ICECE 2022

The Spotlight Presentation, the Keynote Speeches, and the Invited Talks

Spotlight Presentation: A Climate Ready Power System – Resilient and Affordable Decarbonization

Presenter: Arshad Mansoor, President & CEO, Electric Power Research Institute (EPRI), Charlotte, USA

Abstract: According to the Intergovernmental Panel on Climate Change, the world has already experienced adverse impacts from climate change and will continue to face multiple climate-related hazards in the decades to come. What were once estimated to be 1-in-100-year extreme weather events are occurring with greater frequency, and further global temperature increases of 1.5°C or higher will cause even more destructive impacts that will be even more difficult to manage.

The citizens of Bangladesh, like those around the world, are likely to experience more intense and frequent weather events including severe heavy rains and flooding, cyclones, drought, storm surges, and high temperatures and humidity. Such climate and weather extremes can have broad and compounding effects across an electric power system, from generation to transmission and distribution to customer equipment and consumption patterns.

Electric power is the lifeblood of a country, the engine of economic growth and prosperity and the enabler of higher living standards. The Bangladesh power system is growing rapidly along with the country's sustained economic growth rate. Given Bangladeshi society's dependence on electricity, and the vulnerability of its power infrastructure to climate and weather extremes, now is the time to examine how to strengthen the Bangladesh power system's resilience against current and future climate and weather impacts—what I describe as designing the system to be climate ready.

Brief Biography:

Arshad Mansoor is EPRI's President and Chief Executive Officer, responsible for the institute's operation and its portfolio of R&D and demonstration programs, spanning the broad spectrum of how electricity is made, moved and used. As CEO he leads more than 1400 EPRI's trusted experts who collaborate with more than 450 companies in 45 countries, driving innovation to ensure the public has clean, safe, reliable, affordable, and equitable access to electricity across the globe.

Mansoor holds five U.S. patents in power electronics and distributed energy resources. He is a senior member of the IEEE and served as vice president of the U.S. National Committee of CIGRE, the international council on large electric systems.

He has published numerous papers in journals and conference proceedings and has given talks and participated in panels at leading technical forums worldwide.

He earned a Bachelor of Science in electrical engineering from the Bangladesh University of Engineering and Technology. Mansoor earned his Master of Science (1992) and doctorate (1994) in electrical engineering, focusing on power systems engineering from the University of Texas in Austin. He completed the MIT Reactor Technology Course and the Harvard Business School Advanced Management Program.

Keynote Speech 1: Lifelong Learning for Cyber-Security and Time Series Forecasting for Social Studies Using Scalable Spatio-Temporal Graph Neural Networks

Speaker: Latifur Khan, Professor, Department of Computer Science, University of Texas at Dallas (UT Dallas), USA

Abstract: In this presentation, I will focus on two topics such as life-long learning and Spatial-temporal forecasting. With regard to life-long learning, continuous flows of data are considered which we call stream data. Here, concept-drift, and concept-evolution may happen. Concept-drift occurs in data streams when the underlying concept of data changes over time. Concept-evolution occurs when new classes evolve in streams. This talk will present an organized picture on how to handle various data mining techniques in data streams: in particular, how to handle classification and clustering in evolving data streams by addressing these challenges. In this talk a number of applications of lifelong learning/mining will be presented such as adaptive website fingerprinting, evolving insider threat detection, textual stream classification, identifying vulnerable functions using semi-supervised learning, attack trace classification using good quality similarity metrics (metric learning), and domain adaptation.

In the incremental learning to facilitate lifelong learning, deep learning models should be able to learn new information while retaining previously learned skills or knowledge, but catastrophic forgetting happens that we will address here.

Time series forecasting with additional spatial information has attracted a tremendous amount of attention in recent research, due to its importance in various real-world applications on social studies, such as conflict prediction and pandemic forecasting. Conventional machine learning methods either consider temporal dependencies only or treat spatial and temporal relations as two separate autoregressive models, namely, space-time autoregressive models. Such methods suffer when it comes to long-term forecasting or predictions for large-scale areas, due to the high nonlinearity and complexity of spatio-temporal data. In this talk, we propose to address these challenges using spatio-temporal graph neural networks.

*This work is funded by NSF and NSA. The work is in collaboration with Dr. Patrick Brandt and Dr. Jennifer Holmes, School of Economic, Political and Policy Sciences, UT Dallas.

