September 29, 2023

To
The Chair of the Search Committee
University of Texas at Tyler
Tyler, TX

Subject: Applying for Assistant Professor of Electrical and Computer Engineering

Dear Sir/Madam:

I would like to offer my candidature for the Assistant Professor position at University of Texas at Tyler from August 2024 as advertised on HigherEdJobs. I completed my PhD on May 01, 2023 and currently, am working as a full-time postdoctoral research fellow at the University of Waterloo, Canada. I am excited about the opportunity and extremely interested in obtaining a faculty position at your university, where I can contribute to teaching, research, and service in ***design and fabrication of microelectronics, MEMS, and energy-harvesting devices with applications in medicine, agriculture, and environment monitoring***. The reason I am confident is because my whole PhD journey was design and fabricate Organic-Inorganic Nanomaterial Based Highly Efficient Flexible energy harvesters for Self-Powered Wireless Electronics.

I completed my PhD in Electrical and Computer Engineering with specialized in Nanotechnology at the University of Waterloo. While conducting research in nanomaterials for self-powered IoT applications as a Ph.D. student, I have published 12+ high-impact journals and have presented my research at national and international conferences. I have prepared many funding applications from scratch such as Natural Sciences and Engineering Research Council of Canada (NSERC), and National Research Council (NRC), Canada. I supervised, mentored, and administered to several undergraduate and co-op students. I also conducted biweekly project meetings with 16+ members of our group and collaborators. In addition, I voluntarily served on different committees to offer my services to my research group. Currently I am leading two projects, one of which is "***Doping Engineering Towards Stable Lead-Free Flexible Piezoelectric Nanogenerator for Wireless Electronics***". The main milestone of this project is to successfully design, fabricate and characterize an environment friendly stable nanogenerators from Tin based halide perovskite materials. The second project is "***Nanogenerator for Intelligent Sound Monitoring and Identification System with Deep Learning Technique"***. The aim of this project is to develop the triboelectric device-based sound identification system (hardware, software, system integration, testing, publication). Our target is to fabricate and characterize nanogenerators for energy harvesting from available urban sound and at the same time classified the sound with Intelligent Sound Monitoring and Identification System with Deep Learning Technique.

While pursuing my PhD, I completed several courses in a diverse classroom which gave me plenty of opportunities to observe North American classrooms from the perspective of an overseas graduate student at the University of Waterloo, Canada. Consequently, I gained invaluable experiences and developed my own engineering pedagogy regarding classroom management, rules and expectation, effective communication, assessment, and evaluation which I practiced later in my teaching profession as a Teaching Assistant/Sessional Instructor for 12 terms at University of Waterloo.

During the time of COVID, the concept of classroom education turned into a new direction of online teaching. As a teaching assistant at the University of Waterloo, I got the opportunity to conduct online classrooms with students attending from different parts of the world. My main challenge in an online class was to maintain effective communication with students due to their unwillingness to appear in front of the camera and reluctance to ask questions. I successfully addressed these issues by modifying lecture plans and incorporating interactive sessions to effectively engage my students. In addition, I gave them adequate time and space to interact with the instructor and fellow students. These positive changes in the classroom environment boosted the self-esteem and confidence level of my students. While teaching in person in

Canada, I encountered a diverse classroom with students from different religions, colors, races, languages, cultures, and ethnic backgrounds. I observed linguistic and cultural barriers and academic, social, and cultural differences along with mental health concerns. I used to address these issues with high priority from my previous experience of being an overseas student and a teacher in multicultural environments.

Beyond my teaching and research qualifications, I am committed to service and actively participate in departmental and university-wide initiatives. I have served on various committees, mentored undergraduate and graduate students, and organized academic events and conferences. I believe in the importance of contributing to the academic community through service and fostering an environment of collaboration and intellectual growth.

I am very excited to contribute to the academic & research advancement and practice my engineering pedagogy at your university. I am willing to teach any electronics, electrical, photonics, sensors, electronic materials, and semiconductor-related courses both at the undergraduate and graduate levels. I am also interested in actively supervising undergraduate and graduate projects and thesis and developing new curriculums.

I am confident that my expertise, enthusiasm, and dedication to education would make me a valuable asset to the faculty team at University of Texas at Tyler. I would welcome the opportunity to contribute to the institution's mission and vision, working alongside colleagues who share a passion for excellence in teaching, research, and service.
I have attached my curriculum vitae, teaching philosophy statement, research statement, and contact information for references. I would be delighted to discuss my qualifications further and answer any questions you may have. Thank you for considering my application. I look forward to the possibility of joining the esteemed faculty at University of Texas at Tyler.

Sincerely yours,

Md Masud Rana, PhD
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MD MASUD RANA

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Google Scholar: https://scholar.google.com/citations?user=0kAo3tcAAAAJ&hl=en

ACADEMIC CREDENTIALS

Ph.D. in **Electrical and Computer Engineering** | Grade 88/100 *May 01, 2019 -May 01, 2023*
University of Waterloo, Ontario, Canada

M.Sc. in **Electrical and Electronic Engineering** | CGPA: 4.00/4.00 *January 2015 – May 2018*
Khulna University of Engineering & Technology (KUET), Bangladesh

B.Sc. in **Electrical and Electronic Engineering** | CGPA: 3.80/4.00 *March 2009 – September 2013*
Khulna University of Engineering and Technology (KUET), Bangladesh

EXPERIENCE/QUALIFICATIONS

Post-Doctoral Fellow | Photonics and Nanoelectronics Lab *May 2023-present*
University of Waterloo, Ontario, Canada

- **Nanogenerator for Intelligent Sound Monitoring and Identification System with Deep Learning Technique**
  - I am leading the collaborative project between National Research Council (NRC) Canada and University of Waterloo. The aim of this project is to develop the triboelectric device-based sound identification system (hardware, software, system integration, testing, publication). Our target is to fabricate and characterize nanogenerators for energy harvesting from available urban sound and at the same time classified the sound with Intelligent Sound Monitoring and Identification System with Deep Learning Technique.
  - Working on improving the stability of lead free Sn based Perovskite Piezoelectric Nanogenerator (as a continuation of my PhD project).
  - Moreover, my duty is to provide training/mentoring to junior group members, assist with lab coordination and maintenance, and other assigned tasks.

Graduate Research Assistant | Photonics and Nanoelectronics Lab *May 2019- April 2023*
University of Waterloo, Ontario, Canada

- **High-Performance Energy Harvester Design**

  •Development of a High-Performance Piezoelectric thin film Based on Organic/Inorganic Nanomaterials.

  – Design and fabricate porous polyvinylidene fluoride (PVDF)-based Piezoelectric nanogenerator (PENG) with two steps solution-based process.

  – Developed ICP/RIE dry etching recipe for surface treatment to enhance the piezoelectricity of the film.

  – Developed HCl wet etching recipe to control the porosity of the film to enhance the mechanical stability of the film.

– Used Piezoelectric Force Microscope (PFM/AFM) to dc poling the device to enhance the ferroelectricity that enhances the output by 10-fold compared to a non-poled device.

– Demonstrated a custom-made self-powered wireless communication system.

– Demonstrated stable operation up to 48000 repeating cycles.

