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Education History

State University of New York, Binghamton, NY
Ph.D., Mechanical Engineering **2009**
Dissertation: “Dynamics of Hybrid MEMS Sensors and Switches for Mass and Acceleration Detection.”

State University of New York, Binghamton, NY
MS, Mechanical Engineering **2007**
Thesis: An Investigation into the Effect of the PCB Motion on the Dynamic Response of MEMS Devices Under Mechanical Shock Loads.”

American University of Sharjah, Sharjah, UAE
Graduate Certificate in Mechatronics Engineering **2006**

Hashemite University, Zarqa, Jordan
B.S., Mechatronics Engineering **2003**

Employment History

The University of Nebraska-Lincoln, Lincoln, NE **2022 – Present**
Associate Professor – Durham School of Architectural Engineering and Construction

The University of Nebraska-Omaha, Omaha, NE **2020 – Present**
Associate Professor Research Adjunct – Biomechanics Department

- Conduct state-of-the-art research using Informatics and Machine Learning for medical applications such as diagnosing and monitoring patients with PAD [\[1\]](#), [\[2\]](#)
- Develop novel intelligent wearable devices and hardware for health and human activity monitoring applications [\[1\]](#), [NSF](#)
- Develop ML applications for smart building and human comfort [\[1\]](#),[\[2\]](#)
- Develop ML applications for smart bicycling infrastructure [\[1\]](#), [NDoT](#)
- Develop ML applications for COVID-19 cases prediction [\[1\]](#)

Bellevue University (BU), Bellevue, NE **2020 – Present**
Adjunct Faculty – Data Science Department

- Taught undergraduate and graduate courses in ML and data science such as Introduction to Data Science, Predictive Analytics, Statistics for Data Science, Computer Systems for Data Science, Applied Data Science, Introduction to Programming (Python)

The University of Nebraska-Lincoln (UNL), Lincoln, NE **2016 – 2022**
 Assistant Professor – Durham School of Architectural Engineering and Construction

Wichita State University, Wichita, KS **2015 – 2016**
 Assistant Professor – Mechanical Engineering Department

Emerson Electric, Sidney, OH **2011 – 2015**
 Senior Lead Engineer – Algorithm Development

DunAn Microstaq Inc., Austin TX **2009 – 2011**
 R&D Control Engineer

State University of New York, Binghamton, NY **2006-2009**
 Research Assistant

American University of Sharjah, Sharjah, UAE **2004-2006**
 Research and Teaching Assistant

Hashemite University, Zarqa, Jordan **2003-2004**
 Robotics Lab Manager

Research Accomplishments

Research Funding Record

Internally Funded Research Grants (Total of ~\$58 k)

<i>Project Title</i>	<i>Sponsor</i>	<i>Role</i>	<i>Dates</i>	<i>Total Amount</i>	<i>% Attributed</i>
Manufacturing of a Shape Memory Alloy Actuator to Enable an Active Wearable Ankle-Foot Orthosis	<i>Voelte-Keegan Bioengineering UNL program</i>	PI.	3/11/21 – 12/31/21	\$10,000	100%
MEMS COMSOL module	<i>Emergency Research Gap Funding Program</i>	PI.	03/2021	\$1495	100%
Wireless Thermometer Big Data Approach for Understanding Current COVID-19 Outbreak	<i>University of Nebraska ORED</i>	PI	06/25/2020 – 06/24/2021	\$17,094	100%

Quantifying Social Isolation and Healthy Coping Strategies Using Fitness App Data	<i>University of Nebraska ORED</i>	Co-PI	06/25/2020 – 06/24/2021	\$19,451	100%
An Energy-Efficient, Wireless Integrated Sensing and Computing Nano-Micro-Electro-Mechanical System Network	<i>Layman Fund</i>	PI	05/01/2019 – 04/30/2020	\$10,000	100%

Externally Funded Research Grants **(Total of more than \$6 million)**

<i>Project Title</i>	<i>Sponsor</i>	<i>Role</i>	<i>Dates</i>	<i>Total Amount</i>	<i>% Attributed</i>
(phase 2) MEMS Analog Computer (actual name is confidential)	The Intelligence Advanced Research Projects Activity	Co-PI	10/1/2022-9/30/2023	2 million	\$200,000
An Intelligent Adaptive Modular Battery Energy Storage System for the Built Environment	Nebraska Center for Energy Sciences Research (NCESR)	Senior personal	1/1/2024 - 30/12/2024	85,000	25%
(Phase 1) MEMS Analog Computer (actual name is confidential)	The Intelligence Advanced Research Projects Activity	Co-PI	10/1/2021-10/1/2022	2.5 million	\$250,000
Collaborative Research: Micro-Electro-Mechanical Neural Integrated Sensing and Computing Units for Wearable Device Applications	NSF	Lead PI.	09/15/2019 – 08/31/2022	\$547,037	\$391,532 Including T&M Subaward (\$148,776)

A Big Data Approach for Improving Nebraska Cycling Routes	NDOT	PI	07/01/2019 – 12/31/2020	\$65,179	\$59,972
Investing in Bicycle Infrastructure to Spur Statewide Economic Growth through Bicycle Tourism	NDOT	Co-PI	07/01/2019 – 12/31/2020	\$62,704	\$7,200
Superheat Controller Big Data Analysis (extension)	DunAn Microstaq, Inc.	PI.	05/17/2019 – 08/01/2019	\$15,000	\$15,000
Superheat Controller Big Data Analysis	DunAn Microstaq, Inc.	PI.	8/01/2018 – 08/01/2019	\$50,000	\$50,000
MEMS Oscillator to Measure Relative Humidity	DOE-Argonne National Laboratory	PI.	09/2016 – 09/2017	\$20,000 (in technical support)	\$20,000

Externally Funded Non-Research Grants.

