Asim H. Gazi

School of Engineering and Applied Sciences
Harvard University
Cambridge, MA, 02138, United States
https://asimgazi.github.io/

Research Interests

My research is on **"agentic wearables,"** intelligent systems that *autonomously* provide health support in daily life – *personalized* to biobehavioral states inferred from wearable, mobile, and ubiquitous sensor (and survey) data. I specifically focus on **(1) dynamic modeling and digital twin design** to predict and elucidate the effects of interventions (e.g., non-invasive vagus nerve stimulation) and evaluate AI systems *in silico* before deployment; **(2) state inference and sensor informatics** for agents to infer and track latent states (e.g., stress) using sensor data; and **(3) online decision making and closed-loop interventions** for agents to learn online (e.g., via reinforcement learning) and personalize support.

Current Position

2023-Present	**Postdoctoral Fellow** in Computer Science Joint Appointment in Statistics Advisor: Susan A. Murphy	Harvard University

Education

2018-2023	**Ph.D.** in Electrical Engineering Minor in Biomedical Engineering Advisors: Omer T. Inan and Christopher J. Rozell	Georgia Institute of Technology (GT)
2014-2018	**B.S** in Electrical Engineering Minor in Mathematics GPA: 4.0/4.0 (*Summa Cum Laude*)	University of Texas at Dallas (UTD)

Honors and Awards

Fellowships and Scholarships

2023-2025	Schmidt Science Fellow *(1 of 32 selected globally)*
2020-2023	National Science Foundation (NSF) Graduate Research Fellowship
2018-2022	GT President's Fellowship
2014-2018	UTD Academic Excellence Scholarship
2014-2018	Wylie ISD Pearl Birmingham Scholarship

Best Papers and Presentations

2023	InterfaceRice 2023 Best Lightning Talk Award
2023	GT Three Minute Thesis Competition - 2nd Place
2021	IEEE-EMBS International Conference on Biomedical and Health Informatics (BHI) 2021 - 3rd Prize Best Paper Award
2020	NYC Neuromodulation Conference 2020 Outstanding Presentation by an Early Career Scientist
2019	IEEE-EMBS International Conference on BHI 2019 - 2nd Prize Best Poster Award

Teaching and Service

2022	GT ECE 2021-2022 Outstanding Service and Outreach Award
2019	GT ECE 2018-2019 Graduate Teaching Assistant of the Year
2019	GT Spring 2019 Thank a Teacher Award *(Recognition given by students)*

Other Honors and Awards

2026	Innovation and Leadership Delegate of the 56th Annual International Achievement Summit

2024	mHealth Training Institute (mHTI) 2024 Scholar
2021	NextProf Nexus 2021 Workshop Alumnus
2017	UTD ECE Fall 2017 Senior Design EXPO - 1st Place
2016	Mathematical Association of America 2016 Texas Calculus Bowl - 1st Place

Grant Writing

2024	NIH/NIBIB K99/R00 proposal on uncertainty quantification and uncertainty-informed decision making for closed-loop interventions in mobile health, **PI: A. H. Gazi** [**Awarded, $976k (up to $747k for First Three Years of Assistant Professorship)**]

Contributed to the scientific content of the following grant proposals:

2022	DARPA NEAT proposal on fusing electroencephalography with peripheral physiological signals to capture preconscious inclinations for behavioral health screening, PI: B. Bracken [**Awarded, $1.6M**]
2021	NIH/NIMH R01 proposal on dose response modeling of peripheral physiological responses to transcutaneous cervical vagus nerve stimulation (tcVNS), PI: J. D. Bremner
2021	NSF NCS proposal on dynamic modeling of latent neurophysiologic state and its closed-loop regulation for stress using transcutaneous auricular vagus nerve stimulation (taVNS), PI: C. J. Rozell
2020	ONR proposal on digital biomarkers of stress and wearable hardware for closed-loop peripheral nerve stimulation, PI: J. O. Hahn [**Awarded, $925k**]
2020	NIH/NIMH R01 proposal on closed-loop estimation and attenuation of acute stress using wearable physiological sensing and transcutaneous auricular vagus nerve stimulation (taVNS), PI: O. T. Inan
2019	NSF SCH proposal on multimodal fusion of acoustic and physiological signals measured via wearables for trauma recall detection in patients with posttraumatic stress disorder (PTSD), PI: O. T. Inan

Mentorship

PhD Students

2025-Present	Patrick Puma, Harvard University	Robotics
2023	Michael Cho, GT [**NSF Graduate Research Fellow**]	Electrical Engineering
2021-2023	Afra Nawar, GT [**NSF Graduate Research Fellow**]	Electrical Engineering
2021-2023	Tamara Lambert, GT	Bioengineering
2021-2022	J. Antonio Sanchez-Perez, GT [**NSF Graduate Research Fellowship Honorable Mention**]	Electrical Engineering
2021-2022	Mohammad Nikbakht, GT	Electrical Engineering
2020-2022	David Lin, GT	Electrical Engineering
2020-2022	Michael Chan, GT	Biomedical Engineering

MS Students

2026-Present	Nina Bodenstab, Visiting Student from EPFL	Robotics
2022	Nikolina Tomic, Visiting Student from EPFL	Robotics
2020-2022	Anna Harrison, GT	Bioengineering
2020-2021	Rachel Erbrick, GT	Electrical Engineering

BS Students

2020-2023	Georgia Saks, GT [**GT President's Undergraduate Research Award (PURA)**]	Biomedical Engineering
2020-2023	Srirakshaa Sundararaj, GT [**Lead Author of Journal Article; GT PURA x 2**]	Neuroscience
2020-2022	Ali Mirzazadeh, GT [**PhD Student in Computer Science at MIT**]	Computer Science

2020-2022	Shlok Natarajan, GT **[PhD Student in Biomedical Data Science at Stanford]**	Computer Science

Teaching

Guest Lecturer

2023	Introduction to Biomedical Engineering (BME 200) at University of Portland (virtual): "Reading and Changing Your Mind by Sensing and Reacting to Your Body"
2022	Introduction to Probability and Statistics for ECE (ECE 3077) at GT: "Confidence Intervals for the Sample Mean"
2020	Problems in Biomedical Engineering (BMED 2250) at GT: "Wearable Sensing for Stress: Non-Invasive Estimation of a Mind-Body Sensation"

