Dr. Shaik Rafi Ahamed

Professor
Department of Electronics and Electrical Engineering
Indian Institute of Technology Guwahati, Guwahati-781039, Assam, India

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SPECIALIZATION

VLSI Architectures for Signal Processing and AI/ML Algorithms, Digital IC Design, Adaptive Signal Processing, Biomedical Signal Processing.

ACADEMIC QUALIFICATIONS

Degree	Year	Discipline	Institution	Grade
Ph.D.	2008	Electronics & Electrical Communication Engg.	Indian Institute of Technology Kharagpur	NA
M. Tech	1993	Electronic Instrumentation and Communication Systems	SVU College of Engg., Tirupati, India	72.3%
B. Tech	1991	Electronics & Comm. Engg.	K.S.R.M. College of Engg., Kadapa, India	72.5%

WORK EXPERIENCE (26+ YEARS)

Professor(HAG), IIT Guwahati — *May 2026 – Present*

Professor, IIT Guwahati — *June 2018 – April 2026*

Associate Professor, Indian Institute of Technology (IIT) Guwahati — *Feb 2014 – May 2018*

Assistant Professor, IIT Guwahati — *Aug 2008 – Jan 2014*

Assistant Professor, Bapatla Engineering College, Andhra Pradesh — *Oct 1998 – July 2003*

Lecturer, Bapatla Engineering College, Andhra Pradesh — *Aug 1995 – Sept 1998*

Lecturer, Deccan College of Engg. & Tech., Hyderabad — *Oct 1993 – July 1995*

PUBLICATIONS (SELECTED REFEREED JOURNALS)

[1] N. Atif, S. Mazhar, Shaik Rafi Ahamed and M. K. Bhuyan, "DECoDeNet: Achieving Impressive Accuracy-Efficiency Trade-off for Semantic Segmentation in Embedded Applications," *IEEE Embedded Systems Letters* (Accepted and available in early access).

[2] N. Atif, S. Mazhar, Ameen M, Shaik Rafi Ahamed and M. K. Bhuyan, "CTPNet: Achieving Real-Time Semantic Segmentation on Resource-Constrained Edge Devices for Autonomous Driving," *IEEE Transactions on Circuits and Systems I*, vol. 73, pp. 4322 - 4335, June 2026.

[3] Raktim Acharjee and Shaik Rafi Ahamed, "An Interpretable Multi-Scale Temporal Residual Framework for Gender-Specific EEG-based Emotion Recognition," *IEEE Sensors Journal*, Vol. 26, pp. 16047 - 16061, May 2026

[4] Saquib Mazhar, Nadeem Atif, MK Bhuyan, Shaik Rafi Ahamed, "Context Guided Multiscale Attention for Real-time Semantic Segmentation of Road Scene," *IEEE Transactions on Artificial Intelligence*, vol. 7, pp. 1761-1775, March 2026.

[5] Inamul Hussain and Shaik Rafi Ahamed, "Design of a novel efficient microwave absorption material (MAM) using Cu-g-C3 N4/PVDF/CB Composite," *IEEE Transactions on Dielectrics and Electrical Insulation*, vol. 33, pp. 175-182, Feb. 2026.

[6] Aditi Paul, Shaik Rafi Ahamed and R. P. Paily, "Continuous Flow 4096-Point FFT/IFFT Hardware Architecture for 5G Applications," *IEEE Transactions on Circuits and Systems I*, vol. 72, pp. 8146-8159, Dec. 2025.

[7] N. Atif, S. Mazhar, Ameen M, Shaik Rafi Ahamed and M. K. Bhuyan, "SLICENet: An FPGA-based Efficient Semantic Segmentation Network for Edge Deployment," *IEEE Transactions on Circuits and Systems II*, vol. 9, pp. 1338-1342, Aug. 2025.

[8] Rituparna Choudhury, Shaik Rafi Ahamed, Prithwijit Guha, "Simplified Oblique Decision Tree Accelerator," *IEEE Embedded Systems Letters*, vol. 17, pp. 79-82, April 2025.

[9] V. Padmakumar, T. M. Ignatius, T. B. Singha, R. P. Paily, Shaik Rafi Ahamed, "Boosting AES Intrinsic Resilience using Split SubBytes Round Function Against Power Attacks," *IEEE Embedded Systems Letters*, vol. 17, pp. 10-13, Feb. 2025.

[10] T. B. Singha, R. P. Paily, Shaik Rafi Ahamed, "Analysis of S-Box Hardware Resources to Improve AES Intrinsic Security Against Power Attacks," *IEEE Embedded Systems Letters*, vol. 16, pp. 525-528, Dec. 2024.