– Published 10+ journal papers as first-author and co-author in high-impact journals of the field such as **Nano Energy (IF: 19.06), JMCA (IF: 14.5), ACS AMI (IF: 10.38), ACS Energy Letter (IF: 23.01), Small (IF: 15.56)**

– Provided training to several Ph.D. and MS students and supervise UG students for the 4th-year capstone project.

Design and fabricate PENG based on a low-temperature full-solution synthesis approach, as a sustainable power source. Highly experienced in growing the following composite PENG devices:

– FAPbBr2I/PVDF on ITO/PET substrate with spin coating.

– PVDF/ZnO nanowire fabrication by hydrothermal process

– FASnBr3/PDMS on ITO/PET substrate by drop casting method

Graduate Teaching Assistant | Dept. of Electrical and Computer Engineering *May 2019- April 2023*

University of Waterloo, Ontario, Canada

- Tutored 10+ courses over 12 semesters in graduate and undergraduate programs
- Developed teaching materials: syllabus, visual aids, answer keys, notes
- Evaluated student essays, projects, labs, tests, and other assessments
- Facilitated class discussions and answered student questions as an instructor

Assistant Professor| Department of Electrical and Electronic Engineering *August 2017- April 2019*

Khulna University of Engineering and Technology (KUET), Bangladesh

- Instructed 8+ courses
- Supervised several undergraduate thesis
- Developed curriculum to provide short training courses on Renewable Energy

Course instructor: Circuit theory I & II, Analog Electronics I & II, Control System and Engineering, Digital Electronics, Physics and Models of Semiconductor Devices, Optoelectronic Devices

Lab instructor: Digital Electronics, Electronics-I & II, Control system and Engineering, Electrical Machine, Fundamentals of Electrical Circuits

Lecturer| Department of Electrical and Electronic Engineering *August 2014- August 2017*

Khulna University of Engineering and Technology (KUET), Bangladesh

- Instructed 4+ courses
- Supervised several undergraduate Projects
- Developed curriculum to provide short training courses on Renewable Energy

Course instructor: Circuit theory I & II, Analog Electronics I & II, Control system and Engineering, Digital Electronics,

Lab instructor: Digital Electronics, Electronics-I & II, Control system and Engineering, Fundamentals of Electrical Circuits

- **Mentored Student**

  Mentored students, instructed and evaluated grades for electrical engineering-related courses, monitoring research projects, perform any other work assigned by the department chair.

Maintenance Engineer | Department of Electrical and Electronic Engineering *January 2014- August 2014*

Khulna University of Engineering and Technology (KUET), Bangladesh

Establishment of High Voltage Lab Project, Department of EEE, Khulna University of Engineering & Technology (KUET), Khulna, Bangladesh

Graduate Research Assistant | Graphene and related 2D material (Part-time) *July 2016 – April 2018*

Khulna University of Engineering and Technology (KUET), Bangladesh

- **Developing analytical model to quantify phonon properties of 2D material**

  I worked on analytical modeling, particularly developing a versatile model to quantify the electronic and vibrational (phonon) properties of 2D material like Graphene, TDMC (Two-dimensional metal dichalcogenides), and carbon nanotubes; which was still a challenging task to researchers around the world.

Undergraduate Research Assistant | Digital Signal Processing Lab (Part-time) *May 2012 – August 2013*

Khulna University of Engineering and Technology (KUET), Bangladesh

- **EEG signal processing for developing Brain-Computer Interface (BCI) Technology**

  We developed a brain-computer interface (BCI) technology that can help users to input any command in the graphical user interface. The system is based on the steady-state visual evoked potential (SSVEP). To ensure universal applicability, a system with three fixed positioned electrodes for reducing user variation on system performance has been proposed. The attractive features of the system are noninvasive signal recording, little training required for use, higher information transfer rate (ITR), and higher accuracy in living environments

FUNDED RESEARCH PROPOSAL WRITING

Grant Activity - neither PI or Co-PI

Piezoelectric and triboelectric nanogenerators: an enabling green energy technology

As a PhD student I have developed the idea and helped in writing the proposal. The proposal was accepted and funded by Natural Sciences and Engineering Research Council of Canada(NSERC) (grant no: CRDPJ514858-17) and Shimco North America Inc., Cambridge, Ontario, Canada. Awarded $300K

Exploiting perovskite materials for new functions:

As a PhD student I have developed the idea and helped in writing the proposal. The proposal was accepted and funded by Ontario Centers of Excellence (OCE) (grant no.: VIPII-28314), and University of Waterloo (grant no:10001-10643). Awarded $340K

Nanogenerator for Intelligent Sound Monitoring and Identification System with Deep Learning Technique

As a Post-Doc I have developed the idea and helped in writing the proposal. The proposal was accepted and funded by National Research Council (NRC), Canada (grant no: 51001-10058), Awarded $180K

