

INDRANIL BHATTACHARYA

Professor and Interim Chairperson
Department of Electrical and Computer Engineering
Director of SOLBAT-TTU Energy Research Laboratory
Tennessee Tech University
Phone # (931)-372-3430

Email: ibhattacharya@tntech.edu

EDUCATION

Ph.D. (Electrical Engineering), Florida State University, FL, USA

M.S. (Electrical Engineering), Florida State University, FL, USA

B.E. (Electronics and Communication Engineering, First Class with Distinction), INDIA

PROFESSIONAL EXPERIENCE

I. Professor and Interim Chairperson of Electrical and Computer Engineering (August 2023 - Present), Tennessee Tech University.

II. Associate Chairperson of Electrical and Computer Engineering (2022 - July 2023), Tennessee Tech University.

III. Associate Professor (2019 - May 2023), Electrical and Computer Engineering, Tennessee Tech University.

IV. Assistant Professor (2013 - May 2019), Electrical and Computer Engineering, Tennessee Tech University.

V. Adjunct Professor (2011 - 2013), Electrical and Computer Engineering, Florida State University.

VI. Graduate Research Assistant (2008-2013), Faculty Advisor: Dr. Simon Y. Foo, Electrical and Computer Engineering, Florida State University.

VII. Project Leader Boeing Project (2010), Machine Intelligence Lab, Electrical and Computer Engineering, Florida State University.

VIII. Graduate Teaching Assistant (2007-2011), Electrical Engineering, Florida State University.

IX. Lecturer of Electronics and Communication Engineering (2005-2006), India.

LEADERSHIP POSITIONS

1. Interim Chairperson of Electrical and Computer Engineering (ECE), (2023- present)

Responsibilities: As the Chief Administrative and Academic Officer of the ECE Department at Tech

- Lead the ECE department comprising 15 faculty, 2 staff, and 420 students.
- Provide leadership to maintain and enhance high excellence in the research, teaching, and service activities of the department.
- Work with faculty, students, and staff in establishing a long term vision for the department that is consistent with the college, and university missions.

- Oversee curriculum development and revisions, review and assess academic programs and initiate new concentrations based on student needs.
- Lead student recruitment and establish mechanisms for high student retention.
- Plan and develop course schedules that serve the EE and CmpE programs and students' needs.
- Plan and oversee semester faculty teaching assignments.
- Oversee the department's fiscal operations; develop and regularly monitor the department's budget.
- Recruit, appoint, and supervise faculty along with mentoring newly hired ECE faculty.
- Perform annual evaluation of faculty and staff performance.
- Coordinate student advising, make decisions on student transfer credit, and review academic appeals and grievances.

Accomplishments:

- Increased incoming freshman enrollment for Electrical Engineering by 40% (from 47 to 66 in just two years). This number is still growing for Fall 2024.
- Increased incoming freshman enrollment for Computer Engineering by 42% (from 31 to 44 in just last year). This number is still growing for Fall 2024.
- Fall to Fall Electrical Engineering retention is up by 7% (from 83% to 90%) since becoming the Chair.
- Organizing an industry day in November 2024.

2. **Associate Chairperson, Electrical and Computer Engineering (2022-2023)**, Tennessee Tech University. As the Associate Chair of the department, I lead the assessment and ABET accreditation, curriculum and course modification and scheduling, student recruitment and other department efforts. I am trained in Fundamentals of Program Assessment Workshop in ABET Headquarters.

Accomplishments:

- As the main person responsible for recruiting, increased the incoming freshman student enrollment of the Electrical and Computer Engineering Department by **13.7%** (from 80 to 91) in 2023.
- Modified Program Educational Objectives and acquired feedback from constituents.
- Developed new assessment schemes that help in better addressing ABET student outcomes and continuous improvement.
- Established collaborations with Oak Ridge National Laboratory, Nissan U.S.A and Volkswagen Group America.
- Established collaboration with Tritium Inc. and acquired a gift of two DC fast chargers worth of \$70,000 for teaching and research purposes.

3. **Chair of Vehicle Engineering Concentration, Electrical and Computer Engineering:** As the chair of the vehicle engineering concentration, I lead a team of seven faculty members in research, industry connection and teaching endeavors related to electric vehicles, autonomous and connected vehicles, battery technology, and sensors and instrumentation for next generation mobility. I am also responsible for curriculum and course scheduling and modification in these areas.
4. **Chair of Assessment and Accreditation Committee, Electrical and Computer Engineering:** As the Chair of the Assessment and Accreditation committee, I organize meetings and am responsible for documenting and leading the efforts pertaining to the accreditation of the two majors under the ECE department. Along with other committee members, I develop and write program educational objectives and collect feedback from stakeholders, select courses reflecting student outcomes, create rubrics for course and program assessment, analyze data and reflect on continuous improvement process, and lead efforts related to collecting, documenting, and submitting report to the ABET.
5. **Student Recruitment for the Electrical and Computer Engineering Department.** As the Associate Chair of the department, I am responsible for student recruitment. I actively lead efforts in recruiting high quality and diverse students for the ECE Department at Tennessee Tech University. I organize workshops in Fall, Spring and Summer semesters and meet with visitors and their parents to discuss

about courses offered, job prospects, industrial connections and internship/co-op opportunities. Make phone calls to interested students and families and participate in recruiting fairs.

6. **Chair of Scholarship Committee, Electrical and Computer Engineering:** With the help of the Committee members, select best students for as many as ten different scholarships in the department and make sure of their timely disbursement.
7. **Elected Member of College of Engineering Advisory Committee,** Tennessee Tech University. One of only five faculty members elected to advise the Dean of College of Engineering regarding policies related to research, teaching, budget, committee formation and tenure and promotion.
8. **Chair of Faculty Search Committee, Electrical and Computer Engineering,** Tennessee Tech University. As a chair of the faculty search committee in the ECE department, I have written advertisement for the open-rank faculty positions, drafted minimum and preferred qualifications, created hiring matrix, determined the evaluation criteria, and worked closely with the other committee members in selecting candidates based on their qualifications.