<i>Project Title</i>	<i>Sponsor</i>	<i>Role (PI or Co-PI)</i>	<i>Dates</i>	<i>Total Amount</i>	<i>% Attributed to Candidate</i>
COVID-19 Pandemic Challenge	Amazon Web Services (AWS)	PI	03/2021	\$3,000	\$3,000
Smart Building Workshop Support	Emerson Electric	PI	9/2018	\$2,500	\$2,500
Smart Building Workshop Support	HDR	PI	9/2018	Technical support estimated at \$5,000	\$5,000
CAS MEMS Devices	Sensata Technology	PI	1/2018	\$1000	\$1,000
Superheat Controllers for Teaching and Research	DunAn MicrostaQ	PI	9/2017	\$6,000	\$6,000

Sample Publication Record

1. Al-Ramini, A., Fallahtafti, F., Pipinos, I., Myers, S., **Alsalem, F.**, PAD Severity Quantification Using Biomechanics Data Toward Treatment Outcomes Prediction, to be submitted to the Nature Digital Medicine Journal (2024).
2. Takallou, M.A., Fallahtafti, F., Hassan, M., Al-Ramini, A., Qolomany, B., Pipinos, I., Myers, S., **Alsalem, F.**, Diagnosis of disease affecting gait with a body acceleration-based model using reflected marker data for training and a wearable accelerometer for implementation. *Sci Rep* 14, 1075 (2024).
3. Mohaidat, S., and **Alsalem, F.**, A Threshold Helium Leakage Detection Switch for Dry Cask Nuclear Storage System Applications, *Sensors* 23 (8), 4019, **2023**.
4. Nikfarjam, H., Megdadi, M., Okour, M., M., Pourkamali, **Alsalem, F.**, Energy efficient integrated MEMS neural network for simultaneous sensing and computing, *Nature Communications Engineering* 2 (1), 19, **2023**.
5. Nikfarjam, H., Megdadi, M., Okour, M., M., Pourkamali, **Alsalem, F.**, Theoretical and Experimental Investigation of Using Multi-Degree of Freedom Electrostatic Actuated Micro-Structures in Performing Classification Problems, in *IEEE Sensors Journal*, doi: 10.1109/JSEN.2023.3265908, **2023**.
6. Al-Ramini, A., Hassan, M., Fallahtafti, F., Takallou, M.A., Rahman, H., Qolomany, B.; Pipinos, I.I., **Alsalem, F.**, Myers, S.A. Machine Learning-Based Peripheral Artery Disease Identification Using Laboratory-Based Gait Data. *Sensors*, **2022**, 22, 7432.
7. Al-Ramini, A., Takallou, M. A., Piatkowski, D. P., & **Alsalem, F.** (2022). Quantifying changes in bicycle volumes using crowdsourced data. *Environment and Planning B: Urban Analytics and City Science*, 49(6), 1612–1630, **2022**.
8. Emad-Un-Din, M, Jafari, R., Hasan, M., Pourkamali, S., Muhammad, and **Alsalem, F.**, Simulation for a MEMS-based CTRNN Ultra-Power Implementation of Human Activity Recognition, *Frontiers in Digital Health-Connected Health*, **2021**. [50%, NSF project primary PI.]
9. Hasan, M., Abbasalipour, A., Nikfarjam, H., Pourkamali, S., Muhammad, Emad-Un-Din, M., Jafari, R., **Alsalem, F.**, Exploiting Pull-in/Pull-out Hysteresis in Electrostatic MEMS Sensor Networks to Realize A novel Sensing Continuous-time Recurrent Neural Network, *Micromachines*, vol.12 (3), 268, **2021**. [50%, NSF project primary PI.]
10. Hasan, M., Alramini, A., Abdel-Rahman, E., Jafari, R., **Alsalem, F.**, Colocalized Sensing and Intelligent Computing in Micro-Sensors, *Sensors*, vol.20 (21), pp.6346; <https://doi.org/10.3390/s20216346>, **2020**. [50%, NSF project primary PI.]

11. **Alsaleem, F.**, Mehari K., Rafeie, M., Sinkar, K., Besarla, D., Arunasalam, P., “An IoT Framework for Modeling and Controlling Thermal Comfort in Buildings,” *Frontiers in Built Environment*. vol.6(87), doi: 10.3389/fbuil.2020.00087, **2020**. [60%, Microstaq Inc. project, primary PI.]
12. Ouakad, H., Hasan, M., Jaber, N., Hafiz, M., **Alsaleem, F.**, and Younis, I., “On the Double Resonance Activation of Electrostatically Actuated Microbeam Based Resonators,” *International Journal of Non-Linear Mechanics*, vol. 121, pp.103437, **2020**. [40%, NSF project primary PI.]
13. Rafeie, M., Hasan M.,**Alsaleem F.**, “Neuromorphic MEMS Sensor Network,” *Applied Physics Letters*, vol.114 (16), pp.163501, **2019**. [35%].
14. Hafiz, M., Jaber, N., Kazmi, S., Hassan, M., **Alsaleem, F.**, S. Ilyas, and Younis, “Efficient Excitation of Micro/Nano Resonators and Their Higher-Order Modes,” *Nature: Scientific Reports*, vol.9 (1), 319, **2019**. [30%].
15. Hafiz, M., Jaber, N., Kazmi, S., Hassan, M.,**Alsaleem, F.**, and Younis, M., “Efficient Activation of Nanomechanical Resonators,” *Advanced Electronics Materials*, 5 (1), 1800356, **2019**. [30%].
16. Hassan, M., **Alsaleem, F.**, Ramini, A., Voltage and Deflection Amplification via Double Resonance Excitation in a Cantilever Microstructure, *Sensors*, v.19 (2), 380, **2019**. [50%].
17. **Alsaleem, F.** Hassan, M., and Tesfay, M., “A MEMS Nonlinear Dynamic Approach for Neural Computing,” *J. Microelectromech. Syst*, **2018**. [60%]
18. Hasan, M., **Alsaleem, F.**, Jaber, Nizar, Hafiz, Md Abdullah Al, Younis, I., “Simultaneous Electrical and Mechanical Resonance Drive for Large Signal Amplification of Micro Resonators,” *AIP Advances*, vol. 8(1), pp.5312, **2018**.
19. Tesfay, M., **Alsaleem, F.**, Arunasalam, P., and Rao A, “Adaptive-model Predictive Control of Electronic Expansion Valves with Adjustable Setpoint for Evaporator Superheat Minimization,” *Building and Environment*, vol.133, April 2018, pp.151-160, **2018**. [70%, Microstaq Inc. project primary PI.]
20. Hasan, M., **Alsaleem, F.**, Ouakad, H., “Novel Threshold Pressure Sensors Based on Nonlinear Dynamics of MEMS Resonators,” *Journal of Micromechanics and Microengineering*, vol.28(6), pp. 65007-18, **2018**. [50%]
21. Hasan, M.,**Alsaleem, F.**, Mostafa R., “Sensitivity Study for the PMV Thermal Comfort Model and the Use of Wearable Devices Biometric Data for Metabolic Rate Estimation, *Building and Environment*,” vol. 110, pp.173-183, **2016**. [35%]

