Turibius Rozario

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Objective

To pursue a PhD in Mechanical Engineering with a focus in integrating renewable energy sources, improving energy efficiency, and mitigating environmental effects.

Education

Boston University (BU) — May 2030
PhD in Mechanical Engineering (ME)

University of Maryland, Baltimore County (UMBC) — May 2025
BS in ME, Minor in Computer Science (CS) — 3.91/4.00 GPA

Audited Courses: Energy Within Environmental Constraints (HarvardX, EdX), Fundamentals of Fluid Power (University of Minnesota, Coursera), Energy Sources for the Future (UMBC)

Skills

Programming	C++, HTML / CSS, LaTeX, MATLAB & Simulink, Python
Software	Ardupilot, Inkscape, Keras, PHREEQC, PyTorch, SolidWorks, GNU/Linux
Hardware	Arduino, BeagleBone, Raspberry Pi, Sensor Modules
Technical abilities	3D Printing, Hand Lamination, Model Aircraft Pilot, Power Tools, Soldering

Awards & Honors

Student Leadership Award, UMBC — May 2025
VTSI Sustained Research Award, UMBC — October 2023 – May 2024
President's List, UMBC — January 2022 – January 2024
S-STEM Scholar, UMBC — June 2022 – June 2023

Research Experience

Integration of Controls and Neural Networks — November 2021 – January 2025
ME Department, UMBC
Mentor: Dr. Ankit Goel (ankgoel@umbc.edu)

- Develop novel neural network training methods such as finite time estimation and FSolve, and improve their long-term approximation by integrating extended kalman filters.
- Manufacture 2D simultaneous localization and mapping platform for future research and coursework.

Magnesium Extraction Methods from Seawater — Summer 2024
ME Department, University of Wisconsin, Madison (UW)
Mentor: Dr. Michael Wagner (mjwagner2@wisc.edu)

- Compiled existing and novel methods of magnesium salt precipitation and magnesium metal extraction to produce several start-to-finish methods for extracting magnesium from seawater.
- Determined costs, energy demands, concentrations, temperature, pressure, and other factors associated with each reaction in the extraction process.

Design of a Hardware-in-the-Loop Test System for Wave Energy Harvesting — Summer 2023
ME Department, University of Minnesota, Twin Cities (UMN)
Mentor: Dr. James Van de Ven (vandeven@umn.edu)

- Used equations for fluid flow and computations on system efficiency and size to scale down the full-scale system into lab space model validation purposes.
- Designed custom parts and fittings for hydraulic components, drafted an overall assembly model, and produced a bill of materials for test system.

Publications & Presentations

Undergraduate Research and Career Advancement Day, UMBC April 16, 2025
Abstract title: "UMBC Multidisciplinary Capstone: Design and Development of an Autonomous Fixed-Wing UAV for Long-Range Payload Delivery".

P. Oveissi, **T. Rozario**, A. Goel. "A Novel Neural Filter to Improve Accuracy of Neural Network Models of Dynamic Systemss". Submitted to: 2025 IEEE Conference on Control Technology and Applications. Status: **Accepted**.

T. Rozario, P. Oveissi, A.Goel. "Matrix-Based Representations and Gradient-Free Algorithms for Neural Network Training". Submitted to: 2024 International Conference on Machine Learning and Applications (ICMLA). Status: **Accepted**.

Summer Undergraduate Research Experience Poster Session, UW July 31, 2024
Poster title: "Magnesium Extraction Methods from Seawater".

Undergraduate Research and Career Advancement Day, UMBC April 10, 2024
Abstract title: "Modelling Dynamic Systems Using Neural Networks".

Summer Undergraduate Research Expo, UMN August 10, 2023
Abstract title: "Design of a Lab-Scale Ocean Wave-Powered Desalination System".

Undergraduate Research and Career Advancement Day, UMBC April 12, 2023
Abstract title: "A Tutorial on Neural Networks and Gradient-free Training".

Co-curricular Activities

American Institute of Aeronautics and Astronautics (AIAA),
Design, Build, Fly (DBF) Project Lead September 2021 – May 2024
Student Unmanned Aerial Systems (SUAS) Captain February 2023 – May 2025

- Utilized lift, drag, kinematic, and other equations to produce a structural and propulsion system design for a vertical take-off and landing (VTOL) vehicle, capable of travelling 15 miles for 25 minutes while having a gross weight of 12.5 kg for the SUAS Competition.
- Led the DBF team to the international DBF competition, and for the first time in UMBC history, successfully complete a flight mission.
- Led the SUAS team to the international SUAS competition for the very first time in UMBC history, and placed 19th out of 81 teams.
- Simultaneously managed a team of 17 members in DBF and 15 members in SUAS, and hosted general events for the UMBC community with 12 to 35 participants in all events.

Student Government Association, ***First Year Ambassador*** September 2021 – May 2022

- Hosted campus-wide wellness events for over 200 people and initiated proposals with university stakeholders.