[11] T. B. Singha, B. Sanjana, T. M. Ignatius, R. P. Paily, Shaik Rafi Ahamed, "Improvement in Resilience of AES Design with Reconfigurable CFB Mode Against Power Attacks," *IEEE Transactions on VLSI Systems*, vol. 32, pp. 2149-2153, Nov. 2024.

[12] Saquib Mazhar, Nadeem Atif, MK Bhuyan, Shaik Rafi Ahamed, "Rethinking DABNet: Light-weight Network for Real-time Semantic Segmentation of Road Scenes," *IEEE Transactions on Artificial Intelligence*, vol. 5, pp. 3098-3108, June 2024.

[13] Muhammad Zubair, Umesh K Naik M, Rajesh K Tripathy, Mohammed Alhartomi, Saeed Alzahrani, Shaik Rafi Ahamed, "Detection of Sleep Apnea from ECG Signals using Sliding Singular Spectrum based Sub-Pattern Principal Component Analysis," *IEEE Transactions on Artificial Intelligence*, vol. 5, pp. 2897-2906, June 2024.

[14] Rituparna Choudhury, Shaik Rafi Ahamed, Prithwijit Guha, "Pipelined training accelerator for portable devices," *AEU-International Journal of Electronics and Communications*, vol. 177, 155167, April 2024.

[15] Nadeem Atif, Saquib Mazhar, Shaik Rafi Ahamed, MK Bhuyan, Sultan Alfarhood, Mejdl Safran, "DMPNet: Distributed Multi-scale Pyramid Network for Real-time Semantic Segmentation," *IEEE Access*, vol. 12, pp. 16573-16585, Jan. 2024.

[16] Jinti Hazarika, M. T. Khan, Rafi Ahamed Shaik, H. B. Nemade, "An Efficient Implementation Approach to FFT Processor for Spectral Analysis," *IEEE Transactions on Instrumentation and Measurement*, vol. 72, 2023.

[17] Mohammed A Alhartomi, Mohd Tasleem Khan, Saeed Alzahrani, Ahmed Alzahmi, Rafi Ahamed Shaik, et al., "Low-Area and Low-Power VLSI Architectures for Long Short-Term Memory Networks," *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, vol. 13, pp. 1000-1014, Dec. 2023.

[18] Saquib Mazhar, Nadeem Atif, MK Bhuyan, Shaik Rafi Ahamed, "Block Attention Network: A Lightweight Deep Network for Real-time Semantic Segmentation of Road Scenes in Resource-constrained Devices," *Elsevier Engineering Applications of Artificial Intelligence*, vol. 126, Nov. 2023.

[19] T. B. Singha, R. P. Paily, Rafi Ahamed Shaik, "Securing AES Designs Against Power Analysis Attacks: A Survey," *IEEE Internet of Things Journal*, vol. 10, pp. 14332-14356, Aug. 2023.

[20] R. Choudhury, Rafi Ahamed Shaik, P. Guha, "FPGA Implementation of Batch-Mode Depth-Pipelined Two Means Decision Tree," *IEEE Embedded Systems Letters*, vol. 15, pp. 17-20, Mar. 2023.

[21] Mohd. Tasleem Khan, Rafi Ahamed Shaik, "High-Performance VLSI Architecture of DLMS Adaptive Filter for Low-MSE," *IEEE Transactions on Circuits and Systems II*, vol. 69, pp. 2106-2110, April 2022.

[22] Mohd. Tasleem Khan, Rafi Ahamed Shaik, M. Alhartomi, "An Efficient Scheme for Acoustic Echo Canceller Implementation using Offset Binary Coding," *IEEE Transactions on Instrumentation and Measurement*, vol. 71, 2022.

[23] Jinti Hazarika, Shaik Rafi Ahamed, Harshal B. Nemade, "Low-Complexity, Energy-Efficient Fully Parallel Split-Radix FFT Architecture," *IET Electronics Letters*, vol. 58, pp. 678-680, Aug. 2022.

[24] P. Kopperundevi, M. Surya Prakash, Rafi Ahamed Shaik, "A High Throughput Hardware Architecture for Deblocking Filter in HEVC," *Elsevier Signal Processing: Image Communication*, vol. 100, 2022.

[25] R. Choudhury, Rafi Ahamed Shaik, P. Guha, "Training Accelerator for Two Means Decision Tree," *IEEE Transactions on VLSI Systems*, vol. 29, pp. 1465-1469, July 2021.