COURSES TAUGHT

Recipient of **university-wide** top award “**Outstanding Faculty Award in Teaching**”. Year after year, I have received the best teaching evaluations in the Electrical and Computer Engineering Department at Tennessee Tech. I have consistently maintained an IDEA evaluation record of 5/5, 4.95/5 and 4.9/5 from the students.

Teaching Innovations: As a part of my National Science Foundation-Improving Undergraduate STEM Education Grant, (\$300K), I introduced incoming freshman students in academic and project-based critical thinking activities to facilitate transition into the program. There were pre and post Critical Thinking Assessment (CAT) tests given to two groups of students designated as test groups (ECE 1020 Section 002 and ECE 1020 Section 004) and control groups (ECE 1020 Section 001 and ECE 1020 Section 003). Even though the course contents were same, the test groups were introduced to critical thinking exercises whereas the control groups were not. The results showed a higher CAT score for the sections with test groups vs. control groups and improved student retention Fall to Spring significantly from around 70% to around 90%.

Undergraduate Level:

1. Electromagnetic Fields I (ECE 3510)
2. Electromagnetic Fields II (ECE 4510)
3. Physical Electronics (ECE 3540)
4. Optoelectronic Engineering (ECE 4520/5520)
5. EM Fields Simulation Lab (ECE 4560)
6. Explorations in ECE (ECE 1000)
7. Freshman Connections (ECE 1020)
8. Circuits and Electronics I (ECE 2050)

Graduate Level:

1. Photovoltaic Engineering (ECE 6900)
2. Electromagnetic Fields (ECE 6510)

ACTIVATED GRANT PROPOSALS

Total funding of 7 million (7,000,000) as a Principal Investigator or co-Principal Investigator. Five active grants from the National Science Foundation.

1. **National Science Foundation**, “NRT-GCR, AI: Immersive Research Traineeship in the Convergence of AI, Energy and Cybersecurity”, **Total amount \$3,000,000, Role: Principal Investigator**, 2024-2029.
2. **National Science Foundation**, “Collaborative Research: CyberTraining: Implementation: Small: Training AI-skilled and Fairness-aware Research Workforce for Cloud Infrastructure Cybersecurity”, Total amount \$300,000, Role: Co-Principal Investigator (25% responsibility), 2024-2027.
3. **National Science Foundation**, “RET Site: Energize Teachers”, Total amount \$600,000, Role: Co-Principal Investigator (50% responsibility), 2023-2026.
4. **National Science Foundation**, “Collaborative Research: SaTC: EDU: Adversarial Malware Analysis - An Artificial Intelligence Driven Hands-On Curriculum for Next Generation Cyber Security Workforce”, Total amount \$300,000, Role: Co-Principal Investigator (15% responsibility), 2023-2026.
5. Faculty Research Grant, “Addressing Critical Challenges in Sodium Transition-Metal Oxide Cathodes for Sodium-Ion Batteries”, Total amount \$20,000, 2024-2025.
6. **National Science Foundation**, “IUSE/EHR: Improving Undergraduate Success through Effective Critical Thinking (iUSE-CT)”, Total amount \$298,284, Role: Co-Principal Investigator (50% responsibility), 2021-2025.
7. Faculty Research Grant, “Low-Frequency Metamaterial for High-Power and High-Efficiency Wireless Power Transfer”, Role: Principal Investigator, Total amount \$20,000, 2022-2023.
8. **National Science Foundation Graduate Research Fellowship Program**, “Understanding the Doping Effects on Nickel Oxide for Performance Optimization of Perovskite”, Total amount \$138,000, Role: Co-Principal Investigator, 2021-2024. My research student Mr. Eungkyun Kim is the recipient of the NSF GRFP award. I have mentored and helped him in preparing his proposal.
9. **Oak Ridge National Laboratory, US Department of Energy**, “Investigating Early Transition Metal Dopant Effects in Cobalt Free Lithium ion Batteries”, Total amount \$100,000, Role: Principal Investigator, 2019-2021.
10. **US Department of Energy, Office of Energy Efficiency and Renewable Energy**, "Developing an EV Demonstration Testbed in the Upper Cumberland Region of Tennessee, an Economy Distressed Rural Region", Total amount \$1,559,686, Role: Co-Principal Investigator, 2019-2022.
11. Faculty Research Grant, “Investigating Effects of Smaller-Ionic Radius Vanadium Doping on Stability and Electrochemical Performance of Next Generation Sodium-Ion Batteries”, Role: Principal Investigator, Total amount \$10,000, 2021-2022.
12. Faculty Research Grant, “Investigating Optical Characteristics, Current Matching and Carrier Transport Mechanisms in High-Efficiency Perovskite Multijunction Solar Cells”, Role: Principal Investigator, Total amount \$10,000, 2020-2021.
13. **Tennessee Valley Authority**, “High-Energy Density Sodium Ion Batteries for Grid Level Energy Storage”, Total amount \$100,000, Role: Principal Investigator, 2019-2021. This proposal was a competitive proposal among Universities from TVA associated Universities in seven states.
14. Faculty Research Grant, “Cobalt Free High-Energy Density and Longer Life Cycle Sodium-Ion Batteries”, Role: Principal Investigator, Total amount \$10,000, 2019-2020.
15. **National Science Foundation REU Site**: Immersive Research in Energy Generation, Storage/Conversion and Power Transmission, Total amount \$331,750, Role: Principal Investigator, 2018-2022.