Teaching Assistant

2019	Graduate Teaching Assistant at GT for Fundamentals of Digital Design (ECE 2020)
2018	Graduate Teaching Assistant at GT for Feedback Control Systems (ECE 3550)

Supplemental Instruction (SI)

2017-2018	SI Team Leader at UTD for the Engineering, Mathematics, Physics, and Accounting Supplemental Instruction team
2016-2017	SI Leader at UTD for Advanced Engineering Mathematics (ENGR 3300)
2016	SI Leader at UTD for Electromagnetism and Waves (PHYS 2326)
2015	SI Leader at UTD for State and Local Government (GOVT 2306)

Journal Articles

*Equal Contribution, Mentee

Under Review or In Revision

[J47] J. Choi, B. Pearce, A. Sharma, F. N. Rahman, A. Nawar, J. A. Nye, T. P. Lambert, M. Robinson, **A. H. Gazi**, V. Abbaraju, N. Tomic, A. B. Harrison, N. Jaquemet, K. Mermin-Bunnell, H. Mesfin, T. A. Gray, J. W. Welsh, K. E. Dunn, M. Bikson, V. Vaccarino, A. J. Shah, O. T. Inan, and J. D. Bremner, "Non-Invasive Vagus nerve Stimulation's Effects on Withdrawal-Associated Inflammatory Biomarkers in Individuals With Opioid Use Disorder"

[J46] B. T. Gullapalli, V. Shetty, A. L. Trella, **A. H. Gazi**, and S. A. Murphy, "Learning When to Intervene on Habitual Behaviors: A Case Study in Oral Health Care"

[J45] J. D. Bremner, **A. H. Gazi**, N. Z. Gurel, T. P. Lambert, M. T. Wittbrodt, J. W. Welsh, B. D. Pearce, V. Vaccarino, A. J. Shah, and O. T. Inan, "Effects of Vagus Nerve Stimulation on Autonomic Function in Stress and Opioid Withdrawal"

[J44] **A. H. Gazi***, Y. Guo*, D. Gao, Z. Xu, K. W. Zhang, and S. A. Murphy, "Reinforcement Learning in the Real World: A Survey of Statistical Challenges and Future Directions"

[J43] **A. H. Gazi**, D. Gao, Z. Xu, P. Klasnja, J.-O. Hahn, and S. A. Murphy, "Data Impoverishment Challenges the Continuity of Digital Twins in Digital Health"

[J42] A. Xi, T. G. Melesse, S. A. Murphy, **A. H. Gazi**, P. Puma, S. D. Hollon, W. K. Tang, K. K. Lau, K. N. K. Fong, J. J. Zhang, P. W.-H. Kwong, C. L. Hsu, and S. C. L. Lau, "Just-in-Time Adaptive Interventions (JITAIs) for Reducing Depressive Symptoms: A Systematic Review and Meta-Analysis"

[J41] **A. H. Gazi**, S. Ghosh, Y. Guo, D. Gao, Z. Xu, I. Nahum-Shani, and S. A. Murphy, "Key Concepts in Online Learning and Decision-Making for Personalizing Just-in-Time Adaptive Interventions (pJITAIs)"

[J40] J. A. Berkebile, M. Chan, J. A. Sanchez-Perez, **A. H. Gazi**, S. An, O. T. Inan, and P. A. Beach, "Assessing the Transient Autonomic Effects of Levodopa with Wearable Cardiovascular Sensing in Parkinsonism: A Feasibility Study"

Published or In Press

[J39] **A. H. Gazi**, D. Gao, S. Ghosh, Z. Xu, A. Trella, P. Klasnja, and S. A. Murphy, "Digital Twins for Just-in-Time Adaptive Interventions (JITAIs): Framework for Optimizing and Continually Improving JITAIs," *Journal of Medical Internet Research*, in press, 2026

[J38] S. Ghosh, B. T. Gullapalli, D. Gao, **A. H. Gazi**, A. Trella, Z. Xu, K. Zhang, and S. A. Murphy, "Reproducible Workflow for Online AI in Digital Health," *Philosophical Transactions of the Royal Society A*, in press, 2026

[J37] C. O. Yaldiz, D. J. Lin, **A. H. Gazi**, G. Cestero, C. Chen, B. K. Bracken, A. Winder, S. Lynn, R. Sameni, and O. T. Inan, "Real-Time Autoregressive Forecast of Cardiac Features for Psychophysiological Applications," *IEEE Journal of Biomedical and Health Informatics*, in press, 2026

[J36] J. D. Bremner, M. T. Wittbrodt, N. Z. Gurel, J. A. Nye, M. M. H. Shandhi, **A. H. Gazi**, A. J. Shah, V. Amorim, B. D. Pearce, V. Vaccarino, and O. T. Inan, "A Pilot Study of Brain Correlates of Long-term Treatment with Transcutaneous Vagal Nerve Stimulation in Posttraumatic Stress Disorder," *Journal of Affective Disorders Reports*, in press, 2026

[J35] F. N. Rahman, P. S. Bindra, A. Nawar, H. T. Crane, J. A. Sanchez-Perez, J. A. Berkebile, O. S. Kilic, C. Chen, V. Abbaraju, C. J. Nichols, J. M. Cook, S. Mabrouk, **A. H. Gazi**, J.-O. Hahn, and O. T. Inan, "A Wearable System Enabling Acute Stress Monitoring and Closed-Loop Mitigation Through Transcutaneous Median Nerve Stimulation," *Biosensors and Bioelectronics*, vol. 301:118461, 2026

[J34] **A. H. Gazi**, S. An, J. A. Sanchez-Perez, M. Chan, M. Nikbakht, D. J. Lin, S. Natarajan, K. A. Johnsen, J. D. Bremner, J.-O. Hahn, O. T. Inan, and C. J. Rozell, "Modeling Latent Dynamics of the Autonomic Nervous System in Response to Trauma Recall and Non-Invasive Vagus Nerve Stimulation," *IEEE Transactions on Biomedical Engineering*, vol. 73, no. 1, 2026