22. Younis, M., and Ouakad, H., and **Alsaleem, F.**, “Dynamic Response of an Electrostatically Actuated Microbeam to Drop-Table Test,” *J. Micromech. Microeng.*, vol.22, **2012**.
23. **Alsaleem, F.** and Younis, M., “Integrity Analysis of Electrically Actuated Resonators with Delayed Feedback Controller,” *Journal of Dynamic Systems, Measurement, and Control*, vol.133 (3), 2011.
24. **Alsaleem, F.**, Younis, M., and Ruzziconi, L., “An Experimental and Theoretical Investigation of Dynamic Pull-in in MEMS Resonators Actuated Electrostatically,” *Journal of Microelectromechanical Systems*, vol.19 (4), pp.794-806, **2010**.
25. Ibrahim, M., Younis, and **Alsaleem, F.**, “An Investigation into the Effects of Electrostatic and Squeeze-Film Non-linearities on the Shock Spectrum of Microstructures,” *International Journal of Non- Linear Mechanics*, 45 (8), **2010**.
26. Younis, M., Ouakad, H., **Alsaleem, F.**, Miles, R., Cui, C., “Nonlinear Dynamics of MEMS Arches Under Harmonic Electrostatic Actuation,” *Journal of Microelectromechanical Systems* vol. 19 (3), pp. 647-656, **2010**.
27. **Alsaleem, F.** and Younis, M., “Stabilization of Electrostatic MEMS Resonators Using a Delayed Feedback Controller,” *Journal of Smart Materials and Structures*, vol.9(3), **2010**.
28. **Alsaleem, F.** and Younis, M., “A Study for the Effect of the PCB Motion on the Dynamics of MEMS Devices Under Mechanical Shock,” *Journal of Microelectromechanical systems*, vol.18 (13), **2009**.
29. **Alsaleem, F.**, Younis, M., and Ouakad, H., “On the Nonlinear Resonances and Dynamic Pull-in of Electrostatically Actuated Resonators,” *J. Micromech. Microeng.*, vol.19, **2009**.
30. Younis, M. and **Alsaleem, F.**, “Exploration of New Concepts for Mass Detection in Electrostatically-Actuated Structures Based on Nonlinear Phenomena,” *Journal of computational and nonlinear dynamics*, vol. 4 (2), pp.021010, **2009**.
31. **Alsaleem, F.**, Younis, M., and Miles, R., “An Investigation into the Effect of the PCB Motion on the Dynamic Response of MEMS Devices Under Mechanical Shock Loads,” *Journal of Electronic Packaging*, vol.130 (3), pp.031002, **2008**.
32. Younis, M., **Alsaleem, F.**, and Jordy, D., “The Response of Clamped-Clamped Microbeams Under Mechanical Shock,” *International Journal of Nonlinear Mechanics*, vol. 42, **2007**.
33. Younis, M., **Alsaleem, F.**, Miles, R., and Su, Q., “Characterization for the Performance of Capacitive Switches Activated by Mechanical Shock,” *J. Micromech. Microeng.*, vol.17, **2007**.