16. Faculty Research Grant, "Improving Energy Density through Synthesis, Characterization and Investigation of Diffusion Mechanisms In Layered Structure Sodium Ion Batteries", Role: Principal Investigator, Total amount \$10,000, 2018-2019.
17. **National Science Foundation**, "Investigating Optical Characteristics, Doping Levels and Current Matching in Perovskite/Si, Perovskite/GaAs/Si and Perovskite/III-V Ternary Semiconductors", \$30,047, Role: Principal Investigator, July 2017-June 2018.
18. Faculty Research Grant, "Development and Modeling of High-Energy-Density Solid State Lithium Sulfur Battery", Tennessee Tech Office of Research, Total amount \$10,000, Role: Principal Investigator, 2016-2017.
19. URECA Team Grant, Total amount \$5,000, Tennessee Tech University, Role: Principal Investigator, January 2016.
20. Design and modeling of Very-High Efficiency Multijunction Solar cells - Faculty Research Assistance, Tennessee Tech Office of Research, Role: Principal Investigator, Total amount \$10,000.
21. **National Science Foundation** - REU Site: Summer Research Internships in Manufacturing and Techno-Entrepreneurship, Role: Faculty Mentor, Total amount \$373,907.

AWARDS AND DISTINCTIONS

1. **T.S. McCord Engineering Faculty Award (2024)**, College of Engineering, Tennessee Tech. This award is given to an outstanding engineering faculty member who demonstrates a deep compassion for his/her students through their teaching and/or advising of students and have the students' welfare as top priority in all that he/she does.
2. **University-wide Outstanding Faculty Award in Teaching**, (2022-23), Tennessee Technological University. This is the highest University Award for Teaching.
3. **Centennial Scholar-Mentor Award**, Tennessee Technological University, 2021. This is the highest award at Tennessee Tech that is given to a faculty who has excelled in research scholarship, mentoring undergraduate and graduate students and teaching.
4. Offered prestigious **Wolfspeed Endowed Chair Professor** by the **State University of New York** in 2023. Had to respectfully decline as Tennessee Tech University offered the ECE Department chair job.
5. **Wings Up 100/2021 Research Achievement Award**, Tennessee Technological University, 2021. This honor was bestowed to acknowledge high-external funding received.
6. **Wings Up 100/2019 Research Achievement Award**, Tennessee Technological University, 2019. This honor was bestowed to acknowledge high-external funding received.
7. **FSU Innovators Award**, April 14, 2015, presented by Florida State University of Research Division.
8. **FSU Innovators Award**, December 5, 2011, presented by Florida State University of Research Division.
9. **Grant Assistance Program (GAP) Funding Award** from Florida State University Council of Research and Creativity, December 2010.
10. **2013 Statewide (Florida) Graduate Student Research Symposium, 2nd Place Award for Research Excellence in the STEM Category (Among student participants from all Universities in the State of Florida)**, April 19, 2013, Tampa, Florida.
11. **Graduate Research Poster Presentation Award**, College of Engineering, Florida State University, March 22, 2013.
12. Bachelor of Engineering in Electronics and Communication Engineering from India in "**First Class with Distinction**".
13. **National Scholarship** from the state of West Bengal, India.

AWARDS AND HONORS RECEIVED BY STUDENTS

1. Babatunde Dami Soyoye, M.S. Best Research Paper Award, College of Engineering, Tennessee Tech University, 2024.
2. Trapa Banik, Ph.D. Best Research Award, Annual Student Research and Creative Inquiry Day for 2022, Tennessee Tech University.
3. Abiodun Olatunji, M.S. Best Research Paper Award, College of Engineering, Tennessee Tech University, 2022.
4. Abiodun Olatunji, M.S. Best Research Award, Annual Student Research and Creative Inquiry Day for 2022, Tennessee Tech University.
5. Joshua Thomas, Undergraduate Best Research Paper Award, College of Engineering, Tennessee Tech University, 2021
6. Eungkyun Kim, **National Science Foundation Graduate Research Fellowship** Program award, 2021.
7. Eungkyun Kim, Undergraduate Best Research Paper Award, College of Engineering, Tennessee Tech University, 2021.
8. Webster Adepoju, Ph.D. Best Research Award, Annual Student Research and Creative Inquiry Day for 2021, Tennessee Tech University.
9. Eungkyun Kim, Excellence in Creative Inquiry Student Award, Tennessee Tech University, 2021.
10. Muhammad Bima, Ph.D. Best Research Award, Annual Student Research and Creative Inquiry Day for 2020, Tennessee Tech University.
11. Muhammd Bima, Best Ph.D. Research Paper, Electrical and Computer Engineering, Tennessee Tech University, 2020.
12. Eungkyun Kim, Undergraduate Best Research Award, Annual Student Research and Creative Inquiry Day for 2020, Tennessee Tech University.
13. Devendrasinh Darbar, Best Research Award, Annual Student Research and Creative Inquiry Day for 2019, Tennessee Tech University.
14. Devendrasinh Darbar, Best Ph.D. Research Paper, Electrical and Computer Engineering, Tennessee Tech University, 2019.
15. Bibek Tiwari, Ph.D. Best Research Poster Award, Annual Student Research and Creative Inquiry Day for 2018, Tennessee Tech University.
16. Bibek Tiwari, Best Teaching Assistant, Electrical Engineering, 2016.
17. Ian Gwaltney and Michael Lee Turnbull received the Undergraduate Research Award from Tennessee Tech University, 2016.

PATENTS

1. M. Bima, **I. Bhattacharya**, Layered Double-D Coil For Wireless Power Transfer Applications, **U.S. Patent No. 11837884**, Tennessee Technological University, Issued on December 5, 2023.
2. **I. Bhattacharya** and Simon Y. Foo, **US Patent No. 8,609,984**, “High Efficiency Photovoltaic Cell for Solar Energy Harvesting”, Florida State University, Issued on December 17, 2013.
3. **I. Bhattacharya** and Simon Y. Foo, **US Patent Application No. US 61/547,303**, “Four Junction Solar Cell”, filed (Florida State University Research Foundation) with the US Patent and Trademark Office on October 14, 2012.