Brief Biography:

Dr. Latifur Khan is currently a full Professor (tenured) in the Computer Science department at the University of Texas at Dallas, USA where he has been teaching and conducting research since September 2000. He received his Ph.D. degree in Computer Science from the University of Southern California (USC)

in August of 2000. He received his BSc Engineering degree in Computer Science and Engineering from Bangladesh University of Engineering and Technology (BUET) in 1993 with first class honors (2nd position).

Dr. Khan is a fellow of IEEE, IET, BCS, and an ACM Distinguished Scientist. He has received prestigious awards including the IEEE Technical Achievement Award for Intelligence and Security Informatics, IEEE Big Data Security Award, and IBM Faculty Award (research) 2016. Dr. Latifur Khan has published over 300 papers in premier journals and prestigious conferences.

Currently, Dr. Khan's research area focuses on big data management and analytics, data mining and its application over cyber security, and complex data management including geo-spatial data and multimedia data. His research has been supported by grants from NSF, NIH, the Air Force Office of Scientific Research (AFOSR), DOE, NSA, IBM, and HPE. More details can be found at: www.utdallas.edu/~lkhan

Keynote Speech 2: Photonic Devices Exploiting Plasmonics

Speaker: B M Azizur Rahman, Professor, City, University of London, UK

Abstract: With the advent of semiconductor lasers and low-loss optical fibres in mid 60s, the progress of Photonics technology has been rapid. Photonics, as the name indicates, manipulates photon or light, similar as Electronics manipulate electrons, but much faster. Photonics made a significant impact, in the field of optical fibre links, joining all the countries and major cities by faster Tbit/sec bandwith link, made Internet almost free, thinner flat screen display for computers and mobile phones, and lasers for healthcare and material processing applications. During the last EU research cycle, Horizon2020, Photonics was identified as one of the 6 Key Enabling Technologies, and expected to play a key role in shaping the technology landscape of this century.

With the advancement of fabrication technologies photonic devices are also becoming more exotic and complex exploiting strong light-matter interactions. As results design and optomisation such devices and photonic integrated systems are also becoming more challenging. The optimization of existing realistic designs or the evaluation of new designs for photonic devices and sub-systems has created significant interest in the development and use of effective numerical methods. Prof. Rahman was the first to develop vector-field finite element method for optical waveguides and subsequently they have developed finite element based junction analysis method and the beam propagation method, which are more versatile and numerically very efficient.

Plasmonics is a key emerging area of photonics. Surface plasmons are confined to the surfaces which interact strongly with the electromagnetic waves. They occur at the interfaces where the relative permittivity of the bounding materials is of opposite sign. It is well know that some metals and highly doped semiconductor shows highly negative relative permittivity and a structure with a dielectric cladding supports surface plasmon modes. These modes decay exponentially, they can be highly localised and can also be confined inside a sub-wavelength size guided wave structure. Although plasmonic modes are mostly very lossy but due to strong ligh-matter interactions often devices are sub-micron size and the total loss is often rather small. Some selected results for plasmonic waveguides and devices for the optical and terahertz frequencies, including optical and THz waveguides, plasmonic optical sensors, polarisation diversity photonic devices, and optical nanoantennas will be presented.

Brief Biography:

B. M. Azizur Rahman received the B.Sc.Eng and M.Sc.Eng. degrees in Electrical Engineering with distinctions from Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh, in

1976 and 1979, respectively. He also received two gold medals for being the best undergraduate and graduate students of the whole university in 1976 and 1979, respectively. In 1979, he was awarded with a Commonwealth Scholarship to study for a PhD degree in the UK and subsequently in 1982 received his PhD degree in Electronics from University College London.

In 1988, he joined City, University of London, as a lecturer, where became a full Professor in 2000. At City University, he leads the research group on Photonics Modelling, specialised in the development and use of rigorous and full-vectorial numerical approaches to design, analyse and optimise a wide range of photonic devices. He has published more than 700 journal and conference papers, and his journal papers have been cited more than 8000 times with H-index of 40. He has supervised 35 students to complete their PhD degrees as their first supervisor and received more than £13 M in research grants. Many of these projects have been supported by the EPSRC, NERC, EU, British Council, and industries, notably Siemens, Nortel, Corning, Bookham, US Army, Marconi, and QinetiQ. Prof. Rahman is Life Fellow of the IEEE, and Fellow of the Optical Society of America (Optica) and the SPIE.