[26] M. Surya Prakash, Rafi Ahamed Shaik, "A Distributed Arithmetic based Realization of the Least Mean Square Adaptive Decision Feedback Equalizer with Offset Binary Coding Scheme," *Elsevier Signal Processing*, vol. 185, 2021.

[27] Mohd. Tasleem Khan, J. Kumar, Rafi Ahamed Shaik, J. Faridi, "Partial-LUT Designs for Low Complexity Realization of DA-based BLMS Adaptive Filter," *IEEE Transactions on Circuits and Systems II*, vol. 68, pp. 1188-1192, April 2021.

[28] Mohd. Tasleem Khan, Rafi Ahamed Shaik, "High-Throughput and Improved-Convergent Design of Pipelined Adaptive DFE for 5G Communication," *IEEE Transactions on Circuits and Systems II*, vol. 68, pp. 652-656, Feb. 2021.

[29] Babita J., Mahanta A. and Rafi Ahamed Shaik, "Energy-Efficient DAC Switching Technique for Single-Ended SAR ADC," *Elsevier AEU*, vol. 124, July 2020.

[30] Mohd. Tasleem Khan, Rafi Ahamed Shaik, "High-Performance Hardware Design of Block LMS Adaptive Noise Canceller for In-ear Headphones," *IEEE Consumer Electronics Magazine*, vol. 9, pp. 105-113, May 2020.

[31] Babita J., Mahanta A. and Rafi Ahamed Shaik, "IEEE 802.15.6 WBAN Standard Compliant IR-UWB Time-Hopping PPM Transmitter using SRRC signaling pulse," *Elsevier AEU*, vol. 117, April 2020.

[32] Krishna Praveen Y., Saurabh Dhall, Mohd. Tasleem Khan and Rafi Ahamed Shaik, "Low-Complexity Distributed Arithmetic based Pipelined Architecture for a LSTM Network," *IEEE Transactions on VLSI Systems*, vol. 28, pp. 329-338, Feb. 2020.

[33] R. K. Sarma, Mohd. Tasleem Khan, Rafi Ahamed Shaik and Jinti Hazarika, "A Novel Time-Shared and LUT-Less Pipelined Architecture for LMS Adaptive Filter," *IEEE Transactions on VLSI Systems*, vol. 28, pp. 188-197, Jan. 2020.

[34] Jinti Hazarika, Mohd. Tasleem Khan, Rafi Ahamed Shaik and Harshal B. Nemade, "Energy Efficient VLSI Architecture of Real-valued Serial Pipelined FFT," *IET Computers & Digital Techniques Journal*, vol. 13, pp. 461-469, July 2019.

[35] Mohd. Tasleem Khan, Rafi Ahamed Shaik, "Optimal Complexity Architectures for Pipelined Distributed Arithmetic-Based LMS Adaptive Filter," *IEEE Transactions on Circuits and Systems I*, vol. 66, pp. 630-642, Feb. 2019.

[36] Karam Singh, Rafi Ahamed Shaik, "Low Power Motion Estimation Algorithm and Architecture of HEVC/H.265 for Consumer Applications," *IEEE Transactions on Consumer Electronics*, vol. 64, pp. 267-275, Aug. 2018.

[37] M. Ajay Kumar, Rafi Ahamed Shaik, "Separation of Sources from Single Channel EEG Signals using Independent Component Analysis," *IEEE Transactions on Instrumentation and Measurement*, vol. 67, pp. 382-393, Feb. 2018.

[38] Mohd. Tasleem Khan, Rafi Ahamed Shaik, Surya Prakash Matcha, "An Improved Convergent Distributed Arithmetic based Low Complexity LMS based Adaptive Filter," *IET Circuits, Devices and Systems*, vol. 12, pp. 792-801, 2018.

[39] Babita J, Anil Mahanta and Rafi Ahamed Shaik, "Mixed-Signal Demodulator for IEEE 802.15.6 IR-UWB WBAN Energy Detection based Receiver," *IET Circuits, Devices and Systems*, vol. 12, pp. 523-531, 2018.

[40] V. Harikrishna, Rafi Ahamed Shaik, "Design Procedure for Multifinger MOSFET Two-stage OTA with Shallow Trench Isolation Effect," *IET Circuits, Devices and Systems*, vol. 12, pp. 513-522, 2018.

[41] Karam Singh, Rafi Ahamed Shaik, "Computationally Efficient Motion Estimation Algorithm for HEVC," *Springer Journal of Signal Processing Systems*, vol. 90, pp. 1713-1727, 2018.

