

Raghav Mahalingam
raghavmahalingam@austin.utexas.edu

Education

- Ph.D. (1999) in Aerospace Engineering, Georgia Institute of Technology, Atlanta, GA.
- M.S. (1995) in Aerospace Engineering, Georgia Institute of Technology, Atlanta, GA.
- B. Tech (1994) in Aerospace Engineering, Indian Institute of Technology, Madras, India.

Core Areas of Technical Expertise

- Fluid mechanics, Thermodynamics, Heat transfer, Vortex dynamics
- Thermal management in microelectronic systems.
- Experimental methods in fluid mechanics and heat transfer
- Sensor and actuation technologies
- System design, product development processes.

Teaching Interests

- Basic and advanced courses in fluid mechanics, thermodynamics, heat transfer, transport phenomena, propulsion systems, electromechanical systems, actuation technologies and experimental methods in thermo-fluids.
- System design and product development processes.
- Entrepreneurship and intellectual property creation and management.
- Socially responsible engineering for the sustained well-being of future generations.

Experience

Lecturer, ASE, UT Austin, Jan 2016- present

Courses Taught: Propulsion (S16, F18), Low Speed Aerodynamics (F16, S17, F17, S18, F18, S19, F19, Su20), Electromechanical Systems (S17, S18, S19, S20), Computational Engineering Capstone Design (S19, S20), Fluid Mechanics (ME, Su19), Applied Aerodynamics (F19), Foundations of Fluid Mechanics (ME/ASE, F19).

Courses Designed: Computational Engineering Capstone Design.

Director of Robotics Education, Apptronik, Inc. Jan 2018-Jan 2019

Apptronik is a robotics startup building high power, high efficiency actuators and robotic systems. My role is directing the development of a online education and training platform for robotics under a SBIR Phase I grant. The vision for the platform is to provide Robotics-as-a-Service (RaaS) for the education and training market, with the goal of eliminating infrastructure, maintenance and safety costs for customers. Funded project:

“Cloud Based Shared Robotics Laboratory” – NSF-SBIR Phase I award, 2018 PI, \$225K, 2018

VP Product Strategy, CoolChip Technologies, Nov 2014-Apr 2016

CoolChip Technologies was a VC backed start-up that is developing a technology called Kinetic Cooling for high-performance thermal management. My role in the company was to develop product strategy based on market needs and drive early customer traction through technology evangelization and system analysis.

Co-founder and Chief Scientist, Nuventix, Inc.: 2005 to 2014, acquired by Aavid Thermalloy

Nuventix was a VC backed company that developed low power, high efficiency thermal management systems for electronics using synthetic jets and was acquired by Aavid Thermalloy. I was one of the principal researchers who adapted the Synjet technology for thermal management at Georgia Tech and subsequently, one of the founders of the company. I led the growth of Nuventix IP over last 8 years to over 80 patents and directed the Nuventix technology strategy for diverse thermal management markets.

Research Engineer, Woodruff School of Mechanical Engineering, Georgia Tech: 2001-2005

Post-Doctoral Fellow, Woodruff School of Mechanical Engineering, Georgia Tech: 1999-2001

I developed the fundamental know-how for producing small-scale synthetic jets and studied their interactions with heated surfaces. This research laid the groundwork for the formation of Nuventix. With Prof. Ari Glezer, I pioneered the concept of using synthetic jet ejectors for thermal management. As part of a DARPA funded program, we demonstrated the feasibility of using small scale synthetic jets for highly efficient cooling using the inherent turbulence of the synthetic jets and their ability to entrain mean flow.

Graduate Research Assistant, School of Aerospace Engineering, Georgia Tech: 1994-1999

For my doctoral research, I studied the development of axial flow in the core of the tip vortex formed at the rotor blade and its effect when the vortex impinges on an airframe. This research showed that the core axial velocity is nearly the same magnitude as the core circumferential velocity and cannot be ignored in predictive models. Additionally, the behavior of the trailing vortex when it hits a surface is dependent on the strength of the axial velocity component at the time of impact.

