

Dr. Nandhini Raju

✉ Nandhini.raju@ucf.edu ☎ +1-407-232-3996 📍 Knoxville, TN, USA



Research Experience

University/Institute	Department/Lab	Position held	Year
Oak Ridge National Laboratories	High temperature sample environment, Neutron Scattering Division	Technical Professional	Nov 2024- Present
University of Tennessee, Knoxville	Heat Transfer lab	Research Associate	Sep 2024- Nov 2024
Oak Ridge National Laboratories	Neutron Scattering Division, High Flux Isotope Reactor	Graduate Research at ORNL (GRO)	Feb 2024- July 2024
Siemens Energy Inc	Large Gas Turbine (high temperature material testing)	Engineering Intern	May 2023-Dec 2023
University of Central Florida	Center for Advanced Turbomachinery and Energy Research	Doctoral Candidate	Aug 2019- July 2024
Singapore University of Technology and Design	Digital Manufacturing and Design	Research Assistant	Apr 2018- Aug 2019
Indian Institute of Technology, Madras	Engineering Design & Central Workshop	Research Intern	Jan 2018- Mar 2018
Indian Institute of Technology, Madras	Engineering Design	Project Associate	Jun 2017- Sep 2017
Indian Institute of Technology, Madras	Mechanical Engineering (Internal Combustion Lab)	Project Associate	Jan 2017- Jun 2017
Indian Institute of Technology, Madras	Mechanical Engineering (Turbo Machinery Lab)	Project Associate	May 2016-Dec2016
National Aerospace Laboratories (NAL), India	Experimental Aerodynamic Division	Research Intern & Thesis Student	Apr 2015-Oct 2015
Indian Institute of Technology, Madras	Aerospace Engineering (Rarified Gas Dynamics Lab)	Research Intern	Jun 2014-Oct 2014

Education

2019-2024	Ph.D. in Mechanical Engineering, University of Central Florida , USA <u>Dissertation Topic: Improving Structural Integrity Additively Manufactured High Temperature Gas Turbine Component.</u>
Dec 2021	M.S in Mechanical Engineering (MSME-Specialized in Thermo-fluids track) University of Central Florida , USA <u>Thesis Topic: Material Properties Of 17-4ph Stainless Steel Fabricated with Cooling Holes By Atomic Diffusion Additive Manufacturing (ADAM)</u>
July 2017	M.Sc., Aerospace Engineering Nanyang Technical University - Technical University of Munich (Collaborative program), Singapore

Thesis topic: Improving Inlet Performance of Turbo-Ramjet Engine by Using Surface Correction

June 2013

B.Tech., Aeronautical Engineering/ Vel Tech University, India | Silver Medalist | University Rank Holder

Final year project: Optimization of the 3rd stage space launcher powered by a Continuous Detonation Wave (CDW) rocket engine, MBDA missile systems, France.

Publications

Journals

1. **Nandhini Raju**, Samyeon Kim, David W. Rosen, “A Characterization Method for Mechanical Properties of Metal Powder Bed Fusion Parts,” International Journal of Advanced Manufacturing 2020, published 15 April 2020 (<https://doi.org/10.1007/s00170-020-05298-7>)
2. Jaehyeok Doh, **Nandhini Raju**, Nagarajan Raghavan, David W. Rosen, Samyeon Kim, “Bayesian inference based decision of fatigue life model for metal additive manufacturing considering effects of build orientation and post-processing,” International Journal of Fatigue (<https://www.sciencedirect.com/science/article/pii/S0142112321003893>)
3. Peter warren, **Nandhini Raju**, Hossein Ebrahimi, Milos Krsmanovic, Seetha Raghavan, Jayanta Kapat, Ranajay Ghosh, “ Effect of Sintering Temperature on Microstructure and Mechanical Properties of Molded Martian and Lunar Regolith” Ceramics International, July 2022(<https://doi.org/10.1016/j.ceramint.2022.07.329>)
4. **Nandhini Raju**, Erik Fernandez, David J Mitchell, Jayanta Kapat, “ Chapter 3: Additive Manufacturing Metals and Superalloys”, book chapter , Additively Manufactured Smart Materials and Structures : Design, Processing and Applications(submitted and in review)

