# KHAIRUZZAMAN MAMUN, Ph.D.

## Research Engineer, Data Scientist

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## SUMMARY

Research engineer and data scientist with a Ph.D. in Mechanical Engineering and a foundation in mathematics, statistics and physics. Over 12 years across research and industry: C++ computer-vision and camera-calibration software running on mass-production lines in Japan, CFD/FEA simulation in a JAXA collaboration, and machine learning from physics-informed neural networks to fine-tuning vision-language models. I take an unfamiliar problem, model it mathematically, and deliver it as reliable production software. Looking for an R&D, data-science or ML-engineering role.

## WORK EXPERIENCE

**Research Engineer (Research & Solutions Engineering)** 2022 – present

*Innovative System Solutions · Morioka, Japan*

- Built full-stack C++/MFC stereo-camera calibration software for mass production; it is used by two major Japanese manufacturers and has calibrated nearly 2,000 fisheye, monocular and stereo cameras.
- Designed C++ algorithms that measure the curvature (radius) of convex mirrors with a ZED stereo camera, driving automated inspection machinery for automotive side glass.
- Developed back-end modules for 3-camera and 5-camera panoramic-view calibration systems for next-generation Mazda and Toyota vehicles.
- Trained deep-learning models in Python/PyTorch for industrial automation and camera-based inspection.
- Led on-site development, installation and debugging at customer plants across Japan and in India; translated customer problems into technical requirements and delivered on committed timelines.

**Post-doctoral Researcher** 2020 – 2022

*Iwate University · Morioka, Japan*

- Predicted flutter of a rocket-engine turbopump turbine blade with JAXA: pre-stressed modal analysis (ANSYS Mechanical) coupled with CFD (ANSYS CFX, RANS/SST); identified the stable inter-blade phase-angle range.
- CFD, FEA and fluid–structure interaction (FSI) analysis; authored technical papers.

**Research Assistant** 2017 – 2020

*Iwate University · Morioka, Japan*

- Supported research projects in CFD and FSI, managed the laboratory and mentored undergraduate students.

**Teaching Assistant** 2012 – 2017

*Dhaka University of Engineering & Technology · Gazipur, Bangladesh*

- Taught mathematics to undergraduates; assisted professors with CFD research and research papers.

## KEY ACHIEVEMENTS

- Delivered an automated curvature-measurement machine in India that inspects each mirror in 0.5 s: 99.7% faster cycle time, nearly 100% less manual work, accuracy raised from 50% to 99.99%.
- Calibration software now part of the mass-production workflow of two major Japanese companies (~2,000 cameras calibrated).
- 10 research papers and one book on CFD and physiological blood flow.

## DATA SCIENCE & AI PROJECTS

**Vision-language model for Japanese garbage-collection calendars** 2026 – present

- Few-shot fine-tuning of Qwen3-VL-4B with QLoRA on a single 8 GB laptop GPU to read municipal garbage calendars (image/PDF → structured schedule); built the data pipeline, ground-truth set and evaluation. Journal paper in preparation.

**drmamun.org, multilingual portfolio with AI** 2026

- Custom WordPress plugin (PHP/JavaScript): site in 11 languages with LLM-based automatic translation, an AI chatbot that answers in the visitor's language, RTL support and accessibility tuning.

**Community web apps, iwate-bd.org**

- Prayer-times PWA with web-push notifications, a halal food-ingredient checker (ingredient dictionary, Open Food Facts integration) and other tools for the Bangladeshi community in Japan.

## SKILLS

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| **Machine learning** | PyTorch, deep learning, fine-tuning (LoRA/QLoRA), vision-language models, physics-informed neural networks, LLM APIs |
| **Data science** | Statistics, regression, SPSS, NumPy, Matplotlib, data pipelines, evaluation and error analysis |
| **Computer vision** | Camera calibration, stereo vision, camera geometry, image processing, OpenCV, ZED SDK (depth, point clouds) |
| **Programming** | C++, Python, C, MFC/Win32, STL, Qt, OpenMP/OpenACC offloading, PHP, JavaScript, Git |
| **Modeling & simulation** | Mathematical modelling, CFD (FVM), FEA, FSI, ANSYS Fluent / CFX / Mechanical, SolidWorks |
| **Optimization** | Gradient descent, Newton–Raphson, least squares, geometric and measurement modelling, error analysis |
| **Professional** | Customer-site requirement analysis, on-site deployment, cross-cultural teamwork (Japan, India), technical writing |
| **Languages** | Bengali (native), English (professional), Japanese (conversational), Hindi and Urdu (spoken) |

## EDUCATION

**Doctor of Engineering, Mechanical Engineering** 2017 – 2020
*Iwate University · Morioka, Japan*
Thesis: computational simulation of physiological blood flow through arterial stenosis, measuring the effects of stenotic shapes on flow parameters.

**Master of Philosophy, Applied Mathematics** 2012 – 2015
*Dhaka University of Engineering & Technology · Gazipur, Bangladesh*
Thesis: simulation of pulsatile blood flow through arterial stenosis.

**Master of Business Administration, Finance & Banking** 2011 – 2013
*Jahangirnagar University · Dhaka, Bangladesh*
Thesis: technical analysis with Bollinger Bands, an empirical study on the Dhaka Stock Exchange.

**M.Sc., Mathematics** 2010 – 2011
*Jahangirnagar University · Dhaka*

**B.Sc., Mathematics** 2006 – 2010
*Jahangirnagar University · Dhaka*

## SELECTED PUBLICATIONS

- K. Mamun. Computational simulation for the prediction of a rocket turbine blade's flutter.
- K. Mamun, K. Funazaki. Comparative study of non-Newtonian physiological blood flow through an elastic stenotic artery with a rigid-wall stenotic artery.
- K. Mamun, K. Funazaki, S. Akter, M. N. Akhter. The effect of magnetic field on blood flow through a stenotic artery: a review on bio-magnetic fluid dynamics.
- K. Mamun, K. Funazaki, M. N. Akhter. Statistical analysis for measuring the effects of stenotic shapes and spiral flows on wall shear stress.
- Book: Simulation of Pulsatile Blood Flow through Arterial Stenosis. Full list (10 papers): drmamun.org

References available upon request.