Invited Talk 1: Strategies towards a 'Smart City' and demonstration of City-led 'Open Data Platform' in Australia

Speaker: Emran Amin, Spectrum Planning Engineer, Australian Communication and Media Authority (ACMA); Adviser, Smart Casey, Melbourne, Australia

Abstract: In his talk Dr Emran Amin will provide an overview of globally recognised 'Smart City' strategies and framework. He will delve into the definitions and evolution of the emerging concepts ie 'Smart City'/ 'Digital Twin'/ 'Circular Economy'/ 'Open Data' and provide LIVE examples and case studies on how cities around Australia are adopting these technologies. In Particular, he will present *Open Data platform* at the City of Casey, Melbourne Metropolitan area, Australia. Discussion will be around challenges and opportunities towards future smart cities.

Brief Biography:

Dr Emran Amin has a dynamic career in wireless communication and Smart technology strategic planning and deployment for more than 10 years. He has a PhD from the Electrical and Computer Systems Engineering Department of Monash University (2015) and worked as a visiting researcher at the AutoID lab, Massachusetts Institute of Technology (MIT). He received the B.Eng. degree in Electrical and Electronics Engineering (EEE) Department from Bangladesh University of Engineering and Technology (BUET) in 2009. He served as a lecturer at EEE, BUET.

With a PhD in innovative internet of things (IoT) solution development, he has extensive experience in telecommunication, broadcast and defence industry as a lead project manager and systems engineer. His experience complements through co-founding an IoT start-up and successfully developing innovative solutions through strategic partners with local and state government, IoT service providers and private industries in key development areas of the South-East Asian market. Currently, he is working at the Australian Communication and Media Authority (ACMA) as a planning engineer for spectrum management of future technologies ie 5G, IoT and future indoor wireless communication. He is a leading community reference member for the 'Smart Casey' initiative at the City of Casey advocating for smart city, open data platform and digital-twin. He is a presenter, organiser and judge at a number of events and competitions on Smart City and sustainable City deployment initiatives. His ultimate passion is to work for digital inclusion and equity and continue to facilitate awareness and uptake of digital technologies and promote innovation so that technology can benefit the planet and its life.

Invited Talk 2: Full-Duplex Integrated Sensing and Communications for Distributed Systems

Speaker: Kumer Vijay Mishra, Senior Fellow, the United States DEVCOM Army Research Laboratory (ARL), Adelphi

Abstract: As a next-generation wireless technology, the in-band full-duplex (IBFD) transmission enables simultaneous transmission and reception of signals over the same frequency, thereby doubling spectral efficiency. Further, a continuous up-scaling of wireless network carrier frequencies arising from ever-increasing data traffic is driving research on integrated sensing and communications (ISAC) systems. In this context, we study the co-design of common waveforms, precoders, and filters for an IBFD multi-user (MU) multiple-input multiple-output (MIMO) communications with a distributed MIMO radar. In particular, we tackle a multi-target detection and localization problem in this distributed FD ISAC framework. This co-design problem that includes practical MU-MIMO constraints on power and quality of service is highly non-convex. We solve this problem using an alternating optimization framework and also propose a low-complexity procedure based on Barzilai–Borwein gradient algorithm to obtain the design parameters and mixed-integer linear program for distributed target localization. Numerical experiments demonstrate the feasibility and accuracy of multi-target sensing of the distributed FD ISAC system. Toward the end of the talk, we briefly touch upon our research on other ISAC topics.

Brief Biography:

Kumar Vijay Mishra (S'08-M'15-SM'18) obtained a Ph.D. in electrical engineering and M.S. in mathematics from The University of Iowa in 2015, and M.S. in electrical engineering from Colorado State University in 2012, while working on NASA's Global Precipitation Mission Ground Validation (GPM-GV) weather radars. He received his B. Tech. summa cum laude (Gold Medal, Honors) in electronics and communication engineering from the National Institute of Technology, Hamirpur (NITH), India in 2003. He is currently Senior Fellow at the United States DEVCOM Army Research Laboratory (ARL), Adelphi; Technical Adviser to Singapore-based automotive radar start-up Hertzwell and Boston-based imaging radar startup Aura Intelligent Systems; and honorary Research Fellow at SnT - Interdisciplinary Centre for Security, Reliability and Trust, University of Luxembourg. He is the recipient of the U. S. National Academies Harry Diamond Distinguished Fellowship (2018-2021), Royal Meteorological Society Quarterly Journal Editor's Prize (2017), Viterbi Postdoctoral Fellowship (2015, 2016), Lady Davis Postdoctoral Fellowship (2017), DRDO LRDE Scientist of the Year Award (2006), and NITH Director's Gold Medal (2003). He is Vice-Chair (2021-present) of the newly constituted IEEE Synthetic Aperture

