

# MOHAMMAD MAHINUR RAHMAN

PH.D. STUDENT  
ELECTRICAL AND COMPUTER ENGINEERING  
NORTH CAROLINA STATE UNIVERSITY

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## EDUCATION

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**Doctor of Philosophy in Electrical Engineering** Aug. 2021 – Present  
*North Carolina State University* Raleigh, NC, USA  
CGPA: 3.85/4.00 (EXPECTED GRADUATION: MAY 2026)  
RESEARCH SUPERVISOR: DR. IQBAL HUSAIN (ELECTRICAL ENGINEERING)

**Bachelor of Science in Electrical and Electronic Engineering** Jan. 2015 – Apr. 2019  
*Bangladesh University of Engineering and Technology (BUET)* Dhaka, Bangladesh

## CURRENT RESEARCH INTEREST

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Power Electronics - Fast Charging of Electrified Transportation, Electric Vehicle On-Board Chargers (OBC)

## RESEARCH EXPERIENCE

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**North Carolina State University | FREEDM Systems Center** Aug. 2021 - Present  
Principal Investigators: *Dr. Iqbal Husain, Dr. Srdjan Lukic*

### Design of Isolated DC-DC Converters with variable voltage output

- Studied the Dual-Active Bridge (DAB) topology followed by a buck converter as candidates
- Analyzed the several components of the system and designed a 750V/300V-420V hardware prototype
- Investigated the switching performance, complexity, and efficiency of a DAB if Zero Voltage Switching (ZVS) is maintained for a wide voltage and power range operation by using multiple phase shift modulations
- Currently working with analysis and design of Multi-Active Bridge DC-DC Converters

### Voltage Source Inverter (VSI) PWM analytical loss modeling

- Studied the different losses in power semiconductor devices for the case of a VSI
- Analyzed and modeled the conduction losses, switching losses, and electro-thermal losses in a VSI

**Bangladesh University of Engineering and Technology (BUET)** Apr. 2018 - April 2019  
Principal Investigator: *Dr. Md. Ziaur Rahman Khan*

### Study on the Effect of Electric Three Wheelers (ETWs) on the National Grid of Bangladesh - A Generation Side Perspective [*Undergraduate Thesis*]

- Studied on the scenario and evolution of ‘Electric Three Wheelers (ETWs)’ in Bangladesh
- Analyzed generation side data from 2005 to 2018 and a survey on ETW charging pattern and infrastructure
- Studied the effect of integration of ETWs in the National Grid and observed the change in daily load curve pattern

### Design of an Efficient Three-Phase Charging System - Simulation-Based Analysis [*Undergraduate Thesis*]

- Analyzed the existing chargers for ETWs and identified scopes of improvement
- Studied three-phase chargers for ETWs which have added advantages over single-phase chargers
- Designed and simulated a 3-phase efficient charger with unity power factor and low harmonics

## PUBLICATIONS ([Google Scholar Profile](#))

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6. **Mohammad Mahinur Rahman**, and M. Z. R. Khan, “Solar Energy based Net Metered Easy-Bike Charging Station in Bangladesh”, International Conference on Information and Communication Technology for Sustainable Development, Dhaka, Bangladesh, 2021.
5. **Mohammad Mahinur Rahman**, and M. Z. R. Khan, “Design and Performance Assessment of a Locally Developed Solar Pipe Light”, 2020 11<sup>th</sup> International Conference on Electrical and Computer Engineering (ICECE), Dhaka, Bangladesh, 2020.
4. S. Shuvo, A. A. Akib, **Mohammad Mahinur Rahman**, T. Islam, R. U. Rashid, S. Mahnaz, M. S. Anwar, S. A. Fattah, and C. Shahnaz, “Analog Signal Processing Based Hardware Implementation of a Real Time Audio Visualizer”, 2020 IEEE Region 10 Symposium (TENSYP), Dhaka, Bangladesh, 2020.

