# Irfan Nafiz Shahan

Sylhet, Bangladesh

Website | LinkedIn | Google Scholar | Github | YouTube | Email

## EDUCATION

**Shahjalal University of Science and Technology (SUST)**, Sylhet, Bangladesh 2025
Bachelor of Science (Hons.) in *Electrical and Electronic Engineering* *3.86/4.00*
Thesis Title: *CARLASnowScenes: Towards Solving Adverse Weather Autonomous Driving*
Supervisor: Dr. Md. Rasedujjaman
Honors: **Ranked 1st out of 83** (Highest Honor)
**2 x** SUST STEM Scholarship (Merit) Recipient

## PUBLICATIONS

**Preprints:**

- **Shahan I.,** Auvi M., Rasedujjaman M. "CARLASnowScenes: Towards Adverse Weather Autonomous Driving" BSc. Thesis, Shahjalal University of Science and Technology [Ref]
- **Shahan, I,** Hossain, A, Sakib, S., Nabil, A. **"**A Real-Time DETR Approach to Road Object Detection for Autonomous Vehicles.**"** arXiv [Ref]
- **Shahan I.,** Auvi M. "Towards Speaker Identification with Minimal Dataset and Constrained Resources using 1D Convolution Neural Networks" arXiv [Ref]

**Manuscripts *(In Preparation)***

- Hassan, R., Nabil, A., **Shahan, I.,** Rahman, I. "Holistic Robustness Evaluation for NR-IQA Models under MOS-Stratified Perturbations"
- **Shahan, I.**, Nabil, A., Kusari, A. "LiDAR Point Generation without Raycasting in Simulation"
- **Shahan I.,** Auvi M., Rasedujjaman M. **"**CARLASnowScenes: Towards Solving Adverse Weather Driving – An Analysis and Approach to Synthetic Snow Road Scenes for Autonomous Driving**"**
- Rasedujjaman M., **Shahan I.**, Rakhaine N., Rahman I. "A Scalable Embedded IoT Device for Secure RFID and Fingerprint Attendance Management" [Target: Journal]

**Poster Presentations:**

- **Shahan, I.,** Ahmed, M., Supty, S., Sarker, R., "A Cost-effective TinyML Assistive Device for Sign Language Interpretation" Rice360 GLHT Design Competition 2025 [Ref]
- Mowaz M., **Shahan, I.,** Nabil, A., Dey, P., Paul, A., Chowdhury, T. "I-Braille: An Affordable Internet-of-Things based Braille Display" *IC4IR 2021* [Ref]

## RESEARCH AND PROJECT EXPERIENCE

**Researcher, TMRI, University of Michigan** Mar 2025 – Present
Supervisor: Dr. Arpan Kusari Michigan, US
Developed a raycasting-free LiDAR point generation pipeline using spherical projection and GPU vertex–raster shaders.

- Implemented a geometry-based LiDAR point generation method using mesh and vector computation
- Built the computational geometry logic for vertex and raster shaders in a GPU rendering pipeline

**Team Supervisor and Educator, STEMX-365** May 2024 – Present
Project Coordinator: Mizanul Haq Chowdhury, (MIT Space Systems Lab) Tokyo, Japan
*JAXA* organized Kibo-Astrobee ISS Robot Programming Challenge (KRPC) [Ref]

- Built the autonomy stack for Astrobee inside ISS ROS module for waypoint navigation avoiding obstacles
- Implemented Bash scripts and compatibility fixes for students for use in different hardware specifications
- Troubleshoot OpenGL nested virtualization with containerized Docker simulations in multiple OS platforms

**Researcher, EEE, SUST** Jan 2025 – Present
Undergraduate Project Sylhet, Bangladesh
Supervisor: Dr. Md. Rasedujjaman
Project Title: A Scalable Embedded IoT Device for Secure RFID and Fingerprint Attendance Management

- Designed the device using Fusion360, tested structural and thermal stability.
- Designed secure on-device authentication and local data logging architecture for institutional deployment.

**Researcher, EEE, SUST** 2024 – 2025
Undergraduate Thesis Sylhet, Bangladesh
Supervisor**:** Dr. Md. Rasedujjaman
Project Title: CARLASnowScenes: Development of Synthetic Snow Weather Data for Autonomous Driving

- Implemented missing snow weather shaders (accumulation and snowfall) into CARLA simulator Unreal Engine
- Created a large-scale deterministic synthetic snow weather dataset for autonomous driving evaluation
- Compared benchmarks of SOTA vision models with CARLASnowScenes dataset

**Team Leader, Team SignTalk, SUST** Oct 2024 – Aug 2025
Undergraduate Project Texas, US
Supervisors: Dr. Farzana Hussain (HTU) and Dr. Nancy Griesinger (TSU)
Project Title: SignTalk – A TinyML Based Inertial Glove for Sign Language Translation [Ref]

- Performed local surveys on disability schools and institutions on the difficulties of Bengali mute community
- Developed a TinyML model for inference on 5 6-DOF inertial measurements units for different sign movements.

