals, fellowships, & Awards

I have written proposals that have granted me generous **funding to pursue my academic goals**, including several competitive scholarships such as **Fulbright scholarship** and **Rice ECE graduate fellowship**. Furthermore, I acquired **$70,000 to explore research commercialization and translation** as a graduate student, discretionary funds of **$12,500 for demonstrating excellence in research**, and several travel grants.

- **Entrepreneurial lead**, National Science Foundation (NSF) I-Corps, Equity-free funding of $50,000   **2023**
- **Rice Innovation Fellow**, Liu Idea Lab for Innovation & Entrepreneurship, Equity-free funding of $20,000 **2023**
- Selected for **Future Leaders Summit by Michigan Institute of Data Science**, the University of Michigan

Ann Arbor, USA **2023**

- Ken Kennedy Institute ExxonMobil **Graduate Fellowship**, $7,500 **2022**

- Cadence Diversity in Technology **Scholarship**, $5,000 **2022**

- Selected for Rice **Ignite Entrepreneurship Program** in Silicon Valley, CA, sponsored by Rice Alliance **2022**

- Rice ECE **Distinguished Student Service Award**, $500 **2018**

- **Texas Instruments Scholarship Award**, $1800/year **Aug 2016-2024**

- Rice **Graduate Research Assistant Fellowship**, $70,000/year **Aug 2016-2024**

- Awarded **Fulbright Scholarship** for Ph.D., United States Educational Foundation in Pakistan (USEFP), $50,000/year for 4 years **2016**

- **Awarded Gold Medal** for top of graduating class, LUMS **Class 2015**

- **Masters Merit Scholarship**, LUMS, $Rs.219,000$ **Jan 2014-May 2015**

- **Best Undergraduate Senior Thesis Award**, UET Lahore **Class 2013**

- 3rd **position**, IEEE Lahore Section Final Year Project Evaluations **2013**

- ICT R&D Undergraduate **Student Research Grant**, $Rs.77,000$ **2012**

- Award for **top 25 students nationwide and abroad**, Federal Board of Intermediate and Secondary Education Pakistan, $Rs.20,000$ **2009**

Teaching & Mentorship

Signals, Systems, and Learning *Houston, TX, USA*
Rice University *Aug 2018 – Dec 2018*

- Conducted bi-weekly 1-hour discussion sessions for a class of 40+ students, reinforcing core course concepts and problem-solving skills.
- Designed weekly problem sets and the final course project to support applied learning objectives.
- Delivered guest lectures in the instructor's absence, ensuring continuity of instruction and maintaining academic rigor.
- Assisted in grading assignments, exams, and final projects, providing timely and constructive feedback.
  Principal Lecturer: Dr. Richard G. Barainuk (*Ph.D: UIUC*)

1st Year Grad Students Ph.D. Qualifier Exam *Houston, TX, USA*
Rice University *Jan 2018 – May 2018*

- Delivered lectures to a class of 30+ students on core technical communication skills, including formulating research questions, abstract writing, designing presentation graphics, and integrating visuals into papers and talks.
- Created and facilitated interactive workshops to help students rehearse their PhD qualifier presentations and receive feedback from senior graduate students.
- Provided coaching on effective oral presentation techniques tailored for academic and professional audiences.

Fundamentals of Electrical Engineering *Houston, TX, USA*
Rice University *Aug 2017 – Dec 2017*

- Delivered over 30+ hours of instruction to a class of 40+ students through weekly 2-hour sessions, simplifying complex topics such as Linear Systems, Continuous-Time Fourier Analysis, and Discrete-Time Fourier Analysis into intuitive concepts.
- Earned strong student feedback for clarity, engagement, and effectiveness in translating theory into understanding.
- Delivered a guest lecture in the instructor's absence, ensuring continuity of instruction and maintaining academic rigor.

Principal Lecturer: Dr. Don H. Johnson (*Ph.D: MIT*)

ECE Mentor-Mentee Program   *Houston, TX, USA*

Rice University   *Aug 2018 – Aug 2021*

- ○ Mentored three first-year PhD students at Rice University, providing support during their transition into graduate school.
- ○ Advised on coursework planning, lab rotations, and university resources; served as a point of contact for questions and challenges throughout their first year.

Undergraduate Summer Internship Program   *Houston, TX, USA*

Rice University   *May 2021 – Aug 2022*

- ○ Recruited and mentored two undergraduate students on phantom experiments related to EMvelop stimulation, guiding them through experimental design, setup, and data collection.
- ○ Provided hands-on support with troubleshooting and debugging hardware and software issues, fostering their technical growth and research independence.

Leadership and Collaboration

Demonstrated leadership across **2 multidisciplinary academic organizations** by guiding diverse teams, organizing **20+ professional development and social initiatives**. Experienced in coordinating events, facilitating communication, and supporting peers.

