

# Tarandeep Singh Thukral

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EDUCATION	<b>University of Illinois at Urbana-Champaign</b> , Urbana-Champaign, IL <span style="float: right;"><i>Aug '21 - present</i></span> Candidate for Doctor of Philosophy in Mechanical Engineering
	<b>Indian Institute of Technology Delhi</b> , New Delhi, India <span style="float: right;"><i>Jul '17 - May'21</i></span> Bachelor of Technology, Mechanical Engineering <ul style="list-style-type: none"><li>• CGPA: 9.33/10.00</li></ul>
	<b>KTH Royal Institute of Technology</b> , Stockholm, Sweden <span style="float: right;"><i>Aug '19 - Jan '20</i></span> Exchange Student, School of Engineering
RESEARCH EXPERIENCE	<b>Graduate Research Assistant</b> <span style="float: right;"><i>Aug'21 - present</i></span> <i>Guide:</i> Prof. Nenad Miljkovic, Energy Transport Research Laboratory, UIUC <ul style="list-style-type: none"><li>• Working of development of corrosion-resistant self-healing coatings for HVAC systems</li></ul>
	<b>Bachelor's Thesis: Imbibition in Microfluidic Devices</b> <span style="float: right;"><i>Aug'20 - May '21</i></span> <i>Guide:</i> Prof. Supreet Singh Bahga, Department of Mechanical Engineering, IIT Delhi <ul style="list-style-type: none"><li>• Completed an extensive literature review of Capillary Imbibition, finalizing Capillary Descent as the focus area of my thesis</li><li>• Developed an alternate approach to obtain imbibition dynamics in non-circular capillaries using surface energy-minimisation and hydraulic resistance</li><li>• Developed a generalized imbibition model incorporating non-Newtonian (power-law) viscosity effects of the imbibing and the displaced fluid for uniform, horizontal capillaries</li><li>• Extended the model for capillary descent in straight capillary tubes and symmetric, axially varying 2D channels channels</li><li>• Numerically solved the models developed using in-built solvers in MATLAB and compared with available experimental results</li><li>• Validated the model developed for straight capillaries through simulation in COMSOL Multi-physics</li></ul>
	<b>Filtration of Soft Particles in Biodiesel</b> <span style="float: right;"><i>Aug'19 - Dec'19</i></span> <i>Guide:</i> Research Engineer Botond Csontos, Dept. of I.C Engines, KTH, Sweden <ul style="list-style-type: none"><li>• Developed a MATLAB model of a pump-driven dead-end filtration process to predict process lifetimes and back-pressure build-up during biodiesel filtration in engine fuel-filters</li><li>• Experimentally validated the model in the laboratory filter rig driven by a piston pump using freshly stirred suspensions of diesel and glycol to mimic biodiesel</li><li>• Formulated a model for filtration efficiency calculation incorporating inertial and interception effects for modeling membrane filters in series</li></ul>
	<b>Redesign of Forging Furnaces</b> <span style="float: right;"><i>May '19 - Jul '19</i></span> <i>Guide:</i> Prof. M.R Ravi, Department of Mechanical Engineering, IIT Delhi <ul style="list-style-type: none"><li>• Analyzed the existing furnace design to identify flaws and introduced design changes to prevent flame roll-out, minimize flue gas leakage and install a regeneration system</li><li>• Modeled the new design as a counter-flow heat exchanger to calculate the temperature acquired by the load and enthalpy loss through the exhaust</li><li>• Simulated the steady-state furnace operation in ANSYS Fluent to study flow and pressure patterns inside the furnace chamber, validate the theoretical predictions and finalize the design parameters</li><li>• The new design predicted a reduction in daily fuel consumption by <math>\approx 60</math> liters and an increase in thermal efficiency by <math>\approx 22\%</math></li></ul>