34. **Alsaleem, F.** and Younis, M., “An Investigation for the Effects of Packaging on the Dynamic Response of a MEMS Device under Mechanical Shock Loads,” *International Journal of Non-Linear Mechanics*, vol. 42, pp. 643-657, **2006**.
35. Alsaleem, F., Hasan, M., Nikfarjam, H., Pourkamali, S., *Sensors as Neural Computing Units*, (chapter book), Elsevier, 2022.
36. Okour, M., Megdadi, M., Nikfarjam, H., Pourkamali, S., & **Alsaleem, F.** "A Small MEMS Neural Network to Classify Human Sitting and Standing Activities." *Proceedings of the ASME 2022 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. Volume 8: 16th International Conference on Micro- and Nanosystems (MNS)*. St. Louis, Missouri, USA. August 14–17, 2022. V008T08A012. ASME.
37. Megdadi, M, Nikfarjam, H, Okour, M, Pourkamali, S, & **Alsaleem, F.** "A Three Degree of Freedom Model Approach to Enable a MEMS-Based Neural Computing Unit." *Proceedings of the ASME 2022 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. Volume 8: 16th International Conference on Micro- and Nanosystems (MNS)*. St. Louis, Missouri, USA. August 14–17, 2022. V008T08A011. ASME.
38. Mohaidat, S., **Alsaleem, F.**, “Novel MEMS Capacitive Sensor Excited at Electrical Resonance for Detecting Helium Based on Changes in Air Electrical Properties”, *Proceedings of the ASME 2022 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. Volume 8: 16th International Conference on Micro- and Nanosystems (MNS)*. St. Louis, Missouri, USA. August 14–17, 2022, DETC2022-90015, V008T08A009; 4 pages.
39. Ayadi, O., Ramini, A., Alahmad, M., **Alsaleem, F.**, Mechanical Designing an experimental framework to evaluate Agri-voltaic systems in Jordan, United States-Jordan University Cooperation Network (UCN) Conference, July 24-26, 2022 Hosted by International Affairs Unit (IAU), University of Jordan, Amman.
40. Ayadi, O., Ramini, A., David Yuill, **Alsaleem, F.**, Evaluation of methods to improve thermal comfort in shelters in refugee camps in Jordan, University Cooperation Network (UCN) Conference, July 24-26, 2022. Hosted by International Affairs Unit (IAU), University of Jordan, Amman.
41. Nikfarjam, H., Abbasalipour, A., Tesfay, M., Hasan., M., Pourkamali, S., Jafari, R., **Alsaleem, F.**, Signal Classification Using a Mechanically Coupled MEMS Neural Network, 2021 IEEE Sensors, 2021, pp. 1-4, doi: 10.1109/SENSORS47087.2021.9639616.
42. Hasan, M., and **Alsaleem, F.**, “Multi-modeshape Reservoir Computing using a Continuous MEMS Microbeam,” *ASME 2021 International Design Engineering*

*Technical Conferences & Computers and Information in Engineering Conference
IDETC/CIE 2021, Virtual, August 2021.*

43. Tesfay, M., **Alsalem, F.**, Sinkar K., Arunasalam, P., “Superheat Prediction & fault Diagnostics of HVAC from Simple Temperature Measurements using Big Data Approach”, accepted to be presented at the *6th International High Performance Buildings Conference*, Purdue University, May **2021**.
44. Takallou, M., Myers, S., Pipinos, I., Hassan, M., Qolomany, B., Takallou, M., **Alsalem, F.**, "Gait-Biomechanics Based Analysis for Diagnosing Peripheral Artery Disease ", accepted to be presented at *the 6th Annual Human Movement Variability Conference*, **2021**.
45. Takallou, M., **Alsalem, F.**, Qolomany, B., Myers, S., Hassan, M., Pipinos, I., "Peripheral Artery Disease Diagnostics using Wearable Accelerometer Device “, *the UNL Graduate Student Symposium*, February **2021**.
46. Hasan, M., **Alsalem, F.**, Al-Ramini, A., Jafari, R., Pourkamali, S., “Reservoir Computing Augmentation in Micro-Sensors,” *International Conference on Neuromorphic Systems*, (Virtual), July **2020**.
47. Hasan, M., & **Alsalem, F.**, “Nonlinear Time-Series Prediction Using a Single MEMS Reservoir,” Proceedings of the *14th ASME 2020 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference* IDETC/CIE, Vol. 83907, pp. V001T01A016, (Virtual), August **2020**.
48. Hasan, M., **Alsalem, F.**, Abbasalipour, A., Anaraki, S., Emad-Un-Din, M., Jafari, R., “Machine Learning Augmentation in Micro-Sensor Assemblies,” *Proceedings of the 14th ASME 2020 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference* IDETC/CIE, Vol. 83907, pp. V001T01A015(Virtual), August **2020**.
49. Tesfay, M., **Alsalem, F.**, Rafaie, M., Sinkar K., Besarla, D., Arunasalam, P., “Big Data-Driven Fault Detection and Diagnostics of HVAC Components,” *Intelligent Building Operation Workshop*, Denver, **2019**.
50. Tesfay, M., Hasan, M., **Alsalem, F.**, Rafaie, M., “CTRNN Computing Realization Through Network of Coupled MEMS,” *ASME 2018 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, Quebec, vol. 51791, pp. V004T08A024, **2018**.
51. **Alsalem, F.**, Hasan, M., Rafaie, M., “MEMS as a Continuous Time Recurrent Neuron (CTRNN) Computing Unit,” *ASME 2018 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, Quebec, V004T08A023-8, **2018**.

52. Hasan, M. , Ouakad, M., Jaber N., Hafiz M., **Alsalem, F.**, Younis M., “An Experimental and Theoretical Investigation of Double Resonance Activation in Electrostatic MEMS Resonators,” *ASME 2018 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, Quebec, vol. 5179, pp. V004T08A026, **2018**.
53. Holthaus, A., (MAE student), Rafaie, M., **Alsalem, F.**, “Comfort-Based Optimal Temperature Setpoint Calculation,” *5th International High-Performance Buildings Conference*, Purdue University, **2018**.
54. Rafaie, M., Tesfay, M., **Alsalem, F.**, “Utilizing Wearable Devices to Design Personal Thermal Comfort Model,” *5th International High-Performance Buildings Conference at Purdue*, **2018**.
55. Rafaie, M., **Alsalem, F.**, Tesfay, M., “Localized Indoor Temperature Estimation Using Smartphone and Laptop Internal Sensors,” *5th International High-Performance Buildings Conference at Purdue*, **2018**.
56. Rafaie, M.,² Hasan, M., and **Alsalem, F.**, “Nano/Micro-Electro-Mechanical System Neuromorphic Computers,” *International Conference on Neuromorphic Systems*, Knoxville, TN, **2018**.
57. Quedan, A., Gariety, M., **Alsalem, F.**, Fullenkamp, P., “Low Charge Detection and Diagnoses for A Non-Critically Charged Refrigeration System,” *Proceedings of the 2017 IEEE International Conference on Electro Information Technology (EIT)*, **2017**.
58. **Alsalem, F.**, Tesfay, M., Arunasalam, P., and Rao A., “Adaptive-Model Predictive Control of Electronic Expansion Valves for Evaporator Superheat Minimization,” *Proceedings of the 2017 IEEE International Conference on Electro Information Technology (EIT)*, **2017**.
59. Hasan, H., Ouakad, M., **Alsalem, F.**, “On the Effects of Temperature and Relative Humidity on the Response of a MEMS Arch Resonator,” *ASME 2017 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, DETC2017-68241, V004T09A015, (Cleveland, Ohio), **2017**.
60. Hasan, H., **Alsalem, F.**, Ouakad, M., “A Novel Threshold Pressure Sensor Based on Nonlinear Dynamics of MEMS Arches,” *ASME 2017 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, DETC2017-67874, V009T07A055, (Cleveland, Ohio), **2017**.
61. Rafaie, M., **Alsalem, F.**, Holthaus, A.,(MAE student), “Data Fusion Application in Predicting Human Comfort”, *Structural health monitoring*, Stanford University **2017**.

