

Thomas L. Spencer

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I. EDUCATION

Georgia Institute of Technology 08/2015 – 05/2020
PhD, Mechanical Engineering
Research Advisor: Dr. David Hu

Georgia Institute of Technology 08/2015 – 12/2017
Masters of Science, Mechanical Engineering Major GPA: 4.0

Georgia Institute of Technology 08/2010 – 05/2015
Bachelor of Science, Mechanical Engineering GPA: 3.61
Research Advisor: Dr. Brandon Dixon

II. RESEARCH EXPERIENCE

Georgia Institute of Technology Atlanta, GA
Graduate Research Assistant 06/2015 – 05/2020
Advisor: Dr. David L. Hu

- Specializing in fluid dynamics and bio-inspired design of olfaction and chemical sensing technologies
- Focus on understanding and leveraging the unique fluid dynamic phenomena involved in particle deposition in nature
- 11 national presentations including one receiving 3rd place in graduate research competition and another as finalist for best oral presentation
- Collaborated with Oak Ridge national labs to develop 3D printed antennae on the nano scale
- Created patent pending device to mimic mammalian sniffing abilities to enhance chemical detection
- Collaborating with Georgia Tech Research Institute (GTRI) to develop chemical and biological sensing technology for aerial drones

Undergraduate Research Assistant

12/2013 – 05/2015

Advisor: Dr. Brandon Dixon

- Utilized fluids and heat transfer skills to create a milli-fluidic system for lymphatic filariasis disease research to analyzed where in lymphatic vessels the disease carrying worms congregate due to fluid transport properties
- Received first place in Mechanical Engineering Research Symposium at Georgia Tech for research presentation
- Presented at Biomedical Engineering Society conference in San Antonio

III. WORK EXPERIENCE

WasteWizer Technologies

Atlanta, GA

Co-founder and CTO

05/2019 - Present

- Working to bring IoT solutions to the waste industry. Solving problems in mechanical engineering, IoT, and sensor development.
- Invited to submit SBIR Phase 1 application in advanced materials
- Featured in [Hypepotamus](#) and [Atlanta Inno](#) as a top startup out of Atlanta
- Y Combinator finalist, and Atlanta Startup Battle Semi-finalist

C&J Energy Services, Inc.

Houston, TX

Research and Technology Mechanical Engineering Intern

05/2014 – 08/2014

- Designed, fabricated, and controlled a flow loop apparatus to test various coiled tubing prototype tools
- Created control program in LabView in order to manage flow through the system
- Completed training in order to field test coiled tubing tools

Johnson Outdoors Marine Electronics

Alpharetta, GA

Mechanical Engineering Co-op

05/2011 – 08/2013

- Assisted in entire manufacturing and design process of Humminbird AS 360 system from initial idea to finalized product
- Designed and built fixtures to test prototypes for water resistance, structural loading, solar resistance, and thermal analysis
- Implemented many troubleshooting techniques to diagnose and successfully fix malfunctioning units
- Utilized Pro Engineering software to create drawings and model parts
- Directed and trained assembly line workers on how to most efficiently build new products

IV. PUBLICATIONS/PATENTS

T. L. Spencer, A. Clark, J. Fonollosa, A. Alexeev, D. L. Hu, “*Sniffing speeds up chemical detection by redirecting airflows near sensors*” *Nature Communications*, Feb. 23, 2021

T. L. Spencer, N. Mohebbi, G. Jin, M. L. Forister, A. Alexeev, D. L. Hu, “*Moth-inspired methods for particle capture on a cylinder*” *Journal of Fluid Mechanics*, Dec. 17, 2019

T. L. Spencer, A. Lee, D. L. Hu, “Methods, Systems and Devices For Agent Detection”. Patent application number 16/265,923, 1 February 2019

N. Mohebbi*, **T. L. Spencer***, A. Mandel, J. Casas, D. L. Hu, “The scaling of olfaction, from insects to mammals”. *Journal of Experimental Biology*, *Under Review* *these authors contributed equally to this work

T. L. Spencer, A. Lee, D. L. Hu, “*A biomimetic nose for advanced threat detection*” *HDIAC Journal*, Volume 5, Issue 1, Spring 2018 (Cover article)