PUBLICATIONS

Peer-Reviewed Journals

12. Resul Saritas *, Majed Al-Ghamdi, Taylan Das, Omar Rasheed, Samed Kocer, Ahmet Gulsaran, Asif Abdullah Khan, **Md. Masud Rana**, M.E. Khater, Muhammed Kayaharman, Dayan Ban, Mustafa Yavuz, Eihab Abdel-Rahman " Nano Groove and Prism Structured Triboelectric Nanogenerator " **Micromachines**, **2023, 14(9), 1707**
11. Majid Haji Bagheri, Asif Abdullah Khan, Shamaila Shahzadi**, Md Masud Rana**, Soyaeb Hasan and Dayan Ban "Advancements and Challenges in Molecular/Hybrid Perovskites for Nanogenerator Application: A Comprehensive Review " **Nano Energy**, **(under review: NANOEN-D-23-02373)**
10. Asif Abdullah Khan*****, **Md Masud Rana***, Sasa Wang, Md Fahim Al-Fattah, Muhammed Kayaharman, Kaiping Zhang, Shawn Benedict, I.A. Goldthorpe, Y. Norman Zhou, Edward H. Sargent, Dayan Ban " Control of Halogen Atom in Inorganic Metal-Halide Perovskites Enables Large Piezoelectricity for Electromechanical Energy Generation" **Small**, **2023, 202303366** (***authors contributed equally)**
9. **Md Masud Rana**, Asif Abdullah Khan, Weiguang Zhu, Md Fahim Al Fattah, Sathursan Kokilathasan, Shazzad Rassel, Rozenn Gautheron-Bernard, Soraya Ababou-Girard, Pascal Turban, Shuhong Xu, Chunlei Wang, and Dayan Ban " Enhanced Piezoelectricity in Lead-free Halide Perovskite Nanocomposite for Self-Powered Wireless Electronics" **Nano Energy**, **101, 2022, 107631.**
8. Nicolas R. Tanguy*, **Md. Masud Rana***, Asif A. Khan, Xiao Zhang, Nicole Tratnik, Heyu Chen, Dayan Ban, and Ning Yan, " Natural lignocellulosic nanofibrils as tribonegative materials for self-powered wireless electronics." N**ano Energy**, **98, 2022, 107337. (*authors contributed equally)**
7. Weiguang Zhu, Asif Abdullah Khan, **Md Masud Rana**, Rozenn Gautheron-Bernard, Nicolas R. Tanguy, Ning Yan, Pascal Turban, Soraya Ababou-Girard, Dayan Ban, "Poly(vinylidene fluoride)-Stabilized Black γ-Phase CsPbI3 Perovskite for High-Performance Piezoelectric Nanogenerators" **ACS Omega, 2022, 7, 12, 10559–10567.**
6. Asif Abdullah Khan, Resul Saritas, **Md Masud Rana**, Nicolas Tanguy, Weiguang Zhu, Nanqin Mei, Sathursan Kokilathasan, Shazzad Rassel, Zoya Leonenko, Ning Yan, Eihab Abdel-Rahman, Dayan Ban, "Performance-Improved Highly Integrated Uniaxial Tristate Hybrid Nanogenerator for Sustainable Mechanical Energy Harvesting" **ACS Applied Materials & Interfaces**, **(2022)**, **3,14, 4119–4131.**
5. MD FAHIM AL FATTAH, Asif Abdullah Khan, Hossein Anabestani, **Md Masud Rana,** SM Shazzad Rassel, Joel Therrien and Dayan Ban, "Sensing of Ultraviolet Light: A Transition from Conventional to Self-powered Photodetector" **Nanoscale**, **(2021), 13, 15526-15551.**
4. Asif Abdullah Khan, Guangguang Huang, **Md Masud Rana**, Nanqin Mei, Margherita Biondi, Shazzad Rassel, Nicolas Tanguy, Bin Sun, Zoya Leonenko, Ning Yan, Chunlei Wang, Shuhong Xu, Dayan Ban, "Superior Transverse Piezoelectricity in Organic-Inorganic Hybrid Perovskite Nanorods for Mechanical Energy harvesting" **Nano Energy**, **(2021), 86, 2021, 106039.**
3. G Huang, A. A. Khan, **M. M. Rana**, C. Xu, S. Xu, R. Saritas, S. Zhang, E. A-Rahman, P. Turban, S. A-Girard, C. Wang and D. Ban, "Achieving Ultrahigh Piezoelectricity in Organic-Inorganic Vacancy-Ordered Halide Double Perovskites for Mechanical Energy Harvesting", **ACS Energy Letter**, **(2020), 6, 16-23.**
2. **Md Masud Rana**, Asif Abdullah Khan, Guangguang Huang*, Nanqin Mei, Resul Saritas, Boyu Wen, Steven Zhang, Peter Voss, Eihab Abdel-Rahman, Zoya Leonenko, Shariful Islam, and Dayan Ban, "Porosity Modulated High-Performance Piezoelectric Nanogenerator Based on Organic/Inorganic Nanomaterial for Self-Powered Structural Health Monitoring", **ACS Appl. Mater. Interfaces, (2020), 12, 42, 47503–12.**
1. Asif Abdullah Khan, **Md Masud Rana**, Guangguang Huang, Nanqin Mei, Resul Saritas, Boyu Wen, Steven Zhang, Peter Voss, Eihab-Abdel Rahman, Zoya Leonenko, Shariful Islam, Dayan Ban, "Maximizing piezoelectricity by self-assembled highly porous perovskite–polymer composite films to enable the internet of things", **Journal of Material Chemistry A**, **(2020), 8, 27, 13619-1362**

Conference Proceedings

10. K. Habashy, J. Li, **M. M. Rana**, M. H. Bagheri A. A. Khan, M. H. Bagheri, G. Xiao, P. Xi and D. Ban, " Urban Sound Classification Using Acoustic Triboelectric Nanogenerators ", IEEE SENSORS 2023, October 29 - November 1, Vienna, Austria.
9. **M. M. Rana**, A. A. Khan, M. H. Bagheri, and D. Ban, "Doping Engineering Towards Stable Lead-Free Flexible Piezoelectric Nanogenerator for Self-Powered Wireless Electronics", 20th Canadian Semiconductor Science and Technology Conference (CSSTC), August 2023, Montreal, Canada.
8. **Md. Masud Rana***, Nicolas R. Tanguy*, Asif A. Khan, Xiao Zhang, Nicole Tratnik, Heyu Chen, Dayan Ban, and Ning Yan, "Wood-Derived Lignocellulosic Nanofibrils Based Triboelectric Nanogenerator for Electronic Integration", 2022 MRS Fall Meeting & Exhibit, Boston, Massachusetts, USA
7. **Md Masud Rana**, Asif Abdullah Khan, Weiguang Zhu, Md Fahim Al Fattah, Sathursan Kokilathasan, Shazzad Rassel, Shuhong Xu, Chunlei Wang and Dayan Ban, "Lead-Free FASnBr3/PDMS-Based Flexible Piezoelectric Nanogenerator for Self-Powered Wireless Electronics", 2022 MRS Fall Meeting & Exhibit, Boston, Massachusetts, USA
6. **Rana, M. M**; Khan, A. A; Huang, G; Mei, N; Saritas, R; Wen, B; Zhang, S; Voss, P; Rahman,E. A; Leonenko, Z; Islam, S; Ban, D; "Organic-Inorganic Nanomaterials Based Piezoelectric Nanogenerator for Self-Powered Structural Health Monitoring", Materials Research Society, Boston, Massachusetts, USA, 2021
5. Khan, A. A; **Rana, M. M**; Huang, G.; Zhang, S; Ban, D, "Highly Piezoelectric Organic-Inorganic Hybrid Vacancy-Ordered Double Perovskite for Energy Harvesting", Materials Research Society, Boston, Massachusetts, USA, 2021
4. Khan, A. A; **Rana, M. M**; Huang, G; Mei, N; Saritas, R; Wen, B; Zhang, S; Voss, P; Rahman,E. A; Leonenko, Z; Islam, S; Ban, D, "A NOVEL PEROVSKITE-POLYMER COMPOSITE PIEZOELECTRIC FILM: FROM CRYSTAL GROWTH TO IOT APPLICATION", Materials Research Society, Boston, Massachusetts, USA, 2021
3. Md. Rasidul Islam; **Md. Masud Rana;** A. S. M. Jannatul Islam, "Electronic and Vibrational Properties of Single Layer Transition Metal Dichalcogenides (TMDC)", 2017 2nd International Conference on Electrical & Electronic Engineering (ICEEE), IEEE, Bangladesh, 2018

2. Azom M. A., **Rana M. M**., Ahmad M., " "Design and implementation of a user independent SSVEP based brain-computer interface with high transfer rates", International Conference on Informatics, Electronics & Vision (ICIEV), 2013, Dhaka, Bangladesh.", ICIEV

1. Islam M. M., **Rana M. M**., Mitul A. F., Khan M. M. A., Talukder A., Reja M. I., Sarker, N., Hoque M. N., Hazari N.A., ""Microcontroller based power inverter for grid connected PV system", International Conference on Green and Ubiquitous Technology (GUT), 2012, Jakarta, Indonesia. ", GUT,

Book Chapter

1. **M. M. Rana**, A. A. Khan and D. Ban, Optoelectronic Organic-Inorganic Semiconductor Heterojunctions, ISBN:9781000325713, CRC Press, Taylor & Francis, 2020
   https://www.amazon.ca/s?k=9781000325713&i=stripbooks&linkCode=qs