**Researcher, EEE, SUST** Aug 2024 – Jan 2025
Undergraduate Project Sylhet Bangladesh
Project Title: TinyRecycler: A TinyML based Smart Trash Segregator [Ref]

- Built a custom minimal dataset of 250+ images containing 5 recyclable objects
- Reduced SRAM usage to 85kB, for deployment on low cost edge embedded nano BLE devices.

**Researcher, EEE, SUST** Aug 2024 – Jan 2025
Undergraduate Project Sylhet Bangladesh
Project Title: SUSTsat-1 **-** A Raspberry Pi based Multifunctional SmallSat with Payload and Telemetry [Ref]

- Utilized POCSAG, SSTV and FSK for instrumentation and camera data telemetry
- Ground up electrical, software and mechanical design, with custom buck-boost module for BMS
- SDR based ground station, utilizes an RTL-SDR to decode telemetry

**Researcher, MAT, SUST** Sep 2022 – July 2023
Supervisor: Dr. Pabel Shahrear
Project Title: Expeditions on Time-Series ML Architectures for Dengue Outbreak Prediction in Bangladesh
(Data Provided by Institute of Epidemiology Disease Control And Research (IEDCR), Bangladesh)

- Experimented on accuracy of statistical and TSDNNs on predicting dengue outbreak in Bangladesh
- Models were benchmarked - LSTMs, Bi-LSTMs, FFN, ARIMA and SARIMA

**Team Leader, Team ICARUS, SUST** Aug 2022 – Oct 2023
NASA Space Apps Challenge Projects Dhaka, Bangladesh
Supervisor: Dr. Forhad Rabbi

- Developed an N-Body Space Simulator and Orbital Trajectory VR Simulation using Unity Engine. [Ref]
- Utilized NASA data to create a VR Perseverance Rover Launch, Landing and Deployment in Mars Terrain [Ref]

**Team Leader and Researcher, SUST** Mar 2021 – Dec 2022
Supervisor: Dr. M. Jahirul Islam
Project Title: Development of Affordable Braille Display for the Visually and Auditory Impaired in Developing Countries [Ref]

- Designed device 3D model using Fusion360, iterated for ergonomics for optimal hand grip on braille device
- Conducted testing on piezoelectric and mechanical actuators for braille cell design
- Developed OCR model for Bengali-to-Braille conversion for documents using Raspberry Pi 3B

## SCHOLARSHIPS AND GRANTS (14,000+ USD)

2025 **Funding 3,000 USD Youth Innovation Challenge** by Startup Bangladesh Limited
2024 **SUST STEM "Professor Guaranga Deb Roy Memorial Scholarship" (Merit)** [Ref]
2023 **SUST STEM Scholarship 2023 Recipient (Merit)** [Ref]
2021 **Grant Funding 10,000 USD** | Top 10 Most Innovative Engineering Projects [Ref]

## PROFESSIONAL EXPERIENCE

**Executive and Educator** May 2024 – Present
STEMX-365 Massachusetts, US
Project Coordinator: Mizanul H. Chowdhury (MIT Space Systems Lab)

- Lead development for nested virtual machine simulation deployment using ROS, Docker and Android Studio
- Develop robust automation and online platform for ISS Astrobee Simulation for training purposes
- Mentor prospective students on ATZG, autonomous NASA Astrobee and core astronomy and robotics concepts

**Teaching Assistant** Feb 2024 – Present
Department of Electrical and Electronics Engineering, SUST Sylhet, Bangladesh
Courses: Digital Signal Processing I (Theory and Lab)
Signals and Linear Systems,
Electronics II Lab

**Industrial Trainee** Nov 2024 - Dec 2024
Technical Institute for Chemical Industries Dhaka, Bangladesh
Key Achievement: Ranked 1st out of 60 trainees *[Dec 19th 2024]*

- PLC Design and Verification
- Distributed Control Systems (DCS)
- Factory Automation with SCADA

**Judge** 2023
HerWill, "The Data Forge" Natural Language Processing Contest 2023 [Ref] USA

**Technical Assistant** 2023
ISTEME Conference 2023 [Ref] Huston-Tillotson University, TX, US

## LEADERSHIP EXPERIENCES

**Founder and President** Jul 2023 – Present
NSDC SUST, Columbia University, NEBD Hub New York, US

- Pioneered a 2-month long event event "DATADRIVE 1.0 A Speedrun to Advanced Machine Learning"
- Collaborated HerWILL Inc. (US) to provide workshops on NLP and Semantic Analysis

**ATZG Bangladesh Lead, STEMX-365** Dec 2024 – Present
Project Coordinator: Mizanul Haq Chowdhury, (MIT Space Systems Lab) Tokyo, Japan
*JAXA* organized Asian Try Zero Gravity Challenge (ATZG)

- Mentored and assisted students on ATZG project submissions with space engineering and sciences.
- Ensured to be a mode of communication with JAXA ATZG team for validation of student work.