PUBLICATIONS

Journals

1. W. Adepoju, **I. Bhattacharya**, M. Bima, A. Olatunji, E.N. Esfahani, T. Banik, "Metaheuristic-Based Multi-Objective Optimization and Prototype Investigation of Low-Frequency Metamaterial for Wireless Power Transfer Application", *IEEE Access*, vol. 11, pp. 54577-54587, 2023, doi: 10.1109/ACCESS.2023.3280423.
2. W. Adepoju, **I. Bhattacharya**, M. Sanyaolu and E. N. Esfahani, "Equivalent Circuit Modeling and Experimental Analysis of Low Frequency Metamaterial for Efficient Wireless Power Transfer," in *IEEE Access*, vol. 10, pp. 87962-87973, 2022, doi: 10.1109/ACCESS.2022.3199065.
3. D. Darbar, T. Malkowski, E. C. Self, **I. Bhattacharya**, M. V. Reddy, J. Nanda, "An overview of cobalt-free, nickel-containing cathodes for Li-ion batteries", *Materials Today Energy* (2022): 101173.
4. W. Adepoju, **I. Bhattacharya**, M. E. Bima, T. Banik, E. N. Esfahani, A. Olatunji, "Critical Review of Recent Advancement in Metamaterial Designs for Wireless Power Transfer", *IEEE Access*, vol. 10, pp. 42699-42726, 2022, doi: 10.1109/ACCESS.2022.3167443.
5. D. Darbar, **I. Bhattacharya**, "Application of Machine Learning in Battery: State of Charge Estimation Using Feed Forward Neural Network for Sodium-Ion Battery", *Electrochem* 2022, 3(1), 42-57; <https://doi.org/10.3390/electrochem3010003>.
6. M. E. Bima, **I. Bhattacharya**, W. O. Adepoju and T. Banik, "Effect of Coil Parameters on Layered DD Coil for Efficient Wireless Power Transfer", in *IEEE Letters on Electromagnetic Compatibility Practice and Applications*, 2021, 3(2), pp.56-60.
7. D. Darbar, N. Muralidharan, R. P. Hermann, J. Nanda, **I. Bhattacharya**, "Evaluation of Electrochemical Performance and Redox Activity of Fe in Ti doped Layered P2-Na_{0.67}Mn_{0.5}Fe_{0.5}O₂ Cathode for Sodium Ion Batteries", *Electrochimica Acta*, 2021. 380, p.138156.
8. D. Darbar, M. V. Reddy, **I. Bhattacharya**, "Understanding the Effect of Zn Doping on Stability of Cobalt-Free P2-Na_{0.60}Fe_{0.5}Mn_{0.5}O₂ Cathode for Sodium Ion Batteries", *Electrochem*, 2(2), 2021, 323-334.
9. M. E. Bima, **I. Bhattacharya** and C. W. V. Neste, "Experimental Evaluation of Layered DD Coil Structure in a Wireless Power Transfer System," in *IEEE Transactions on Electromagnetic Compatibility*, vol. 62, no. 4, pp. 1477-1484, Aug. 2020, doi: 10.1109/TEMC.2020.3002694.
10. D. Darbar, E. C. Self, L. Li, C. Wang, H. M. Meyer, C. Lee, J. R. Croy, M. Balasubramanian, N. Muralidharan, **I. Bhattacharya**, I. Belharouak, J. Nanda, "New synthesis strategies to improve Co-Free LiNi_{0.5}Mn_{0.5}O₂ cathodes: Early transition metal d₀ dopants and Manganese Pyrophosphate Coating", *Journal of Power Sources*, 2020.
11. L. Li, E. C. Self, D. Darbar, L. Zou, **I. Bhattacharya**, D. Wang, J. Nanda, and C. Wang, "Hidden Subsurface Reconstruction and Its Atomic Origins in Layered Oxide Cathodes", *Nano Letters*, DOI: 10.1021/acs.nanolett.0c00380, 2020.
12. L. Li, J. Yu, D. Darbar, E. Self, D. Wang, J. Nanda, **I. Bhattacharya**, C. Wang, "Atomic-Scale Mechanisms of Enhanced Electrochemical Properties of Mo-Doped Co-Free Layered Oxide Cathodes for Lithium-Ion Batteries", *ACS Energy Letters*, 2019, DOI: 10.1021/acsenergylett.9b01830, 2019.
13. Bibek Tiwari, **Indranil Bhattacharya**, "Layered P2- type novel Na_{0.7}Ni_{0.3}Mn_{0.59}Co_{0.1}Cu_{0.01}O₂ cathode material for high-capacity & stable rechargeable sodium ion battery", *Electrochimica Acta*, Volume 270, 2018, Pages 363-368, ISSN 0013-4686.

14. M. Rentschler, **I. Bhattacharya**, "Decoupled control of wireless eliminating the interdependence of load resistance and coupling to achieve a simple control framework with fast response times", International Journal of Electrical Power and Energy Systems, Volume 99, Pages 156-163. July 31, 2018.
15. D. Darbar, M.R. Anilkumar, V. Rajagopalan, **I. Bhattacharya**, H.I. Elim, T. Ramakrishnappa, F.I. Ezema, R. Jose, M.V. Reddy, "Studies on spinel cobaltites, MCo_2O_4 ($M=Mn, Zn, Fe, Ni$ and Co) and their functional properties", in Ceramics International, Volume 44, Issue 5, 1 April 2018, Pages 4630-4639.
16. B. Papari, C. Edrington, **I. Bhattacharya**, G. Radman, "Effective Power Management of Hybrid AC-DC Microgrids with Storage Devices" IEEE Transactions on Smart Grid, 2017.
17. M. J. Hossain, B. Tiwari, **I. Bhattacharya**, "Novel High Efficiency Quadruple Junction Solar Cell with Current Matching and Quantum Efficiency Simulations", Solar Energy Journal, Volume 139, 1 December 2016, Pages 100-107.
18. B. Tiwari, M.J. Hossain, **I. Bhattacharya**, "GaP/InGaAs/InGaSb triple junction current matched photovoltaic cell with optimized thickness and quantum efficiency", Solar Energy, Volume 135, October 2016, Pages 618-624.
19. I. J. Ogundana, S. Y. Foo, Z. Yu, **I. Bhattacharya**, "Low-Cost Fabrication of High Efficiency Polymer Solar Cells", Electrochemical Society Transactions, 2015.
20. E. N. Esfahani, **I. Bhattacharya**, "Parameter Tuning Method for a Lattice Compensated Wireless Power Transfer System", Advances in Electrical Engineering, Electronics and Energy, Elsevier.