Conferences

1. **Nandhini Raju**, Manoj Prabakar, Biswajit Medhi, Osborn Oliver, T.M. Muruganandam, “Tomography Schlieren system for Visualization of supersonic jet,” 54th AIAA Aerospace Science Meeting, AIAA SciTech (2016 - 1050) (<https://arc.aiaa.org/doi/10.2514/6.2016-1050>)
2. **Nandhini Raju**, Balaganesan, Saravana Kumar G “Energy Consumption of Welding based additively manufactured materials,” 7th international & 28th All Indian Manufacturing Technology, Design and Research Conference 2018(AIMTDR 2018 Conference)(https://doi.org/10.1007/978-981-32-9433-2_11)
3. **Nandhini Raju**, Manoj Prabakar Sargunraj, Biswajit Medhi, Muruganandam T M.,” Three Dimensional Schlieren Using Iterative Phase Tomography” AIAA SciTech Forum 2020, January 6-10, Orlando, USA.(<https://doi.org/10.2514/6.2020-2205>)
4. Akshay Khadse, Ladislav Vesely, James Sherwood, Andres Curbelo, Vipul Goyal, **Nandhini Raju**, Jayanta S. Kapat, Wanjae Kim, paper number: GT2020-15523, “Study of Buoyancy effects on Supercritical CO2 heat transfer in circular pipes”, Turbomachinery Technical Conference and Exposition, June 22-26, London, England. (<https://doi.org/10.1115/GT2020-15523>)
5. **Nandhini Raju**, Tonse Gokuldas Pai, Verma S B, Venkatakrishnan L, “An Experimental Investigation of Turbo-Ramjet Engine Intake at Mach 4”, 2020 AIAA Propulsion & Energy Forum, New Orleans, LA (virtual event)(<https://doi.org/10.2514/6.2020-3772>)
6. Emmanuel Gabriel-Ohanu, Akshay Khadse, Ladislav Vesely, **Nandhini Raju**, Marcel Otto, Jayanta S. Kapat, Kurt Harris, **Paper No:** GT2021-59939 “Optimization of a primary heat exchanger for fLiBe molten salt nuclear reactor with SCO2 power system”, Turbomachinery technical conference and exposition GT2021, June 7-11, 2021, Virtual.(<https://doi.org/10.1115/GT2021-59939>)
7. **Nandhini Raju**, David W. Rosen, “Fatigue Properties of 3D printed Maraging steel”, 2021 Annual International Solid Freeform Fabrication Symposium, Austin TX, USA (<https://repositories.lib.utexas.edu/bitstream/handle/2152/90687/2021-068-Raju.pdf>)
8. **Nandhini Raju**, Peter Warren, Ramesh Subramanian, Ranajay Ghosh, Seetha Raghavan, Erik Fernandez, Jayanta Kapat, “Material Properties of 17-4PH Stainless Steel Fabricated by Atomic Diffusion Additive Manufacturing (ADAM)”, 2021 Annual International Solid Freeform Fabrication Symposium, Austin TX, USA (<http://utw10945.utweb.utexas.edu/sites/default/files/2021/074%20Material%20Properties%20of%2017-4PH%20Stainless%20Steel%20Fabr.pdf>)

9. Peter Warren, **Nandhini Raju**, Milos Krsmanovic, Hossein Ebrahmi, Jayanta Kapat, Ramesh Subramanian, Ranajay Ghosh, GT2022- 83418 “Shrinkage Prediction Using Machine Learning for Additively Manufactured Ceramic and Metallic Components for Gas Turbine Applications”, Proceedings of ASME Turbo Expo 2022: Turbomachinery Technical Conference and Exposition, GT 2022. (<https://doi.org/10.1115/GT2022-83418>)
10. **Nandhini Raju**, Peter Warren, Ramesh Subramanian, Ranajay Ghosh, Erik Fernandez, Seetha Ragavan, Jayanta Kapat, GT2022-83592 “Sintering Behavior of 3D Printed 17-4PH Stainless Steel”, Proceedings of ASME Turbo Expo 2022: Turbomachinery Technical Conference and Exposition, GT 2022. (<https://doi.org/10.1115/GT2022-83592>)
11. **Nandhini Raju**, Quentin Fouliard, Jeffrey R Bunn, Ramesh Subramanian, Jayanta Kapat, Seetha Raghavan GT2023-102572: “Neutron Characterization of 3D Printed Gas turbine alloy with internal Cooling Structure” Proceeding of ASME Turbo Expo 2023, Turbomachinery Technical Conference and Exposition GT 2023, June 26-30, Boston, Massachusetts (<https://doi.org/10.1115/GT2023-102572>)
12. Abhilash M Prasad, Elena Torres, **Nandhini Raju**, Erik Fernandez, Jayanta Kapat, GT2024-122070 :“Design and Evaluation of High Temperature Alkali Metal Heat Pipe for sCO₂ Heat Exchanger Interface” Proceeding of ASME Turbo Expo 2024, Turbomachinery Technical Conference and Exposition GT 2024, June 24- June 29, London .

