

NAHIAN IBN HASAN

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IN, USA \diamond Cont: 7652501626

EDUCATION

- Ph.D. Candidate, Electrical and Computer Engineering 2021-2024
Purdue University, WL, USA
- M. Sc., Electrical and Computer Engineering 2021-2022
Purdue University, WL, USA
CGPA: 3.94/4.00
- B. Sc., Electrical and Electronic Engineering 2014-2018
Bangladesh University of Engineering and Technology (BUET)
CGPA: 3.86/4.00 and Department Deans Award for Outstanding Performance

RESEARCH INTEREST

Computational Electromagnetism, Neural Engineering, Transcranial Magnetic Stimulation (TMS), Transcranial Direct Current Stimulation (tDCS), Biomedical Signal Analysis, Neuroscience, Computer Vision, Machine Learning, Neural Modelling, Digital Image Processing, Brain Machine Interface.

SCHOLARLY WEBSITES

- Google Scholar - [Link](#)
- ResearchGate - [Link](#)
- LinkedIn - [Link](#)

JOURNAL PUBLICATIONS

- J8. [Under Review] **Nahian I. Hasan**; Moritz Dannhauer; Dezhi Wang; Zhi-De Deng and Luis J. Gomez (2024). Real-Time Computation of Brain E-Field for Enhanced Transcranial Magnetic Stimulation Neuronavigation and Optimization; *Imaging Neuroscience*, DOI:10.1101/2023.10.25.564044.
- J7. Rita Appiah, Venkatesh Pulletikurthi, Helber Antonio Esquivel-Puentes, Cristiano Cabrera, **Nahian I. Hasan**, Suranga Dharmarathne, Luis J. Gomez, Luciano Castillo (2024). Brain Tumor detection using Proper Orthogonal Decomposition integrated with Deep Learning Networks; *Computer Methods and Programs in Biomedicine*, DOI:10.1016/j.cmpb.2024.108167.
- J6. Moritz Dannhauer; Dezhi Wang; Zhi-De Deng, **Nahian I. Hasan**; and Luis J. Gomez (2023). Electric field modeling in personalizing TMS interventions; *Biological Psychiatry*, DOI: 10.1016/j.biopsych.2023.11.022
- J5. **Nahian I. Hasan**; Dezhi Wang; Luis J. Gomez (2023). Fast and accurate computational E-field dosimetry for group-level transcranial magnetic stimulation targeting; *Computers in Biology and Medicine*, DOI: 10.1101/2023.02.08.527758
- J4. Dezhi Wang; **Nahian I. Hasan**; Luis J. Gomez; (2022). Fast Computational E-field Dosimetry for Transcranial Magnetic Stimulation using Adaptive Cross Approximation and Auxiliary Dipole Method (ACA-ADM); *NeuroImage*, DOI: 10.1016/j.neuroimage.2022.119850
- J3. Xiaofan Jia; Sadeed Bin Sayed; **Nahian I. Hasan**; Luis J. Gomez; Guang-Bin Huang; Abdulkadir C. Yucel. (2021). DeepTDCS: Deep Learning-based Estimation of Currents Induced During Transcranial Direct Current Stimulation; *IEEE Transactions on Biomedical Engineering*, DOI: 10.1109/TBME.2022.3213266
- J2. **Nahian I. Hasan** (2021). A hybrid method of COVID-19 patient detection from modified CT-scan/chest-X-ray images combining deep convolutional neural network and two-dimensional empirical mode decomposition; *Computer Methods and Programs in Biomedicine Update*, DOI: 10.1016/j.cmpbup.2021.100022

- J1. **Nahian I. Hasan**, & A. Bhattacharjee (2019). Deep Learning Approach to Cardiovascular Disease Classification Employing Modified ECG Signal from Empirical Mode Decomposition; *Biomedical Signal Processing and Control*, DOI:10.1016/j.bspc.2019.04.005.