Awards and Service

- ASE/EM LUNAR Council Teaching Award for 2019
- Most Exemplary Faculty Member Award, Dept. of Aerospace Engineering, 2017, presented by the Student Engineering Council and Cockrell Schooling of Engineering.
- Harvey Rosten Award for Excellence in the field of thermal analysis of electronic equipment, "...for pioneering work in synthetic jets for electronics cooling applications...", 2007.
- NSF I-Corp-L Award, Business Mentor, UT-Austin team for the NSF I-Corp-L cohort, "Scalable Online STEM Teacher Training in Engineering Innovation/Entrepreneurship", Jan 2015.

- Panelist, NSF SBIR Phase I Proposal Reviews, 2019.
- Panelist, NSF SBIR Phase II Proposal Reviews, 2018.
- Invited Panelist: Federal Labs Consortium National Meeting, “Commercialization Trends and Insights across Academe, Industry, and Federal Labs”, Apr 2017.
- Invited Panelist: Thermal Challenges of Smart Phones, Tablets, Phablets and Beyond, IEEE ITherm Conference, 2014.
- Invited Panelist: How can Thermal and Packaging design enable low cost 100W equivalent LED A-line lamps , ASME InterPack Conference, July 2013.
- Invited Lectures: Indian Institute of Technology, Mandi, India and University of Texas at Arlington, “Sustainability, Engineering and Collapsing Civilizations”.
- Invited book chapter: Thermal Management for LED applications, “Air Cooling for LED lighting”, Editors: Lasance, C., and Poppe, A., pp. 267-298, Springer 2014.

Patents

- European Pat. EP 1943687. Synthetic jet cooling system for LED module, 2014.
- US Pat. 9016903. Thermal management of LED-based illumination devices with synthetic jet ejectors, 2014.
- US Pat. 8845138. Light fixture with multiple LEDs and synthetic jet thermal management system, 2011.
- US Pat. 8770765. Thermal management of small form factor projectors with synthetic jets, 2014.
- US Pat. 8777456. Thermal management of LED-based illumination devices with synthetic jet ejectors, 2014.
- US Pat. 8672648. Methods for reducing the non-linear behavior of actuators used for synthetic jets
- US Pat. 8579476. Thermal management of led-based illumination devices with synthetic jet ejectors, 2013.
- US Pat. 8430644. Synthetic jet ejector for the thermal management of PCI cards. 2013
- US Pat. 8388142. Thermal management of small form factor projectors with synthetic jets, 2013.
- US Pat. 8030886. Thermal management of batteries using synthetic jets, 2011.
- US Pat. 7932535. Synthetic jet cooling system for LED module, 2011.
- US Pat. 8066410. Light fixture with multiple LEDs and synthetic jet thermal management system, 2011.
- US Pat. 8069910. Acoustic resonator for synthetic jet generation for thermal management, 2011.
- US Pat. 7784972. Thermal management system for LED array, 2010.

- US Pat. 7819556. Thermal management system for LED array, 2010.
- US Pat. 7760499. Thermal management system for card cages, 2010.
- US Pat. 7606029. Thermal management system for distributed heat sources, 2009.
- US Pat. 7607470. Synthetic jet heat pipe thermal management system, 2009.
- GB Pat. 2419644. System and method for thermal management using distributed synthetic jet actuators, 2008.
- US Pat. 7252140. Apparatus and method for enhanced heat transfer, 2007.
- US Pat. 6588497. System and method for thermal management by synthetic jet ejector channel techniques, 2003.

