

Arnav Garcha

Mechanical Engineer, Ph.D. Student

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EDUCATION

Carnegie Mellon University (Pittsburgh, PA)

2022 – 2027 (Expected)

Doctor of Philosophy (Ph.D.), Mechanical Engineering with Focus in Biomedical Engineering

University of Waterloo (Waterloo, ON, Canada)

2017 – 2022

Bachelor of Applied Science (BASc), Honours Mechanical Engineering with Co-operative Program

Graduation Accolades: Sanford Fleming Foundation Foundation Academic Excellence Award & Dean's Honour List

SKILLS

Scientific Programming: MATLAB, Microsoft Excel VBA, Python

Computational Methods: SolidWorks Computational Fluid Dynamics (CFD), SolidWorks Stress Analysis (FEA), ANSYS CFX, COMSOL

3D Computer Aided Design (CAD): SolidWorks (CSWP License), Onshape, Solid Edge, Design for Manufacturing & Assembly (DFMA)

EXPERIENCE

Lumafield

Cambridge, Massachusetts, USA

Co-op, Mechanical Engineering (40 hrs./week)

Aug. 2021 – Dec. 2021

- Owned the ventilation system design for three distinct computerized tomography (CT) machines using welded frames and sheet metal
- Designed radiation shielding using Onshape to meet a 1-week deadline and ensure radiation exposure < 0.1 micro-sieverts/hour
- Accounted for the tolerance stackup of aforementioned designs in top-level assembly to prevent interference fit
- Collaborated on manufacturing four CT machine prototypes to meet the company's objective and key result (OKR) for Q4 2021

XL Aero Inc (Employee Evaluation: Outstanding)

Surrey, British Columbia, Canada

Co-op, Aeronautical Engineering Trainee (40 hrs./week)

2021

- Finalized the detailed design with Excel VBA models and began prototyping a Micro-combined heat and power (MicroCHP) system
- Produced a conjugate heat transfer CFD model within an electronics enclosure using SolidWorks CFD to model experimental results

Part-Time, Aeronautical Engineering Trainee (10 – 20 hrs./week)

2020 – 2021

- Produced a conjugate heat transfer CFD model within an electronics enclosure using SolidWorks CFD to model experimental results
- Analyzed the forces on a novel Airbus helicopter window with SolidWorks CFD for Federal Aviation Administration (FAA) certification
- Achieved a type certificate (P-LSH21-005/D) from Transport Canada on a load beam project through comprehensive engineering reports

Co-op, Aeronautical Engineering Trainee (40 hrs./week)

2020

- Conducted a thermodynamic study with an Excel VBA model to select a suitable operating point for the MicroCHP's power unit
- Completed the 1D geometric design of radial turbomachinery using an Excel VBA model and validated the results with AxCENT CFD
- Authored two technical reports to highlight the research and computational modeling progress made for the MicroCHP project

Materials Interaction with Biological Systems Laboratory, University of Waterloo

Waterloo, Ontario, Canada

Undergraduate Research Assistant (10 hrs./week)

2019 – 2022

- Developing a microfluidic chip design by researching passive and mechanical sorting methods for leukocytes in blood flow
- Simulated microfluidic flows using COMSOL CFD software to visualize inertial flow separation for experimental analysis
- Designed a 3D printed motor mount to upgrade a blood shearing assay for clinical study of a cardiopulmonary bypass Ph.D. project

PROJECTS (COMPUTATIONAL)

Computational Fluid Dynamics

2021

- Produced CFD models with ANSYS CFX to simulate flow in a non-reacting combustor and predict the optimal fuel inlet angle for mixing
- Completed CFD simulations with $k - \epsilon$ and *BSL* Reynolds Stress turbulence models to elucidate their impacts on simulated results

Heat Transfer

May 2021 – Aug. 2021

- Coded a finite difference model with MATLAB to solve the 2D heat conduction partial differential equation (PDE) along a fin array
- Implemented verification and validation techniques to ensure that the model demonstrated the expected heat transfer physics