62. **Alsaleem, F.**, Hasan, H., “A Novel Low Voltage Electrostatic MEMS Resonator Sensor Based on Double Resonance Dynamic Amplification,” *ASME 2017 Dynamic System and Control Conference*, <https://doi.org/10.1115/DSCC2017-5333>, (Tysons, Virginia), **2017**.
63. Hasan, M., **Alsaleem, F.**, Mostafa R., “Sensitivity Analysis for the PMV Thermal Comfort Model and the Use of Wearable Devices to Enhance Its Accuracy,” *4th International High Performance Buildings Conference*, Purdue University, **2016**.
64. **Alsaleem, F.** and Quedan, A., “Low Refrigerant Algorithm Detection for Cooling Systems Relying on Trending and Data Analysis,” *4th International High Performance Buildings Conference*, Purdue University, **2016**.
65. **Alsaleem, F.**, Munroe, M., Rafaie, M.,² “Current Based HVAC Systems Air Filter Diagnostics and Monitoring,” *4th International High Performance Buildings Conference*, Purdue University, **2016**.
66. **Alsaleem, F.**, Abiprojo, R., Arensmeier, J., Hemmelgarn, G., “HVAC System Cloud-Based Diagnostics Model,” *International Refrigeration and Air Conditioning Conference*. Paper 1508, <http://docs.lib.purdue.edu/iracc/1508>, Purdue University, **2014**.
67. Siddharth, B., Parthiban, A., and **Alsaleem, F.**, “Multi-Physics Reliability of Die Attach Solder for High Powered MEMS Chip in Harsh Environments,” *In Proc. InterPACK 2011 ASME Pacific Technical on Packaging and Integration of Electronics*, Portland, Oregon, **2011**.
68. **Alsaleem, F.** and Younis, M., “Stability Analysis of Electrostatically Actuated Resonators with Delayed Feedback Controller,” *In Proc. of the ASME 2010 International Design Engineering Technical Conference (IDETC)*, (Quebec, Canada), **2010**.
69. Ouakad, H., **Alsaleem F.**, Younis, M., Levo, T., and Pitarresi, J., “Response of An Electrostatically Actuated Microbeam to Drop-Table Test,” *IEEE thermal, Mechanical & Multiphysics Simulation and Experiment in Micro/ Nano Electronics and Microsystems Conference, Eurosin*, (Bordeaux, France), **2010**.
70. **Alsaleem, F.** and Younis, M., “Stabilizing the Dynamics of Electrostatic MEMS Resonators using Delayed Feedback Controller,” *2009 Design Engineering Technical Conference & computer and Information in Engineering Conference*, DETC2009-86903 (San Diego), **2009**.
71. **Alsaleem, F.** and Younis, M., “An Experimental and Theoretical Investigation of Dynamic Pull-in in MEMS Devices Actuated Electrostatically,” *2009 Design Engineering Technical Conference & computer and Information in Engineering Conference*, DETC2009-86909, San Diego, **2009**.

72. **Alsalem, F.** and Younis, M., "Controlling Dynamic Pull-in and Escape in Electrostatic MEMS," IEEE transaction: *The 7th AUS Int'l Symposium on Mechatronics* , AUS-ISM09, **2009**.
73. **Alsalem, F.**, Younis, M., and Ouakad, H., "Experimental and Theoretical Investigating the Nonlinear Dynamics of an Electrostatically-Actuated Device," *2008 ASME International Mechanical Engineering Congress and Exposition*, IMECE'08, Boston, MA, **2008**.
74. **Alsalem, F.** and Younis, M., "On the Utilization of the Escape Phenomenon to Realize New Mass Detectors," *Proceeding of the ASME 2008 International Design Engineering Technical Conferences and computer and Information in Engineering Conference* IDETC/CIE 2008, IDETC2008-50122, **2008**.
75. **Alsalem, F.**, Younis, M., and Ibrahim, M., "The Effect of the PCB Motion on the Dynamic Response of MEMS Devices Under Mechanical Shock Loads," *SEM XI International Congress & Exposition on Experimental and Applied Mechanics* , Orlando, Florida USA, June 2 - 5, **2008** .
76. Younis, M. and **Alsalem, F.**, "New Concepts of Mass Sensors Based on Nonlinear Dynamic Principles," *SEM XI International Congress & Exposition on Experimental and Applied Mechanics*, Orlando, Florida USA, June 2 - 5, **2008**.
77. **Alsalem, F.** and Younis, M., "Theoretical and Experimental Investigation of Dynamic Instabilities in Electrostatic MEMS," *SEM XI International Congress & Exposition on Experimental and Applied Mechanics*, Orlando, Florida USA, June 2 - 5, **2008**.
78. Younis, M. and **Alsalem, F.**, "Switch Triggered by Mass Threshold," Proceedings of the 6th International Conference on Computation of Shell and Spatial Structures IASS-IACM 2008, "Spanning Nano to Mega"28-31, Cornell University, Ithaca, NY, USA, May **2008**.
79. Younis, M. and **Alsalem, F.**, "Nonlinear Dynamics of MEMS Resonators and its Applications for Mass Sensing," *Dynamics and Control Workshop*, Amman, Jordan, March 27, 2008.
80. **Alsalem, F.**, Younis, M., Miles, R., and Su Q., "Experimental and Theoretical Investigation of New Capacitive Switches Activated by Mechanical Shock and Acceleration", *Proceedings of the 21st Biennial Conference on Mechanical Vibration and Noise (VIB)*, Las Vegas, Nevada, DETC2007-35417. September 4-7, **2007**.
81. **Alsalem, F.** and Younis, M., "An Investigation for the Effect of Packaging on the Response of MEMS Devices Under Shock Loads," Proceedings of the *Third International Conference on Advances in Mechanical Engineering and Mechanics (ICAMEM 2006)*, Hammamet, Tunisia, , MEMS01, December, **2006**.