Patent application

1. Dayan Ban, Asif Abdullah Khan, **Md Masud Rana**, Guangguang Huang, Steven Zhang, Shariful Islam and Peter Voss "Piezoelectric composite film and method for making the same" US Patent, PCT/CA2021/050892

Name of the course (PG &UG)	Course contents (partial)	Credit
Physics, and Models of Semiconductor Devices	Energy bands, Carrier statistics and Fermi level, p-n junctions, MOSFET. Few optoelectronic devices such as LED, Diode, and Laser.	3.0
Optoelectronics	Optical properties of semiconductors, band gaps, properties of light, LEDs, Stimulated emission and Lasers, Photodetectors, solar cells, light modulation, and integrated optics.	3.0
Fabrication in the Nanoscale: Principles, Technology, & Applications	Overview of micro-fabrication. Lithography, thin film deposition, etching. High resolution photon-based lithography. Deep UV lithography with resolution enhancement technology, interference lithography, two-photon lithography. Extreme UV (soft x-ray) lithography and x-ray lithography. Electron beam lithography. Nano-patterning by focused ion beam (FIB). Nanoimprint lithography (NIL). Thermal NIL, UV-curable NIL, resist, alignment, mold fabrication. Soft lithography and self assembly.	3.0
Special Topics in Solid State Devices	Vacuum and Plasma Processes, Thin films and Deposition Processes, Plasma Etching Processes, Fabrication of Nanostructures, Limits of Optical Lithography, Nano-patterning, Transistor Fabrication and CMOS, Fabrication of Thin Film Devices, Nanoelectronics Device Fabrication	3.0
Electronics-I (UG)	introduction to semiconductors, p-n junction, diodes circuit analysis, and adders. Bipolar Junction Transistors and related analysis. Field Effect Transistors and related analysis.	3.0
Electronics-II (UG)	Frequency response of the amplifier. Operational amplifier and related analysis. Negative feedback and filters. Different types of signal generators.	3.0
Control System & Engineering (UG)	Steady-state response, poles and zeros, frequency response from pole-zero diagram, Routh's stability criterion; block diagrams, canonical forms, transfer functions and signal flow graph, root locus, frequency response, gain and phase margins, Nyquist's stability criterion, phase lead and lag compensator design using root locus and bode diagram. P, PI, PD and PID Controller, their applications in control system design.	4.0
Digital Electronics (UG)	Number systems and codes, digital logic circuits, simplification of logic expressions, classification of logic systems, sequential logic systems.	4.0

Electrical Circuit-I (UG)	Basic concept: Charge, current, voltage, power, energy. Circuit elements. DC analysis. Kirchhoff's laws, Circuit solving theories, Energy storage elements (LC), AC circuit analysis, Magnetic circuits, and concepts	3.0
Electrical Circuit-II (UG)	Review of single-phase steady state AC circuit analysis, Network theorem applied to AC circuit analysis, Polyphase circuits, Two ports networks, filters.	3.0

TECHNICAL & PERSONAL SKILLS

Fabrication of Energy harvester, and Photovoltaic: UV photolithography, contact mask aligner, Reactive Ion Etching (RIE), Wet Chemical Etching, thin film deposition of Ti, Au, SiO2, SiN, Al2O3 by sputtering and thermal, wafer lapping, cleaving, mounting, bonding

Characterization: Nano/Micro material-based device: CV, I-V, laser, electroluminescence, Photoluminescence, UV-VIS, PCE, open-circuit voltage, short circuit current, Power, Keithly-4200.

Imaging of device/ nanomaterials: Scanning Electron Microscopy (SEM), DIC microscope, Energy Dispersive X-ray Spectroscopy (EDS), Focused Ion Beam (FIB), Rapid Thermal Annealing (RTA), AFM, PFM, KPFM, FTIR

Design and Simulation: Design hybrid energy harvester by cascading individual layer and validate by using COMSOL Multiphysics platform.

Computer Skills: MATLAB, LabVIEW, C/C++, PSPICE, SolidWorks, Visual Basic, Excel Macro, quantum expresso, virtual nano lab, VESTA, Origin.

Others: Familiar with machine shop, filling, drilling, soldering, and common lab equipment. Optical assembly, Lens, Polarizer, power attenuator, collimator, optical filter. Cryostat, controllers, power sources, signal generators, Arduino prototype.

Operating System: Windows, Linux

Language Proficiency: Bangla (Bangladesh, Native); English (Proficient)

STANDARDIZED TEST

International English Language Testing System (IELTS) *December 2020*

Overall: 7; Listening: 7.5; Reading: 6.5; Writing: 6.5; Speaking: 7

SCHOLARSHIPS/AWARDS

- **Faculty of Engineering Awards (FOEs), University of Waterloo, Canada** October 2022

  https://uwaterloo.ca/electrical-computer-engineering/graduate-students/awards-and-funding

- **Waterloo Institute for Nanotechnology Nanofellowship, University of Waterloo, Canada** June 2022

  The Nanofellowships are awarded to top graduate students pursuing nanotechnology research at the University of Waterloo. These prestigious fellowships valued at $10,000 each are awarded to outstanding graduate applicants and current MSc and Ph.D. students at the University of Waterloo

https://uwaterloo.ca/institute-nanotechnology/funding-and-awards/nanofellowships

- **Faculty of Engineering Awards (FOEs), University of Waterloo, Canada** June 2022

  https://uwaterloo.ca/electrical-computer-engineering/graduate-students/awards-and-funding

- **University of Waterloo Graduate Scholarship Award, Dept. of ECE** February 2022

  This award valued at 2,000 CAD is provided to the top graduate students based on their research accomplishments in the past 12 months.

- **Waterloo Institute for Nanotechnology Nanofellowship, University of Waterloo, Canada** June 2021

  The Nanofellowships are awarded to top graduate students pursuing nanotechnology research at the University of Waterloo. These prestigious fellowships valued at $10,000 each are awarded to outstanding graduate applicants and current MSc and Ph.D. students at the University of Waterloo

  https://uwaterloo.ca/institute-nanotechnology/funding-and-awards/nanofellowships

- **Faculty of Engineering Awards (FOEs), University of Waterloo, Canada** February 2021

  https://uwaterloo.ca/electrical-computer-engineering/graduate-students/awards-and-funding

- **Graduate Research Studentship (GRS), University of Waterloo, Canada** May 2019- April 2023

  https://uwaterloo.ca/human-resources/support-managers/payroll/graduate-research-studentship-vs-graduate-research

- **International Doctoral Student Award (IDSA), University of Waterloo, Canada** May 2019- April 2023

  https://uwaterloo.ca/graduate-studies-postdoctoral-affairs/awards/international-doctoral-student-award-idsa

- **Faculty Dean's Award, KUET, Khulna, Bangladesh** April 2010-September 2013

  Dean's Award recipients are the top undergraduate students with a grade point average of higher than 3.75/4.00 in each term of their study.