[J33] Y. Zhou, S. M. Shahrbabak, P. Rezaei, R. Bahrami, F. N. Rahman, J. A. Sanchez-Perez, **A. H. Gazi**, O. T. Inan, and J.-O. Hahn, "A virtual experiment generator to replicate cardiovascular responses to acute mental stress and transcutaneous median nerve stimulation," *Journal of Dynamic Systems, Measurement, and Control*, vol. 148, no. 1, 2026

[J32] A. Nawar, **A. H. Gazi**, M. Chan, J. A. Sanchez-Perez, F. N. Rahman, C. Ziegler, O. Daaboul, G. Haddad, O. A. Al-Abboud, H. Ahmed, J. D. Bremner, A. Quyummi, V. Vaccarino, O. T. Inan, and A. J. Shah, "Quantifying the Cardiovascular Response to Mental Stress Using a Compact Multimodal Wearable Sensing Patch," *ACM Transactions on Computing for Healthcare*, vol. 7, no. 1, 2026

[J31] A. L. Trella, W. Dempsey, **A. H. Gazi**, Z. Xu, F. Doshi-Velez, and S. A. Murphy, "Non-Stationary Latent Auto-Regressive Bandits," *Reinforcement Learning Journal*, vol. 6, 2025

[J30] F. N. Rahman, A. Nawar, J. Nye, J. Choi, T. Lambert, M. Robinson, **A. H. Gazi**, V. Abbaraju, N. Tomic, A. B. Harrison, N. Jaquemet, K. Mermin-Bunnell, H. Mesfin, T. Gray, J. Welsh, K. Dunn, M. Bikson, V. Vaccarino, A. J. Shah, O. T. Inan, and J. D. Bremner, "Transcutaneous cervical vagus nerve stimulation modulates prefrontal cortex activity during opioid withdrawal in individuals with opioid use disorder," *Neuromodulation: Technology at the Neural Interface*, vol. 28, no. 8, 2025

[J29] B. Dwyer, M. Flathers, A. Sano, A. G. Dempsey, A. Cipriani, **A. H. Gazi**, B. Hill, C. Gorban, C. I. Rodriguez, C. Stromeyer, D. King, E. Rozenblit, G. Strudwick, J. Linardon, J. Cheong, J. Firth, J. Herpertz, J. Schwarz, K. Truong, M. Emerson, M. P. Paulus, M. Patriquin, Y. Hua, S. Choudhary, S. Siddals, L. O. Pinillos, J. Bantjes, S. M. Schueller, X. Xu, K. Duckworth, D. H. Gillison, M. Wood, and J. Torous, "Mindbench.ai: an actionable platform to evaluate the profile and performance of large language models in a mental healthcare context," *NPP — Digital Psychiatry and Neuroscience*, vol. 3, no. 28, 2025

[J28] S. Sundararaj, **A. H. Gazi**, V. Vaccarino, A. J. Shah, O. T. Inan, and J. D. Bremner, "Accrued Reductions in Heart Rate Following Transcutaneous Vagal Nerve Stimulation in Adults with Posttraumatic Stress Disorder," *Frontiers in Neuroscience*, vol. 19:1456662, 2025. **[Undergraduate Mentee Lead Author]**

[J27] Y. Zhou, S. M. Shahrbabak, R. Bahrami, F. N. Rahman, J. A. Sanchez-Perez, **A. H. Gazi**, O. T. Inan, and J.-O. Hahn, "Non-Pharmacological Mitigation of Acute Mental Stress-Induced Sympathetic Arousal: Comparison between Median Nerve Stimulation and Auricular Vagus Nerve Stimulation," *Sensors*, vol. 25, no. 5, 2025

[J26] J. A. Berkebile, **A. H. Gazi**, M. Chan, T. D. Albarran, O. T. Inan, and P. A. Beach, "Remote Monitoring of Cardiovascular Autonomic Dysfunction in Synucleinopathies with a Wearable Chest Patch," *IEEE Sensors Journal*, vol. 25, no. 4, 2025

[J25] Y. Zhou, J. Parreira, S. M. Shahrbabak, J. A. Sanchez-Perez, F. N. Rahman, **A. H. Gazi**, O. T. Inan, and J.-O. Hahn, "A Synthetic Multi-Modal Variable to Capture Cardiovascular Responses to Acute Mental Stress and Transcutaneous Median Nerve Stimulation," *IEEE Transactions on Biomedical Engineering*, vol. 72, no. 1, 2025

[J24] **A. H. Gazi**, J. A. Sanchez-Perez, G. L. Saks, E. A. Perez-Alday, A. Haffer, H. Ahmed, D. Herraka, N. Tarlapally, N. Smith, J. D. Bremner, A. J. Shah, O. T. Inan, and V. Vaccarino, "Quantifying Posttraumatic Stress Disorder Symptoms During Traumatic Memories Using Interpretable Markers of Respiratory Variability," *IEEE Journal of Biomedical and Health Informatics*, vol. 28, no. 8, 2024

[J23] M. Nikbakht, M. Chan, D. J. Lin, **A. H. Gazi**, and O. T. Inan, "A Residual U-Net Neural Network for Seismocardiogram Denoising and Analysis During Physical Activity," *IEEE Journal of Biomedical and Health Informatics*, vol. 28, no. 7, 2024

[J22] Y. Zhou, A. S. Mousavi, Y. R. Chalumuri, J. D. Parriera, M. Modak, J. A. Sanchez-Perez, **A. H. Gazi**, O. T. Inan, and J.-O. Hahn, "Inference-Enabled Tracking of Acute Mental stress via Multi-Modal Wearable Physiological Sensing: A Proof-of-Concept Study," *Biocybernetics and Biomedical Engineering*, vol. 44, no. 4, 2024

[J21] T. P. Lambert, M. Chan, J. A. Sanchez-Perez, M. Nikbakht, D. J. Lin, A. Nawar, S. K. Bashar, J. Kimball, J. Zia, **A. H. Gazi**, G. I. Cestero, D. Corporan, M. Padala, J.-O. Hahn, and O. T. Inan, "A Comparison of Normalization Techniques for Individual Baseline-Free Estimation of Absolute Hypovolemic Status Using a Porcine Model," *Biosensors*, vol. 14, no. 2, 2024

