Mugdho Jeferson Rozario

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Education

McMaster University

Hamilton, Ontario Bachelor of Engineering: Engineering Physics (GPA: 3.2/4.0) Expected Graduation Year: 2028 Relevant Coursework: Computational Multiphysics, Principles of Nuclear Engineering, Signals & Systems for Engineering

Work Experience

Robotics and Manufacturing Laboratory, McMaster University — Hamilton, Ontario **Research Intern**

- Contributed to the development of vision-guided collaborative robots aimed at enhancing safety and productivity in manufacturing and assistive contexts.
- Engineered a 3D vision-based algorithm to translate camera coordinates into robot coordinate space, enabling seamless spatial mapping.
- Enabled precision tool handoffs by allowing the robot to identify and align with a human hand's location in real time using depth sensing.

Projects (Full project descriptions and source code available on GitHub and accessible via: mjefersonrozario.com/projects)

- Reactor Core Heat Transfer Optimization Python, MATLAB, Fourier Series, Heat Transfer Modelling
- Simulated temperature distribution in a nuclear reactor core using a 50-term Fourier series to solve the radial heat equation and • model thermal gradients.
- Optimized coolant flow velocity using fminbound and exponential cooling models, significantly reducing peak reactor temperature to enhance thermal safety.
- Visualized heat transfer using 2D heatmaps, 3D surface plots, and vector fields to identify thermal hotspots and assess reactor cooling efficiency.

Simplified Nuclear Core Simulation: Fuel Burnup & Leakage - MATLAB

- Developed a MATLAB-based simulation of a 10×10 nuclear reactor core with randomized fuel rod burnup over 100 cycles, . tracking decay history in a 3D matrix.
- . Implemented directional energy leakage logic using upper-triangle matrix operations to simulate anisotropic thermal loss across the core grid.
- Integrated a Gauss-based scheduling algorithm to predict reactor inspection days over a 10-year span, aiding preventive • maintenance planning.

Extra-Curricular Involvement

First Year Representative – McMaster Bengali Student Association

- September 2021-April 2022
- Collaborated with the executive team of 12 members to plan monthly event themes and promote engagement within the Bengali student community.
- Managed outreach and branding, including creating and sharing promotional materials on social media platforms to attract firstyear participants.
- Coordinated event logistics including space booking, schedule planning, and AV setup in collaboration with the executive team. ٠

Achievements

- McMaster Engineering Award of Excellence: \$3,000 merit-based scholarship for 95%+ admission average August 2021
- Dean's Excellence Scholarship: \$7,500 award for academic excellence and demonstrated leadership August 2021
- Engineering Research Experience Award: Granted to top 1% of undergraduate applicants August 2021

Skills

- Programming Languages: Python, MATLAB, C, HTML, CSS, Bash .
- Tools & Technologies: Git, GitHub, Plotly, Seaborn, OpenWeatherMap API, Visual Studio Code, Photoshop, Autodesk CAD
- Interpersonal Skills: Leadership, Team Collaboration, Research Communication, Public Speaking •

Website: https://www.mjefersonrozario.com LinkedIn: https://www.linkedin.com/in/mugdho-rozario GitHub: https://github.com/mugjeff12

May 2022 – August 2022