- **Technical Scholarship, KUET, Khulna, Bangladesh** April 2010-September 2013

  KUET Technical Scholarship is provided to support pursuing the undergraduate program based on student's excellency

- **Education Board Scholarship, Bangladesh** July 2009- September 2013

  This scholarship is awarded to the students who demonstrated outstanding performance nationwide in the Higher secondary certificate examination

- **Education Board Scholarship, Bangladesh** July 2007- June 209

This scholarship is awarded to the students who demonstrated outstanding performance nationwide in the Secondary School certificate examination

- **Dutch Bangla Bank Merit Scholarship, Bangladesh** July 2009- September 2013

  This scholarship is awarded to the students who demonstrated outstanding performance nationwide in the Higher secondary school certificate examination

- **Dutch Bangla Bank Merit Scholarship, Bangladesh** July 2007- June 2009

  This scholarship is awarded to the students who demonstrated outstanding performance nationwide in the Secondary School certificate examination.

- **Osman Goni Sarder Foundation Scholarship, Bangladesh** July 2007- June 2009

  This scholarship is awarded to the students who demonstrated outstanding performance

  from our local high school (grade 6 to 12)

MEMBERSHIP AND AFFILIATION

- Student Member, Institute of Electrical and Electronics Engineers (IEEE) (ID: 96960798)
- Member, The Institution of Engineers, Bangladesh (IEB), (ID: A/17974)

LEADERSHIP AND VOLUNTEER

Alongside academic and research life I continued my practice in volunteering and leadership activities.

- Mentor of Hardware Acceleration Club of KUET (HACK), KUET
- Member and later Mentor of Math club and KUET Programming club where I trained aspired students on embedded systems, solving critical math problems, programming problems in order to prepare them for national and international level competitions.
- As a sports lover, I used to participate in Inter-University tournaments, especially in volleyball and cricket. I can remember my role as a cricket team captain to win the runners up trophy,
- organizing member of our technical project showcasing “Tech-Fiesta’12, 16,18”, IEEE sponsored conference “EICT-2013,2015,2017, 2019”,
- Dr. M. A. Rashid Rahman Hall Dining manager, KUET, Bangladesh, and many more.

  These were very helpful to learn new skills and most importantly to take responsibility for the community.

PhD and Post Doc supervisor

- Dr. Dayan Ban, Professor, Electrical and Computer Engineering, University of Waterloo, dban@uwaterloo.ca, Phone: 519-888-4567 x37467

PhD committee member and research collaborator

- Dr. Eihab Abdel-Rahman, Professor, System Design and Engineering, University of Waterloo, eihab@uwaterloo.ca, Phone: 519-888-4567 x37737

Ex-Colleague and research mentor at University of Waterloo, Canada

- Dr. Shazzad Rassel, Assistant Professor, Electronics Engineering, Fairmont State University, West Virginia, USA, srassel@fairmontstate.edu, Phone: 403-402-9713

Ex-Colleague and research mentor at Khulna University of Engineering and Technology, Bangladesh

- Dr. Md. Golam Kibria, Professor, Chemical Engineering, University of Calgary, md.kibria@ucalgary.ca, Phone: 403.338.3320

M.Sc Supervisor, class teacher and later Ex-Colleague at Khulna University of Engineering and Technology, Bangladesh

- Dr. Md. Sherajul Islam, Professor, Electrical and Electronic Engineering, Khulna University of Engineering & Technology, Bangladesh, sheraj_kuet@eee.kuet.ac.bd, Phone: +880-41-769471~5, Ext. 314

Statement of research accomplishments and future plans

- **Research accomplishments**

I would like to take this opportunity to explain how I intend to continue my work in the future position at University of Texas at Tyler (UT Tyler). My proposed endeavor is to continue research and development on self-powered energy-harvesting systems to develop battery-less Internet of Things (IoT) devices integrated with wireless sensor network (WSN) technology with applications in medicine, agriculture, and environment monitoring. I hope this research statement will serve to illustrate my plans for how I intend to build upon my past work for the benefit of future society.

My academic record throughout the undergraduate study was excellent and stood first in the class in a few terms, which ended up by retaining myself within the top 1% of students of the class. During the four-year-long engineering study, I have covered many basic courses on Semiconductor device and Physics, Electronics, Engineering material, and advanced course of communication. In my sophomore year, the most profound thing happened in the "Electrical Engineering Materials" course when Prof. Sherajul Islam spoke in the class "how the paradigm shift of a civilization comes along with the innovation in material science"; this quickly triggered a sense of enthusiasm which ultimately culminated into greater interest for material science and ended up joining Professor Islam's diverse research group.

I graduated from Khulna University of Engineering and Technology in 2013 with a B.Sc. and in 2018 with an M.Sc. in Electrical and Electronic Engineering, which is one of the leading engineering universities in Bangladesh. I served as a lecturer in the Department of Electrical and Electronic Engineering at Khulna University of Engineering and Technology, Khulna, Bangladesh from August 2014 to August 2017 and later promoted to Assistant Professor and served until April 2019. I taught courses, such as "Semiconductor Device and Technology", "Engineering Materials", which have extended my knowledge to conduct research in my field of interest. Also, I skilled up with theoretical knowledge of semiconductor material physics and device technology, and hands-on experience with design tools. I moved to Canada in April 2019 with the prestigious University of Waterloo Graduate Research Studentship (GRS) Scholarship and International Doctoral Student Award (IDSA) (C$160,000) to conduct research on developing self-powered wireless electronics based on organic-inorganic hybrid materials-based energy harvester.

As material growth and fabrication had limited opportunities in a developing country like Bangladesh, during my master's (January 2015-May 2018), I worked on analytical modeling, particularly developing a versatile model to quantify the electronic and vibrational (phonon) properties of 2D material like Graphene, TDMC (Two-dimensional metal chalcogenides), and carbon nanotubes; which was still a challenging task to the researchers around the world. While solving the critical problems in research, I worked hand to hand with mathematicians, chemists,

physicists, and engineers, conceiving the fruitfulness of trans-disciplinary participation to promote new knowledge contribution.

Furthermore, rather than confining myself in a very narrow research barrier, concurrently I got involved with other research projects as well - graphene field-effect transistors (GFET), Microcontroller based power inverter design for the grid-connected PV system, etc. My multitasking competence, collaboration, and thoroughness resulted in a few full-length publications in IEEE conferences in Bangladesh, India, and Indonesia.

However, until now, my firm resolution of contributing to humankind through new and exciting research endeavors intangibly lacked in-depth experimental work. From there onwards, fascinated by the cutting edge research at the intersection of material science and renewable energy in Prof. Dayan Ban's laboratory, University of Waterloo (UW), I choose to pursue a Doctor of Philosophy (Ph.D.) study in Electrical and Computer Engineering (ECE), devoting myself deeply into assigned project-energy harnessing using ubiquitous contact electrification and piezoelectric effect of materials and efficiently deploying those devices to realizing self-powered electronics/micro/nanosystems. Rapidly I was certified with most of the fabrication and characterization tools carefully designed and modified my research project. From the result of my hard work and dedication, I was appointed as a team leader of this multicultural project, which was in collaboration with a top Canadian aerospace defense industry, Shimco North America Inc. As I always groomed myself in a broad spectrum of extracurricular activities from the start, I adapted quickly to conduct this professional responsibility. This was a thrilling experience for me in generating fundamental knowledge and turning it into commercial products through leadership, which is fueling the momentum of change. As a team leader of the project, I trained three students and set up most of our device testing laboratory from scratch, expanded our collaboration networks, where Prof. Wang's research group at Georgia Tech, USA (pioneer group in energy harvesting research) is worth to be mentioned. I have published 12 journal articles and 9 conference proceedings where I have significant number of citations on google scholar proving my works are recognized by scientist all over the world. Moreover, my research findings have been filed in one US provisional patent application entitled "Piezoelectric composite film and method for making the same". Considering my excellent progress in graduate courses and research work, I was granted with Waterloo Institute for Nanotechnology Nanofellowship (two times, worth $20,000) one of the most prestigious awards at UW, faculty of engineering award (FOE) (5 times, worth $10,000) University of Waterloo Graduate Scholarship Award, etc.