Presentation

1. **Nandhini Raju**, Manoj Prabakar, Biswajit Medhi, T.M. Muruganandam, “Tomographic reconstruction of the supersonic jet by using Background oriented Schlieren,” SATEC 2016 Singapore Aerospace Technology & Engineering Conference.
2. **Nandhini Raju**, David W. Rosen, “Study of printing direction, post-processing effects on mechanical and material properties of EOS MS1 maraging steel “30th Annual International Solid Freeform Fabrication symposium-an additive manufacturing conference, August 12-14,2019, Texas, USA
3. **Nandhini Raju**, Peter Warren, Ramesh Subramanian, Ranajay Ghosh, Erik Fernandez, Jayanta Kapat, “A Novel Approach to 3D Print Complex Cooling Structures by Affordable Additive Manufacturing Methods” ASTM International Conference on Advanced Manufacturing, Research to Application through Standardization, Oct 30- Nov 3, 2023 Washington D.C. (Accepted for student presentation competition)
4. **Nandhini Raju**, “Discover the power of gas turbines: A hands on exploration (gas turbine research for aviation & power generation)” **STEM Day presentation and exhibition. At UCF (Oct,20,2023)**
5. **Nandhini Raju**, Abhilash prasad, Erik Fernandez, Ramesh Subramanian, Jayanta Kapat, “A Unique Process flow to 3D print Efficient High Temperature Applications” manufacturing for high temperature applications” WAMSymposium (co-organized by NASA & ESA, Feb 19-23,2024, Orlando, FL, USA (Submitted the abstract)

Poster Presentations

1. **Nandhini Raju**, Manoj Prabakar, Biswajit Medhi, T.M.Muruganandam, “Tomographic Reconstruction of the supersonic jet by using Back ground-oriented schlieren,” Poster presentation, Singapore Aero Campus (SAAC)-2016
2. **Nandhini Raju**, David W. Rosen, “A Conceptual Approach to Test EOS Maraging Steel Grade 300 Produced by Powder Bed Fusion”, 8th MRS-Singapore conference on Advanced Materials, 21-23 November 2018, NUS, Singapore.
3. **Nandhini Raju**, Samyeon Kim, David W. Rosen, “A characterization Method for Mechanical Properties of Metal Powder Bed Fusion Parts” 40th International Matador Conference, Hangzhou, July 07-10,2019, China
4. **Nandhini Raju**, Luisana Calderon, Andres Curbelo, Shinjan Ghosh, Jayanta S. Kapat “Adiabatic film/transpiration cooling effectiveness of an additively manufactured structures” 2019 University Turbine Systems Research Project review meeting, Orlando, Florida, USA (<https://www.netl.doe.gov/node/9363>).
5. **Nandhini Raju**, Ankur Deshmukh, Ian Cormier, Akshay Khadse, Ladislav Vesely, Jayanta Kapat, “Impact of Transients on Supercritical CO₂ compressor” Turbo Expo 2020
6. **Nandhini Raju**, Joshua Schmitt, Ian Cormier, Akshay Khadse, Ladislav Vesely, Jayanta kapat, “Additively Manufactured cooled turbine for supercritical CO₂ Power cycle” Turbo Expo 2020.

7. **Nandhini Raju** and Peter Warren, Ramesh Subramanian, Ranajay Ghosh, Erik Fernandez, Seetha Raghavan, Jayanta Kapat | Mechanical Engineering – “*Improving Density, Strength, Printability, Accuracy for 3D Printed Parts*” UCF student scholar symposium, UCF research week 2022.
8. **Nandhini Raju**, Jeffrey R Buun, David J Mitchell, Christopher Ledford, Erik Fernandez, Jaynata Kapat, Andrew Payzant, “Investigating Residual Strains in Externally Heated and Internally Cooled 3D printed IN718 Neutron Diffraction Technique” MDF Innovation days, May 8, 2024, Oak Ridge National Laboratory, Oak Ridge, TN.
9. **Nandhini Raju**, Jeffrey R Bunn, Christopher Ledford, David J Mitchell, Erik Fernandez, Jayanta Kapat, “Investigating Residual Strains in 3D Printed IN718 with Internal Hollow Structures by Neutron Diffraction” American Conference on Neutron Scattering (ACNS2024), June 23 -June 27, 2024, Knoxville, TN