Peer-Reviewed Conference papers and Proceedings

21. B. D. Soyoye, **I. Bhattacharya**, M. A. Dhason, "Enhancing Efficiency and Robustness in Bidirectional Wireless Power Transfer via CLLLC Resonant Networks", IEEE International Conference on Electromagnetic Signal and Power Integrity 2024, August 5-9, Phoenix, Arizona, USA.
22. T. Banik, **I. Bhattacharya**, "Tailoring Cathode Materials: Al_2O_3 Coating for Advanced Sodium-Ion Batteries", ECS PRiME 2024, October 6-11, 2024, Honolulu, HI.
23. M. A. Dhason, **I. Bhattacharya**, "Average Voltage Prediction of Battery Electrode Materials Using Transformer Deep Learning Architecture", 245th ECS Meeting, San Francisco, CA, May 26-30, 2024.
24. N. D. Ledezma, J. J. Biernacki, S. Wendt, T. Majors, **I. Bhattacharya**, "Improving Undergraduate Success Through Effective Critical Thinking", 2024 ASEE Southeast Section Conference, Marietta, GA.
25. A. Olatunji, **I. Bhattacharya**, W. Adepoju, "Comparative Analysis of Physics and Finite Element Method Based Multi-Objective Optimization of High-Frequency Transformer for Electric Vehicle", IEEE Wireless Power Technology, IEEE Wireless Power Technologies Conference and Expo (WPTCE) Conference and Expo 2023, June 4-8, San Diego, CA.
26. T. Banik, **I. Bhattacharya**, "Synthesis of Single Crystalline Spike Shaped Nano-Rod Structured Cathode for High Performance Sodium-Ion-Battery", 243rd ECS Meeting, May 28 - June 2, 2023, Boston, MA.
27. K. Patel, T. Banik, **I. Bhattacharya**, "Improving the Ionic Conductivity and Electrochemical Performance of NASICON Based Ca^{2+} Doped NZSP Solid-State Electrolyte for Solid State Sodium Batteries", 243rd ECS Meeting, May 28 - June 2, 2023, Boston, MA.
28. W. Adepoju, **I. Bhattacharya**, M. Sanyaolu, E. Esfahani, A. Olatunji, "Modeling and Theoretical Investigation of Grid-Interactive Ultracapacitor Fuel-Cell for Renewable Application," 2023 IEEE IAS Global Conference on Renewable Energy and Hydrogen Technologies (GlobConHT), Male, Maldives, 2023, pp. 1-7, doi: 10.1109/GlobConHT56829.2023.10087751.

29. A. Olatunji, **I. Bhattacharya**, W. Adepoju, E. N. Esfahani, “Multi-Objective and Finite Element Based Optimization of High-Frequency Solid State Transformer for Electric Vehicle Applications”, IEEE SoutheastCon 2023, April 13-16, Orlando, FL.
30. E. N. Esfahani, **I. Bhattacharya**, W. Adepoju, “Modeling and Parameter Tuning of a Bidirectional Wireless Power Transfer For interfacing EVs with the DC Smart Grids”, IEEE Vehicle Power and Propulsion Conference, November 1-4, 2022, Merced, CA.
31. W. Adepoju, **I. Bhattacharya**, C. V. Neste, “Model Based Analysis of Low Frequency Metamaterial for Efficient Wireless Power Transfer”, IEEE Vehicle Power and Propulsion Conference, November 1-4, 2022, Merced, CA.
32. A. Olatunji, **I. Bhattacharya**, W. Adepoju, E. N. Esfahani, “Application of Artificial Intelligence in Optimization of Solid-State Transformer Core for Modern Electric Vehicles Using Multi-Objective Genetic Algorithm”, IEEE Vehicle Power and Propulsion Conference, November 1-4, 2022, Merced, CA.
33. W. Adepoju, **I. Bhattacharya**, E. N. Esfahani, “Equivalent Circuit Modeling and Analysis of a Metamaterial Based Wireless Power Transfer”, IEEE International Symposium on Electromagnetic Compatibility, Signal and Power Integrity 2022, August 1-5, Spokane, Washington, USA.
34. W. Adepoju, **I. Bhattacharya**, “Modeling and Analysis of Grid Connected Ultracapacitors and Fuel Cells for Renewable Energy Applications”, IEEE International Symposium on Electromagnetic Compatibility, Signal and Power Integrity 2022, August 1-5, Spokane, Washington, USA.
35. E. N. Esfahani, **I. Bhattacharya**, W. Adepoju, “Simultaneous Design of Circular Pad and Double Side Compensation Network for Dynamic Wireless Power Transfer”, 2022 IEEE International Symposium on Electromagnetic Compatibility, Signal and Power Integrity, August 1-5, Spokane, Washington, USA.
36. M. A. Ali, I. Fidan, M. Allen, **I. Bhattacharya**, and K. Tantawi. "Utilizing lattice infill structures to optimize weight with structural integrity investigation for commonly used 3D printing technologies." In 2022 International Solid Freeform Fabrication Symposium. 2022.
37. T. Banik, **I. Bhattacharya**, “Extenuation of Jahn-Teller Distortion by Ti and V Co-Doping in P2 Type Sodium Iron Manganese Oxide Cathode”, 242nd Electrochemical Society Meeting, October 9-13, 2022, Atlanta, GA.
38. T. Banik, **I. Bhattacharya**, “Potency of Potassium Doping on Na-Ion Sites to Avert Phase Transition in P2 Type Sodium-Ion Battery”, 242nd Electrochemical Society Meeting, October 9-13, 2022, Atlanta, GA.
39. W. Adepoju, **I. Bhattacharya**, M. Bima, T. Banik, “Metamaterial and AI-based Parameter Optimization for Efficient Wireless Power Transfer”, IEEE Vehicular Power and Propulsion 2021 (IEEE VPPC 2021), October 25-28, 2021, Gijón, Spain.
40. M. Bima, **I. Bhattacharya**, W. Adepoju, G. Winfree, P. Mitchell, C. Stephens, “Neural Network Based Mutual Inductance Estimation for Maximum Power Point Tracking in Wireless Power Transfer Array”, IEEE Vehicular Power and Propulsion 2021 (IEEE VPPC 2021), October 25-28, 2021, Gijón, Spain.
41. J. W. Thomas, J. T. Thomas, **I. Bhattacharya**, “Novel P2-Type $\text{Na}_{0.6}\text{Fe}_{0.5}\text{Mn}_{0.5-2x}\text{Cu}_x\text{V}_x\text{O}_2$ Cathode Material for Improved Sodium Ion Batteries”, 240th Electrochemical Society Meeting, October 10-14, 2021, Orlando, FL.
42. W. Adepoju, **I. Bhattacharya**, “Modeling and Performance Comparison of GaN HEMT and SiC MOSFET for OBC Application”, 2021 IEEE 93rd Vehicular Technology Conference, April 24-28, Helsinki, Finland.
43. D. Darbar, **I. Bhattacharya**, “Application of Machine Learning in Battery: State of Charge Estimation Using Feed Forward Neural Network for Na-Ion Batteries”, 240th Electrochemical Society Meeting, October 10-14, 2021, Orlando, FL.

