MINGEUN CHOI

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EDUCATION

Georgia Institute of Technology — Atlanta, GA
Ph.D. in Mechanical Engineering (Advisor: Dr. Satish Kumar) — Jan. 2023 – Dec. 2027 (expected)
Seoul National University — Seoul, Republic of Korea
M.S. in Mechanical Engineering (Advisor: Dr. Seung Jin Song) — Mar. 2017 – Feb. 2019
Korea University — Seoul, Republic of Korea
B.S. in Mechanical Engineering — Mar. 2013 – Feb. 2017

RESEARCH EXPERIENCE (SELECTED)

Graduate Research Assistant, Georgia Institute of Technology — Jan. 2023 – Present

- Designed an automated electrothermal modeling framework to co-optimize vertical power delivery architecture and substrate-embedded microfluidic cooling for thermally sustainable, high-power-density operation.
- Built a machine-learning–accelerated electrothermal modeling framework to predict spatiotemporal temperature fields from individual FinFET devices to arrays for fast, accurate, self-heating-aware evaluation at the device and array levels.
- Developing a machine-learning–enabled frequency-domain thermoreflectance inversion model to estimate the thermal properties of thin films for high-throughput, low-uncertainty characterization.
- Linking device- and package-level modeling with thin-film thermal-property characterization into a self-consistent multiscale workflow with high-fidelity thermal-property inputs.

TECHNICAL SKILLS

- **Engineering and Simulation Software:** Ansys Electronics Desktop (AEDT) Icepak (including PyAEDT); Ansys Fluent (including PyFluent); Dassault Systèmes SolidWorks; Microsoft Visual Studio Code.
- **Programming and Scripting:** Python; MathWorks MATLAB; Julia; National Instruments LabVIEW.
- **Experimental Metrology:** Frequency-domain thermoreflectance (FDTR); thermoreflectance thermal imaging (TTI); thermofluidic measurement; machining; manufacturing; commissioning; calibration; uncertainty analysis.

PUBLICATIONS (SELECTED)

Refereed Journal Articles

[7] **M. Choi**, S. Krishnakumar, Y. Popryho, R. R. Khorasani, M. Swaminathan, I. Partin-Vaisband, and S. Kumar, "Self-Consistent Electrothermal Modeling of Distributed Vertical Power Delivery Architecture with Substrate-Embedded Microfluidic Cooling," *IEEE Trans. Compon., Packag., Manuf. Technol.*, early access, Nov. 24, 2025.

[6] S. Yun, D. Go, **M. Choi**, R. Kondakindi, P.-C. Lee, P. R. Bandaru, S. Kumar, and A. C. Kummel, "High Speed, High Thermal-Conductivity of Aluminum Nitride Deposited by DC Reactive Sputtering at Low Temperature in the Transition Regime," *Ceram. Int.*, vol. 52, no. 4, pp. 4777-4786, Feb. 2026.

[5] P.-C. Lee, **M. Choi**, D. Contreras Mora, K. Wang, S. Yun, D. Go, J. Dutta, D. Pal, S. Kumar, and A. C. Kummel, "High-Speed AlN Film Deposition via Low-Pressure Bipolar High Power Impulsed Magnetron Sputter for Enhanced Thermal Conductivity," *Thin Solid Films*, vol. 832, p. 140821, Dec. 2025.

[4] **M. Choi**, D. Vaca, and S. Kumar, "Machine Learning-Enabled Fast and Accurate Inversion of Thermal Properties at the Micro- and Nanoscale via Optical Metrology," *Annu. Rev. Heat Transfer*, vol. 28, pp. 277-337, Oct. 2025.

[3] **M. Choi**, S. Krishnakumar, R. R. Khorasani, M. Swaminathan, I. Partin-Vaisband, and S. Kumar, "Substrate-Embedded Microfluidic Cooling of Distributed Vertical Power Delivery Architectures for High-Performance Computing Processors," *IEEE Trans. Compon., Packag., Manuf. Technol.*, vol. 15, no. 9, pp. 1912-1920, Sep. 2025.

[2] P.-C. Lee, A. J. McLeod, **M. Choi**, D. Vaca, D. Contreras Mora, K. Wang, S. Yun, J. Dutta, D. Pal, S. Kumar, and A. C. Kummel, "Achieving a High Thermally Conductive One Micron AlN Deposition by High Power Impulse Magnetron Sputtering Plus Kick," *ACS Appl. Mater. Interfaces*, vol. 16, no. 20, pp. 26664–26673, May 2024.

[1] **M. Choi**, B. Goo, G. Cho, and S. J. Song, "Swirl Enhancement Effect on Turbine Rim Seal Performance," *ASME J. Turbomach.*, vol. 146, no. 5, p. 051002, May 2024.

Refereed Conference Proceedings

[9] **Best Paper** **News Release** **M. Choi**, S. Krishnakumar, Y. Popryho, R. R. Khorasani, M. Swaminathan, I. Partin-Vaisband, and S. Kumar, "Automated Electro-Thermal Modeling Framework of Distributed Vertical Power Delivery Architectures with Substrate-Embedded Microfluidic Cooling," in *Proc. 24th IEEE Intersoc. Conf. Thermal Thermomech. Phenomena Electron. Syst. (ITherm)*, Dallas, TX, USA, May 2025.

