

# SHUVAGATA NATH SOUMMA

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## Education

Bangladesh University of Engineering and Technology (BUET)

Bachelor of Science in Mechanical Engineering

CGPA: 3.32/4.00

Dhaka, Bangladesh

Apr. 2019 – Jul. 2024

## Test Scores

IELTS Academic

Sep. 2025

Overall Score 8/9 | Listening 8.5/9 | Reading 7.5/9 | Writing: 7.5/9 | Speaking 7.5/9

## Research Interests

- Additive Manufacturing
- Material Design
- Fracture Mechanics
- Numerical Modelling
- Material Behavior
- Bio-inspired Materials
- Computational Mechanics
- Machine Learning

## Research Experience

Undergraduate Thesis

Jul. 2023 – Jul. 2024

*A Study of Enhancing Thermal Comfort and Development of an Intelligent Efficient Cooling System for Parked Car Interiors*

Supervisor: Dr. Md. Ehsan, Professor, Dept. of Mechanical Engineering, BUET

- Investigated solar heat transfer and thermal behavior in parked car interiors through controlled experiments, where cabin temperatures rose to 50–52 °C.
- Developed and validated an ANSYS Fluent CFD model using SolidWorks-based CAD to simulate solar load and optimize airflow, achieving a 15–18 °C cabin temperature reduction.
- Designed a low-cost Arduino-controlled console-box cooling device costing about USD 50 with 12 V power usage to enhance passenger comfort.

## Publications

1. U. W. Tabassum, **S. N. Soumma**, A. Sengupta, and T. Tabassumut, “Design and Fabrication of a Cost-Effective, Refreshable Mechanical Braille Display for Visually Impaired Students in Bangladesh,” *Proceedings of the 14th International Conference on Mechanical Engineering (ICME)*, 2023.
2. S. T. Ahmed, **S. N. Soumma**, M. Ehsan, and C. R. Shaishab, “A Study of Enhancing Thermal Comfort and Development of an Intelligent Efficient Cooling System for Parked Car Interiors,” *Proceedings of the 9th BSME International Conference on Thermal Engineering (ICTE)*, 2024.

## Selected Projects

Braille-X: Refreshable Mechanical Braille Display

Apr. 2022 – Aug. 2022

Electromechanical System Design Coursework

- Designed and 3D-printed custom octagonal Braille disks for a low-cost refreshable display.
- Developed text-to-Braille algorithms for accurate character rendering.
- Engineered a linear motion system with stepper motors to align disks for smooth sequential Braille output.

SmartAQI – Machine Learning Based Air Quality Prediction

Jun. 2021 – Nov. 2021

Computer Programming Language Coursework

- Developed a Random Forest regression model for Dhaka’s AQI prediction.
- Performed data preprocessing, train-test split, and model evaluation (MAE,  $R^2$ ).
- Analyzed feature importance and created an interactive real-time prediction tool.

FSAE Standard Vehicle Chassis

Jun. 2022 – Aug. 2022

Formula Student Competition

- Optimized a spaceframe chassis across 34 design iterations and 500+ simulations, maximizing safety factor while minimizing weight.
- Selected BS1387 steel for optimal strength-to-weight ratio; fabricated chassis using CAD drawings, jigs, and precision welding.

Renaissance V1.0: Mars Rover

Apr. 2022 – Oct. 2022

University Rover Challenge

- Designed and fabricated a truss-based rover structure with optimized triangulation.
- Manufactured rover arm components (base plate, bearing holder) via sheet metal laser cutting.

## Gasketed Plate Heat Exchanger

Nov. 2022 – Feb. 2023

Heat Transfer Equipment Design Coursework

- Built a 9-plate exchanger using aluminum, rubber gaskets, and steel endplates.
- Assembled and tested prototype; confirmed leak-free operation up to 15 kPa.

## Topology Optimization and Fabrication of a Formula Student Bell Crank

Sep. 2023 – Mar. 2024

Formula Student Competition

- Performed topology optimization in ANSYS to achieve weight reduction while maintaining stiffness.
- Conducted FEA under braking and cornering loads to validate factor of safety and fatigue life.
- Fabricated the optimized bell crank via CNC machining using Mild Steel (MS)

## Technical Skills

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**Simulation:** ANSYS Fluent, ANSYS Structural

**CAD:** SolidWorks, AutoCAD, Fusion 360

**Programming:** Python, MATLAB, C

**ML-Framework:** Scikit-learn

**Thermal Design Tools:** HTRI Xchanger Suite 6.0, 3E Plus

**Documentation & Presentation:** Office Suite, LaTeX, Tecplot 360, Matplotlib, NumPy

## Work Experience

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### Assistant Manager – Product Quality

Sep. 2024 – Present

A.O. Smith Corporation

- Improved valve reliability by replacing *Silicon with EPDM* in solenoid diaphragms following root cause analysis.
- Reduced assembly defects by correcting *Mold Design* and introducing *Post-molding Air Cleaning*; improved sealing performance in final assemblies.
- Lowered complaint rate below 5% while leading and developing a nationwide team of 350 technicians serving over 10M consumers.

### Research & Development Engineer

Jun. 2023 – Oct. 2023

Spectrum Engineering Consortium (Pvt.) Ltd.

- Designed robotic subsystems including a rover elbow with integrated linear actuator in SolidWorks.
- Conducted structural and stability analyses using ANSYS and analytical calculations.
- Manufactured rover components via CNC machining, validating design through prototyping.

## Affiliations

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**Team Leader**, AUTOMAESTRO: Formula Student Team of BUET

Nov. 2022 – Jul. 2024

Led a 40-member team in Formula Student competitions; coordinated with BITAC for CNC machining, supervised fabrication of chassis and components, and managed sourcing of engines and suspension from abroad.

**Vice President**, BUET Automobile Club

May. 2023 – Jul. 2024

Organized BUET AutoFest and technical workshops; instructed students on CAD modeling and FEA fundamentals to build design and analysis skills.

**Event Organizer**, Mechanical Engineering Association (MEA) & IMechE, BUET

Apr. 2019 – Jul. 2024

Planned and executed departmental seminars, career talks, and design competitions with national and international speakers.

**Class Representative**, Dept. of Mechanical Engineering, BUET

Apr. 2019 – Apr. 2023

Facilitated communication between faculty and students; managed academic coordination for a cohort of over 180 peers.

**Mechanical Sub-Team Member**, INTERPLANETER: Mars Rover Team of BUET

Apr. 2022 – Oct. 2022

Contributed to the design and fabrication of rover subsystems for University Rover Challenge, focusing on structural optimization and manufacturing support.

## Achievements & Certifications

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**Academic Excellence Scholarship**, Government of Bangladesh

Jun. 2018 – Jul. 2024

**4<sup>th</sup> Place**, European Rover Challenge (ERC), Poland

Sep. 2022

**23<sup>rd</sup> Place**, University Rover Challenge (URC), USA

Jun. 2022

**11<sup>th</sup> Place**, Lap Time Simulation, Formula Student UK

May. 2022

**Certified SolidWorks Professional (CSWP)**, Mechanical Design

Jun. 2021

**Champion**, Creative Talent Hunt, Government of Bangladesh

Jan. 2016

**1<sup>st</sup> Runner Up**, BAS Physics Olympiad

Jan. 2015