Standards Committee of the IEEE Signal Processing Society. Since 2020, he has been the Associate Editor of IEEE Transactions on Aerospace and Electronic Systems. He is Vice Chair (2021-2023) and Chair-designate (2023-2026) of the International Union of Radio Science (URSI) Commission C. He is a co-lead guest editor of an upcoming IEEE Journal of Selected Topics in Signal Processing Special Issue on *Recent Advances in Wideband Signal Processing for Classical and Quantum Synthetic Apertures*. He is the lead co-editor of three upcoming books on radar: *Signal Processing for Joint Radar-Communications* (Wiley-IEEE Press), *Next-Generation Cognitive Radar Systems* (IET Press Radar, Electromagnetics & Signal Processing Technologies Series), and *Advances in Weather Radar Volumes 1, 2 & 3* (IET Press Radar, Electromagnetics & Signal Processing Technologies Series). His research interests include radar systems, signal processing, remote sensing, and electromagnetics.

Invited Talk 3: Promise of plasmonics: From communications to renewable energy

Speaker: Muhammad Zulfiker Alam, Assistant Professor, Queen's University, Canada

Abstract: At optical wavelengths metal-dielectric interfaces support surface waves known as surface plasmons. The study and applications of surface plasmons – a research area known as plasmonics – has attracted significant interest from researchers in engineering, physics and biology, due to the large variety of applications which plasmons may enable. One key reason behind this interest in plasmonics is the ability of plasmonic waveguides to confine light in a very small area, which is not possible by other practical means. However, the large propagation loss of surface plasmons (caused by the inclusion of metal as part of the guiding structure) severely limits the usefulness of plasmonics for many applications. Innovative designs proposed in last few years have overcome this limitation to a great extent and created many exciting opportunities. In this talk I will discuss applications of plasmonics ranging from communication to renewable energy. Existing challenges and potential solutions will also be discussed.

Brief Biography:

Muhammad Zulfiker Alam is currently an Assistant Professor at the Department of Electrical and Computer Engineering at Queen's University. He received BSc and MSc from Bangladesh University of Engineering and Technology, MASc from the University of Victoria and PhD from the University of Toronto. His research interests include metasurface, plasmonics and integrated optics. During his PhD research work, he proposed the hybrid plasmonic waveguide. As a recognition of this contribution, he received the Douglas R. Colton Medal for Research Excellence – which is given to one researcher in Canada every year for making significant research impact in micro and nanotechnology. As a KNI Prize Postdoctoral Fellow at Caltech, he worked with Samsung Electronics for developing metasurfaces for real-life applications including LIDAR for automated vehicles. During this time, he was also a visiting scientist at the Jet Propulsion Laboratory and the Lawrence Berkeley National Laboratory. His research work has resulted in more than 60 journal and conference publications, and 4 patents.

Invited Talk 4: Computer-Aided System for Hormone Receptor Expression in Breast Carcinoma

Speaker: Mohammad Faizal Ahmad Fauzi, Professor, The Faculty of Engineering, Multimedia University, Malaysia

Abstract: Hormone receptor status is determined primarily to identify breast cancer patients who may benefit from hormonal therapy. The current clinical practice for the testing using either Allred score or H-score is still based on laborious manual counting and estimation of the amount and intensity of positively stained cancer cells in immunohistochemistry (IHC)-stained slides. This work integrates cell detection and classification workflow for breast carcinoma estrogen receptor (ER)-IHC-stained images and presents an automated evaluation system. The system first detects all cells within the specific regions and classifies them into negatively, weakly, moderately, and strongly stained, followed by Allred scoring for ER status evaluation. The generated Allred score relies heavily on accurate cell detection and classification and is compared against pathologists' manual estimation. Experiments on 40 whole-slide images show 82.5% agreement on hormonal treatment recommendation, which we believe could be further improved with an advanced learning model and enhancement to address the cases with 0% ER status. This promising system can automate the exhaustive exercise to provide fast and reliable assistance to pathologists and medical personnel. The system has the potential to improve the overall standards of prognostic reporting for cancer patients, benefiting pathologists, patients, and also the public at large.