3. M. R. Awal, **Mohammad Mahinur Rahman**, A. K. M. N. Islam, J. Al-Hossain, and M. Z. R. Khan, “Energy Consumption Analysis of Electric Three Wheelers in Bangladesh”, 2019 IEEE International Conference on Power, Electrical, and Electronics and Industrial Applications (PEEIACON), Dhaka, Bangladesh, 2019.
2. **Mohammad Mahinur Rahman**, A. Uddin, and S. Kabir, “Voice and EMG signal based low-cost automated assistive arm”, 2017 IEEE Region 10 Humanitarian Technology Conference (R10-HTC), Dhaka, 2017.
1. S. A. Fattah, **Mohammad Mahinur Rahman**, N. Mustakin, M. T. Islam, A. I. Khan, and C. Shahnaz, “Wrist-card: PPG sensor based wrist wearable unit for low cost personalized cardio healthcare system”, 2017 IEEE Global Humanitarian Technology Conference (GHTC), San Jose, CA, 2017.

## PROJECTS

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- **Ultra-low Cost, All-SiC Modular Power Converters for DC Fast Charging Equipment Connected Directly to Medium Voltage Distribution System** Feb. 2023 - Present  
*[Funded by the United States Department of Energy (DOE)]*
  - Working on electrical and thermal simulations for finalizing circuit topology and device selection
- **Intelligent, Grid-friendly 1MVA Medium Voltage Extreme Fast Charger (XFC)** Jan. 2022 - July 2023  
*[Funded by the United States Department of Energy (DOE)]*
  - Low-voltage side buildup of the Solid-State Transformer (SST)
  - Assembly of the whole system module-by-module and integration to the medium voltage grid
  - Electrical testing and Partial Discharge testing of the SST modules and also the whole system
  - Worked on the field deployment of the 1MVA XFC system at the project site
- **48V / 60V Programmable Charger for Electric Three Wheelers** Dec. 2020 – Apr. 2021  
*In collaboration with Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ), BUET, and Sustainable and Renewable Energy Development Authority (SREDA), worked in developing the hardware and field implementation.*
- **3 - Phase High Speed Data Acquisition System** Mar. 2020 – Oct. 2020  
*In collaboration with GIZ, GOPA-International Energy Consultants GmbH, and BUET, worked in developing the hardware and field implementation of the devices.*
- **Solar Home System (SHS) Demonstration Kit** Dec. 2019 – Jan. 2020  
*In collaboration with GIZ, BUET, SREDA, worked in developing the hardware for demonstration of SHS concept.*
- **1 KW Energy Efficient Charger for Electric Three Wheelers** Sep. 2018 – Nov. 2018  
*In collaboration with GIZ, BUET, and SREDA, worked in developing the hardware.*

## SKILLS

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|-------------------------------------|---|
| <b>Power Electronics Simulation</b> | PLECS, PSIM, LTSpice, Ansys   |
| <b>CAD Design</b>                   | SolidWorks, Eagle PCB, Altium                                       |
| <b>Embedded Engineering</b>         | TI DSP, Arduino, Raspberry Pi, Atmel Studio, Code Composer Studio   |
| <b>Software</b>                     | MATLAB-Simulink, OriginPro, Adobe Illustrator, Photoshop, Lightroom |

## PROFESSIONAL EXPERIENCES

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- Graduate Research Assistant** Jan. 2022 – Present  
*FREEDM Systems Center, North Carolina State University*

*Raleigh, NC, USA*
- Graduate Teaching Assistant** Aug. 2021 – Dec. 2021  
*Department of ECE, North Carolina State University*

*Raleigh, NC, USA*

  - Teaching assistant and grader of **ECE 200 - ‘Introduction to Signals, Circuits and Systems’** course
- Lecturer** Feb. 2021 – Jun. 2021  
*Department of EEE, Daffodil International University*

*Ashulia, Bangladesh*

  - Conducted **‘Electrical Circuit’** and **‘Numerical Analysis Laboratory’** courses
- Designer and Demonstrator** Jan. 2020 – Mar. 2020  
*Internet of Things (IoT) Lab, Bangabandhu Sheikh Mujibur Rahman Digital University*

*Gazipur, Bangladesh*

- Designed lab materials, projects, and instrument manuals
- Trained lab instructors on ‘**Embedded Systems and IoT**’ and demonstrated the know-how of lab equipment