[42] V. Harikrishna, Rafi Ahamed Shaik, "Low-voltage PVT-insensitive bulk-driven OTA with enhanced DC-gain in 65-nm CMOS process," *Elsevier AEU*, vol. 90, pp. 88-96, 2018.

[43] V. Harikrishna, Rafi Ahamed Shaik, "A 0.3-V Pseudo-Differential Bulk-Input OTA for Low-Frequency Applications," *Springer Journal on Circuits, Systems and Signal Processing*, vol. 37, pp. 5199–5221, 2018.

[44] Mohd. Tasleem Khan, Rafi Ahamed Shaik, "An Energy Efficient VLSI Architecture of Decision Feedback Equalizer for 5G Communication System," *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, vol. 7, pp. 569-581, Dec. 2017.

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[46] G. Bhoopal Rao, Rafi Ahamed Shaik, "Programmable Cellular Automata based Low Power Architecture to S-Box: An Application to WBAN," *Springer Journal on Circuits, Systems and Signal Processing*, vol. 37, pp. 1116-1133, 2017.

[47] V. Harikrishna, Rafi Ahamed Shaik, "An Ultra-Low Voltage Bulk Driven Analog Voltage Buffer with Rail-to-Rail Input/output Range," *Springer Journal on Circuits, Systems and Signal Processing*, vol. 37, pp. 4886-4907, 2017.

[48] G. Bhoopal Rao, Rafi Ahamed Shaik, "Low Power S-Box Architecture for AES Algorithm using Programmable Second-order Reverse Cellular Automata: An Application to WBAN," *Springer Journal of Medical Systems*, vol. 40, pp. 1-13, 2016.

[49] M. Ajay Kumar, Rafi Ahamed Shaik, "Removal of EOG Artifacts from Single Channel EEG Signals using Combined Singular Spectrum Analysis and Adaptive Noise Canceller," *IEEE Sensors Journal*, vol. 16, pp. 8279-8287, Dec. 2016.

[50] M. Ajay Kumar, Rafi Ahamed Shaik, "Motion Artifact Removal from Electroencephalogram Signals using Singular Spectrum Analysis," *Elsevier Biomedical Signal Processing and Control Journal*, vol. 30, pp. 79-85, 2016.

[51] M. Surya Prakash, Rafi Ahamed Shaik, "DA based Approach for the Implementation of Block DFE," *IET Signal Processing Journal*, vol. 10, pp. 676-684, 2016.

[52] M. Surya Prakash, Rafi Ahamed Shaik and Sagar K., "An Efficient Distributed Arithmetic-Based Realization of Decision Feedback Equalizer," *Springer Journal on Circuits, Systems and Signal Processing*, vol. 35, pp. 603-618, 2016.

[53] M. Surya Prakash, Rafi Ahamed Shaik, "Low-Area and High-Throughput Architecture for an Adaptive Filter using Distributed Arithmetic," *IEEE Transactions on Circuits and Systems II*, vol. 60, pp. 781-785, Nov. 2013.

[54] G. V. S. karthik, S. Y. Fathima, M. Zia Ur Rahman, Rafi Ahamed Shaik and A. L. Ekuakille, "Efficient Signal Conditioning Techniques for Brain Activity in Remote Health Monitoring Network," *IEEE Sensors Journal*, vol. 13, pp. 3276-3283, 2013.

[55] Rafi Ahamed Shaik, Mrityunjoy Chakraborty, "A Block Floating Point Treatment to Finite Precision Realization of the Adaptive Decision Feedback Equalizer," *Elsevier Signal Processing*, vol. 93, pp. 1162-1171, 2013.

[56] Md. Zia Ur Rahman, Rafi Ahamed Shaik, D. V. R. K. Reddy, "Efficient and Simplified Adaptive Noise Cancellers for ECG Sensor based Remote Health Monitoring," *IEEE Sensors Journal*, vol. 12, pp. 566-573, 2012.

[57] Md. Zia Ur Rahman, Rafi Ahamed Shaik, D. V. R. K. Reddy, "Efficient sign based normalized adaptive filtering techniques for cancelation of artifacts in ECG signals: Application to wireless biotelemetry," *Elsevier Signal Processing*, vol. 91, pp. 225-239, 2011.

[58] Mrityunjoy Chakraborty, Rafiahamed Shaik and Moon Ho Lee, "An Efficient Implementation of the Sign LMS Algorithm using Block Floating Point Format," *EURASIP Journal on Advances in Signal Processing*, 2007.