[J20] M. Chan, **A. H. Gazi**, V. B. Aydemir, M. Soliman, G. C. Ozmen, K. L. Richardson, C. A. Abdallah, M. Nikbakht, C. J. Nichols, and O. T. Inan, "Respiratory Rate Estimation During Walking Using a Wearable Patch with Modality Attentive Fusion," *IEEE Sensors Journal*, vol. 23, no. 23, 2023

[J19] J. A. Sanchez-Perez, **A. H. Gazi**, S. A. Mabrouk, J. A. Berkebile, G. C. Ozmen, R. Kamaleswaran, and O. T. Inan, "Enabling Continuous Breathing-Phase Contextualization via Wearable-Based Impedance Pneumography and Lung Sounds: A Feasibility Study," *IEEE Journal of Biomedical and Health Informatics*, vol. 27, no. 12, 2023

[J18] J. A. Sanchez-Perez, **A. H. Gazi**, F. N. Rahman, A. Seith, G. Saks, S. Sundararaj, R. Erbrick, A. B. Harrison, C. J. Nichols, M. Modak, Y. R. Chalumuri, T. K. Snow, J.-O. Hahn, and O. T. Inan, "Transcutaneous Auricular Vagus Nerve Stimulation and Median Nerve Stimulation Reduce Acute Stress in Young Healthy Adults: A Single-Blind Sham-Controlled Crossover Study," *Frontiers in Neuroscience*, vol. 17:1213982, 2023

[J17] D. J. Lin, **A. H. Gazi**, J. P. Kimball, M. Nikbakht, and O. T. Inan, "Real-Time Seismocardiogram Feature Extraction Using Adaptive Gaussian Mixture Models," *IEEE Journal of Biomedical and Health Informatics*, vol. 27, no. 8, 2023

[J16] J. D. Bremner, **A. H. Gazi**, T. P. Lambert, A. Nawar, A. B. Harrison, J. W. Welsh, V. Vaccarino, K. M. Walton, N. Jaquemont, K. Mermin-Bunnell, H. Mesfin, T. A. Gray, K. Ross, G. Saks, N. Tomic, D. Affadzi, M. Bikson, A. J. Shah, K. E. Dunn, N. A. Giordano, and O. T. Inan, "Noninvasive Vagal Nerve Stimulation for Opioid Use Disorder," *Annals of Depression and Anxiety*, vol. 10, no. 1, 2023

[J15] M. Nikbakht, **A. H. Gazi**, J. Zia, S. An, D. J. Lin, O. T. Inan, and R. Kamaleswaran, "Synthetic Seismocardiogram Generation Using a Transformer-Based Neural Network," *Journal of the American Medical Informatics Association*, vol. 30, no. 7, 2023

[J14] G. C. Ozmen, S. Mabrouk, C. J. Nichols, J. A. Berkebile, Q. Goossens, **A. H. Gazi**, and O. T. Inan, "Mid-Activity and At-Home Wearable Bioimpedance Elucidates an Interpretable Digital Biomarker of Muscle Fatigue," *IEEE Transactions on Biomedical Engineering*, vol. 70, no. 12, 2023

[J13] J. D. Parreira, Y. R. Chalumuri, A. S. Mousavi, M. Modak, Y. Zhou, J. A. Sanchez-Perez, **A. H. Gazi**, A. B. Harrison, O. T. Inan, and J.-O. Hahn, "A Proof-of-Concept Investigation of Multi-Modal Physiological Signal Responses to Acute Mental Stress," *Biomedical Signal Processing and Control*, vol. 85:105001, 2023

[J12] C. J. Nichols, S. A. Mabrouk, G. C. Ozmen, **A. H. Gazi**, and O. T. Inan, "Validating Adhesive-Free Bioimpedance of the Leg in Mid-Activity and Uncontrolled Settings," *IEEE Transactions on Biomedical Engineering*, vol. 70, no. 9, 2023

[J11] **A. H. Gazi***, A. B. Harrison*, T. P. Lambert, M. Obideen, P. Alavi, N. Murrah, L. Shallenberger, E. G. Driggers, R. A. Ortega, B. P. Washington, K. M. Walton, J. W. Welsh, V. Vaccarino, A. J. Shah, Y.-L. Tang, R. Gupta, S. E. Back, O. T. Inan, and J. D. Bremner, "Transcutaneous Cervical Vagus Nerve Stimulation Reduces Behavioral and Physiological Manifestations of Withdrawal in Patients with Opioid Use Disorder: A Double-Blind, Randomized, Sham-Controlled Pilot Study," *Brain Stimulation*, vol. 15, no. 5, 2022

[J10] **A. H. Gazi**, A. B. Harrison, T. P. Lambert, A. Nawar, M. Obideen, E. G. Driggers, V. Vaccarino, A. J. Shah, C. J. Rozell, M. Bikson, J. W. Welsh, O. T. Inan, and J. D. Bremner, "Pain is Reduced by Transcutaneous Cervical Vagus Nerve Stimulation and Correlated with Cardiorespiratory Variability Measures in the Context of Opioid Withdrawal," *Frontiers in Pain Research*, vol. 3:1031368, 2022

[J9] T. P. Lambert, **A. H. Gazi**, A. B. Harrison, S. Gharehbaghi, M. Chan, M. Obideen, P. Alavi, N. Murrah, L. Shallenberger, E. G. Driggers, R. A. Ortega, B. Washington, K. M. Walton, Y.-L. Tang, R. Gupta, J. A. Nye, J. W. Welsh, V. Vaccarino, A. J. Shah, J. D. Bremner, and O. T. Inan, "Leveraging Accelerometry as a Prognostic Indicator for Increase in Opioid Withdrawal Symptoms," *Biosensors*, vol. 12, no. 11, 2022

[J8] V. G. Ganti, **A. H. Gazi**, S. An, A. V. Srivatsa, B. N. Nevius, C. J. Nichols, A. M. Carek, M. Fares, M. Abdulkarim, T. Hussain, G. F. Greil, M. Etemadi, O. T. Inan, and A. Tandon, "Wearable Seismocardiography-Based Assessment of Stroke Volume in Congenital Heart Disease," *Journal of the American Heart Association*, vol. 11, no. 18, 2022