82. **Alsalem, F.** and Al-Jarrah, M., “Evaluation and comparison study of shooting ball algorithm,” *The 2nd AUS Int'l Symposium on Mechatronics* , AUS-ISM05, **2005**.
83. **Alsalem, F.**, Hasan, M., “A New Pressure Threshold Sensor Based on Nonlinear MEMS Oscillator,” *11th annual TechConnect World Innovation Conference & Expo: Informatics, Electronics and Microsystems TechConnect Briefs*, vol.3, pp. 84 – 87, **2017**.
84. Ouakad, H., Hasan, M.; **Alsalem, F.**, “A New Concept for Humidity Sensing Using Curved Micro-Beams,” *11th annual TechConnect World Innovation Conference & Expo: Informatics, Electronics and Microsystems TechConnect Briefs* vol.4, pp. 112-115, **2017**.
85. Hasan, M. and **Alsalem, F.**, “A New Humidity Sensor Based on the Effect of Water Content on a Capacitive MEMS Oscillator’s Thermo-Electrical Characteristics,” *11th annual TechConnect World Innovation Conference & Expo: Informatics, Electronics and Microsystems TechConnect Briefs* 3, pp. 76 – 79, **2017**.
86. Nikfarjam, H., Abbasalipour, A., Tesfay, M., Hasan, M., Pourkamali1, S., Jafari, R., and **Alsalem, F.** “Signal Classification Using a Mechanically Coupled MEMS Neural Network,” Poster presentation at the IEEE SENSORS 2021 Conference, **2021**.
87. Al-Ramini, A., Takallou, M., Piatkowski, D., **Alsalem, F.**, “Quantifying the Effect of Signage on Bicycle Ridership,” *100th TRB Annual Meeting*, **2021**.
88. Hasan, M. , **Alsalem, F.**, “Single MEMS Reservoir Computer,” *ASME 2019 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, Anaheim, **2019**.
89. Hasan, M., Rafaie, M., **Alsalem, F.**, “Object Classification and Tracking Via a Neural Network of MEMS,” *ASME 2019 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference*, Anaheim, **2019**.
90. Al-Ramini, A., Piatkowski, D., **Alsalem, F.**, Poster Presentation in the *BikeWalk Summit*, Omaha, October **2019**.

Patents and Patent applications

1. **Alsalem, F.**, et al., Diagnosing Peripheral arterial disease from gait acceleration measurements, Patent application 63/476,862, 2022.
2. **Alsalem, F.**, Hasan, M., Rafaie, M. Neuromorphic computing using electrostatic mems devices, 11,314,210, 2022.
3. **Alsalem, F.**, Remotely testing whether a climate control system controller is correctly installed, 11,366,461, 2022.
4. **Alsalem, F.**, Hasan, M. ,Artificial intelligence-based analog sensors and wearable devices incorporating the same, US20220041433A1, 2022.
5. Gariety, M., Fullenkamp, P., and **Alsalem, F.**, “Low Charge Detection System for Cooling Systems,” US patent application # 2020.
6. **Alsalem, F.**, and Hasan, M., “Systems and Methods for Reducing the Actuation Voltage for Electrostatic MEMS Devices,” US Patent 10,771,040, 2020.
7. **Alsalem, F.** and Hemmelgarn, G., “Method of Monitoring Charge Condition of Heat Pump System,” US Patent 10,443,863, 2019.
8. **Alsalem, F.**, “Building Envelope and Interior Grading Systems and Methods,” US Patent 10,352,783, 2019.
9. **Alsalem, F.**, “Heat Pump and Air Conditioning Grading Systems and Methods,” US Patent 10,344,997, 2019.
10. **Abiprojo, P.**, and Alsalem, F., “HVAC System Air filter Diagnostics and Monitoring,” US Patent 10,309,677, 2019.
11. **Alsalem, F.** and Hemmelgarn, G., “Heat-Pump System with Refrigerant Charge Diagnostics,” US Patent 9,765,979, 2017.
12. Arensmeier, J., Hemmelgarn, G., **Alsalem, F.**, and Abiprojo, P., “HVAC System Remote Monitoring and Diagnosis,” US Patent 9,638,436, 2017.
13. Pham, H. and **Alsalem, F.**, “Compressor Having A Control and Diagnostic Module,” US Patent 9,762,168, 2017.
14. **Alsalem, F.** and Rao A., “Adaptive Predictive Functional Controller,” US Patent 8,996,141, 2015.

Sample Invited Talks or Keynote Speeches.