H. Hyacinth, C. Sugihara, **T. Spencer**, D. Archer, A. Shih, “*Higher prevalence of spontaneous cerebral vasculopathy and cerebral infarcts in a mouse model of sickle cell disease*” *Journal of Cerebral Blood Flow & Metabolism* (2017)

T. Spencer, N. Lavrik, D. L. Hu, “*Synthetic Moth Antennae Fabricated as Preconcentrator for Odor Collection*” *Proceedings of the 2017 ISOEN/IEEE International Symposium on Olfaction and Electronic Nose*

A. Lee, **T. Spencer**, M. Ersted, J. Pillarisetti, D. Hu, “*Mimicking Sniffing for Improving Machine Olfaction*” *Proceedings of the 2017 ISOEN/IEEE International Symposium on Olfaction and Electronic Nose*

T. Spencer, V. Spencer, P. Patel, A. Jariwala “*Safety in a Student-Run Makerspace via Peer-to-Peer Adaptive Training*” *International Symposium on Academic Makerspaces*, Massachusetts Institute of Technology (2016)

V. ORAL PRESENTATIONS

T. Spencer, A. Clark, D. Hu, "Sniffing Scaling Study for Superior Sensing." The Society for Integrative & Comparative Biology 2019 Meeting, Tampa, FL, January 5, 2019

T. Spencer, A. Clark, D. Hu, "What is the Best Frequency for Sniffing." 72th Annual Meeting of APS Division of Fluid Dynamics, Atlanta, GA, November 19, 2018.

A. Lee, **T. Spencer**, D. Hu, "Underwater sniffing by the star-nosed mole." 70th Annual Meeting of APS Division of Fluid Dynamics, Denver, CO, November 20, 2017.

T. Spencer, N. Lavrik, D. Hu, "Synthetic Moth Antennae Fabricated as Preconcentrator for Odor Collection" 2017 ISOEN/IEEE International Symposium on Olfaction and Electronic Nose, Montreal, CN, June 1, 2017

T. Spencer, A. Jariwala, "The Invention Studio - A student perspective on a student run makerspace" The Student Shop Managers Conference (SSMC) July 13, 2016. Atlanta, GA

T. Spencer, L. Murphy, J. Linsey, A. Jariwala, "Making the K-12 to college connection" One of four Keynote speakers at the Association of Technology Leaders at Independent Schools (ATLIS) Conference. April 18, 2016, Atlanta, GA

T. Spencer, M. Ballard, A. Alexeev, M. Forister, D. Hu, "Pheromone Capture by Moth Antennae." The Society for Integrative & Comparative Biology 2016 Meeting, Portland, OR, January 5, 2016

T. Spencer, M. Ballard, A. Alexeev, M. Forister, D. Hu, "Moth's Smell With Their Antennae." 68th Annual Meeting of APS Division of Fluid Dynamics, Boston, MA, November 23, 2015.

M. Ballard, **T. Spencer**, A. Alexeev, M. Forister, D. Hu, "Pheromone Capture in Moth Antennae." Southeast Regional Society for Integrative & Comparative Biology, Atlanta, GA, October 12, 2015

T. Spencer, D. Hu, "A Tale of Two Nostrils." The Southeast Regional Society for Integrative & Comparative Biology 2016 Meeting, Durham, NC, November 19th, 2016

Y. Zhou, **T. Spencer**, D. Hu, "Pollen Filtration Inspired by Moth's Antenna And Flower's Stigma." The Southeast Regional Society for Integrative & Comparative Biology 2016 Meeting, Durham, NC, November 19th, 2016

VI. POSTER PRESENTATIONS

T. Spencer, B. Lee, D. Hu, "Optimal Bio-Inspired Sniffing for Improved E-Nose Detection", 236th Electrochemical Society Meeting. Atlanta GA, October 17, 2019.