**Director of Robotics** Jul 2021 – June 2025
RoboSUST, SUST Sylhet, Bangladesh

- Led multiple robotics teams to startup and national robotics contests
- Conducted educational workshops of robotics and engineering fundamentals

**Vice Chair | IEEE SUST Student Branch** Jan 2023 – June 2025
EEE, SUST Sylhet, Bangladesh

- Promoted several conferences (BECITHON 2024, ICCIT 2024, RAAICon 2024)
- Served as an advisor on contests such as Robo Tech Olympiad 2024

**Co-Founder, CTF Lead** Jan 2022 – Jan 2024
NMOSS Independent Cybersecurity Research Group, SUST [Webpage] Sylhet, Bangladesh

- Led a Cyber Security Competition and Workshop "Introduction to CTFs 1.0"
- Ranked 14th in 2022 throughout Bangladesh in ctftime.org [ctftime]

## INVITED TALKS

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|---|---|---|
| 2024 | National Student Data Corps Bi-Annual Meeting, Columbia | New York, US |
| 2023 | National Student Data Corps Bi-Annual Meeting, Columbia | New York, US |
| 2021 | "Meet Team I-Braille – An Experience Sharing Session" | Dept. of Arch,, SUST, Bangladesh |

## STUDENT SUPERVISION

2024 Coach, Team Invicta CERN, A Beamline for Schools (BL4S)
"Effect on Quantum Particles on Microcomputers" | Shortlisted [Ref][Cert]
2023 Mentor and Educator JAXA Asian Try Zero Gravity Challenge
"Finding the Shape of Magnetic Field Lines in Microgravity" Experiment performed in ISS [Ref]

## WORKSHOPS

2025 Instructor | Arduino Programming, RoboSUST Introduction to Robotics Workshop
2024 Instructor | Engineering Advanced LFRs, RoboSUST Training of Trainers
2024 Instructor | DataDrive 1.0, NSDC SUST
2024 Instructor | PyChamp 2.0, 5-day Workshop on Beginner to Advanced Python Programming
2023 Instructor | "Cyber 101: Beginner's Guide to CTFs", NMOSS Research Group
2022 Instructor | "Cryptography, Forensics and Hardware Hacking" NMOSS Research Group

## AWARDS AND HONORS

### International:

2025 DEI Award | Rice University Rice360 Global Health Design Competition (1000 USD) [Ref]
2023 2nd Runner Up | KRPC 2023 organized by JAXA [Ref][Video]
2023 Global Top 3% [Rank 179th], 2nd in Bangladesh Region | CyberApocalypse 2023 CTF [Ref]
2022 Ranked 235 | Google CTF
2022 Champion, Global Nominee | NASA Space Apps Challenge 2022 [Ref]
2021 Gold Medal | International Astronomy and Astrophysics Competition (IAAC) [Ref]

### National:

2024 1st | Industry Training, TICI, Bangladesh
2024 6th | DL Enigma 2024 Autonomous Driving Road Vehicle Detection [Ref]
2022 Runner Up | RoboSUST Senior Project Hunt
2021 Champion | IC4IR 2021 Idea Contest [Ref][Video]
2021 Finalist | BIKIRON Sustainable Energy Innovation Challenge 2021
2019 16th | Bangladesh Physics Olympiad (Category C)
2018 2nd Runner Up | Bangladesh Physics Olympiad (Category B)

## SYNERGISTIC ACTIVITIES

**Radio Guitarist** Sylhet Radio, Sylhet
**Volunteer** Kid's Campus Pre-school, Sylhet

## REFERENCES


1. **Dr. Arpan Kusari,**
   **Research Faculty, UMTRI**
   Research Supervisor
   Ann Arbor, Michigan, US
   Contact: kusari@umich.edu
2. **Dr. Md. Rasedujjaman,**
   **Associate Professor, EEE, SUST**
   Course Coordinator, Research Supervisor
   Sylhet, Bangladesh
   Contact: mrased@sust.edu
3. **Dr. Farzana Hussain,**
   **Professor and Chair, Dept of Mathematics, HTU**
   Research Supervisor,
   Austin, TX, US
   Contact: fhussain@htu.edu
4. **Mr. Mizanul Haq Choudhury,**
   **Technical Expert, MIT Engineering Systems Lab**
   STEMX-365 Project Coordinator,
   Massachusetts, US
   Contact: mizanul@mit.edu