I have designed and fabricated a high-performance piezoelectric nanogenerator, which can respond to any mechanical triggering and generate enough output power to drive a wireless node to transmit sensing information to the receiver. This work can enable a brand-new era of self-powered wireless devices/systems for structural health monitoring in aerospace, automobiles, and self-powered wearable/implantable electronics such as a cardiac pacemaker, wearable watches, etc.

Later, I have designed a self-assembled, highly porous perovskite/polymer (polyvinylidene fluoride (PVDF) in this case) composite film for fabricating high-performance piezoelectric nanogenerators (PNGs). Using these highly-efficient perovskite/polymer PNGs, sufficient power is obtained to run a self-powered integrated wireless electronic node (SIWEN). The PNGs application was then extended to real-life scenarios including wireless data communication between the nanogenerators and personal electronics, efficient energy harvesting from automobile vibrations, and also from biomechanical motion. This P-PNG based on a low-temperature full-solution synthesis approach may initiate a paradigm shift by opening the realms of flexible PNGs as sustainable power sources.

To harvest low frequency ambient mechanical energy more efficiently, we then proposed a highly integrated hybridized piezoelectric-triboelectric-electromagnetic (tristate) nanogenerator in a uniaxial structure. This work will be a superior solution for harvesting low-frequency ambient energies by improving the performance of hybrid nanogenerators, potentially curtailing the technology gap for self-powered micro/nanosystems for the Internet of Things.

- **Future research plan at UT Tyler**

Currently, science is evolving at a breathtaking pace. In the future at UT Tyler, I intend to continue my research to explore the depths in order to transform self-powered technology from laboratory research into a real product that can revolutionize the electronics and energy sectors. The duty of the leaders in research is not limited only to leading their projects in such a way as to have an impact not only on mankind but relies on effective policy-making issues so that the society's greater interest is served for a better tomorrow.

In the future, the aim of my research is intended to design and fabricate a multi-functional energy harvesting platform by integrating different types of harvesters into a single unit. The system utilizes novel organic-inorganic hybrid halide perovskite nanomaterials with unique material properties, where several energy sources can be leveraged either simultaneously or individually, making it possible to use whatever energy is available at any time. Nevertheless, it is pragmatic to consider the proposed hybrid energy scavenging platform as it may have the scope to further open up new horizons by providing superior energy solutions on a sustainable basis.

This future research at UT Tyler will start with an in-depth theoretical and experimental investigation on preparing high-performance energy materials. So, during the first phase of this research, the performance of the individual nanogenerators will be improved by synthesizing organic-inorganic hybrid mesoporous composite nanomaterial such as Poly (vinylidene fluoride-co-trifluoroethylene) (PVDF-TrFE) with the heterogeneous perovskite nanocrystals, for example, Methylammonium Tin halides, Formamidinium Tin halide, etc. Since the porosity together with

the composite electroactive nanomaterial possesses immense potential in enhancing ferroelectric polarization and surface charge density via intensifying charge trapping capability upon mechanical excitation; however, at the same time not sacrifice the material flexibility. Another degree of freedom is provided by the temperature-dependent polarization in these material systems by harvesting thermal energy, which requires more careful investigation.

During the second phase, the focus should be more pointed towards reliable device fabrication by utilizing the state-of-the-art nanofabrication techniques for controlling the surface morphology, leakage current reduction via developing efficient electron blocking layer, conductive polymer fabrication like PEDOT: PSS to surpass the stiffness margin imposed by the inorganic electrode material and reliable device integration through lithography techniques.

At the final stage, performance evaluation of the devices will be carried out in terms of sensing, output power density, load driving capabilities, energy conversion efficiency, charging characteristics, etc. by comparing with the existing hybrid technologies and then the stability of an array of such devices will be investigated both in the laboratory and also in a practical context. Together with the advanced nanofabrication facilities in the research laboratory at UT Tyler, and financial support from the government project and the University of Texas System Science and Technology Acquisition and Retention program, I will develop robust nanogenerator testing tools including an electrodynamic shaker for generating a wide range of mechanical stimulation, linear pushing tester, low noise current, and voltage measuring equipment, etc. The energy storage, management, and the universal low power wireless node for the individual energy harvesters have already been successfully demonstrated by me and further optimization is in progress for the multimodal approach.
Apart from my core research, I would like to conduct research in collaboration with industries to solve real-life problems by integrating energy harvesters to build a battery-less self-powered system.

I will continue my volunteer work with the Institute of Electrical and Electronics Engineers (IEEE) and other non-profit organizations. In UT Tyler, I would like to be an active volunteer. I would like to contribute my engineering experience and education to the students for sustainable technological advancement. I am also interested in working with advanced self-powered electronics and structural health monitoring of aerospace systems, automobiles, and battery management systems.

I hope that this information helps you further understand my proposed endeavor at UT Tyler, and why my future work will be beneficial to the nation. Thank you for taking the time to review this statement and my application.

Statement of Teaching Philosophy

I found myself privileged to obtain diverse work experience in academia since 2014. After my graduation, I joined as a Lecture at the Khulna University of Engineering & Technology, Bangladesh, and worked for more than four years. At this international university, I had the experience of teaching and mentoring native students along with students from 5-6 different countries. Such diverse experiences gradually enriched my realization and approach toward developing my classroom teaching philosophy.

Teaching Philosophy

I always put my highest priority to recognize the needs of my students. When I understood those learning needs and teaching requirements, I could better design my teaching materials and methods. I strongly believe that only a well-equipped lecture is not enough for a student to fully understand a subject matter; rather it is extremely necessary to interreact with students, provide variety in teaching tools, and establish a strong feedback system between the instructor and students to continuously improve the classroom learning process. I focus on creating a collaborative knowledge-making classroom environment.

Teaching practice

At the beginning of teaching a course, I always motivated my students by introducing the real-life applications of the subject matter. I connected the content of the subject to the real-life applications through stories and experiences which easily made them enthusiastic and sensitive to learning. I tried to engage my students into small talks, group discussions, round table critical discussions, and project-based tasks, which encouraged them to share their learning experiences and improve their independent learning capabilities. I believe that the more they engaged, the better they learned about any subject matter.

Teaching development

I always monitored the development of my students by establishing an evaluation system through quizzes, questionnaires, short and oral performances, as well as from the feedback of the Teaching Assistants, who reported the struggles/inquiries of the students about the classes. As much as I monitored the performance of an individual student or a group of students, I also monitored and improved my teaching tools by addressing the concerns and struggles of the students. For example, when I noticed that a student or a group of students were performing poorly, I used to talk to them, find the causes of their struggle, and immediately attend to them with available resources, continuing to help them. From my teaching experiences, I found that small efforts to assist a challenged student can boost their confidence and eventually enhance their learning process and abilities.