	<b>Modeling coal-carrying pipe for industrial furnace</b>	Nov '18 - Dec '18
	<i>Guide:</i> Prof. M.R Ravi, IIT Delhi	
	<ul style="list-style-type: none"> <li>• Modeled a pipe with multiple bends carrying pulverised coal and air using the discrete phase particle model in Ansys Fluent</li> <li>• Studied the distribution of coal across the pipe cross section and optimized the air velocity and coal particle size to achieve a uniform distribution to prevent pipe blockage near bends</li> </ul>	
INDUSTRY EXPERIENCE	<b>Acoustic Designer (Summer Trainee, work-from-home)</b>	Jun'20 - Jul'20
	<i>Akustikdoktorn Sweden AB, Stockholm, Sweden</i>	
	<ul style="list-style-type: none"> <li>• Analyzed vertical vibrations in railcars induced by point-irregularities in rail tracks through a simplified 1-D model by representing the railcar as a uniform spring-supported beam</li> <li>• Developed a model to analyze the dynamic effects of attaching tuned vibration absorber (TVA) systems to the beam using the receptance method</li> <li>• Adapted the model to railcars - vibration suppression by tuning on-board system suspensions to act as TVAs</li> <li>• The model predicted a 63% reduction in the fundamental mode amplitude for 5% damping of in the TVA, a major improvement in ride quality and passenger comfort</li> </ul>	
TEACHING EXPERIENCE	<b>Teaching Assistant - Energy Systems and Technologies</b>	Feb '21 - May '21
	<i>Course Coordinator:</i> Prof. Krishnakant Agrawal	
	<ul style="list-style-type: none"> <li>• Responsible for preparation of study material and evaluation of bi-weekly assignments, holding online weekly tutorial and doubt-clearing sessions for 90 students</li> </ul>	
TECHNICAL SKILLS	<ul style="list-style-type: none"> <li>• <b>Programming Languages:</b> C, C++, Python, MATLAB.</li> <li>• <b>Softwares and Tools:</b> Ansys Fluent, SolidWorks, Surface Evolver, AutoDesk Inventor, LaTeX</li> </ul>	
EXTRA-CURRICULAR ENDEAVOURS	<b>Core Team Member, Alo Learning</b>	Apr '18 - Jul '19
	<i>EdTech venture for experiential career discovery and skill development</i>	
	<ul style="list-style-type: none"> <li>• Led the design, implementation, and marketing of an experiential learning curriculum in Mechanical Engineering and Product Design</li> <li>• Selected for a six-month incubation in <i>UIncept Startup Accelerator</i> (2018)</li> </ul>	
	<b>Associate Member, Enactus IIT Delhi</b>	Nov '17 - Apr '19
	<i>Student Organisation in Empowerment through Entrepreneurship</i>	
	<ul style="list-style-type: none"> <li>• <u>Project Titli</u>: Developed cloth-based washable sanitary napkins for underprivileged women in villages around the Delhi - NCR region to improve menstrual hygiene</li> <li>• <u>Project Nirmalya</u>: Developed a composting-mesh for household waste and collaborated with housing societies in New Delhi for its installation</li> <li>• Represented Enactus IIT Delhi at the Enactus Nationals competition, 2018</li> </ul>	
	<b>Student Mentor, Board of Student Welfare</b>	Jul '19 - Sep '20
	<ul style="list-style-type: none"> <li>• Mentored 5 freshmen to smoothen their academic and social transition into college</li> </ul>	
	<b>Volunteer Work</b>	
	<ul style="list-style-type: none"> <li>• <b>Mission Buniyaad, Govt. of Delhi (Jun '18)</b>: Oversaw the implementation of the fundamental reading, writing and arithmetic summer curriculum in 7 govt. run schools</li> <li>• <b>National Service Scheme, IIT Delhi (Feb '18 - present)</b>: Active volunteer in projects <i>Aarohan</i> and <i>Vidya</i>, teaching science and mathematics to /underprivileged school students</li> </ul>	