CONFERENCE PROCEEDINGS AND PRESENTATIONS

- C23. **Hasan, Nahian I.**; Gomez, Luis.(2023). Optimized E-field Dosimetry in Group-Level Transcranial Magnetic Stimulation (TMS). *IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), 2024, Italy*.
- C22. **Hasan, Nahian I.**; Dannhauer, Moritz; Wang, Dezhi; Deng, Zhi-De; Gomez, Luis.(2023).Real-Time Computation of E-Field for Transcranial Magnetic Stimulation. *IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), 2024, Italy*.
- C21. **Hasan, Nahian I.**; Gomez, Luis.(2023).Group-Level Optimum Coil Placement for Transcranial Magnetic Stimulation (TMS). *Applied Computational and Electromagnetic Society (ACES) Conference, 2024, USA*.
- C20. **Hasan, Nahian I.**; Dannhauer, Moritz; Wang, Dezhi; Deng, Zhi-De; Gomez, Luis.(2023).Real-Time Computation of E-Field for Transcranial Magnetic Stimulation. *Applied Computational and Electromagnetic Society (ACES) Conference, 2024, USA*.
- C19. **Hasan, Nahian I.**; Dannhauer, Moritz; Wang, Dezhi; Deng, Zhi-De; Gomez, Luis.(2023).Real-Time Computation of Brain E-Field for Enhanced Transcranial Magnetic Stimulation Neuronavigation and Optimization. *PIERS, 2024, China*.
- C18. **Hasan, Nahian I.**; Gomez, Luis.(2023).Group-Level Optimized E-field Dosimetry Estimation in Transcranial Magnetic Stimulation (TMS). *PIERS, 2024, China*.
- C17. **Hasan, Nahian I.**; Wang, Dezhi; Gomez, Luis.(2023).Application of Fast E-Field Solvers in Developing Individualized Optimal Transcranial Magnetic Stimulation. *Brain and Human Body Modeling, 2023, Boston, MD, USA*.
- C16. **Hasan, Nahian I.**; Wang, Dezhi; Gomez, Luis.(2023). Real-time E-Field Dosimetry Estimation in Transcranial Magnetic Stimulation via Probabilistic Matrix Decomposition (PMD) and Huygens' Principle. *IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), 2023, Portland, Oregon, USA*.
- C15. **Hasan, Nahian I.**; Wang, Dezhi; Gomez, Luis.(2023).Application of Fast E-Field Solvers in Developing Individualized Optimal Transcranial Magnetic Stimulation and Population-level Uncertainty Quantification. *IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), 2023, Portland, Oregon, USA*.
- C14. Wang, Dezhi; **Hasan, Nahian I.**; Gomez, Luis.(2023).Fast E-field Determination of Transcranial Electric Stimulation Using Probabilistic Matrix Decomposition. *IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), 2023, Portland, Oregon, USA*.
- C13. **Hasan, Nahian I.**; Wang, Dezhi; Gomez, Luis.(2023).Fast Solvers for Population-Level Optimization and Uncertainty Quantification in Transcranial Magnetic Stimulation (TMS). *Brain Stimulation: Basic, Translational, and Clinical Research in Neuromodulation, 2023, Lisbon, Portugal*.
- C12. **Hasan, Nahian I.**; Wang, Dezhi; Gomez, Luis.(2022). Fast Population Level Optimization of Transcranial Magnetic Stimulation via Probabilistic Matrix Decomposition *IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), 2022, Denver, Colorado, USA*.
- C11. **Hasan, Nahian I.**; Gomez, Luis.(2022). Synthetic Segmented Virtual Head Model Generation Using Generative Adversarial Network (GAN) for Population-Based E-field Dosimetry Estimation and Uncertainty Quantification *IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), 2022, Denver, Colorado, USA*.