Teaching tools

I used to employ a web portal along with a phone application as a feedback system and an electronic placeholder where students could connect, share their learning experiences, ask questions, and discuss the subject content. Introducing an Android or iPhone app as a feedback media was an easy and readily accessible platform for connecting with students.

Evidence of teaching ability

I have **four and a half** years of classroom teaching experience in undergraduate level at the Khulna University of Engineering & Technology, Bangladesh, **four** years of tutoring experience in the undergraduate level with more than 10 courses as a TA, and a lab instructor at the University of Waterloo, Canada. I am confident to conduct classes both in-person, online, and in hybrid mode. Below, I briefly described my teaching experiences, a sample course outline, and a letter of reference of my teaching ability.

1. Teaching Experience as Instructor, Khulna University of Engineering & Technology, Bangladesh

Name of the course	Course contents (partial)	Credit
Electrical Circuit-I	Basic concept: Charge, current, voltage, power, energy. Circuit elements. DC analysis. Kirchhoff's laws, Circuit solving theories, Energy storage elements (LC), AC circuit analysis, Magnetic circuits, and concepts	3.0
Electrical Circuit-II	Review of single-phase steady state AC circuit analysis, Network theorem applied to AC circuit analysis, Polyphase circuits, Two ports networks, filters.	3.0
Electronics-I	introduction to semiconductors, p-n junction, diodes circuit analysis, and adders. Bipolar Junction Transistors and related analysis. Field Effect Transistors and related analysis.	3.0
Electronics-II	Frequency response of the amplifier. Operational amplifier and related analysis. Negative feedback and filters. Different types of signal generators.	3.0
Control System & Engineering	Steady-state response, poles and zeros, frequency response from pole-zero diagram, Routh's stability criterion; block diagrams, canonical forms, transfer functions and signal flow graph, root locus, frequency response, gain and phase margins, Nyquist's stability criterion, phase lead and lag compensator design using root locus and bode diagram. On-off, fuzzy, P, PI, PD and PID Controller, their applications in control system design, introduction to programmable logic controllers (PLC), temperature, position and speed control systems.	4.0
Digital Electronics	Number systems and codes, digital logic circuits, simplification of logic expressions, classification of logic systems, sequential logic systems.	4.0
Semiconductor Devices	Energy bands, Carrier statistics and Fermi level, p-n junctions, MOSFET. Few optoelectronic devices such as LED, Diode, and Laser.	3.0
Optoelectronics	Optical properties of semiconductors, band gaps, properties of light, LEDs, Stimulated emission and Lasers, Photodetectors, solar cells, light modulation, and integrated optics.	2.0

2. Teaching Experience as Lab Instructor, Khulna University of Engineering & Technology, Bangladesh

Name of the course	Course contents (partial)	Credit
Linear circuit	Analysis of linear circuits, current and voltage, Ohm's law, Kirchhoff's Laws, power and energy, series circuit, parallel circuit, Thevenin and Norton's equivalent circuit.	1.5
Electronics-I and II	PN junction diode characteristics, Zener diode characteristics and voltage regulator, halfwave and fullwave rectifier, transistor characteristics, Frequency response of operational amplifier, UJT, FET, bipolar junction transistor, MOS-FET.	1.5
Digital electronics	Digital logic circuits, gates (AND, OR, NOT, NAND and more) and latches, D flip-flops, JK flip-flops, half/full adder/subtractor, encoder/decoder, counters, shift	1.5

	registers, sequence generator, Demorgan's theorem, 3-bit adder project, multiplexers.	
Electricity and Magnetism	Electrostatics; electric field, flux, Gauss's Law, potential and potential energy. Capacitors; dielectric, capacitance, electric energy storage. Resistors; charge flow, current, resistance. Magnetostatic; magnetic force, magnetic fields, Ampere's Law. Inductors; magnetic flux, inductance, magnetic materials, magnetic energy storage.	1.5
Control system Engineering	Based on the theory of control system engineering course mentioned above	1.5

3. Tutoring experience as Teaching Assistant

Graduate Teaching Assistant at the University of Waterloo, Canada

- Electromagnetism with Dr. Dayan Ban
- Circuit and Instrumentation with Dr. Ayman El-Hag
- Analog Control System with Dr. Andrew Heunis
- Discrete Mathematics and Logic with Dr. Matthew Harris
- Electromagnetic Field with Dr. John Saad
- Microfabrication with Dr. Bo Cui
- Telecommunication Systems with Dr. Stanko Dimitrov
- Computer Architecture and project studio with Dr. David Lau

4. Program development experience

- Developed curriculum to provide short training courses on Renewable Energy.
- Developed teaching materials, such as syllabi, visual aids, answer keys, and supplementary notes.

5. Active Supervision

Undergraduate supervision

- supervised quite a few undergraduate students' theses.
- supervised a few undergraduate students' Capstone Projects at the University of Waterloo

Co-op students

- Mentored a few co-op students at Prof. Dayan Ban's lab, at the University of Waterloo

Graduate supervision

- Mentored and gave training to a few graduate students for characterizing and developing self-powered piezoelectric nanogenerators.

6. Professional development

Writing improvement

- Improved student's writing ability of journal and conference papers
- Guided, edited, and monitored manuscript content development
- Reviewed initial writing contents and provided comments and suggestions

Proposal writing

- Wrote proposals for Benting PDF fund, NSERC grant, and industrial funding applications

Others

- Managing biweekly group meetings with 8+ members from academic and industry
- Coordinated critical meetings with other lab members, industry partners

- Provided feedback for students' work, papers, and thesis presentation

7. Sample course outline

Below, I am providing a sample course outline that I prepared for a course titled "Electromagnetism-I" that I prepared as a course instructor.

Teaching Evaluation

I achieved close to **Excellent** in the **Faculty Student Appraisal of Teaching** report for the Spring and Fall 2022 semester and Winter 2023 from the University of Waterloo, Canada as shown below. The University of Waterloo is ranked **"#1"** in Canada's top Engineering University program.
Link to the University website: https://uwaterloo.ca//

MD. MASUD RANA
ECE 380 (Analog Control Systems)
Spring 2022
Class enrolment: *255*
Survey participation: *12*

Survey question	5	4	3	2	1	N/A	Average	MSD
Knowledge of course material	6	3	1	0	0	1	4.5	0.45
Organization of material	4	4	0	0	0	3	4.5	0.25
Verbal communication	6	3	1	0	0	1	4.5	0.45
Availability, approachability, responsive	6	4	0	0	0	1	4.6	0.24
Gives correct information	6	3	1	0	0	1	4.5	0.45
Encourages student to think	4	3	1	0	0	3	4.38	0.48
Overall Rating	6	3	1	0	0	1	4.5	0.45
Have you interacted with this TA this term?	**Yes:** 9 **No:** 3							

Helps really well with labs

Masud Rana was mainly responsible for the course labs (this was the major part of the TA effort this term), and also helped with grading the midterm and final exams. Masud was an excellent TA in all respects, and has my hearty recommendation for future TA assignments. Note that I have put N/A for the categories of "Organization of material" and "Encourages students to think" simply because these attributes were not relevant to the tasks which I assigned Masud this term.

