

Mohammad Arafat Zaman

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Research Interests and Career Goals

My primary research interests are renewable energy, Heat transfer, computational fluid dynamics, turbulence, and fluid mechanics analysis techniques. Long term, I envision my career contributing to society by enhancing renewable energy production's feasibility to subsidize the global energy demands.

Education

Doctor of Philosophy in Mechanical Engineering

University of Illinois Urbana Champaign

August 2021-Present

Urbana-Champaign, IL

Master of Science in Mechanical Engineering

University of Minnesota Duluth

GPA: 3.95/4.00

August 2019-May 2021

Duluth, MN

- Thesis topic: Flow augmentation and performance characterization of a ducted marine turbine using computational fluid dynamics.
- Utilized 3D Ansys Fluent and high-performance computing (HPC) resources to simulate a ducted marine turbine under various operating conditions and rotor designs to investigate performance characteristics and optimal constant angular velocity operating conditions.
- Collaborated with engineers to validated CFD modelling against scaled-model study physical measurements.
- Project was related to accelerating small business technologies in the marine hydrokinetic energy market for the U.S. Department of Energy's SBIR (Small Business Innovation Research) program.

Bachelor of Science in Naval Architecture and Marine Engineering

Bangladesh University of Engineering and Technology

GPA: 3.84/4.00

July 2014-October 2018

Dhaka, Bangladesh

- Thesis topic: Analysis of non-lifting potential flow past a thin symmetric hydrofoil by finite difference method.
- Investigated the potential flow problem around different two-dimensional hydrofoils constructed by specifying the Laplace equations with boundary conditions.
- Transformed the Laplace equations into matrices, solved using Fortran 90, calculated the perturbation potential at each node, and analyzed the pressure distribution along the chord line.
- Additional project: Designed an ocean-going cargo ship (Route: Singapore to Bangladesh).
- Completed detailed designs and calculations throughout the entire ship design and construction process.
- Developed computer-aided design (CAD) drawings using AutoCAD and Rhino3D. Utilized Maxsurf, optimization numerical simulation software, to analyze ship hull dynamic stability.

Experience

Graduate Research Assistant

University of Illinois Urbana Champaign

August 2021-Present

Urbana-Champaign, IL

Graduate Research Assistant

University of Minnesota Duluth

July 2020-July 2021

Duluth, MN

- Investigated, developed, and validated hydrokinetic turbines of different configurations to maximize the energy transfer from flowing water to electrical power.
- Worked towards thesis research, as described above in the Education section.

Graduate Teaching Assistant

University of Minnesota Duluth

August 2019- May 2020

Duluth, MN

- Collaborated to plan, develop, and implement experiments in the Heat Transfer, Thermodynamics and Fluid Mechanics Laboratory (ME 4122) and provide support and guidance to students.
- Assisted with instructing laboratories related to experimental evaluation of conductive, convective, and radiation heat transfer, analysis of performance for various energy systems such as compressors, turbines, fans, refrigerators, and combustion engines, and uncertainty analysis, sensor calibration, and data acquisition system development.

Assistant Engineer

Bay-Tech Ship Solution Zone (Ship designing company)

December 2018-January 2019

Dhaka, Bangladesh

- Created design of ocean-going vessel with production drawing.
- Supervised the work of the manufacturing team to ensure the quality of work.

Naval Architect Intern

Chittagong Dry Dock Limited (CDDL) (Shipyard of Bangladesh Navy)

August 2017-September 2017

Chittagong, Bangladesh

- Worked on the process of tendering, planning, designing, and fabrication of ship professionally.
- Designed a pontoon jetty for Bangladesh Navy submarines while minimizing associated costs.

Publications

- Zaman, M.A., Ramsey, D., and Hill, C. (Anticipated first of 2022), "Optimizing a ducted marine turbine performance for irrigation canals using flow augmentation: A computational fluid dynamics and scaled model study." In preparation for marine energy-related journals such as Renewable Energy, Energies, or Journal of Renewable and Sustainable Energy.

Skills

- Fluid flow simulation & structural analysis: Ansys Fluent, Ansys Mechanical, Abaqus, Maxsurf.
- Computer-aided design: Solidworks, AutoCAD, Rhino3D.
- Programming language: MATLAB, Python, C++, Fortran.
- Data acquisition and other: LabView, EES, MS office.

Accomplishment

- University Dean-list Scholarship 2017, 2016, 2015
- Designer and Constructor of model ships for Bangladesh Naval Academy 2016
- Champion of Model Ship Propulsion Competition 2016
- Competed in Model Ship Propulsion Competition 2015
- Best Volleyball Player of BUET Award 2016