- C10. Wang, Dezhi; **Hasan, Nahian I.**; Gomez, Luis.(2022). Uncertainty quantification of TMS simulations considering MRI segmentation errors *IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), 2022, Denver, Colorado, USA.*
- C9. Wang, Dezhi; **Hasan, Nahian I.**; Czerwonky, David; Gomez, Luis. (2022). Modeling of the Meninges as a Boundary Condition in Computational E-field dosimetry *IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), 2022, Denver, Colorado, USA.*
- C8. Wang, Dezhi; **Hasan, Nahian I.**; Gomez, Luis.(2022). Benchmarking Transcranial Magnetic Stimulation (TMS) coils in terms of their induced E-field in Realistic MRI-derived Head Models *IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), 2022, Denver, Colorado, USA.*
- C7. Wang, Dezhi; **Hasan, Nahian I.**; Gomez, Luis.(2022). Fast E-field Simulation in the Transcranial Magnetic Stimulation Using Adaptive Cross Approximation *IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), 2022, Denver, Colorado, USA.*
- C6. **Hasan, Nahian I.**; Wang, Dezhi; Gomez, Luis.(2021). Virtual Head Model Embedding for Population-Based Uncertainty Quantification. *IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), 2021, Singapore.*
- C5. S.M. Abir Hossain; **Nahian I. Hasan**; Sharif Mohammad Mominuzzaman. (2023). Analytical Study of 1D Monocrystal Graphene Island-based Single Electron Transistor (SET). *International Conference on Electrical and Computer Engineering (ICECE), 2022, Dhaka, Bangladesh.*
- C4. R. Appiah, V. Pulletikurthi, S. Dharmarathne, A. Esquivel, L. Gomez, **Nahian Hasan**, L. Castillo. (2021). Enhanced 3D MRI Brain Tumor Feature Extraction and Segmentation using Snapshot Proper Orthogonal Decomposition (SPOD). *USA-Mexico symposium, 2021.*
- C3. Chowdhury, Srizan; Howlader, Tamanna; **Hasan, Nahian I.**(2019). Deep Neural Network for Predicting Neonatal Mortality in Bangladesh. *International Conference on Applied Statistics (ICAS), 2019, Dhaka, Bangladesh.*
- C2. Mohammad Ariful Haque, Sayeed Shafayet Chowdhury, Ahmed Maksud, Jubaer Hossain, Kinjol Barua; Roknuzzaman Rokon, Muhammad Suhail Najeeb, **Nahian I. Hasan**, Shahruk Hossain, Shakib Zaman and SM, Raiyan Chowdhury (2017). Traffic Sign Detection under Challenging Conditions Using Faster RCNN *International Conference on Image Processing (ICIP), 2017, Beijing, China.*
- C1. **Hasan, Nahian I.**, Hasan,Md. T.; Turja, N. H.; Raiyan, R. Saha,S.; Hossain, Md. F. (2019). A Cyber-Secured MQTT Based Offline Automation System; *International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET), 2019, Chennai, India.*

HONORS & AWARDS

- 1st place in student paper competition in ACES 2024.
- 3rd place in student paper competition in PIERS 2024.
- Graduate Research Assistantship, 2021-2024, Purdue University
- Graduate Teaching Assistantship, 2021, Purdue University
- Video and Image Processing Cup(VIP-Cup,2017), organized by IEEE Signal Processing Society, World rank=3 among 200 global teams.
- University Dean's List Award for three academic years, BUET.
- University Merit Scholarship in all academic years, BUET.
- PGSG (Purdue University) Travel Grant for IEEE AP-S/URSI 2022.
- International Conference on Image Processing(ICIP-2017), Student Travel Grant
- National math camp participant for IMO selection, 2010.
- National Science Festival,2012, National Rank=2, organised by Notre Dame College, Dhaka, Bangladesh
- IEEE Project Show Competition,BUET-2016, National Rank=4.
- National Power and Energy Hackathon, Bangladesh, National Rank=2.