44. T. Banik, I. Bhattacharya, "Novel P2-Type $\text{Na}_{0.66}\text{Fe}_{0.5-2x}\text{Mn}_{0.5}\text{Ti}_x\text{V}_x\text{O}_2$ Cathode for High-Capacity for Sodium-ion Batteries", 240th Electrochemical Society Meeting, October 10-14, 2021, Orlando, FL.
45. E. Kim, **I. Bhattacharya**, "Material selection method for a perovskite solar cell design based on the genetic algorithm", 47th IEEE Photovoltaic Specialists Conference, 2020.
46. E. Kim, M. Warner, **I. Bhattacharya**, "Adaptive step size incremental conductance based maximum power point tracking", 47th IEEE Photovoltaic Specialists Conference, 2020.
47. M. Bima, **I. Bhattacharya**, S. R. Hasan, "Comparative Analysis of Magnetic Materials, Coil Structures and Shielding Materials for Efficient Wireless Power Transfer", 2019 IEEE International Symposium on Electromagnetic Compatibility, Signal and Power Integrity, July 22-26, 2019, New Orleans, LA, USA.
48. Bibek Tiwari, **Indranil Bhattacharya**, "State of Charge Estimation of Sodium Ion Battery under different Operating Conditions", 2018 IEEE Green Energy and Smart Systems Conference (IGESSC), Long Beach, CA, October 29-30, 2018.
49. Jesse Roberts and **Indranil Bhattacharya**, "Improving Any Arbitrary MPPT Hill Climber with ANN Estimations", 44th IEEE Photovoltaic Specialists Conference, Washington DC, June 25-30, 2017.
50. R. V. Penumaka, M. P. Lastres, and **I. Bhattacharya**, "Comparison and Characterization of Carbon-Coated $\text{LiMn}_x\text{Fe}_{1-x}\text{PO}_4$ ($x=0.4$) Between Different Synthesis Routes", 231st ECS Meeting, May 28-June 2, 2017, New Orleans, LA.
51. R. V. Penumaka, M. P. Lastres, and **I. Bhattacharya**, "Low Temperature Synthesis and Characterization of Carbon Coated LiMnPO_4 for Lithium-Ion Batteries", 231st ECS Meeting, May 28-June 2, 2017, New Orleans, LA.
52. R. V. Penumaka, and **I. Bhattacharya**, "Design and Development of an All-Solid-State Lithium Sulfur Battery Using Ceramic Polymer Composite Solid Electrolyte", 231st ECS Meeting, May 28-June 2, 2017, New Orleans, LA.
53. J. Sirigineedi, R. Penumaka, **I. Bhattacharya**, "Analysis of Electrochemical Properties of Li Iron Phosphate Cathode Material Doped with Aluminum", 18th International Meeting on Lithium Batteries, June 19-24, 2016, in Chicago, Illinois.
54. Jesse Roberts and **Indranil Bhattacharya**, "MNFIS and Other Soft Computing Based MPPT Techniques: A Comparative Analysis", 43rd IEEE Photovoltaic Specialists Conference, Portland, OR, June 5-10, 2016.
55. M. J. Hossain, B. Tiwari, **I. Bhattacharya**, "An Adaptive Step Size Incremental Conductance Method for Faster Maximum Power Point Tracking" 43rd IEEE Photovoltaic Specialists Conference, Portland, OR, June 5-10, 2016.
56. B. Tiwari, R. Penumaka, **I. Bhattacharya** and S. M. Mahajan, "A Novel GaP/InGaAs/InGaSb Triple Junction Photovoltaic Cell with Optimized Quantum Efficiency", 42nd IEEE Photovoltaic Specialists Conference, New Orleans, LA, June 14-19, 2015.
57. R. Penumaka, B. Tiwari, **I. Bhattacharya**, S. Y. Foo, "Indium Gallium Antimonide a better bottom subcell layer in III-V multijunction solar cells", 42nd IEEE Photovoltaic Specialist Conference, June 14-19, 2015, New Orleans, LA.
58. **I. Bhattacharya** and S. Y. Foo, "Modeling of Antimony based Subcell Layers for Higher Photon Absorption in Novel Multijunction Solar Cell", IEEE SoutheastCon 2013, April 4-7, Jacksonville, FL.
59. **I. Bhattacharya** and S. Y. Foo, "Effects of Gallium-Phosphide and Indium-Gallium-Antimonide Semiconductor Materials on Photon Absorption of Multijunction Solar Cells", IEEE SoutheastCon 2010, Charlotte, NC, March 18-21, 2010.
60. **I. Bhattacharya**, Y. Deng and S. Y. Foo, "Active Filters for Harmonics Elimination in Solar Photovoltaic Grid-Connected and Stand-Alone Systems", 2nd Asia Symposium on Quality Electronic Design (ASQED '10), August 3-4, 2010, Penang, Malaysia, IEEE Xplore.