[J7] S. An, **A. H. Gazi**, and O. T. Inan, "DynaLAP: Human Activity Recognition in Fixed Protocols via Semi-Supervised Variational Recurrent Neural Networks with Dynamic Priors," *IEEE Sensors Journal*, vol. 22, no. 18, 2022

[J6] H. Jung, J. P. Kimball, T. Receveur, **A. H. Gazi**, E. D. Agdeppa, and O. T. Inan, "Estimation of Tidal Volume Using Load Cells on a Hospital Bed," *IEEE Journal of Biomedical and Health Informatics*, vol. 26, no. 7, 2022

[J5] **A. H. Gazi**, M. T. Wittbrodt, A. B. Harrison, S. Sundararaj, N. Z. Gurel, J. A. Nye, A. J. Shah, V. Vaccarino, J. D. Bremner, and O. T. Inan, "Robust Estimation of Respiratory Variability Uncovers Correlates of Limbic Brain Activity and Transcutaneous Cervical Vagus Nerve Stimulation in the Context of Traumatic Stress," *IEEE Transactions on Biomedical Engineering*, vol. 69, no. 2, 2022

[J4] G. C. Ozmen, **A. H. Gazi**, S. Gharehbaghi, K. L. Richardson, M. Safaei, D. C. Whittingslow, S. Prahalad, J. L. Hunnicutt, J. W. Xerogeanes, T. K. Snow, and O. T. Inan, "An Interpretable Experimental Data Augmentation Method to Improve Knee Health Classification Using Joint Acoustic Emissions," *Annals of Biomedical Engineering*, vol. 49, no. 9, 2021

[J3] M. T. Wittbrodt, N. Z. Gurel, J. A. Nye, M. M. H. Shandhi, **A. H. Gazi**, A. J. Shah, B. D. Pearce, N. Murrah, Y. A. Ko, L. H. Shallenberger, V. Vaccarino, O. T. Inan, and J. D. Bremner, "Noninvasive Cervical Vagal Nerve Stimulation Alters Brain Activity During Traumatic Stress in Individuals With Posttraumatic Stress Disorder," *Psychosomatic Medicine*, vol. 83, no. 9, 2021

[J2] J. D. Bremner, M. T. Wittbrodt, N. Z. Gurel, M. M. H. Shandhi, **A. H. Gazi**, Y. Jiao, O. M. Levantsevych, M. Huang, J. Beckwith, I. Herring, N. Murrah, E. G. Driggers, Y. A. Ko, M. J. L. Alkhalaf, M. Soudan, L. Shallenberger, A. N. Hankus, J. A. Nye, J. Park, A. Woodbury, P. K. Mehta, M. H. Rapaport, V. Vaccarino, A. J. Shah, B. D. Pearce, and O. T. Inan, "Transcutaneous Cervical Vagal Nerve Stimulation in Patients with Posttraumatic Stress Disorder (PTSD): A Pilot Study of Effects on PTSD Symptoms and Interleukin-6 Response to Stress," *Journal of Affective Disorders Reports*, vol. 6:100190, 2021

[J1] **A. H. Gazi**, N. Z. Gurel, K. L. Richardson, M. T. Wittbrodt, A. J. Shah, V. Vaccarino, J. Douglas Bremner, and O. T. Inan, "Digital Cardiovascular Biomarker Responses to Transcutaneous Cervical Vagus Nerve Stimulation: State-Space Modeling, Prediction, and Simulation," *JMIR mHealth and uHealth*, vol. 8, no. 9, 2020

Conference Papers

[C18] **A. H. Gazi***, B. T. Gullapalli*, D. Gao, B. M. Marlin, V. Shetty, and S. A. Murphy, "SigmaScheduling: Uncertainty-Informed Scheduling of Decision Points for Intelligent Mobile Health Interventions," in *Proceedings of the IEEE-EMBS International Conference on Body Sensor Networks (BSN)*, 2025. [**Selected for Oral Presentation**]

[C17] F. N. Rahman, A. Nawar, J. A. Sanchez-Perez, **A. H. Gazi**, J.-O. Hahn, and O. T. Inan, "Transcutaneous Median Nerve Stimulation Regulates Peripheral Skin Temperature During Cold Pressor: A Sham-Controlled Study," in *Proceedings of the IEEE-EMBS International Conference on Body Sensor Networks (BSN)*, 2025

[C16] **A. H. Gazi**, M. Chan, H.-L. Hsu, J. D. Bremner, C. J. Rozell, and O. T. Inan, "StressFADS: Learning Latent Autonomic Factors of Stress in the Context of Trauma Recall and Neuromodulation," in *Proceedings of the IEEE-EMBS International Conference on Body Sensor Networks (BSN)*, 2024

[C15] F. N. Rahman, A. Nawar, P. S. Bindra, J. A. Sanchez-Perez, H. T. Crane, J. A. Berkebile, **A. H. Gazi**, J.-O. Hahn, and O. T. Inan, "Towards Wearable Acute Stress Detection and Mitigation via Real-Time Photoplethysmogram Feature Detection," in *Proceedings of the IEEE Sensors Conference*, 2024

[C14] V. Abbaraju, S. K. Bashar, A. Nawar, F. N. Rahman, J. Choi, T. P. Lambert, **A. H. Gazi**, A. B. Harrison, M. R. Robinson, H. Mesfin, T. A. Gray, K. Mermin-Bunnell, N. Jacquement, N. Tomic, J. W. Welsh, S. Patel, V. Vaccarino, A. J. Shah, J. D. Bremner, and O. T. Inan, "Investigating ultra-short-term heart rate variability as an indicator of craving in recently treated patients with opioid use disorder," in *Proceedings of the 46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2024

[C13] A. Nawar, J. A. Sanchez-Perez, F. N. Rahman, **A. H. Gazi**, M. Chan, C. Ziegler, O. Daaboul, G. Haddad, A.-A. O. A., H. Ahmed, N. Murrah, V. Vaccarino, A. J. Shah, and O. T. Inan, "Capturing physiological correlates of stress-induced blood pressure elevation using a multimodal wearable sensing patch in patients with a history of myocardial infarction," in *Proceedings of the 46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2024

