# Piyush Kulkarni

*PhD Candidate, Mechanical Engg.*
*Vestal, NY*
**LinkedIn**

## Education

**SUNY Binghamton University,**
Binghamton, NY
PhD Candidate,
Mechanical Engineering
*Current*

**Arizona State University**
Tempe, AZ
M.S in Mechanical Engineering
2018

**Birla Institute of Technology and Science, Pilani – Goa Campus**
Goa, India
B.E(Hons.) in Mechanical Engineering
2014

## Area of Expertise

- Thermal interface materials
- Thermal management for semiconductor/electronics packages
- Non-destructive testing using thermal characterization
- Nano/Micro scale Heat transfer
- Additive Manufacturing
- Mechanical Product Design

# *Thermal-Mechanical Engineer*

PhD Candidate in Mechanical Engineering specializing in **thermal management** for semiconductor/electronic packages, non-destructive testing, and **additive manufacturing**. Seeking to apply deep expertise in experimental and numerical techniques for **heat transfer and fluid flow** to solve complex thermal-mechanical challenges in an innovative research and development role.

## Work Experience

**SUNY Binghamton University, Binghamton, NY**
**Graduate Research Assistant** **June 2022 - Current**

- **Optimized** the reflow profile for Indium-Silver alloy solder TIM (TIM0/TIM1) using an inline vacuum chamber, **achieving a void/defect rate below 5% and enhancing thermal performance** (in collaboration with Advanced Process Labs, Universal Instruments Corporation).
- Investigating the **thermomechanical** behavior of **In-Ag alloy solder TIMs** through temperature cycling to determine **performance and failure modes** in large packages under **high warpage** conditions (>30% of bondline thickness).
- Utilized **IR imaging** to analyze **TIM-1 polymer grease** degradation, successfully characterizing **degradation** via junction temperature monitoring across **2,000+ power cycles** for different TIMs.
- Characterized **microstructure-dependent spatial variation** in thermal conductivity for **3d printed aluminum** of 122 W/m·K with a standard deviation of 18 W/m·K using **Frequency Domain Thermo-reflectance (FDTR).**
- Investigating of **interfacial thermal properties** of 3d printed and conventionally deposited silicides using **PVD processes** like **evaporation** and **sputtering**.
- Prediction of **junction temperature** using semiconductor packages through modulated heating in computational elements.

**SUNY Binghamton University, Binghamton, NY**
**Teaching Assistant** **August 2020 - May 2022**

- Assisted faculty with coursework, assignments and examinations and projects in **Heat Transfer**, **Mechanical engineering design** and **Additive manufacturing**.
- Demonstrated and trained students on experiments related to heat transfer and additive manufacturing.

**SUNY Binghamton University, Binghamton, NY**
**Graduate Research Assistant** **January 2020 - August 2020**

- **Nondestructive** techniques to infer **effective thermal conductivity** and junction temperature in semiconductor packages.
- Thermal characterization of **Li-ion battery cathode** (in-situ and ex-situ) using **Frequency Domain Thermo-reflectance (FDTR).**
- Used **thermal flash diffusivity** to measure thermal properties of 3d printed

# Hardware Tools

- CVD Sputtering
- Frequency Domain Thermoreflectance
- Scanning Acoustic Microscope
- Thermal Flash Diffusivity
- Transient Hotwire
- X-Ray Imager/CT scanner
- PVD E-beam/Thermal Evaporation
- Differential Scanning Calorimetry
- Rapid thermal Processing/Annealing
- Shadow Moiré
- Battery Construction and Operation
- Laser Powder bed Fusion printing
- Mechanical Shear Tester
- Mechanical Tensile Tester
- Microtome Polisher
- Optical profilometer
- Thermo-Gravimetric analysis
- Ion Etching/Milling
- Powder size analyzer
- Scanning Electron Microscope
- Microtome polishing
- Ion milling polishing