RESEARCH EXPERIENCE

- Sublime Lab, Purdue University, PI: Dr. Luis Javier Gomez** 2021-Present
- **Research Area:** Computational electromagnetism (CEM), numerical analysis, FEM/ FDM/ BEM, applied linear algebra, high-performance computing (HPC), machine learning, signal processing, computational neuroscience, neural engineering.
 - Built fast numerical algorithms for real-time neuromodulation techniques (TMS, tDCS, etc.), prediction within 4 ms.
 - Developing algorithms to compress surface integral-based boundary element methods (BEM).
 - Conducting population-level studies (Funding by **NIH**), designing TMS coil, generating virtual head model databases, implementing sparse-matrix solvers, generating 3D synthetic head model using GANs.
 - Devising physics-based ML networks, low-rank matrix approximation-based algorithms & sparse matrix solvers.
 - Producing in-house parallel codes for Supercomputing Clusters and GPU-empowered systems for over 100TBs of data, building real-time TMS systems, utilizing FEM for electromagnetic systems with more than 5M unknowns.
- Undergraduate Researcher, BUET, PI: Dr. Ahmed Zubair** 2020
- Investigated performance characteristics of CNT and graphene for developing next-generation electronic devices and prepared cluster simulation scripts of 6 atomic structures with quantum espresso.
- Undergraduate Researcher, BUET, PI: Arnab Bhattacharjee** 2017-2020
- Developed and published a new algorithm for treating patients with cardiovascular diseases and creating deep learning & signal processing-based algorithms for EEG data with 99% accuracy from 3 publicly available databases.
 - Invented a new technique for COVID-19 patient analysis from chest X-ray and CT-Scan data from 3 public databases.
- Undergraduate Researcher, BUET, PI: Dr. Md. Farhad Hossain** 2017-2018
- Created an experimental prototype of a cyber-secured MQTT-based offline automatic control and monitoring system for corporate facilities; wireless communication between software and hardware for 10+ devices, concurrently.
 - Built Python-based GUI establishing real-time communication. Conference publication at WiSPNET 2019 in a team of 5.
- Undergraduate Researcher, BUET, PI: Dr. Sharif Mohammad Mominuzzaman** 2017-2018
- Analyzed 3 novel single-electron-transistor (SET) architectures with graphene, and CNT for power-efficient electronics.
 - Constructed analytical models, performed numerical simulation in Matlab, prepared thesis, and presented at ICECE 2022.
- Undergraduate Researcher, BUET, PI: Dr. Mohammad Ariful Haque** 2017
- Assembled 'FRCNN'-based pipeline for traffic sign detection and classification under environmentally challenging conditions with a database of > 250GB.
 - Implemented pre-processing and post-analysis steps and represented project outcomes at ICIP2017. Achieved world rank = 3 at IEEE Video and Image Processing Cup, 2017 in a team of 10.

RESEARCH COLLABORATION

1. Dr. Moritz Dannhauer, **NIMH, NIH**. 2023-Present
 - Computational Neurostimulation Research Program, Noninvasive Neuromodulation Unit, Experimental Therapeutics & Pathophysiology Branch, National Institute of Mental Health Intramural Research Program, National Institutes of Health
 - Real-Time Computation of Cortical E-Field for Enhanced Transcranial Magnetic Stimulation Neuronavigation and Optimization
 - Project Funding Agency - **NIH**.
2. Dr. Zhi-De Deng, **NIMH, NIH**. 2023-Present

- Computational Neurostimulation Research Program, Noninvasive Neuromodulation Unit, Experimental Therapeutics & Pathophysiology Branch, National Institute of Mental Health Intramural Research Program, National Institutes of Health
 - Real-Time Computation of Cortical E-Field for Enhanced Transcranial Magnetic Stimulation Neuronavigation and Optimization
 - Project Funding Agency - **NIH**.
3. Dr. Abdulkadir C. Yucel, **Nanyang Technological University, Singapore.** 2021-2022
 - Developed deep learning-based electric-field prediction in transcranial direct current stimulation.
 - Constructing machine learning-based Mask R-CNN-augmented inverse scattering algorithm for through-the-wall imaging.
 - Developing 2D TMS/tDCS analysis framework.
 4. Dr. Luciano Castillo, **Purdue University, WL.** 2021-2022
 - Enhanced 3D MRI Brain Tumor Feature Extraction and Segmentation using Snapshot Proper Orthogonal Decomposition (SPOD).
 - Contributed in data analysis and deep neural network training.
 - Project Funding Agency - **Intel**.
 5. Dr. Tamanna Howlader, **Dhaka University, Bangladesh.** 2018-2020
 - Develop artificial intelligence-based algorithms for predicting child mortality rate in developing and poor nations.
 - Developed in-house codes and parallel-processing system in small clusters.
 - Presented project outcomes at (ICAS, 2019).