61. **I. Bhattacharya** and S. Y. Foo, “Indium-Phosphide, Indium-Gallium-Arsenide and Indium -Gallium-Antimonide based High Efficiency Multijunction Photovoltaics for Solar Energy Harvesting”, 1st Asia Symposium on Quality Electronic Design (ASQED '09), July 15-16, 2009, KL Malaysia, IEEE Xplore.
62. Y. Deng, **I. Bhattacharya**, S. Y. Foo, "Regenerative Electric Power for More Electric Aircraft", IEEE SoutheastCon 2014, March 13-16, 2014, Lexington, KY.
63. Richard A. Nelson, S. Y. Foo, **I. Bhattacharya**, “Simplified Modeling of Photovoltaic Maximum Power Point Tracking Using MATLAB”, IEEE SoutheastCon 2014, March 13-16, 2014, Lexington, KY.

INVITED SPEAKER

1. Research trend in Lithium-ion and sodium-ion battery, University of Mississippi, February 26, 2024.
2. Research experience in next-generation energy storage and semiconductor technologies, State University of New York, April 24, 2023.
3. Research experience and developing large collaborative grant proposals, College of Engineering, Tennessee State University, Nashville, Tennessee, April 12, 2023.
4. Preparing and Including Undergraduates in Energy Access Research, National Science Foundation-Energy Educators’ Conference, Minneapolis, Minnesota, June 24-25, 2022.
5. Next-Generation Energy Generation, Storage and Power Transfer Technologies, Michigan Technological University, April 09, 2021.
6. Lithium-ion Battery, Flow Battery for Grid-Scale Energy Storage, Michigan Technological University, April 08, 2021.
7. International Conference on Emerging Smart Materials in Applied Chemistry (ESMAC-2021), KIIT University, India, 3-4th December 2021.
8. International Conference on Emerging Smart Materials in Applied Chemistry (ESMAC-2020), KIIT University, India, 10-12th August 2020.
9. High-Energy Density Lithium/Sodium Ion Batteries for Grid Level Energy Storage, Tennessee Valley Authority, Chattanooga, Tennessee, January 18, 2019.
10. International Workshop on Emerging Trends in Energy Systems Management as a key invited speaker and deliver a special addresses on Smart Energy Systems, Annamalai University, India 03/14/2014 – 03/17/2014.

TECHNICAL SOCIETY MEMBER

- Senior Member of Institute of Electrical and Electronics Engineers (IEEE).
- International Solar Energy Society (ISES).

CHAIR OF DOCTORAL DISSERTATION SUPERVISORY COMMITTEE (Total Number: 10)

1. Webster Adepoju (Ph.D., graduated, December 2022), Title, “Modeling, Optimization and Experimental Evaluation of Novel Low Frequency Metamaterial for Efficient Wireless Power Transfer”.
2. Devendrasinh Darbar (Ph.D., graduated December 2021), Title, “Cobalt-Free Cathodes for Lithium-ion and Sodium-ion Battery Technologies and Artificial Intelligence-Based State of Charge Estimation”.
3. Muhammad Bima (Ph.D., graduated, August 2021), Title, “Novel Magnetic Coil Structure, Beam Steering and Artificial Intelligence-Based Coupling Coefficient Estimation for Efficient High Power Wireless Power Transfer System”.

4. Bibek Tiwari (Ph.D., graduated December 2018), Title, “Synthesis of a High-Capacity Novel P2-Type $\text{Na}_{0.7}\text{Ni}_{0.3}\text{Mn}_{0.59}\text{Co}_{0.1}\text{Cu}_{0.01}\text{O}_2$ Cathode Materials for Sodium Ion Batteries & Developing Algorithms for State-of-charge and State-of-health Estimation”.
5. Ebrahim Nasr Esfahani (Ph.D., expected graduation, December 2023), Title, “Designing an optimized grid-connected wireless power transfer system for dynamic charging of electric vehicles”.
6. Trapa Banik (Ph.D., expected graduation, December 2024).
7. Mohamed Mansour, (Ph.D., expected graduation, December 2025).
8. Mary Antony Dhasan, (Ph.D., expected graduation, December 2027).
9. Zack Bikakis, (Ph.D., expected graduation, December 2027).
10. Ifeoluya Adeloye, (Ph.D., expected graduation, December 2027).