[8] **News Release** **M. Choi**, R. Dutta, P. Saha, M. P. Singh, S. Mukhopadhyay, S. Datta, and S. Kumar, "Fast Prediction of Spatio-Temporal Temperature Profiles in FinFET Arrays via Numerical and Machine-Learning Approaches," in *Proc. IEEE Int. Electron Devices Meeting (IEDM)*, San Francisco, CA, USA, Dec. 2024.

[7] Y. Im, J. Kim, **M. Choi**, M. Bouzidi, X. Li, J. W. Kim, A. M. Muslu, S. Kumar, M. Swaminathan, S. K. Sitaraman, and Y. Joshi, "Parametric Thermal Design for Heterogeneously Integrated High-Power Packages," in *Proc. ASME 2024 Int. Tech. Conf. Exhib. Packaging Integr. Electron. Photon. Microsystems (InterPACK)*, San Jose, CA, USA, Oct. 2024.

[6] P.-C. Lee, A. J. McLeod, **M. Choi**, D. Vaca, S. Kumar, and A. C. Kummel, "Thermal Conductivity Study of One Micron AlN Deposition by Bipolar High Power Impulse Magnetron Sputtering," in *Proc. IEEE Int. Interconnect Technol. Conf. (IITC)*, San Jose, CA, USA, Jun. 2024.

[5] S. Krishnakumar, **M. Choi**, R. R. Khorasani, R. Sharma, M. Swaminathan, S. Kumar, and I. Partin-Vaisband, "Vertical Power Delivery for High Performance Computing Systems with Buck-Derived Regulators," in *Proc. IEEE 74th Electron. Compon. Technol. Conf. (ECTC)*, Denver, CO, USA, May 2024.

[4] **M. Choi**, S. Krishnakumar, R. R. Khorasani, I. Partin-Vaisband, R. Sharma, M. Swaminathan, and S. Kumar, "Thermal Analysis of High Current Vertical Power Delivery Network with Embedded Microchannel Cooling," in *Proc. 23rd IEEE Intersoc. Conf. Thermal Thermomech. Phenomena Electron. Syst. (ITherm)*, Aurora, CO, USA, May 2024.

[3] S. Krishnakumar, **M. Choi**, R. R. Khorasani, R. Sharma, M. Swaminathan, S. Kumar, and I. Partin-Vaisband, "Design Considerations for DC-DC Voltage Regulators in Distributed Vertical Power Delivery Systems," in *Proc. IEEE Int. Symp. Circuits Syst. (ISCAS)*, Singapore, May 2024.

[2] P.-C. Lee, A. J. McLeod, **M. Choi**, D. Vaca, D. Contreras Mora, S. Kumar, and A. C. Kummel, "High Thermally Conductive, High-Speed Deposition of AlN by Bipolar High Power Impulse Magnetron Sputtering," in *Proc. IEEE Int. Symp. VLSI Technol. Syst. Appl. (VLSI-TSA)*, Hsinchu, Taiwan, Apr. 2024.

[1] **M. Choi**, B. Goo, G. Cho, and S. J. Song, "Swirl Enhancement Effect on Turbine Rim Seal Performance," in *Proc. ASME Turbo Expo 2023: Turbomach. Tech. Conf. Expo*, Boston, MA, USA, Jun. 2023.

Patents

[1] P.-C. Lee, **M. Choi**, D. Contreras Mora, D. Go, S. Kumar, and A. C. Kummel, "Aluminum Nitride Thin Film Deposition Using Sputtering," U.S. Patent Application No. 19/366,019, filed on Oct. 22, 2025.

HONORS AND AWARDS (SELECTED)

Most First Author Journal Papers Topping Fellowship, Georgia Institute of Technology 2025
Best Paper Runner-Up Award, Institute of Electrical and Electronics Engineers 2025
News Release **Excellence in Service and Leadership Award**, Georgia Institute of Technology 2025
Community Builder/Leader Topping Fellowship, Georgia Institute of Technology 2025
Strong Gap Funding Topping Fellowship, Georgia Institute of Technology 2024
Best Presentation Award, Korean Society for Fluid Machinery 2018
Merit-Based Scholarship, Seoul National University 2018
Brain Korea 21 Plus Fellowship, National Research Foundation of Korea 2017
National Science and Engineering Scholarship, Korea Student Aid Foundation 2015 – 2016
Academic Excellence Scholarship for Freshman, Korea University 2013

LEADERSHIP AND SERVICE (SELECTED)

Director of Communications, Georgia Tech Nu Chapter of Pi Tau Sigma Jan. 2025 - Present
- Launched a monthly newsletter and renovated the chapter website, driving a 100 % increase in new-initiate turnout in Spring 2025 and boosting alumni engagement by 30 %.

External Vice President, Mechanical Engineering Graduate Association (MEGA) May 2024 - Apr. 2025
- Coordinated eight professional networking events with Dow Inc., Sandia National Laboratories (SNL), Exponent, and Kratos Defense, increasing event offerings by 50 % and graduate-student attendance by 40 % over the academic year.