## Operations and Project Lead

Jan. 2019 – Sep. 2019

CODE 19

Dhaka, Bangladesh

- Did a thorough analysis of the client’s business and requirement
- Aided senior management team with workflow management of a project
- Worked closely with the technical team and the sales team to develop solutions that fulfill the client’s requirement

## LEADERSHIP EXPERIENCE

### Co - Founder and Executive Director

Feb. 2018 – Present

IoT For Bangladesh

Dhaka, Bangladesh

- Functional leadership of the entire organization
- Anchoring of project managers and contributors
- Addressing and reporting operational transactions
- **Editor-in-Chief** of the only ‘**Internet of Things (IoT)**’ magazine in Bangladesh

## HONORS AND ACHIEVEMENTS

- **University Graduate Fellowship**, NC State University Aug. 2021 - July 2022
- **Graduate Merit Award (GMA)**, NC State University College of Engineering Aug. 2021 - July 2022
- **EEE Day 2019 Inter-University Poster Presentation Competition – Champion** Jan. 2019
- **EEE Day 2016 Inter-University Project Showcasing Competition – Champion** Dec. 2016
- **Dean’s List Award** (Sophomore Level) Jan. 2016 - Feb. 2017
- ‘**The Duke of Edinburgh’s International Award**’ - **Bronze Award** Jan. 2013
- **The Daily Star Award**, for outstanding results in IGCSE and IAL Mar. 2012 & Mar. 2014
- **Recipient, Maple Leaf International School Scholarship for Grade 11 & 12** Jan. 2012 - Dec. 2013

## SYNERGISTIC ACTIVITIES / PROFESSIONAL AFFILIATIONS AS VOLUNTEER

- Treasurer, **Bangladesh Student Association - NC State University** Sept. 2022 - Aug. 2023
- Editorial Board Member, **IEEE PES eNews Update** Nov. & Dec. 2019; Mar. 2021 - Jun. 2021
- Assistant Rapporteur, **Intl. Conf. on Energy Efficiency and Conservation Awareness** Nov. 2019
- Volunteer, **IEEE Bangladesh Section (IEEE BDS)** Aug. 2016 - Dec. 2019
  - **Conference Secretary**, IEEE PEEIACON 2019, *June 2019 - Dec 2019*
  - **Program Coordinator**, IEEE SPAC 2018, *December 2018*
  - **Associate Editor**, IEEE Bangladesh Section Newsletter, *Mar. 2017 - Dec. 2019*
  - **Student Ambassador**, IEEE BDS SYWM Congress, *Oct. 2016 and Nov. 2018*
  - **Coordinator**, IEEE BDS SYWM Congress, *Dec. 2017 and Nov. 2018*
  - **Tourism Volunteer Lead**, IEEE R10 Humanitarian Technology Conference 2017, *Dec. 2017*
  - **Associate Editor**, IEEE BDS 25 Years Commemorative Magazine, *Dec. 2017*
- Volunteer, **IEEE BUET Student Branch (IEEE BUET SB)** Nov. 2015 - Oct. 2020
  - **Advisor**, Reminiscence: IEEE BUET SB 25 Years Commemorative Magazine, *July 2020 - Oct. 2020*
  - **Treasurer**, *Nov. 2018 - July 2019*
  - **Publicity Chair**, *Sep. 2017 - Oct. 2018*
  - **Publicity and Documentation Coordinator**, *Mar. 2016 - Aug. 2017*
  - **Executive Member (Documentation)**, *Nov. 2015 - Feb. 2016*
- President, **English Medium BUETians’ Association (EMBA)** Oct. 2018 - Apr. 2019
- General Secretary, **Maple Leaf Community Service Club (MLCSC)** Oct. 2012 - Sep. 2013
- Volunteer, **Jaago Foundation** Aug. 2011 - Dec. 2011
- Conducted Workshops on **Basic Electronics, Arduino, Sensor Interfacing and Line Follower Robots**
  - **Organisers:** IEEE BUET SB (*Oct. 2016, Apr. 2017*), BUET Robotics Society (*May 2018*), IEEE Stamford Univ. SB (*Oct. 2017*), IEEE Northern Univ. SB (*Nov. 2019*), Eastern Univ. Engineering Club (*Feb. 2020*)