Other Contributions

1. **Technical Reference: TR70:2019** Guideline on the selection criteria for metal additive manufacturing processes(<https://www.singaporestandardseshop.sg/Product/SSPdtDetail/61331b4c-506f-4d1a-810d-798716a78608>)

Invited Talks

1. “Follow your dream” a motivational talk at Jaigopal Garodia National Higher secondary School, Tambaram, India, April 10, 2016
2. “Post-graduation in engineering and Opportunities in Research,” Alumni interaction sessions, Vel Tech Dr. RR & Dr.SR Technical University, Avadi, India. Oct 3, 2016
3. “A characterization Method for Powder bed fusion parts,” PostDoc Research Jam, Singapore University of Technology and Design, Singapore, March 7, 2019
4. “Essential Industrial Applications of Aero Turbomachinery,” Webinar conducted by Hindustan College of Engineering and Technology, June 19, 2020. (YouTube link: https://www.youtube.com/watch?v=8W_xzSOVEe0)
5. “Gas Turbines for Power Generation,” Webinar conducted by Vel Tech Dr, RR and Dr.SR R& D Institute of Science and Technology, July 3, 2020
6. “Fundamentals of Additive Manufacturing and Application in Aerospace & Defense Industry” Webinar conducted by Bannari Amman Institute of Technology, Aug 16, 2020 (<https://www.youtube.com/watch?v=KpZx1SA7we8>)
7. “Do not compromise your dream” Webinar conducted by Saloni Heart Foundation, March 13, 2021(<https://www.facebook.com/SaloniHeartFoundation/videos/2806398082906098>)
8. <https://www.youtube.com/watch?v=z1CzfOBK9d0>
9. “**Women in Mechanical Engineering**” 24h hours live webinar conducted by LEMS Aug 6, 2021 (<https://www.youtube.com/watch?v=2WAqidR4NC4&t=302s>)
10. “NDT for Aerospace Applications” Webinar conducted by School of electrical engineering, Vellore Institute of Technology, April 14, 2022.
11. “Follow your dreams” a motivational guest lecture at Sri National School, Nov 1, 2022, Gobichettipalayam
12. “Dare to dream big” a career guidance program at Shree Vidyalaya Matriculation Higher Secondary School, Nov 7,2022, Gobichettipalayam

Achievements (awards/honors)

1. **Prestigious Department of Energy Award – Graduate Research at ORNL (GRO)**
2. **Neutron Beam time at ORNL**
3. **Board of Director to India’s largest scholarship platform “Buddy4study India Foundation”**
4. **Elisabeth M. and Winchell M. Parsons Scholarship** for fall 2022 from ASME (American Society of Mechanical Engineers)
5. **Dr. Subrato Chandra Memorial Scholarship** from UCF CECS (College of Engineering and Computer Science) 2022-2023 academic year
6. **Student Advisory Liaison Position in ASME conference Turbo Expo 2022**
7. **President of student club, IGSA** (Indian Graduate Student Association) at UCF from Spring 2022, 2023
8. **NSF (National Science Foundation) Student award** to attend and present research works in 32nd annual meeting (Solidfreeform fabrication 2021)

9. **President of a student club, STREET (Students for Training, Research, and education in Energy and Turbines) at UCF Fall 2020- 2022**
10. **Siemens Energy Doctoral Fellowship for doctoral research work: Summer 2020- Present**
11. **Graduate Teaching Assistant- Fall 2019-Spring 2020**
12. **UCF- Presentation fellowship award** (Conference Registration & Travel) funding to attend Turbo Expo 2020(Turbomachinery Technical Conference and Exposition, June 22-26, London, England)
13. **UCF- CRT** (Conference Registration & Travel) individual funding to attend AIAA SciTech Forum 2020, January 6-10, Orlando, USA.
14. **Travel Grants** from SUTD, Singapore to attend 40th International Matador Conference, Hangzhou, July 07-10,2019, China.
15. **Travel Grants** from **TUM Asia** for attending AIAA SciTech 2016 conference at the USA.
16. **Silver Medal** from Vel Tech Technical University for academic proficiency in Bachelors.
17. Winner of **Vel Tech Mahatma Gandhi National Merit Scholarship for 4 years** of bachelor's degree (waived my bachelor tuition fee).
18. **Best Student award** @ secondary school level