1. ML using micro-electromechanical system (MEMS), *tinyML Talks webcast*, May 31,22
2. Covid-19 big data predictive approach, *Center for Intelligent Health Care*, UNMC, Omaha, May 10, 2021.
3. An Analysis of Nebraska Strava Data, *Bike Walk Nebraska event*, February 12021: (*Bike Walk Event*).
4. “Strava data for understanding bike routes in Nebraska,” *Metropolitan Area Planning Agency (MAPA)*,” Omaha, 09/03/2019.
5. “Micro-Electro-Mechanical Neural Integrated Sensing and Computing Units for Wearable Device Applications,” *The Waterloo Institute for Nanotechnology and the Department of Systems Design Engineering*, University of Waterloo, CA, 7/4/2019 (*University of Waterloo talk*).
6. “MEMS-Enabled Bio-Inspired Network: Networks that Sense, Compute, and Actuate,” *King Abdullah University of Science and Technology*, SA, 2/28/2019. (*KAUST Talk*).
7. “Neuromorphic MEMs Systems,” *GE*, Virtual, 09/21/2018.
8. “New Trends in Modeling Thermal Comfort in Smart Buildings,” *at the Intelligent Building Operations Workshop (IBO)*, Purdue University, 7/18/2018.
9. “New faculty research presentation,” at the *Architectural Engineering industry advisory committee*, Omaha, 03/1/2018.
10. “Guest Speaker for University of Southern California (USC),” *Innovation in Integrated Informatics Lab (iLab)*, 02/15/2018, Skype.

Sample Research Awards

1. Received the UNL College of Engineering Faculty Research and Creative Activity Award in 2022.
2. Out of around 500 international teams, our machine learning predictive models ranked as one of the 10 most accurate models to predict the COVID-19 spread across 130 countries in the world for the X-PRIZE global competition (2020-2021), *X-PRIZE Competition*.
3. Recognized by the UNL College of Engineering for research accomplishments and scholarly activity during the research recognition two years in a row (2019, 2020)
4. Multiple news articles at the Omaha World-Herald newspaper (Including the first-page cover article *Omaha World-Herald*)
5. Multiple local TV interviews: *TV Interview Sample*.
6. Featured at UNMC Newsroom multiple times *UNMC News Sample*
7. Featured at Nebraska today news multiple times: *Nebraska News 1*; *Nebraska News 2*
8. Featured at the College of Engineering news multiple times: *Engineering UNL Sample*
9. Organizer and chair of the ASME conference symposium on MEMS/NEMS neural and digital computing 2018-2021.
10. Featured as a notable alumnus of the Mechanical Engineering department at the State University of New York at Binghamton (2018), *Notable Alumnus*.
11. Out of 120 start-up companies and university teams, the idea of applying artificial intelligence to predict indoor temperature from smartphones was selected to be one of the 25 finalists for the 2017 Cleantech Open-Midwest start-up accelerator.
12. Winner of the 2016 CET/Argonne DOE JUMP award, from among 12 other ideas, with my novel idea for using MEMS in humidity sensing
13. Finalist of the international 2016 Lyncee MEMS Innovation.

Teaching Accomplishments

PhD Students

1. Name: Mohammad Hasan
Department: Mechanical Engineering, UNL
Dissertation title: Machine Learning Augmentation Micro-Sensors for Smart Device Applications
Graduation: Fall. **2020**
Current Employment: **Assistant professor at Columbus State University**
2. Name: Mehari Tesfay
Department: Architectural Engineering, UNL
Graduation: Fall. **2021**
Dissertation title: Multilevel Data-Driven Framework for Operating HVAC Systems to Optimize Energy and Comfort in Modern Buildings
Current Employment: **Energy Data Scientist at ACTuate**
3. Name: Ali Ramini
Department: Mechanical Engineering, UNL
Graduation: Fall. **2023**
Dissertation title: PAD Diagnosis and Estimation of Treatment Effectiveness Using Machine Learning
Current Employment: **Data Scientist at Mutual of Omaha**
4. Name: Mohammad Ali Takallou
Department: Architectural Engineering, UNL
Graduation: Fall. **2023**
Dissertation title: Classifying Diseases Affecting Gait with Body Acceleration-Based Machine Learning Models
Current Employment: **Data Scientist at Mutual of Omaha**
5. Name: Sulaiman Mohaidat
Department: Mechanical Engineering, UNL
Expected graduation: Fall. **2024**
6. Name: Mohammad Okour
Department: Architectural Engineering, UNL
Expected graduation: Fall. **2025**
7. Name: Mohammad Megdadi

Department: Mechanical Engineering, UNL
Expected graduation: Fall. **2026**

8. Name: Abdallah Al Zubi
Department: Architectural Engineering, UNL
Expected graduation: Fall. **2026**
9. Mutaz Mohd Hamdi Al Fayad
Department: Architectural Engineering, UNL
Expected graduation: Fall. **2026**

MS Students

1. Name: Abdallah Al Zubi
Department: Architectural Engineering, UNL
Graduation date: Fall. **2023**
2. Name: Mohammad Okour
Department: Architectural Engineering, UNL
Graduation date: Fall. **2023**
3. Name: Ali Ramini
Department: Architectural Engineering, UNL
Thesis title: Analyzing Cycling Routes in Nebraska Using Big Data
Graduation date: Spring. **2019**
4. Name: Mohammad H Hasan
Department: Mechanical Engineering, UNL
Thesis title: Influence of Environmental Conditions on the Response of MEMS Resonators
Graduation date: Spring. **2018**
5. Name: Mostafa Rafaie
Department: Architectural Engineering, UNL
Thesis title: Data-Driven Approach to Thermal Comfort Model Design
Graduation date: Fall. **2018**
Current Employment: **Director of Data Science at Mutual of Omaha**
6. Name: Brenton Regier
Department: Architectural Engineering (MAE student), UNL
Thesis title: A Study of Energy Consumption in Commercial Airplane Environmental Control System
Graduation date: Spring. **2019**
7. Name: Andrew Holthaus
Department: Architectural Engineering (MAE student), UNL