# Software Skills

- **Simulation & FEA:** ANSYS Fluent, ANSYS Workbench, COMSOL
- **CAD Software:** PTC Creo, Catia, SolidWorks, Inventor
- **Programming & Data Analysis:** MATLAB, Python, C/C++

**Bitmapper Integration Technologies Pvt. Ltd., Pune, IN**
**Mechanical Design Engineer, June 2014 - June 2016**

- Designed high performance electronics packaging solutions for thermal, structural and EMI/EMC.
- Implemented use of two resistance thermal modeling by block and plate method as per JESD 15-3 standard in ANSYS for thermal simulation improving accuracy by 5% for electronic product enclosures.
- Contributed to project planning and management initiative with use of planned, limited optimization, DFMEA analysis cycles to save 5% time for design phase.

# Publications(Google Scholar)


- Kulkarni, Piyush, Ali Davoodabadi, and Scott Schiffres. “Optimization of Reflow Profile for Solder Thermal Interface Materials with an Inline Vacuum Oven.” In *2025 IEEE 75th Electronic Components and Technology Conference (ECTC)*, 75:2211–17. Dallas, TX, USA: IEEE, n.d. https://doi.org/10.1109/ECTC51687.2025.00376.
- Kulkarni, Piyush, Ali Davoodabadi, Zechen Zhang, and Scott Schiffres. “Indium Solder TIM Stability under Temperature Cycling.” In *24th IEEE ITHERM Conference*, 24:32–40. Dallas, TX USA: IEEE, n.d.
- Kulkarni, Piyush, Zechen Zhang, Fatemeh Hejripour Rafsanjani, Je-Young Chang, Bahgat Sammakia, and Scott Schiffres. “Non-Destructive Evaluation of Thermal Interface Materials Using Modulated Heating of Selective Cores.” In *2022 21st IEEE Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (iTherm)*, 1–6. San Diego, CA, USA: IEEE, 2022. https://doi.org/10.1109/iTherm54085.2022.9899581.
- Zhang, Zechen, Piyush A Kulkarni, Matthias Daeumer, Ahmad Gharaibeh, Je-Young Chang, Bahgat Sammakia, and Scott Schiffres. “Spatial Thermal Conductivity Variation of Particulate-Filled Thermal Interface Materials.” In *2022 21st IEEE Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (iTherm)*, 1–7. San Diego, CA, USA: IEEE, 2022. https://doi.org/10.1109/iTherm54085.2022.9899581.
- Azizi, Arad, Fatemeh Hejripour, Jacob A. Goodman, Piyush A. Kulkarni, Xiaobo Chen, Guangwen Zhou, and Scott N. Schiffres. “Process-Dependent Anisotropic Thermal Conductivity of Laser Powder Bed Fusion AlSi10Mg: Impact of Microstructure and Aluminum-Silicon Interfaces.” *Rapid Prototyping Journal* 29, no. 6 (June 2, 2023): 1109–20. https://doi.org/10.1108/RPJ-09-2022-0290.
- P. A. Kulkarni, K.P. Shete, S. Jogdankar, R.S. Patil, “Effect of Barrel Wall Fin of the Cyclone Separator on Fluid Dynamic Characteristics”,5th International and 41st National Conference on Fluid Mechanics and Fluid Power, Indian Institute of Technology Kanpur, India,12th December – 14th December 2014.
- K.P. Shete, P. A. Kulkarni, R.S. Patil, “Computational Studies on Effects of Novel Geometries of Distributor Plates on Fluid Dynamics Characteristics of Circulating Fluidized Bed Riser”, 5th International and 41st National Conference on Fluid Mechanics and Fluid Power, Indian Institute of Technology Kanpur, India,12th December – 14th December 2014.
- R. Jain, M. Dasar, P.A. Kulkarni, R. S. Patil, “Investigation on Fluid Dynamic Characteristics of Square Barrel Wall Fins on Efficiency of a Cyclone Separator”, 5th International Conference on Advances in Energy Research, Indian Institute of Technology Bombay, India,15th December – 17th December 2015.