Archival Publications, Conference Papers and Presentations

- Mahalingam, R., "Thermal Management of High Performance Electronics with Kinetic Cooling", European Energy Venture Fair, Zurich, Sept 2015.
- Mahalingam, R., Poynot, A., Helsel, J., "Ultrathin synthetic jets for thermal management of consumer electronics", Proc. Of 30th IEEE Semi-Therm Symposium, pp.109-113, March 2014.
- Mahalingam, R., "SynJet Augmented Cooling for Cloud Computing", Presentation Only, Session: Revolutionary Developments in Thermal Management, Meptec Symposium 2012.
- Mahalingam, R., Noska, B., and Narasimhan, S., "Synjet Augmented Cooling of a 1U Security Chassis", Proc. Of 28th IEEE Semi-Therm Symposium, pp.255-259, 2012.
- Mahalingam, R., "System Level Benefits of Augmenting Fan Cooled Servers with Localized Synthetic Jets", Electronics Cooling Magazine, v.18:3, 2012.
- Mahalingam, R., "SynJets for Forced Air Cooling for Outdoor Telecom Equipment", Presentation only: IMAPS Advanced Thermal Workshop, Nov 2012.
- Mahalingam, R., "Improving Cooling System Metrics Using SynJets for Augmentation of Fans", Presentation only: IMAPS Advanced Thermal Workshop, Nov 2011.
- Noska, B., Cheung, C., Jin, H., and Mahalingam, R., "Enabling new LED designs through advanced cooling technology" Proc. of the 26th IEEE Semi-Therm Symposium, 2010
- Gerlach, D.W., Gerty, D., Mahalingam, R., Joshi, Y.K., Glezer, A., "A Modular Stackable Concept for Heat Removal From 3-D Stacked Chip Electronics by Interleaved Solid Spreaders and Synthetic Jets", IEEE Transactions on Advanced Packaging, v. 32:2, pp. 431-439, 2009.
- Mahalingam, R, "Unique Fanless Air Cooling for LED Lighting", Presentation only: Thermal Management and Technology Symposium, 2008.
- Mahalingam, R., "Modeling of Synthetic Jet Ejectors for Electronics Cooling", Proc. of the 23rd IEEE Semi-Therm Symposium, pp 196-199, 2007.
- Mahalingam, R. Heffington, S., Jones, L., Williams, R., "Synthetic jets for forced air cooling of electronics", Electronics Cooling Magazine, v.13:2, 2007.

- Mahalingam, R., Heffington, S., Jones, L., Schwickert, M., "Newisys server processor cooling augmentation using synthetic jet ejectors", Proc. of the 10th IEEE ITherm Conf., pp. 705-509, 2006.
- Gerty, D., Mahalingam, R., Glezer, A., "Design and Characterization of a Heat Sink Cooled by an Integrated Synthetic Jet Matrix", Proc. of the 10th IEEE ITherm Conf., pp. 356-360, 2006.
- Mahalingam R., Glezer A., "Design and thermal characteristics of a synthetic jet ejector heat sink", J. of Electronic Packaging, v.127:2, pp.172-177, 2005.
- Mahalingam, R., "Thermal Management Using Synthetic Jets", Presentation only: Next-Generation Thermal Management Materials and Systems: Challenges, Opportunities, and Technology Solutions for Microscale Cooling in Photonics and Electronics, Session: From Nano to Macro, 2005.
- Mahalingam R., Glezer A., "Forced Air Cooling with Synthetic Jet Ejectors", Proc. ASME InterPack Conf., pp.199-204.
- Mahalingam R., Rumigny N., Glezer A., "Thermal management using synthetic jet ejectors" IEEE-CPMT, v.27:3, pp. 439-444, 2004.
- Mahalingam R., Glezer A., "Low-profile synthetic jet cooling for portable computers", Proc. ASME InterPack Conf., 2003.
- Gerty, D., Mahalingam, R., Glezer, A., "Fluidic-Driven Ducted Heat Ejector", 56th Annual APS Division of Fluid Dynamics Meeting, 2003.
- Mahalingam, R., Glezer, A., "Air cooled heat sinks integrated with synthetic jets" Proc. of the 8th IEEE ITherm Conf., pp. 285-291, 2002.
- Mahalingam R., Glezer A., "An actively cooled heat sink integrated with synthetic jets", Proc. of the 35th National Heat Transfer Conference, 2001.
- Mahalingam R., Glezer A., "Synthetic Jet Based Impingement Cooling Module for Electronic Cooling", Proc. of the IMAPS Symposium, 2001.
- Mahalingam R., Glezer A., "Synthetic jet based active heat sink for electronic cooling", Proc. of the Intl. symposium on microelectronics, v.4587, pp. 201-206, 2001.
- Rumigny, N., Mahalingam, R., Glezer, A., "Flow and Heat Transfer Characteristics of an Active Heat Sink Powered by Synthetic Jets", 54th Annual APS Division of Fluid Dynamics Meeting, 2001.
- Mahalingam, R., Wong, O., and Komerath, N. M., "Experiments on the Origin of Tip Vortices", AIAA Paper 2000-0278, 31st AIAA Fluid Dynamics Meeting, 2000.
- Wong, O., Mahalingam, R., Tongchitpakdee, C., Komerath, N.M. "The Near Wake of A 2-Bladed Rotor in Forward Flight", AHS Aeromech. Spec. Mtg, 2000.
- Mahalingam, R., Culp, J., Nikolic, J., Glezer, A., "The Evolution of Synthetic Jet Arrays", 52nd Annual APS Division of Fluid Dynamics Meeting, 1999.