CONFERENCE PARTICIPATION & CONTRIBUTION

- Applied Computational Electromagnetics Society (ACES) Symposium (ACES 2024, Orlando, USA)
- IEEE Antennas and Propagation and USNC-URSI Radio Science Meeting (APS/URSI 2024, Florence, Italy)
- Photonics and Electromagnetics Research Symposium (2024, Chengdu, USA)
- 3rd Brain & Human Body Mapping Conference (2023, Boston, USA)
- IEEE Antennas and Propagation and USNC-URSI Radio Science Meeting (APS/URSI 2023, Portland, USA)
- 5th International Brain Stimulation Conference (2023, Lisbon, Portugal)
- 8th Annual BRAIN Initiative Meeting (2022, USA)
- 12th International Conference on Electrical and Computer Engineering (ICECE 2022, Dhaka, Bangladesh)
- IEEE Antennas and Propagation and USNC-URSI Radio Science Meeting (APS/URSI 2022, Denver, USA)
- IEEE Antennas and Propagation and USNC-URSI Radio Science Meeting (APS/URSI 2021, Singapore)
- IEEE Int. Conf. on Energy and Power Engineering (ICEPE 2019, Dhaka, Bangladesh)
- Int. Conf. on Wireless Communications Signal Processing and Networking (WiSPNET 2019, India)
- Int. Conf. on Applied Statistics (ICAS 2019, Dhaka University, Bangladesh)
- IEEE Int. Conf. on Image Processing (ICIP 2017, Beijing, China)

POSTER PRESENTATION

1. Fast And Accurate Population Level Transcranial Magnetic Stimulation via Low-Rank Probabilistic Matrix Decomposition (PMD) 2023
 - Project Funding Agency - **National Institute of Health (NIH)**.
 - Contributors - **Nahian I. Hasan**, Luis J. Gomez, and Dezhi Wang
 - 5th International Brain Stimulation Conference, 2023, Portugal
2. Accurate and reliable computational dosimetry and targeting for transcranial magnetic stimulation 2021
 - Project Funding Agency - **National Institute of Health (NIH)**.
 - Contributors - Luis J. Gomez, Dezhi Wang, and **Nahian I. Hasan**
 - 7th and 8th Annual Brain Initiative Investigators Meeting, 2021, 2022
3. Enhanced 3D MRI Brain Tumor Feature Extraction and Segmentation using Snapshot Proper Orthogonal Decomposition (SPOD) 2021

- Project Funding Agency - **Intel**
 - Contributors - R. Appiah, V. Pulletikurthi, S.Dharmarathne, A.Esquivel, L. Gomez , **Nahian I. Hasan**, L. Castillo
 - USA-Mexico symposium, 2021
4. Data Driven Approaches for Virtual Head Model generation and E-field Dosimetry of Non-invasive Brain Stimulation. 2022
- Project Funding Agency - **National Institute of Health (NIH)**
 - **Nahian I. Hasan**, Luis J. Gomez, Dezhi Wang
 - ECE FO Open House Poster Session, Purdue University, 2022

RESEARCH WORKSHOP

1. A Workshop on RTL Synthesis, Physical Design And Verification of an ASIC Chip. 2017
- Organized by BUET VLSI Laboratory
 - Focus: Design, verification and synthesis of an ASIC Chip with Cadence.
2. Modeling Based on Maxwell's Equation and Drift-Diffusion Equation: Solar Cell. 2017
- Organized by IEEE EDS, BUET, Bangladesh
 - Focus: Use a commercial design tool to design and analyze a solar cell by modeling through Maxwell's Equation and Drift-Diffusion Equation.