CHAIR OF MASTER’S THESIS SUPERVISORY COMMITTEE (Total Number: 15)

1. Jordan Thomas (Expected graduation Spring 2024)
2. Joshua Thomas (Expected graduation Spring 2024)
3. Khushi Patel (Expected graduation Spring 2024)
4. Babatunde Dami Soyoye (Expected graduation Spring 2025)
5. Zack Bikakis, “An Argument for Dynamic Ether in Space”, (Graduated Fall 2023).
6. Abioudun Olatunji, “Application of Artificial Intelligence in Optimization of Solid-State Transformer Core for Modern Electric Vehicles Using Physics and Finite Element Method-Based Multi-Objective Genetic Algorithm”, (Graduated May 2023).
7. Trapa Banik, “A Novel P2 Type Ti/V Co-doped Sodium Iron Manganese Oxide Cathode for High Energy Density Sodium-ion Battery”, (Graduated December 2022).
8. Micah Rentschler, “Optimal Junction Parameters to Improve the Quantum Efficiency of Multijunction Perovskite/III-V Solar Cells”, (Graduated December 2019).
9. Jacob Fesmire, “An Application of Neuro-Fuzzy Algorithmic Modeling for State-of-Charge and State-of-Health Estimation for Sodium-ion Batteries”, (Graduated December 2018).
10. Miguel Lastres, “Nickel doped P2-type Novel Sodium Iron Manganese Oxide ($\text{Na}_{0.67}\text{Fe}_{0.5}\text{Mn}_{0.5}\text{O}_2$) Cathode Material for High-Capacity Sodium-ion Batteries”, (Graduated December 2018).
11. Jesse Roberts, “MNFIS+; or a Better Hybrid Heuristic Maximum Power Point Tracker”, (Graduated, May 2017).
12. Christopher Ibe Ekeocha, “Implementation of Neural Network-Based Learning Machines for Online Diagnostics of Energy Storage Devices”, (Graduated, May 2017).
13. Jobayer Hossain, “Novel High Efficiency Quadruple Junction Solar Cell with Current Matching and Optimized Quantum Efficiency”, (Graduated, August 2016).
14. Jagadish Sirigineedi, “Enhanced Electrochemical Properties of Aluminum Doped Lithium Iron Phosphate Cathode Material for Li-ion Battery Using Solid State Synthesis”, (Graduated, July 2016).
15. Raja Penumaka, “Design, Modeling and Simulation of Ultra High Efficient IMM III-V Multijunction Solar Cell”, (Graduated, December 2015).

UNDERGRADUATES ADVISED (Total Number: 50)

1. Cooper Nelson (2023)
2. Andrei Matei (2023)
3. Tyler Chittum (2022)
4. Jake Shockey (2022)
5. Andrew Alley (2022)
6. Joshua Thomas (2021)
7. Jordan Thomas (2021)
8. Moody Yousef (2021)
9. Chintan Patel (2021)
10. Khushi Patel (2021)

11. Keegan Valentine (2021)
12. Mark Skelton (2021)
13. Joseph Nunley (2020)
14. Austin Wilson (2020)
15. Morgan Warner (2020)
16. Eungkyun Kim (2020)
17. Peyton Mitchell (2020)
18. Caleb Hunter (2020)
19. Grant Winfrey (2020)
20. Dalton Burroughs (2019)
21. Vincent Del Campo (2019)
22. Cole Price (2019)
23. William Lundy (2019)
24. Sean Grimes (2019)
25. Ira Von-Almen (2019)
26. Brandon Neaman (2019)
27. William Web Allen (2019)
28. Hannah Deen (2018)
29. Riley Mcabee (2018)
30. Youssef T Daoud (2018)
31. Joshua E P Adair (2018)
32. Nader Marzouk (2018)
33. Joshua Reese (2018)
34. Drew Miller (2018)
35. Chris Lam (2018)
36. Clinton Iyizoba (2018)
37. Landon B. Crawford (2017)
38. William A Henseley (2017)
39. Devin Teal (2017)
40. Chadwick Beard (2017)
41. Timothy McGovern (2017)
42. Conner Copeland (2017)
43. Fahmi Hashi (2017)
44. Brady T Alred (2017)
45. Michael Sain (2016)
46. Ian Gwaltney (2016)
47. Michael L. Turnbill (2016)
48. Leon Lambert (2016)
49. Adam Stegemann (2014)
50. Jesse Roberts (2013)

NSF-REU Advisees: (Total Number: 9)

1. Joshua Thomas (2021)
2. Christopher Johnson (2021)
3. Michael Girard (2019)
4. Evan Kixmiller (2019)
5. Ryan Rippeon (2018)
6. Samuel Griffin (2018)
7. Christian Brady Alvarez (2018)
8. Stephanie Sandoval (2015)
9. Gera Groshev (2015)

PROFESSIONAL ACTIVITIES

Faculty Advisor of Electrical Engineering honor society HKN Student Chapter

Reviewer of

- National Science Foundation (NSF) Electronic, Photonic and Magnetic Devices
- National Science Foundation, Engineering Education
- National Science Foundation Division of Materials Research
- Advanced Materials (Impact Factor 32)
- IEEE Journal of Photovoltaics
- Elsevier Solar Energy Journal
- IEEE Transactions on Photonics
- IEEE Transactions on Smart Grid
- IEEE Photonics Journal
- Electrochimica Acta
- Journal of Power Sources

Departmental Committees

- Assessment and Accreditation (Chair)
- Tenure and Promotion
- Undergraduate
- Faculty Search Committee (Chair)
- Graduate Programs
- Laboratories
- Scholarships (Chair)
- Devices and Electromagnetics (Chair)
- Power and Energy

College of Engineering and University Committees

- Scholarships
- College of Engineering Advisory Committee
- Honors Committee

OTHER INTERESTS

- Educational outreach K-12 students and families, Millard Oakley STEM Center, Tennessee Tech University.
- Soccer captain in high school and FSU intramural soccer team Diversity FC.
- Performed songs in college festivals and Indian Association festivals.
- 100-, 200- and 400-meters sprint champion in high school and in college.
- Charity work in poor slums during school days.