MD. MASUD RANA
ECE 198 (Project Studio)
Fall 2022
Class enrolment: *406*
Survey participation: *8*

Survey question	5	4	3	2	1	N/A	Average	MSD
Knowledge of course material	5	1	1	0	0	1	4.57	0.53
Organization of material	5	1	1	0	0	1	4.57	0.53
Verbal communication	5	2	0	0	0	1	4.71	0.2
Availability, approachability, responsive	4	2	0	1	0	1	4.29	1.06
Gives correct information	5	1	1	0	0	1	4.57	0.53
Encourages student to think	5	1	0	1	0	1	4.43	1.1
Overall Rating	5	1	1	0	0	1	4.57	0.53
Have you interacted with this TA this term?	**Yes:** 5 **No:** 1							

Mr. Masud Rana is an excellent TA for the ece 198 project course. He gives specifications into what we need to do for the next steps of our project, and has guided us with specificity and a specific layout on what to follow. Overall, hes made the course a lot more intuitive and a lot better in understanding the concepts.

MD. MASUD RANA
ECE 108 (Discrete Mathematics and Logic 1)
Winter 2023
Class enrolment: *175*
Survey participation: *1*

Survey question	5	4	3	2	1	N/A	Average	MSD
Knowledge of course material	1	0	0	0	0	0	5	0
Organization of material	1	0	0	0	0	0	5	0
Verbal communication	1	0	0	0	0	0	5	0
Availability, approachability, responsive	1	0	0	0	0	0	5	0
Gives correct information	1	0	0	0	0	0	5	0
Encourages student to think	1	0	0	0	0	0	5	0
Overall Rating	1	0	0	0	0	0	5	0
Have you interacted with this TA this term?	**Yes:** 1 **No:** 0							

No comments

Electrical and Electronic Engineering

Course title: Electromagnetism
Course code: TBA
Fall TBA

Instructor: Md Masud Rana
Lecture time: TBA (Three one-hour lectures per week)
Office hours: TBA (Two weekly one-hour slots)
Email: mm4rana@uwaterlool.ca
Office: TBA

1. **Introduction**
   In this course, we will discuss the basic knowledge about electromagnetism, which includes electricity, magnetism, field, potential, circuits, Gauss's law, Faraday's law, Lenz's law, etc. We should have time to introduce the famous Maxwell's equations before the end of the term.
2. **Prerequisite**
   Vector Algebra and coordinate system, vector calculus.
3. **Course outlines**
   We will finish ten chapters from the book mentioned below section. The chapters are the following:

   Electric charges and forces, The electric field, Gauss's law, The electric potential, Electric potential and field, Current and conductivity, Fundamentals of circuits, The magnetic field, Electromagnetic induction, Maxwell's equations

Week	Topic	Due dates
Week 1	Vector algebra and coordinate systems, vector calculus, others	
Week 2	Maxwell's equation and Colomb's Law, Colomb's and Gausses Laws	
Week 3	Electric potential and voltage, Electric dipole and force relation	
	Project proposal	**Announce later**
Week 4	Conductors and dielectric properties	
Week 5	Boundary conditions, Capacitance, and Energy	

Week 6	Poisson's and Laplace's equation	
Week 7	Ohm's law, EMF, Kirchhoff's Law, current boundary conditions and resistance	
	Midterm exam-I	**Announce later**
Week 8	Magnetic forces and Ampere's law, Magnetic dipole and Biot-Savart Law	
Week 9	Vector magnetic potential, magnetic materials	
Week 10	Faraday's Law and displacement current, Time-varying fields and transformers	
	Midterm exam-II	**Announce later**
Week 11	Wave equation and time-harmonic fields, wave propagation and polarization	
Week 12	Plane wave in lossy media, Poynting vector	
Week 13	Wave characteristics on Finite Transmission line	
Week 14	Introduction to Antenna	
	Final Exam	**Announce later**

4. Course material

i. Physics for scientists and engineering (volume 4): A strategic approach by R. D. Knight (second edition) Pearson Addison Wesley.

ii. D. K. Cheng, Field and Wave Electromagnetics, Addison Wesley, 2nd edition, 1992.

5. Marking Scheme

Your final score will be calculated base of this formula: 24% homework +12% labs + 24% quizzes (three in total) + 40% final exam.

Vector Calculus Pretest	5%
Homework	10%
Midterm Exam-I	20%
Midterm Exam-II	20%
Project	10%
Final Exam	35%

6. Exam and evaluation method

a. Homework

Homework will be assigned weekly (due every Thursday). Minimal solutions will be posted with the homework. If you have questions about the homework, please report to the TA or me. Grading for the homework will be both completion and performance-based. 30 % of the homework grade will be completed. 70 % of the grade will be based on your performance on one selected problem.

b. Midterm exam

The midterm exams will be in-class exams. You will be given formula sheets for the exam that are posted on D2L. To motivate studying through proper completion of homework and example problems in the textbook, there will be at least one problem from your homework and one problem from the example problems in your required textbooks on each exam

c. Final exam

The final exam will be a closed-book exam. You will be given formula sheets for the exam. The exam will evaluate students' knowledge and skillset that will be taught throughout the semester. The exam will be held according to the final exam schedule provided by the university.

d. Projects

A written project report shall be submitted on an appropriate, agreed-upon research topic. Your report should be a minimum of 10 pages of typed, double-spaced text. All references should be appropriately cited in the body of the report and compiled at the end in IEEE format. I expect at least ten references, 50% of which should be from scientific and technical journals; the remainder may be made up of books, conference proceedings, and electronic documents (web-based). Plagiarism is a serious act of academic misconduct and will be dealt with appropriately.

7. Reasonable accommodation

Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.

8. Religious holidays

It is the policy of the University to excuse absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required class work that may fall on religious holidays.

PhD supervisor

1. Dr. Dayan Ban, Professor, Electrical and Computer Engineering, University of Waterloo, dban@uwaterloo.ca, Phone: 519-888-4567 x37467

PhD committee member

2. Dr. Eihab Abdel-Rahman, Professor, System Design and Engineering, University of Waterloo, eihab@uwaterloo.ca, Phone: 519-888-4567 x37737

Ex-Colleague and research mentor at University of Waterloo, Canada

3. Dr. Shazzad Rassel, Assistant Professor, Electronics Engineering, Fairmont State University, West Virginia, USA, srassel@fairmontstate.edu, Phone: 403-402-9713

Ex-Colleague and research mentor at Khulna University of Engineering and Technology, Bangladesh

4. Dr. Md. Golam Kibria, Professor, Chemical Engineering, University of Calgary, md.kibria@ucalgary.ca, Phone: 403.338.3320

M.Sc Supervisor, class teacher and later Ex-Colleague at Khulna University of Engineering and Technology, Bangladesh

5. Dr. Md. Sherajul Islam, Professor, Electrical and Electronic Engineering, Khulna University of Engineering & Technology, Bangladesh, sheraj_kuet@eee.kuet.ac.bd, Phone: +880-41-769471~5, Ext. 314