Mohammad Khalikujjaman

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CFD, WIND & ENERGY SYSTEMS · GRADUATE ENGINEER · MSc CANDIDATE

PROFILE

Graduate CFD and wind-energy engineer in training with an individual OpenFOAM wake study validated against LES, formal grid/time-step verification practice and energy-system modelling in FLORIS, PyPSA and hourly Power-to-X dispatch. I quantify residual model error and communicate when a result is non-conservative.

CORE CAPABILITIES

CFD & wind	OpenFOAM · finite-volume methods · RANS · actuator disk · SIMPLE / PISO · ParaView · FLORIS · wake steering
V&V; & data	Grid/time-step studies · LES and benchmark comparison · RMSE / MAE · FFT · Python post-processing
Energy systems	PyPSA · Power-to-X · ENTSO-E market data · storage scenarios · renewable-system economics

CFD & WIND PROJECTS

Wind-farm wake modelling in OpenFOAM, validated against LES

May 2026

Individual Wind Energy project · Aarhus University

- Built realizable k-ε RANS actuator-disk models for three six-turbine layouts: 7D aligned, 5D aligned and 7D staggered.
- Post-processed rotor-averaged deficit, turbulence intensity and normalised row power in Python; row-power RMSE ranged from 0.037 (staggered) to 0.083 (5D aligned).
- Identified overly rapid RANS wake recovery as a non-conservative source of aligned-array power error.

Verification and validation of an OpenFOAM cylinder-wake benchmark

May 2025

CFD course · Team of four · Aarhus University

- Established mesh independence at 25,100 cells and time-step independence with CFL-consistent refinement.
- Extracted a 0.17 Hz shedding frequency by FFT, giving St = 0.17: within 3.1% of an empirical correlation and 3.4% of published drag data.

Wind-farm layout and yaw-control optimisation in FLORIS

May 2026

Wind Energy · Team of four · Role: model setup, optimisation and plots

- Swept wind direction at 8 m/s and found 30.81% wake loss at the critical 84° direction.
- At 93°, yaw steering increased farm power by 25.44% under GCH versus 13.14% under Gauss/emgauss, exposing model-choice sensitivity.

ENERGY-SYSTEM PROJECTS

European power-system storage analysis in PyPSA

2026

Energy Systems · Team of three · Aarhus University

- Evaluated 13 scenarios under a 24% nuclear cap and 20/40/55% carbon caps.
- Hydrogen storage reduced annual system cost by EUR 14.44bn, curtailed energy from 109.15 to 0.03 TWh/year and eliminated load shedding in the reference setting.

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ADDITIONAL ENERGY & RESEARCH

Power-to-X waste heat for Hamburg district heating

2025

Individual Renewable Energy Technologies project · Aarhus University

- Modelled a 100 MW electrolyser, methanation and heat-pump system over 1,440 winter hours using ENTSO-E day-ahead prices.
- Heat-first dispatch delivered 89,561 MWh and avoided 17,733 t CO_2; a EUR 39.3/MWh break-even rule instead returned EUR 0.55m operating profit.

Food-grade grease benchmarking for industrial robot reduction gears

Feb – Jun 2026

Industry-linked R&D; · Two-person team · Aarhus University · 10 ECTS, grade 10 (ECTS B)

- Planned and executed 23 ball-on-disc trials on a Bruker UMT TriboLab across 20–70 N and 75–367 rpm; most runs lasted 1,800 s.
- Built one Python workflow that removed the 0–300 s run-in and calculated mean COF, standard deviation, coefficient of variation and drift consistently.
- Best food-grade condition achieved mean COF 0.0946 at 2.0% CV, but visible material removal prevented a replacement recommendation based on friction alone.

PROFESSIONAL EXPERIENCE

Assistant Naval Architect — BIWTA Dredging Department

Jun 2019 – Mar 2022

Contracted via Shahin Engineering & Services · Dhaka, Bangladesh

- Supported three national dredger procurement programmes covering 65 vessels; ran launching, commissioning and acceptance trials across six vessel classes.
- Inspected 700, 600 and 500 mm cutter-suction dredger construction, checked work against specification, and prepared tender documentation and AutoCAD drawings.

Probationary Officer → Senior Officer — United Commercial Bank PLC

Mar 2022 – Jan 2025

Business Operations Division · Dhaka, Bangladesh

- Diagnosed core-banking system and process faults, coordinated fixes and tested results before live release; left to begin full-time MSc study.

EDUCATION

MSc Mechanical Engineering — Aarhus University, Denmark

Feb 2025 – Jan 2027 (expected)

90 of 120 ECTS completed as of August 2026; MSc thesis in progress.

- Focus: CFD, wind and renewable energy, tribology, FEA, reliability, composites, applied mathematics and data science.

BSc Naval Architecture & Marine Engineering — BUET, Bangladesh

2013 – 2018

CGPA 3.36 / 4.00.

- Undergraduate thesis on waste-heat desalination and full preliminary design of a 1,300-tonne inland cargo vessel.

PUBLICATION

M. S. A. Towhid, M. R. Islam, M. Khalikujjaman and B. T. Costa, “Waste heat recovery-based seawater desalination for sustainable maritime operations: a study on heat transfer, techno-economic feasibility, and environmental impact,” Journal of ETA Maritime Science, 13(3), 260–276, 2025. DOI 10.4274/jems.2025.76259. Contribution: data collection and processing, analysis and interpretation, software and validation.

LANGUAGES & AVAILABILITY

Languages: Bengali (native) · English (professional working; IELTS Academic 6.5, November 2022) · Danish (currently studying)
Availability: Full-time graduate roles from February 2027 · References available on request