T. Spencer, A. Lee, D. Hu, "Biomimetic Nose for Airborne Chemical Detection." BioDefense World Summit 2018, Bethesda, MD, June 27, 2018

T. Spencer, A. Lee, D. Hu, "Bubble-Based Underwater Chemical Sensing." BioDefense World Summit 2018, Bethesda, MD, June 27, 2018

A. Lee, **T. Spencer**, M. Ersted, J. Pillarisetti, D. Hu, "Mimicking Sniffing for Improving Machine Olfaction" 2017 ISOEN/IEEE International Symposium on Olfaction and Electronic Nose, Montreal, CN, May 31, 2017

T. Spencer, N. Lavrik, K. Kalaitzdo, D. Hu, "Fabrication of Synthetic Moth Antennae." CNMS User Meeting, August 10, 2016, Oak Ridge National Lab, Oak Ridge, TN.

N. Mohebbi, **T. Spencer**, D. Hu, "Like a Moth to Pheromone: Dynamics Study of Moth Antennae," Annual Undergraduate Research Spring Symposium, Atlanta, GA, April 19, 2016.

T. Spencer, J. B. Dixon, "Filariasis Millifluidic Platform for Minimizing Blood Volume During Mosquito Feeding." Annual Undergraduate Research Spring Symposium, Atlanta, GA, April 22, 2015

T. Spencer, J. B. Dixon, "Filariasis Millifluidic Platform for Minimizing Blood Volume During Mosquito Feeding." Biomedical Engineering Society Annual Meeting, San Antonio, TX, October 23, 2014

T. Spencer, J. B. Dixon, "Eliminating a Major Barrier in Filariasis Disease Research Using Microfluidic Lymphatic Mimetics." Air Products Mechanical Engineering Undergraduate Research Symposium, Atlanta, GA, April 18, 2014

VII. HONORS AND AWARDS

National Science Foundation Graduate Research Fellow- \$34,000 per year for three years. June 2017 – May 2020

T. Spencer, B. Lee, D. Hu, 2nd place poster presentation (from 150+ posters) for "Optimal Bio-Inspired Sniffing for Improved E-Nose Detection" \$1,000 cash award, 236th Electrochemical Society Meeting. Atlanta GA, October 17, 2019.

T. Spencer, A. Clark, D. Hu, Mimi A.R. Koehl and Steven Wainwright Award Finalist for best student oral presentation at The Society for Integrative & Comparative Biology 2019 Meeting, Tampa, FL, January 5, 2019

T. Spencer A. Lee, D. Hu, Honorable mention, SniffEST: the machine-olfaction competition, at the 2017 ISOEN/IEEE International Symposium on Olfaction and Electronic Nose, Montreal, CN, June 1, 2017

3rd place poster (from 33 posters) for "Fabrication of Synthetic Moth Antennae" 2016 Center for Nanophase Materials Sciences Conference at Oak Ridge National Lab. August 11, 2016.

1st place poster (from 75 posters) in College of Engineering at the Annual Undergraduate Research Spring Symposium with N. Mohebbi, "Like a Moth to Pheromone: Dynamics Study of Moth Antennae". April 19, 2016.

President's Fellowship awarded by Georgia Tech Foundation in the value of \$22,000 distributed over 4 years in PhD program for exemplary levels of scholarship and innovation. August 2015 – May 2019

1st place poster at the Air Products Mechanical Engineering Undergraduate Research Symposium. May 2014

President's Undergraduate Research Award - \$1,500 to fund student salary to conduct undergraduate research with Georgia Tech faculty. Fall 2014

Air Products Mechanical Engineering Undergraduate Research Award - \$1,500 for personal salary plus \$500 for research expenses. Spring 2014

VIII. Additional Leadership

Vice President

Atlanta, GA

Invention Studio at Georgia Tech

12/2015 – 5/2017

- Leading largest student run makerspace in the nation
- Meet with industry sponsors and university affiliates to direct the future of the studio
- Studio assists the Georgia Tech community by instructing new users on proper and safe operating techniques for a variety of machines including 3D printers, laser cutters, woodworking/metalworking tools, and a 5-axis CNC waterjet cutter.
- Given three oral presentations at national conferences
- First author on peer reviewed conference paper detailing makerspace best practices

Team Lead

Atlanta, GA

Aquabots Vertically Integrated Project

08/2014 – 12/2014

- Led multidisciplinary team of 15 undergraduates to create a robotic arm to extract organisms from under the Antarctic shelf
- Presented and won 1st place in robotic division and tied for second overall in VIP Innovation Competition