Brief Biography:

Mohammad Faizal Ahmad Fauzi (CEng, SMIEEE, MIEM) received the B.Eng. degree in Electrical and Electronic Engineering from Imperial College, London, UK in 1999, and the Ph.D. degree in Electronics and Computer Science from University of Southampton, Southampton, UK in 2004. He is currently a Professor at the Faculty of Engineering, Multimedia University and the Head for the MMU-UKM-IMU IMU Artificial Intelligence for Digital Pathology (AI4DP) Research Excellence Consortium, Malaysia. His main research interests are in the area of signal and image processing, pattern recognition, computer vision and medical imaging. From May 2013 to June 2014, he was attached to the Clinical Image Analysis Lab at the Ohio State University, USA where he started working on digital pathology, especially on cancer and diseases analysis. He has published more than 100 journal and conference articles to date. Mohammad Faizal is a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE), which he first joined in 2000. He is currently serving as the Chair for IEEE Region 10 Newsletter Committee, as well as the Advisor for IEEE Malaysia Section and IEEE Signal Processing Malaysia chapter.

Invited Talk 5: Atomistic Modeling of Nanoscale Phenomena in Emerging Semiconductor Devices

Speaker: Shaikh S. Ahmed, Professor, School of Electrical, Computer, and Biomedical Engineering, Southern Illinois University Carbondale, USA

Abstract: At Southern Illinois University Carbondale, we are conducting research primarily in the area of theoretical and computational nanoelectronics. Our modeling efforts generally address several scientific hurdles, such as: a) explicit 3-D representation and full atomistic symmetry; b) presence of strong, inhomogene¬ous, non-linear, and long-ranged internal fields originating from interfacial phenomena, structural relaxation, alloy disorder, unintentional doping, defects, atom clustering, and piezoelectric and pyroelectric polarizations; c) full quantum characterization of material properties such as mobility, phonon modes, exciton energy, and transition lifetime; and d) dependence of the devices' terminal characteristics on an intricate interplay and dynamical coupling of charge−phonons–heat bath–radiative/non-radiative recombination processes, which involve different length and time scales. In this talk, we will present our on-going work on the development of an in-house atomistic simulator to model novel electronic, photonic, and energy-harvesting semiconducting devices. The main goal here is to better understand the underlying physical processes and investigate and utilize the additional degrees of freedom available at the nanoscale for improving semiconductor device performance and reliability. We will present simulation results on the following: a) Coupled electron-phonon transport in nanoscale FinFETs where the diffusive boundary scattering for phonons has been modeled using the Beckmann-Kirchhoff (B-K) surface roughness formalism. For a FinFET with a gate length of 18 nm, channel width of 4 nm, and a fin height of 8 nm, simulation results show a ON current degradation of as high as ~7% due to self-heating effect. The temperature rise in the channel region is found to be ~30K. b) Valence band anti-crossing analysis of dilute sulfur in ZnO1-xSx alloys for application in solar cells—Minority anion alloy ZnO_(1-x) S_x exhibits unusual bowing of energy bandgap as compared to cation alloying. The energy bandgap decreases dramatically from 3.37 eV to approximately 2.7 eV as the S composition increases to 10%. This allows the material system to be used in CIGS solar cells in the buffer layer instead of CdS. c) Nitride quantum dot-in-wire structures for use in non-classical light generation—fine structure splitting (FSS) is a bottleneck in quantum dot (QD) based solid-state entangled photon pair generator (EPPG) for application in quantum key distribution (QKD). The FSS originates via the ex¬change interaction from the asymmetries in the QD con¬finement potential and must be removed for the design of an ideal EPPG. It will be demonstrated that QD shape/thickness, material composition, and crystal growth direction (polar c-plane and non-polar m-plane and a-plane) all have significant effects on the FSS in a new nitride-based photon emitter. d) Electron transport in and reliability modeling of AlGaN/GaN and emerging β-Ga2O3 based high-power FETs—Structural relaxations can occur inside the device due to high lattice temperature. This leads to a reduction in the sheet charge density, which is the primary source of channel formation in these transistors, affecting long-term reliability. Whereas, in β-Ga2O3, low crystal symmetry induces multiple phonon modes, which complicates the mobility calculation. Here, 50 meV of POP energy was found to be good enough for the Fröhlich scattering model. For low electrical fields at 300K, we report an electron mobility of 113 cm2/V·s. Simulation results on the effects of dynamic trapping of charge carriers will also be presented