- Mahalingam, R., “Structure of the Near Wake of a Rotor in Forward Flight and its Effect on Surface Interactions”, Ph.D. thesis, 1999.
- Mahalingam, R., and Komerath, N. M., “Characterization of the Near-Wake of a Helicopter Rotor”, AIAA Paper 98-2909, 29th AIAA Fluid Dynamics Meeting, 1998.
- Jain, R., Conlisk, A. T., Mahalingam, R., and Komerath, N. M., “Interaction of Tip-Vortices in the Wake of a Two-Bladed Rotor”, Proc. of the 54th Annual Forum of the American Helicopter Society, 1998.
- Matos, C., Mahalingam, R., Ottinger, G., Klapper, J., Funk, R., Komerath, N., “Wind tunnel measurements of parafoil geometry and aerodynamics”, 36th AIAA Aerospace Sciences Meeting, 1998.
- Mahalingam, R., and Komerath, N. M., “Measurements of the Near-Wake of a Helicopter Rotor in Forward Flight”, AIAA Paper 98-0692, 36th Aerospace Sciences Meeting, 1998.
- Mahalingam, R., Komerath, N. M., Funk, R. B., Kim, J. M., "Three- dimensional vortex-surface interaction", 7th Asian Fluid Dynamics Congress, 1997.
- Mahalingam, R., Radcliff, T., Conlisk, A.T., Komerath, N.M., "Vortex-Surface Collision: 3-D Core Flow Effects", AIAA Paper 97- 1785, 28th Fluid Dynamics Conference, 1997.
- Mahalingam, R., Funk, R. B., and Komerath, N. M., "Low-Speed Canard-Tip-Vortex Interaction", SAE Transactions, 106:11, 136-143, 1997.
- Caradonna, F., Henley, E., Silva, M., Huang, S., Komerath, N.M., Reddy, U., Mahalingam, R., Funk, R., Wong, O., Ames, R., Darden, L., Villareal, L., Gregory, J., "An Experimental Study of a Rotor in Axial Flight", AHS Specialists' Meeting on Rotorcraft Aerodynamics and Aeroacoustics, 1997.
- Mahalingam, R., Komerath, N. M., “Rotor tip-vortex/airframe collision features”, AIAA-1996-2013, 27th AIAA Fluid Dynamics Conference, 1996.
- Mahalingam, R., Funk, R. B., Komerath, N. M., “Flow visualization of low speed perpendicular vortex-airfoil interaction” AIAA-1996-2387, 14th Applied Aerodynamics Conference, 1996.
- Mahalingam, R., Peterson, K.G., Funk, R.B., Komerath, N.M. Conlisk, A.T., "Recent Experiments on Vortex Collision with a Cylinder", Invited Paper, AIAA-95-2236, 26th Fluid Dynamics Conference, 1995.

• Google Scholar Index

	All	Since 2015
Citations	1855	994
h-index	23	18
i10-index	43	25