Thesis title: A Thermal Comfort Simulation of Optimized Temperature Setpoints Using Occupant Activity and the PMV Equation
 Graduation date: Spring. **2018**

8. Name: Joshua H. Smrcina
 Department: Architectural Engineering (MAE student), UNL
 Thesis title: Economic and Energy Analysis of Centralized Versus Decentralized Thermal Energy Systems for Retail Spaces in Omaha, NE.
 Graduation date: Spring. **2018**

Other Teaching Accomplishments

- Developed the new AREN 8600: Smart Building Sensors and Programming course. The course is required for all AE MAE students to take their fifth-year graduate course in the Department of Architectural Engineering at UNL.
- Developed the new AREN 8626: MEMS Sensors Dynamics course. The course is an AE elective course for AE master and Ph.D. students.

3. Sample of my student achievements and awards

Student name	Award	Amount	Year
Mohammad Takallou	<i>Milton E. Mohr Fellowship</i>	\$1000	2021
Ali Ramini and Mohammad Takallou	Top 10 teams in the <i>XPRIZE Pandemic Response</i>	\$3000	2021
Mohammad Hasan	Best Ph.D. dissertation nomination in the <i>ICONS conference</i>	NA.	2020
Ali Ramini	<i>Transportation Research Board (TRB) Conference Travel award</i>	\$90	2020
Mohammad Takallou		\$90	2020
Mohammad Hasan	Keynote speaker at the <i>Lincoln Graduate Research Symposium</i>	NA.	2020
Mohammad Hasan	<i>College of Engineering Research Professional Development Fellowship</i>	\$750	2019
Mehari Tesfay		\$750	2019
Mohammad Hasan	<i>College of Engineering Graduate Student Conference Travel Grant</i>	\$500	2018
Mehari Tesfay		\$500	2018
Mohammad Hasan	<i>DOE Jump award</i>	\$20k in technical support	2016
Mohammad Hasan	Finalist of the <i>Lyncee Tech Innovation Challenge</i>	NA.	2016

Service Accomplishments

Professional Service

1. An editorial board of Sensor Journal (2019- present)
2. Topic Editor for the IoT Technology and Built Environment topic in the Frontiers in Built Environment journal (2018-2019)
3. Organizer and chair of the first ASME conference symposium on MEMS/NEMS neural and digital computing (2018, 2019,2020, 2022, and 2023)
4. Chairperson of the Occupant-based Control and Modeling (IBO) session, the 5th International High-Performance Buildings Conference at Purdue University, 2018
5. Chairperson of the MEMS nonlinear resonators session at ASME IDETC/CIE Conference, 2017.
6. ASME DED Technical Committee member on Micro and Nano Systems (MNS)
7. UNMC Center for Intelligent Health Care Education Committee member
8. Research Review panels and dates of service
 - NSF Panel review with the CMMI division (2020)
 - Natural Sciences and Engineering Research Council of Canada (NSERC) proposal reviewer (December 2019)
 - NSF Panel review with the CMMI division (April 2017)
 - NSF Panel review with the CMMI division (November 2017)
9. Member of the P&T College of Engineering Committee (2023-Present)
10. Chair for the Smart Building Committee (2023)
11. Member of the Grad Recruitment task force (10/2017 – 4/2018)
12. Member of the Transdisciplinary Engineering Subcommittee (TES) (03/2021 – Present)
13. AE search committee (2019)
14. Curriculum Committee (2018 – present)
15. Graduate committee member (2018 – present)
16. Participated in the ABET community
17. Interviewing presidential-scholar candidates

5 Sample Professional Development

1. CoE New Faculty Discussion on Teaching (10/10/2016)
2. Research Essentials Discussion (11/11/2016)
3. New Faculty Development Lunch: NSRI Overview and Doing Research with DoD (2/23/2017)
4. New Faculty Development: Panel Discussion on Teaching (1/26/2017)
5. New Faculty Development: Crucial Conversations skills (3/30/2017)
6. COE New Faculty Discussion on Teaching and Learning (10/17,2017)
7. COE New Faculty Discussion on Research (10/13,2017)
8. COE New Faculty Discussion on Teaching and Learning (2/27/2018)
9. Developing a Competitive NSF CAREER Application (Lincoln, 03/2/2017)
10. Research Development Fellows Program (RDFP), (multiple events, 2017-2018)
11. The NSF Bridging Big Data workshop, 2016.
12. The Initiative for Health Environments (IHE) Fall Summit, 2016.
13. UNL CAREER Club week (Lincoln, 2017)
14. ORED's UNL CAREER Club whole semester events (Lincoln, 2018)
15. Teaching and Learning Symposium, (Lincoln, Spring 2018)
16. CoE P&T information sessions (2017)
17. Biomedical Grant Club (multiple events 2018-2019)
18. UNL, UNMC and UNO biomedical engineering retreat (Omaha, 03,08,209)
19. NSF RDFP trip (D.C., 03/2019)
20. NSF border impacts workshop (Lincoln, 04/5/2018)
21. CoE P&T information sessions (multiple events ,2017- 2018)
22. Evaluating NSF Broader Impacts Workshop (Lincoln,10/ 18/2019)
23. NSF CAREER Award Workshop (Lincoln, 04/ 25/2019)
24. NSF RDFP CAREER trip (DC, 2018 and 11/2019)
25. ORED's NSF CAREER Club (multiple events, 2018-2019)
26. The NSF ENG CAREER Workshop (2020)