[C12] **A. H. Gazi**, J. A. Sanchez-Perez, M. Chan, M. Nikbakht, D. J. Lin, S. Natarajan, J. D. Bremner, J.-O. Hahn, O. T. Inan, and C. J. Rozell, "Physiological Markers Reveal Confounding Effects of Apprehension and Habituation During Stress Protocol," in *Proceedings of the IEEE-EMBS International Conference on Body Sensor Networks (BSN)*, 2023

[C11] J. A. Sanchez-Perez, **A. H. Gazi**, S. Mabrouk, F. N. Rahman, A. Seith, G. Saks, S. Sundararaj, R. Erbrick, A. B. Harrison, M. Modak, J.-O. Hahn, and O. T. Inan, "Characterizing Signal Quality of Three Common Respiratory Sensing Modalities in the Context of Stress and Peripheral Nerve Stimulation," in *Proceedings of the IEEE-EMBS International Conference on Body Sensor Networks (BSN)*, 2023

[C10] **A. H. Gazi**, J. A. Sanchez-Perez, S. Natarajan, M. Chan, M. Nikbakht, D. J. Lin, J. D. Bremner, J.-O. Hahn, O. T. Inan, and C. J. Rozell, "Leveraging Physiological Markers to Quantify the Transient Effects of Traumatic Stress and Non-Invasive Neuromodulation," in *Proceedings of the 45th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2023. **[Selected for Oral Presentation]**

[C9] A. Nawar, **A. H. Gazi**, M. Chan, J. A. Sanchez-Perez, F. N. Rahman, C. Ziegler, O. Daaboul, G. Haddad, N. Murrah, V. Vaccarino, A. J. Shah, and O. T. Inan, "Towards Quantifying Stress in Patients with a History of Myocardial Infarction: Validating ECG-Derived Patch Features," in *Proceedings of the 45th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2023

[C8] **A. H. Gazi**, A. B. Harrison, T. P. Lambert, M. Obideen, J. W. Welsh, V. Vaccarino, A. J. Shah, S. E. Back, C. J. Rozell, J. D. Bremner, and O. T. Inan, "Transcutaneous Cervical Vagus Nerve Stimulation Reduces Respiratory Variability in the Context of Opioid Withdrawal," in *Proceedings of the IEEE-EMBS International Conference on Biomedical and Health Informatics (BHI)*, 2022. **[31% Acceptance Rate; Selected for Oral Presentation]**

[C7] **A. H. Gazi**, H. Jung, J. P. Kimball, and O. T. Inan, "Improving Respiratory Timing Estimation Using Quality Indexing and Electrocardiogram-Derived Respiration," in *Proceedings of the 44th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2022. **[Selected for Oral Presentation]**

[C6] M. Chan, **A. H. Gazi**, M. Soliman, K. L. Richardson, C. A. Abdallah, G. C. Ozmen, M. Nikbakht, and O. T. Inan, "Estimating Heart Rate from Seismocardiogram Signal Using a Novel Deep Dominant Frequency Regressor and Domain Adversarial Training," in *Proceedings of the IEEE Biomedical Circuits and Systems Conference (BioCAS)*, 2022

[C5] M. Nikbakht, D. J. Lin, **A. H. Gazi**, and O. T. Inan, "A Synthetic Seismocardiogram and Electrocardiogram Generator Phantom," in *Proceedings of the IEEE Sensors Conference*, 2022

[C4] **A. H. Gazi**, S. Sundararaj, A. B. Harrison, N. Z. Gurel, M. T. Wittbrodt, M. Alkhalaf, M. Soudan, O. Levantsevych, A. Haffar, A. J. Shah, V. Vaccarino, J. D. Bremner, and O. T. Inan, "Transcutaneous Cervical Vagus Nerve Stimulation Inhibits the Reciprocal of the Pulse Transit Time's Responses to Traumatic Stress in Posttraumatic Stress Disorder," in *Proceedings of the 43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2021. **[Selected for Oral Presentation]**

[C3] **A. H. Gazi**, S. Sundararaj, A. B. Harrison, N. Z. Gurel, M. T. Wittbrodt, A. J. Shah, V. Vaccarino, J. D. Bremner, O. T. Inan, M. Alkhalaf, M. Soudan, O. Levantsevych, A. Haffar, A. J. Shah, V. Vaccarino, J. D. Bremner, and O. T. Inan, "Transcutaneous Cervical Vagus Nerve Stimulation Lengthens Exhalation in the Context of Traumatic Stress," in *Proceedings of the IEEE-EMBS International Conference on Biomedical and Health Informatics (BHI)*, 2021. **[Best Paper Award; 33% Acceptance Rate; Selected for Oral Presentation]**

[C2] **A. H. Gazi**, P. Lis, A. Mohseni, C. Ompi, F. O. Giuste, W. Shi, O. T. Inan, and M. D. Wang, "Respiratory Markers Significantly Enhance Anxiety Detection Using Multimodal Physiological Sensing," in *Proceedings of the IEEE-EMBS International Conference on Biomedical and Health Informatics (BHI)*, 2021. **[33% Acceptance Rate; Selected for Oral Presentation]**

[C1] N. Z. Gurel*, **A. H. Gazi***, K. L. Scott, M. T. Wittbrodt, A. J. Shah, V. Vaccarino, J. D. Bremner, and O. T. Inan, "Timing Considerations for Noninvasive Vagal Nerve Stimulation in Clinical Studies," in *AMIA Annual Symposium Proceedings*, 2019

Select Conference Abstracts

[A7] **A. H. Gazi**, "Uncertainty-Informed Decision Making for Just-in-Time Adaptive Interventions: A Case Study on Decision Point Scheduling," in *IEEE-EMBS International Conference on Biomedical and Health Informatics*, (Atlanta, GA, USA), 2025

[A6] **A. H. Gazi**, "Dynamic Modeling and Digital Twin Simulations of Just-in-Time Stress Mitigation via Non-Invasive Vagus Nerve Stimulation," in *IEEE-EMBS International Conference on Biomedical and Health Informatics*, (Atlanta, GA, USA), 2025

[A5] **A. H. Gazi**, J. D. Bremner, J.-O. Hahn, C. J. Rozell, and O. T. Inan, "Characterizing the Stress-Reducing Effects of Non-Invasive Vagus Nerve Stimulation," in *IEEE-EMBS International Conference on Biomedical and Health Informatics (BHI)*, (Pittsburgh, PA, USA), 2023