JOURNAL REVIEWER

- IEEE Journal of Electromagnetics, RF, and Microwaves in Medicine and Biology,
- Biomedical Signal Processing and Control, Elsevier
- Soft Computing, Springer
- Journal of Healthcare Engineering, Hindawi.

PROFESSIONAL EXPERIENCE

1. Technology Intern, Schlumberger (SLB), Texas Summer 2023
- Formulated analytical and computational models of geo-electromagnetic tools for 1D, 2D & 3D formation structure analysis and sensitivity analysis based on dipole antenna models of transmitters and receivers.
 - Designed Matlab GUI with GPU utilization, prepared technical reports and presented a technical poster.
2. Graduate Teaching Assistant, ECE, Purdue University, West Lafayette 2021
- Instructed undergraduate laboratory classes with 60+ students, supervised laboratory projects, and advised students.
3. Graduate Research Assistant, ECE, Purdue University, West Lafayette 2021
- Working as a research assistant in NIH-funded projects focusing on Transcranial Magnetic Stimulation and Neural Engineering.
 - Collaborating with multiple national/international research groups focusing on computational electromagnetism, applied electromagnetism, and neuro-engineering.
4. Lecturer, ECE, BRAC University, Bangladesh 2019-2021
- Mentored undergraduate Electrical Engineering classes with 100+ students, advised students, conducted academic research, developed academic curriculum, supervised academic projects, and arranged 2 industrial tours.

TECHNICAL STRENGTHS

- Coding : Python, C/C++, OpenMP, MPI, Cuda, Matlab, Bash scripting, Slurm
- Software & Tools : COMSOL, Latex, MS Office, FDM/FEM Solvers, Statistics, Data analysis, Linux
- Machine Learning : Keras, Pytorch, SciPy, OpenCV, Deep Learning, Generative AI, Physics-based ML

MEDIA COVERAGE

- IEEE recognition - [Link1](#) [Link2](#)
- Purdue University recognition - [Link1](#)

VOLUNTARY ACTIVITIES

- Treasurer, Bangladesh Student Association, Purdue University, USA (2022-2023) [Link](#)
- Webmaster, IEEE BUET, Dhaka, Bangladesh (2016-2017)

LEADERSHIP EXPERIENCE AND PROFESSIONAL AFFILIATION

- Treasurer, Bangladesh Student Association, Purdue University, WL, IN 2022-2023
- Graduate Teaching Assistant, Purdue University 2021
- Graduate Research Assistant, Purdue University 2021-Present
- Departmental Routine Committee Coordinator (BRAC University) 2019-2020
- Undergraduate Student Project Advisor & Course Advisor, BRAC University 2020
- Outcome-Based Education (OBE) Curriculum Coordinator, BRAC University 2020
- IEEE member 2016 - Present
- Student Member - IEEE Photonics Society 2019-2020
- Student Member - IEEE Electron Device Society 2019-2020
- Student Member - IEEE Industrial Electronics Society 2019-2020
- Student Member - IEEE Magnetics Society 2019-2020
- Student Member - IEEE Nuclear and Plasma Sciences Society 2019-2020
- Student Member - IEEE Robotics and Automation Society 2016
- Student Member - IEEE Signal Processing Society 2016 - 2020
- Student Member - IEEE Young Professionals 2019 - 2020

PERSONAL TRAITS

Highly motivated and eager to learn new things, Strong motivational and leadership skills, and ability to work in both individual and team environments. I love Tennis, Badminton, and Cricket.

REFERENCE

1. Luis J. Gomez
 - Assistant Professor, Electrical and Computer Engineering, Purdue University
 - Ph.D. Supervisor
 - Email: ljgomez@purdue.edu
2. Weng Cho Chew
 - Distinguished Professor, Electrical and Computer Engineering, Purdue University
 - Ph.D. Thesis Committee Member & Group Advisor
 - Email: wchew@purdue.edu