Memberships & Reviewing works

1. AIAA student member
2. ASME student member
3. Member of SWE (Society of Women Engineers)
4. Reviewer for the 32nd annual meeting (Solidfreeform fabrication 2021)- 2 paper
5. Reviewer for ASME TurboExpo2022 conference – 4 Papers
6. Reviewer for Frontiers in Manufacturing Technology- 1 paper
7. Reviewer for Summer Undergraduate Research Fellowship (SURF) grants, UCF – 25 applications

Community service & projects

1. Being education mentor and helping to continue education for Scheduled caste students at kadamboor & thalavadi hill station (tribe), India (2022-present)
2. Being education mentor in **That's my child** (2015-present)
3. Being education mentor in **Hope3foundation** (2022-present)
4. **Board of director** at **Buddy4study India foundation** (2022 to present)
5. Executive member at **Muthamizh Sangam of Central Florida (MSCF)** to improve Indian community engagement and development (2020- 2023- addressing events, food drive for 700+ members @orlando)
6. Free airports pick up arrangements for UCF international students – Indian Graduate Student Association (2022,2023- 220 international students benefitted)
7. Co-ordinating Free bicycle distribution event with other charities to UCF international grad students - Indian Graduate Student Association (2022- 77 students benefitted)
8. Interviewing industry personnel and organizing aero-mechanical seminar – STREET studentl club (2020-2021)

News & Media

1. <https://mae.ucf.edu/powering-up-their-careers-siemens-internship-helps-mae-students-build-their-resumes/>
2. <https://www.buddy4study.com/article/from-dreaming-of-airplanes-to-flying-high-the-nandhini-story>
3. <https://www.ucf.edu/news/mechanical-and-aerospace-engineering-student-wins-2-prestigious-ucf-scholarships/>
4. <https://www.ucf.edu/news/ucf-researchers-create-lunar-regolith-bricks-that-could-be-used-to-construct-artemis-base-camp/>
5. <https://mae.ucf.edu/mae-students-win-top-awards-during-student-research-week/>
6. <https://www.newscientist.com/article/2322018-bricks-made-of-dust-from-the-moon-and-mars-could-make-space-buildings/>
7. <https://www.youtube.com/watch?v=LxZQVswZXM8&list=LLeBQDunOPhL-F1Kf15youLw&index=2>

8. <https://mae.ucf.edu/powering-up-their-careers-siemens-internship-helps-mae-students-build-their-resumes/>
9. <https://www.youtube.com/watch?v=z1CzfOBK9d0>

Technical Skills

Computational Skills: CATIA V5, SolidWorks, PTC Creo Parametric 3.0, Hypermesh, Materialise Magics21.0, PSW software, MATLAB, NX NASTRAN, Star CCM+

Experimental Skills: Plastic 3D printing, Metal printing (EOS machine, DMLS & PBF), Material characterization, BOS, Tomographic schlieren, Schlieren, Shadowgraphy, Back Led Imaging, Measurement technology for high speed & low-speed flows, Composite material manufacturing and material characterization.

Skills: Research Proposal writing, addressing student crowds, running student clubs, STEM activities & Projects, etc.

Courses

1. Additive Manufacturing-Metal Printing-Advanced training@ DManD center, SUTD, Singapore
2. Additive manufacturing-Metal Printing-Short course@ Temasek Polytechnic, Singapore
3. Chemical Safety Training @ SUTD, Singapore.
4. Shock Wave Reflection Phenomena @ IITM by Prof Gabi Ben-Dor
5. Workshop & training- Pneumatics and Hydraulics, Central workshop, IITM
6. Additive Manufacturing@ IITM
7. Advanced Training in fluent & hyper works
8. Crew Resource Management [CRM] and Human factors training at National Institute of Aviation Safety and Services, Safdarjung Airport
9. Investigation of Heatshield materials in Re-entry environment- case study

Area of Interest

Space craft Technology-CubeSats, satellite systems | Electrical propulsion | Material characterization, Additive Manufacturing | Fluid Mechanics | High & low-speed Aerodynamics, Numerical Simulations | Aero/Space Propulsion, | Gas turbine engines

Other Interests

Carnatic Music | Pencil Sketch, Painting | Reading | Writing Blog & Poems | Swimming | Service