[A4] **A. H. Gazi**, C. J. Rozell, S. An, S. Natarajan, J. A. Sanchez-Perez, J. D. Bremner, J.-O. Hahn, and O. T. Inan, "Latent State-Space Modeling of Physiological Responses to Non-Invasive Vagus Nerve Stimulation and Traumatic Stress," in *InterfaceRice*, (Houston, TX, USA), 2023. **[Best Lightning Talk Award]**

[A3] **A. H. Gazi**, A. B. Harrison, T. P. Lambert, M. Obideen, P. Alavi, N. Murrah, L. Shallenberger, E. G. Driggers, R. A. Ortega, B. P. Washington, K. M. Walton, J. W. Welsh, V. Vaccarino, A. J. Shah, Y.-L. Tang, R. Gupta, S. E. Back, O. T. Inan, and J. D. Bremner, "Transcutaneous Cervical Vagus Nerve Stimulation Reduces Behavioral and Physiological Manifestations of Withdrawal in Patients with Opioid Use Disorder: A Double-Blind, Randomized, Sham-Controlled Trial," in *Atlanta Veterans Affairs Research Day*, (Atlanta, GA, USA), 2022

[A2] **A. H. Gazi**, S. An, S. Natarajan, J. A. Sanchez-Perez, J. D. Bremner, J.-O. Hahn, C. J. Rozell, and O. T. Inan, "Latent State-Space Modeling of Physiological Responses to Non-Invasive Vagus Nerve Stimulation and Traumatic Stress," in *IEEE-EMBS International Conference on Biomedical and Health Informatics (BHI)*, (Ioannina, Greece), 2022

[A1] **A. H. Gazi**, N. Z. Gurel, K. L. Scott, M. T. Wittbrodt, A. J. Shah, V. Vaccarino, J. D. Bremner, and O. T. Inan, "Preliminary Modeling of the Kinetics of Photoplethysmogram Changes Following Non-Invasive Vagus Nerve Stimulation," in *IEEE-EMBS International Conference on Biomedical and Health Informatics (BHI)*, (Chicago, IL, USA), 2019. **[Best Poster Award]**

Book Chapters

[B2] J. D. Bremner, M. T. Wittbrodt, N. Z. Gurel, M. M. H. Shandhi, **A. H. Gazi**, J. Park, and O. T. Inan, "Transcutaneous Vagal Nerve Stimulation in Trauma Spectrum Psychiatric Disorders," in *Vagus Nerve Stimulation* (M. Frasch and E. Porges, eds.), Springer, 2023

[B1] J. P. Kimball, **A. H. Gazi**, G. C. Ozmen, H. Jung, M. M. H. Shandhi, S. Mabrouk, S. Gharehbaghi, V. G. Ganti, and O. T. Inan, "Noninvasive Multimodal Physiological Sensing Systems: Design, Implementation and Validation," in *Encyclopedia of Sensors and Biosensors* (R. Narayan, K. Ikebukuro, R. Jafari, B. Mizaikoff, T. da Paixao, and M. Yuce, eds.), Elsevier, 2022

Patents

[P4] F. N. Rahman, O. T. Inan, P. S. Bindra, A. Nawar, T. H. Crane, J. Berkebile, J. A. Sanchez-Perez, **A. H. Gazi**, S. Mabrouk, and J.-O. Hahn, "Wearable device and methods for closed-loop detection and mitigation of acute stress through peripheral nerve stimulation." U.S. Patent Application 63/902,106, filed Oct. 20, 2025. Patent Pending

[P3] J.-O. Hahn, Y. Zhou, S. Masoumi, O. T. Inan, J. A. Sanchez-Perez, and **A. H. Gazi**, "A system and a method for tracking of transcutaneous median nerve stimulation response." U.S. Patent Application, filed July 14, 2025. Patent Pending

[P2] J.-O. Hahn, Y. Zhou, J. Parreira, Y. R. Chalumuri, A. Mousavi, O. T. Inan, J. A. Sanchez-Perez, **A. H. Gazi**, and A. B. Harrison, "Systems and methods for multi-modal stress tracking." U.S. Patent Application 18/939,326, filed Nov. 6, 2024. Patent Pending

[P1] **A. Gazi**, G. Singh, B. Gabel, M. Chaudhury, and J. Zbranak, "Educational Electronic Circuit Block Set and Simulation Board Displaying Electric Current Flow." U.S. Patent 11806632, issued Nov. 7, 2023

Presentations

Invited Talks

2026	Carnegie Mellon University, Pittsburgh, PA, USA "Engineering Autonomous Biobehavioral Interventions for Just-in-Time Health Support"
2026	Georgia Institute of Technology, Atlanta, GA, USA "Engineering Autonomous Biobehavioral Interventions for Just-in-Time Health Support"
2026	Rice University, Houston, TX, USA "Engineering Autonomous Biobehavioral Interventions for Just-in-Time Health Support"
2026	University of Texas at Dallas, Dallas, TX, USA "Sensor-Informed Autonomous Systems for Just-in-Time Personalized Health Support"
2025	Northeastern University, Boston, MA, USA "Toward Sensor-Informed Autonomous Systems for Just-in-time Health Support"
2025	mHealth Center for Discovery, Optimization, and Translation of Temporally-Precise Interventions "Uncertainty-Informed Decision Making for JITAIs – Deep Dive Into Decision Point Scheduling"
2025	University of Texas at Austin, Austin, TX, USA "Uncertainty-Informed Decision Making for Sensor-Driven Personalized Health Support"
2024	University of Illinois Urbana-Champaign, Champaign, IL, USA "Modeling, Monitoring, and Modulating Biobehavioral State for Just-in-Time Health Support"
2024	University of Utah, Salt Lake City, UT, USA "Transforming Wearables into Intelligent Decision Makers for Just-in-Time Health Support"