President   *Houston, TX, USA*

Rice Electrical and Computer Engineering, Graduate Student   *Sept 2018 – Dec 2019*
Association

- ○ Collaborated in weekly leadership meetings with a core team of 6 GSA members to plan initiatives, assess student needs, and foster departmental engagement, resulting in a $10\times$ increase in organized events compared to the previous year.
- ○ Directed mentor–mentee pairing for 30+ incoming graduate students, matching each with a senior peer to support onboarding and academic success within a department of 200+ graduate students.
- ○ Initiated and organized 20+ professional development and community-building events, including industry speaker sessions, social mixers, and wellness activities, some of which attracted 100+ attendees.
- ○ Prioritized student well-being by hosting inclusive events such as coffee breaks, open tabs, hikes, game nights, trivia sessions, and Thanksgiving dinner; earned praise from the Head of the Department for maintaining an active association.

President   *Houston, TX, USA*

Rice Pakistani Students Association   *Aug 2019 – Aug 2020*

- ○ Instituted bi-weekly leadership meetings and improved team coordination, resulting in a $3\times$ increase in organized events compared to the previous year.
- ○ Led a student organization of 30+ members to promote Pakistani culture through campus-wide events, including cultural showcases, food festivals, and speaker series.
- ○ Organized and chaired guest talks featuring distinguished Pakistani professionals across the U.S.
- ○ Facilitated incoming international students' welcome and introduction to Pakistani community and resources.

Research talks & Posters presentations

Delivered **20+ research talks at international or national** conferences and forums, and nearly **50+ research talks within my research groups**. My presentations were regularly praised for clarity, story telling, and visuals.

- **Fatima Ahsan**, **"EMvelop Stimulation: minimally invasive deep brain stimulation using temporally interfering electromagnetic waves"**, *PhD Defense Talk, Rice University, Houston, TX, USA.* **March 2024**

- **Fatima Ahsan**, **"EMulator: Rapid estimation of electric fields induced during electromagnetic stimulation using data-driven models"**, Poster presented at the *Society for Neuroscience (SFN) Conference, Washington, DC, USA.* **Nov 2023**

- **Fatima Ahsan**, **"Biophysics of amplitude-modulated giga-hertz electromagnetic waves stimulation"**, Poster presented on *IEEE Asilomar Conference, October 2023, Monterrey, CA, USA.*   **Oct 2023**

- **Fatima Ahsan**, **"EMvelop Stimulation: Treatment for medication resistant Parkinson's disease"**, Talk for the *NSF I-Corps program.*   **Jul 2023**

  Fatima Ahsan, **"On developing responsible neurostimulation technologies"**, Talk for *Future Leaders Summit at Michigan Institute of Data Science, Ann Arbor, MI, USA.*   **April 2023**

- **Fatima Ahsan**, **"EMvelop Stimulation: minimally invasive deep brain stimulation using temporally interfering electromagnetic waves"**, *Three posters presented for Neurocon Conference (Rice University, USA), Annual Neuroscience Poster Session (UT Health, USA), and Energy High Performance Computing Conference (Rice University, USA.)*   **April 2022 - April 2023**

- **Fatima Ahsan**, **"Non-invasive Deep Brain Stimulation using Electromagnetic Waves"**, Remote delivery of recorded talk during covid-19 for *IEEE Asilomar Conference 2020, Monterrey, CA, USA*   **Oct 2020**

- **Fatima Ahsan**, **"Defense against the dark arts of neurological disorders: Non-invasive Deep Brain Stimulation using Electromagnetic Waves"**, *Presented on ECE Affiliates Day and DSP50, Rice University, USA.*   **April 2019**

- **Fatima Ahsan**, **" Leveraging massive Multiple-Input Multiple-Output (MIMO) spatial diversity in random access"**, *MS Thesis Defense, Rice University, 2018*   **Dec 2018**

- **Fatima Ahsan**, **"Reducing Network Latency"**, Three posters presented in *Presented on ECE Affiliates Day, Rice University, and North American School of Information Theory, Texas A&M, TX, USA.*   **April 2018**

- **Fatima Ahsan**, **"Reducing latency in LTE network access channels, by the size of Texas"**, *Presented on ECE Affiliates Day, Rice University, USA.*   **April 2017**

- **Fatima Ahsan**, **"Leveraging Massive MIMO Spatial Degrees of Freedom to Reduce Random Access Delay"**, Conference talk for *IEEE Asilomar Conference, Monterrey, CA, USA.*   **Oct 2017**

- **Fatima Ahsan "Seeker: Autonomous Maze-Navigating and Ball Potting Robot"**, Conference talk for *IEEE ICOSST, Lahore, Pakistan.*   **Jun 2015**

- **Fatima Ahsan**, **"Gait Generation and Terrain Navigation Algorithm Design for a Self-Reconfigurable Robot"**, Conference talk for *IEEE Conference on RAEE, Islamabad, Pakistan.*   **Jun 2015**