[59] Mrityunjoy Chakraborty, Rafiahamed Shaik and Moon Ho Lee, "A Block Floating Point Based Realization of the Block LMS Algorithm," *IEEE Transactions on Circuits and Systems II*, vol. 53, pp. 812-816, 2006.

TEACHING

Digital Signal Processing (Around 120 students)

Signals, Systems and Networks (Around 150 students)

Digital Circuits & Microprocessors (Around 150 students)

Basic Electronics (Around 900 students)

Digital Circuits (Including CMOS circuits) (Around 190 students)

Other Courses Taught: Microprocessors, Electromagnetic Field Theory, Digital Electronics, Biomedical Instrumentation, Signal Processing (PG), Signal Processing Algorithms & Architectures, Digital IC Design, VLSI DSP, Foundation of VLSI Architectures.

16. ONLINE COURSES ON NATIONAL PROGRAMME ON TECHNOLOGY ENHANCED LEARNING (NPTEL), MINISTRY OF EDUCATION, GOVT. OF INDIA

I developed following NPTEL courses:

- Microprocessors and Interfacing
- System Design Through Verilog
- Integrated Circuits and Applications

PHD GUIDANCE

Completed (12)

- **Surya Prakash Matcha** (2016): High Performance Architectures for Adaptive Equalizers using Distributed Arithmetic.
- **Ajay Kumar Maddirala** (2017): Efficient Subspace based Techniques for Processing Single Channel Electroencephalogram Signals.
- **Bhoopal Rao Gangadari** (2018): Low Power VLSI Architectures for Cryptographic Algorithms.
- **Karam Singh** (2019): Power Efficient Motion Estimation Algorithms and Architectures for HEVC/H.265.
- **Harikrishna Veldandi** (2019): Performance Enhancement Techniques for Low-Voltage Bulk-Driven Circuits.
- **Babita Jajodia** (2019): Design of IR-UWB Transmitter and Receiver for IEEE 802.15.6 Wireless Body Area Network System. (Co-guide: Prof. A. Mahanta)
- **Mohd. Tasleem Khan** (2019): Low Complexity Distributed Arithmetic based Pipelined VLSI Architectures for LMS Adaptive Filters.
- **Rituparna Choudhury** (2023): VLSI Implementation of Training Accelerators for Decision Tree Algorithms. (Co-guide: Dr. P. Guha)
- **Sumit Agarwal** (2023): Design and Implementation of Continuous Flow FFT Processor for OFDM in Wireless GigaHertz Standards.
- **Jinti Hazarika** (2024): Design and implementation of hardware-efficient architectures for FFT algorithms. (Co-guide: Prof. H. B. Nemade)
- **Thockchom Birjit Singha** (2024): Design and Analysis of Countermeasures for Securing IoT Edge Devices Against Power Analysis Attacks. (Co-guide: Prof. R. P. Paily)
- **Saquib Mazhar** (2025): Lightweight Deep Learning Architectures for Semantic Scene Segmentation for Applications in Autonomous Driving. (Co-guide: Prof. M. K. Bhuyan)
- **Nadeem Atif** (2026): Design and Development of Semantic Segmentation Networks for Autonomous Driving on Embedded Plotforms. (Co-guide: Prof. M. K. Bhuyan)

Ongoing (12)

- Riyaj Uddin Khan, Raktim Acharjee, Aikendrajit Ningthoujam, Aditi Paul, Umesh Kumar Naik Mudavath, Shafi M N, Debajit Borah, Muhammad Nihal K V, Himasree Deka, Shashanka Handique, Hrishikesh Kumar Barua.

SPONSORED RESEARCH & MENTORSHIP

Institute Post-Doctoral Mentorship: Dr. Jyotsna Dogra (2021-23), Dr. Inamul Hussain (2023-25).
Project: Design & development of real-time semantic segmentation networks & FPGA/ASIC-based hardware accelerator for autonomous driving.
Agency: SERB, Govt. of India (28.75 Lakhs). **Duration:** 2023-26.

ADMINISTRATIVE EXPERIENCE & PROFESSIONAL SERVICE

Administrative Experience:

- Chairman, Expert Technical Evaluation Committee for 6G Project proposals, MoC, Govt. of India.
- Member of Expert Teams for NBA Accreditation (Visited 50 institutes).
- Judge, Smart India Internal Hackathon 2024.
- Secretary, Department Postgraduate Program Committee (3+ years).
- Coordinator, PhD admissions; Faculty Advisor; Timetable Coordinator.

Reviewer: IEEE (TCSI, TCSII, TSP, TVLSI, TAI, TIM, IoT, SPL, Sensors), IET, Springer, Elsevier.