Brief Biography:

Shaikh Shahid Ahmed received the B.S. degree in electrical and electronic engineering from Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh, in 1998, and the M.S. and Ph.D. degrees in electrical engineering from Arizona State University, Tempe, in 2003 and 2005, respectively. From 2005 to 2007, he was a Postdoctoral Research Associate in the School of Electrical and Computer Engineering and at the Network for Computational Nanotechnology (NCN), Purdue University, West Lafayette, Indiana, USA. In August 2007 he joined Southern Illinois University Carbondale, Illinois, USA, where he is currently a Full Professor in the School of Electrical, Computer, and Biomedical Engineering.
Research activities in Professor Ahmed's Group focus mainly in the field of computational nanoelectronics and involves multiscale modeling of electronic structure and carrier transport in nanoscale devices including novel transistors, semiconducting 2-D structures and nanowires, quantum dots and nanocrystals, solid-state lighting sources and their reliability, nanoscale thermoelectric and piezoelectric energy-harvesting devices, and nanoelectronic devices for applications in harsh environments. The goal is three-fold: a) better understand the underlying physical processes; b) explore and exploit the enhanced degrees-of-freedom available at nanoscale for device optimization; and c) develop cyber-enabled community nanoelectronics simulation software. Research and computational efforts in Professor Ahmed's group make extensive use of advanced algorithms and state-of-the-art high-performance cluster and CPU/GPGPU distributed computing platforms. Professor Ahmed has graduated 14 PhD and 11 MS students.
Professor Ahmed is the recipient of the 2009 Oak Ridge National Lab/ORAU High-Performance Computing Award. He has authored/co-authored 14 nanoelectronics software tools access to which are freely available on NSF's nanoHUB.org. He was the Principal Investigator of the NSF funded Southern Illinois High Performance Computing Research Infrastructure. He is the recipient of the 2016 Air Force Research Lab Summer Faculty Fellowship, 2013 Dean Juh Wah Chen Outstanding Faculty Award from SIU College of Engineering and 2014 ECE Department Outstanding Teacher Award. Professor Ahmed has published over 80 papers in refereed journals and proceedings, authored six book chapters, and contributed to more than 90 technical presentations. He is a senior member of the IEEE, member of the American Physical Society, and member of the HKN Honor Society.

Invited Talk 6: Future of Tele-presence Using Light Field Imaging Systems

Speaker: Gazi Naser Ali, Research Scientist, Intel Labs, USA

Abstract: Light field capture is a branch of computational imaging that can be used to enhance and extend conventional imaging experiences. The increasing demands due to tele-conferencing, metaverse, virtual reality put emphasis on practical light field capture and rendering methods. In this talk I will be focusing on some of the recent advances on light field capturing system and multi-modal experiences provided by these systems. There will an on overview of the Intel Labs variable view point imaging system that captures sparse light field videos and uses advanced algorithms to generate immersive video content. The talk will provide backgrounds on neural radiance field (NeRF) that uses machine learning approach for view synthesis.

Brief Biography:

Gazi Ali is currently a research scientist at Intel Labs located in Santa Clara, California. His R&D projects within the Intel Labs are related to computational image processing, light field capture, telepresence, and augmented reality. Gazi got his Ph.D from Purdue University on 2006 under the supervision of Professor Jan P. Allebach. His Ph.D works show relation between signal processing, information hiding, and pattern recognition. Gazi joined Sony US research Center (USRC) after graduate studies. During his stay in Sony Gazi was involved in multiple image processing projects and published patents related to optics, imaging system, image signal processor (ISP).

Gazi also worked as technical research lead for Nikon Research Corporation of America (NRCA) and Elo Touch Solutions. Gazi has published more than twenty-five US and international patents. His early works are published in IS&T and IEEE. Gazi received Sony MVP, Intel Innovation award and numerous Intel DRA awards for his technical contributions. As a BUET alumnus Gazi always feels connected to BUET EEE department.