

Education

Massachusetts Institute of Technology *September 2019 - Present*

Cambridge, USA

Candidate for Masters of Science in Mechanical Engineering

Cumulative GPA: 5.0/5.0

Georgia Institute of Technology *August 2015 - May 2019*

Bachelors of Science in Mechanical Engineering, **Highest Honors**

Atlanta, USA

Cumulative GPA: 3.97/4.0

Research Experience

Research Assistant, Bourouiba Group - Fluid Dynamics of Disease Transmission

Cambridge, USA

Massachusetts Institute of Technology

Research Supervisor: Dr Lydia Bourouiba

Evaporation of Complex Fluids and Hydrogel beads in an Acoustic Field, September 2019 - August 2020

- Implemented a distributed point source model in MATLAB to simulate acoustic pressure field and radiation forces on levitated particles
- Designed, simulated, validated and implemented phased arrays to control position and motion of particles suspended in acoustic fields
- Experimentally and theoretically investigated the evaporation rate of liquid droplets and hydrogel beads in an acoustic levitator
- Experimentally visualized the acoustic streaming velocity field around evaporating drops with high-speed Particle Image Velocimetry (PIV)
- Computational modeling of free and sessile droplet evaporation and internal flow (buoyancy vs Marangoni) in COMSOL

Undergraduate Researcher, Solar Fuels and Technologies Laboratory

Atlanta, USA

Georgia Institute of Technology

Research Supervisor: Dr Peter Loutzenhiser

Characterizing Doped Perovskites for High-Temperature Solar Thermochemical Processes August 2018 - December 2018

- Synthesized novel mixed ion-electron conducting perovskite oxides for analysis in air separation, water splitting and thermochemical energy storage processes, using sol-gel techniques
- Investigated the crystalline structure of novel doped perovskite oxides using powder XRD analysis
- Performed cyclic reduction and oxidation of doped perovskites, captured mass change using Thermogravimetric Analysis

Experimentation & Data Analysis of Solar Thermochemical Inclined Flow Reactor August 2017 - May 2018

- Analyzed the reduction of CAM-28 particles in an inclined flow solar reactor for thermochemical energy storage applications
- Designed alumina slopes of varying roughness to investigate the granular flow of CAM-28 (perovskites) particles
- Determined the velocity profile in the uniform velocity regime using Particle Image Velocimetry (PIV) in MATLAB

Research Intern, Nanoshock Team

Munich, Germany

Research Supervisor: Dr Stefan Adami

Department of Aerodynamics and Fluid Mechanics, Technical University Munich, *June 2018 - August 2018*

Interface Interaction in Multiphase Flows

- Implemented an iterative two material Riemann solver in C++ and MATLAB for interface interactions in compressible multiphase flows
- Extended an exact Riemann solver based on the ideal gas equation-of-state(EOS) to solve Riemann problems for stiffened gas EOS and Tait EOS

Levelset Based Geometry Reconstruction for a Compressible Multiphase Solver

- Developed and implemented a triangulation-based algorithm in C++ and MATLAB to compute cell face apertures, interface area and cell volume fractions for cut cells with sharp interfaces

Selected Awards & Honors

President's Undergraduate Research Award *Fall 2018*

- Competitive research award for undergraduate students to conduct research with Georgia Tech faculty

Practical Research Experience Program Scholarship *Summer 2018*

- Scholarship award for research at Technical University of Munich, Germany

Faculty Honors *Fall 2015, Spring 2016, Fall 2016, Spring 2017, Fall 2017*

Dean's List *Spring 2018*

Projects & Employment

Emrgy Inc - Distributed Hydropower Solutions *January 2019- Present*

Atlanta, USA

Engineering Intern

- Simulate & investigate flow characteristics using Simscales for open channel flow in response to presence of hydrokinetic devices
- Numerically determine the water profile upstream of the hydrokinetic device for subcritical gradually varying flow using the standard step method in MATLAB, Python and VBA

Tata Motors Limited *May 2016 - July 2016*

India

Engineering Intern, Department of Vehicular Frame Manufacturing

- Performed quality control for long member and frame manufacturing of transport and military-grade vehicles
- Analyzed defects arising from metal forming, notching and piercing processes in long members
- Instituted changes to boost efficiency on the factory floor using Six Sigma & Lean Manufacturing strategies

Design of Water Treatment Systems for Tribal Groups *August 2018 – December 2018*

Atlanta, USA

Engineering for Social Innovation Center

- Designed a water filtration system allowing the local population to convert locally available water into potable water
- Investigated the effect of boiling, UV radiation and other disinfection methods on bacterial and viral contamination
- Investigated filtration techniques to remove particulates and impurities from contaminated water
- Analyzed the economic and technological limitations imposed on the local population

Streamlining Waste Disposal Techniques *August 2017 - December 2017*

Atlanta, USA

Engineering for Social Innovation Center, In partnership with Waste Ventures, India

- Investigated thermal insulation, waterproofing and tensile strength of wastes containing metallized film
- Developed efficient and cost-effective ways to recycle or repurpose wastes containing metallized films
- Streamlined and boosted efficiency of compacting plastic bottles into bales at Waste Ventures' waste segregation facility for easier transportation and recycling

Combating Parasitic Infection in Marsabit, Kenya *August 2016 - December 2016*

Atlanta, USA

Engineering for Social Innovation Center, in partnership with Partners for Care

- Investigated chigoe flea infestation and related health populations in tribal populations in Kenya
- Designed and developed low-cost protective footwear which tribal groups can use as protection against infection
- Developed a manufacturing process for the local tribal population to produce their own protective footwear

Selected Skills

Research & Engineering: Particle Image Velocimetry, High-Speed Imaging and Shadography, Image Processing and Segmentation, Thermogravimetric Analysis, Powder XRD, Computational Fluid Dynamics, Computer Aided Design

Software: COMSOL, Simscales, Paraview, Engineering Equation Solver, Solidworks, Fusion360, Autodesk Eagle

Programming: MathWorks MATLAB, Simulink, C++, Python, NI Labview, Java, HTML, CSS, Javascript, LaTeX, VBA

Communication: English, Hindi, German (Intermediate)

Publications

Bush, H. E., **Datta, R.**, & Loutzenhiser, P. G. (2019). Aluminum-doped strontium ferrites for a two-step solar thermochemical air separation cycle: Thermodynamic characterization and cycle analysis. *Solar Energy*, 188(June), 775–786. <https://doi.org/10.1016/j.solener.2019.06.059>

Leadership & Activities

Sustainability, MIT Graduate Student Council *June 2020 - Present*

Chair

- Implementation and promotion of local sustainability initiatives and practices

Diversity & Inclusion Fellowship *January 2018 - December 2018*

- Improved accessibility to events for students with physical, intellectual or financial limitations

Georgia Tech Mental Health Student Coalition *May 2017 - December 2017*

Executive Board, Committee Chair, Reaching the Unreached

- Spearheaded an ambassadors program to address mental health challenges in minority student communities

Student Center Programs Council, Georgia Tech *January 2016 - December 2017*

Committee Chair, Wellness, Alumni Relations and Transferable Skills

- Formulated strategies and programs to enhance wellness, inclusivity, professional and technical development of members
- Organized and executed large-scale events for more than 4000 students

Georgia Tech Student Government Association *August 2015 - May 2017*

Communications Board Member & Committee Chair, Graphic Design and Marketing

- Pioneered the restructuring of branding for the Student Government Association