Invited Conference Presentations

2025	IEEE Conference on Biomedical and Health Informatics (BHI), Atlanta, GA, USA "Uncertainty-Informed Decision Making for Just-in-Time Adaptive Interventions: A Case Study on Decision Point Scheduling" "Dynamic Modeling and Digital Twin Simulations of Just-in-Time Stress Mitigation via Non-Invasive Vagus Nerve Stimulation" "Garbage In, Garbage Out: Accounting for Measurement Uncertainty in the Prediction of Episodic Events"
2025	INFORMS Annual Meeting, Atlanta, GA, USA "Uncertainty-Informed Decision Making for Intelligent Mobile Health Support"
2025	47th Annual International Conference of the IEEE Engineering in Medicine and Biology Society "Transforming Wearables into Intelligent Decision-Makers for Personalized Health Support" "Towards Closed-Loop Mitigation of Acute Stress via Non-Invasive Neuromodulation"
2025	RCCN of the NIA Workshop on AI and Health Behaviors for Healthy Aging "Optimizing and Continually Improving AI From One Deployment to the Next"
2023	IEEE Conference on Biomedical and Health Informatics (BHI), Pittsburgh, PA, USA "Characterizing the Stress-Reducing Effects of Non-Invasive Vagus Nerve Stimulation"
2020	NYC Neuromodulation Online Conference, Virtual "Dynamic Modeling of Digital Biomarker Responses to Noninvasive Vagus Nerve Stimulation"

Professional Service

Committee Member	Equity, Diversity, Inclusion, and Belonging Committee, Department of Statistics, Harvard University (2025-Present)
Session Organizer	"Intelligent and Timely Health Support Outside the Clinic," IEEE Conference on Biomedical and Health Informatics (BHI) 2025 "Psychophysiological Monitoring and Closed-Loop Neuromodulation for Precision Health," IEEE Conference on Biomedical and Health Informatics (BHI) 2025 "Sensor-Informed Closed-Loop Systems for Personalized Health Support," 47th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) 2025 "Enabling Closed-Loop Technologies for Mental Health: Biobehavioral Sensor Informatics and Just-in-Time Interventions," IEEE Conference on Biomedical and Health Informatics (BHI) 2023

	"Noninvasive Vagus Nerve Stimulation Applied to Stress Management, Opioid Withdrawal, and Neurocognitive Disorders," NYC Neuromodulation 2020 Online Conference
Associate Editor	48th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC) 2026
Technical Program Committee	Workshop on "Biosignal Intelligence," Conference on Neural Information Processing Systems (NeurIPS) 2026 IEEE-EMBS International Conference on Body Sensor Networks (BSN) 2025 Workshop on "Wearable Intelligence for Healthcare Robotics: from Brain Minds to Body Movements," IEEE Conference on Robotics and Automation (ICRA) 2024
Journal Reviewer	IEEE Transactions on Biomedical Engineering, IEEE Journal of Biomedical and Health Informatics, PNAS Nexus, IEEE Open Journal of Engineering in Medicine and Biology, ACM Transactions on Computing for Healthcare, Journal of Neural Engineering, Psychological Medicine, Journal of Anxiety Disorders, PLOS Digital Health, Scientific Reports, Alcoholism: Clinical and Experimental Research, Alcohol, Biomedical Signal Processing and Control, European Journal of Neuroscience
Conference Reviewer	Modeling, Estimation, and Control Conference (MECC) 2025, IEEE-EMBS International Engineering in Medicine and Biology Conference (EMBC) 2025, EMBC 2024, IEEE-EMBS International Conference on Body Sensor Networks (BSN) 2024, AMIA Annual Symposium 2020

Professional Affiliations

2020-Present	IEEE Systems, Man, and Cybernetics Society
2019-Present	IEEE Engineering in Medicine and Biology Society (EMBS)
2018-Present	IEEE Robotics and Automation Society
2018-Present	IEEE Control Systems Society
2015-Present	Institute of Electrical and Electronics Engineers (IEEE)

Entrepreneurship

2017-Present	Founder and Owner of Internet of Tutors LLC, a tutoring company based in Dallas, TX that employed $\sim$ 60 tutors, served $\sim$ 150 students, and generated $\sim$ \$120k of revenue in 2025

STEM Outreach

2024-Present	Volunteer for the Boston Partners in Education Pathfinders Program
2020-2023	STEM Curriculum Development Lead for the Hands On Atlanta Discovery Planning Committee
2020-2023	Student Ambassador for the GT College of Engineering Center for Engineering Education and Diversity Champions Program
2021-2022	Georgia Chief Science Officers (CSO) Leadership Coach for Science ATL
2019-2020	STEM Volunteer Lead for the Hands On Atlanta Discovery Program
2018-2019	Volunteer for the Hands On Atlanta Discovery Program
2018	Volunteer Exhibit for the Perot Museum of Nature and Science (UTD Senior Design Project)
2017-2018	Volunteer for Heart House Dallas
2016-2018	Board of Directors (Youth, Education, and Outreach Liaison) for the East Plano Islamic Center

Media Coverage

External Press Coverage

2023	National Institutes of Health Awards Grant for Pivotal Clinical Trial of gammaCore™ (nVNS) in Patients with Opioid Use Disorders, *Yahoo Finance*
2023	The Schmidt Science Fellows For 2023 Are Announced, *Forbes*

2022 | "gammaCore (TM) Non-Invasive Vagus Nerve Stimulation (nVNS) Receives Breakthrough Device Designation for Treatment of Posttraumatic Stress Disorder (PTSD)," *The Wall Street Journal*

Institutional News Features

2025 | Postdoctoral Fellow Asim Gazi Receives NIH K99/R00 Award, *Harvard*
2023 | Asim Gazi Makes History as Georgia Tech's First Schmidt Science Fellow, *GT*
2023 | Grad students shine, take home research grants at this year's 3MT Competition, *GT*
2021 | Eid, Gazi Participate in Prestigious Academic Leadership Workshops, *GT*
2021 | Gazi Receives Best Paper Award at IEEE-EMBS BHI Conference, *GT*
2020 | Eight ECE Students Awarded NSF Graduate Research Fellowships, *GT*
2018 | ECE Students Present Educational Tool at Perot Museum, *UTD*
2016 | State, International Math Competitions are Proving Grounds for UT Dallas Undergraduates, *UTD*

Community News Features

2024 | Asim Gazi, Gardner Pilot Academy, *Boston Partners in Education*
2023 | Meet Asim Gazi: PhD Candidate and STEM Enthusiast, *Hands On Atlanta*