CV

Elias Nikolaos Pergantis, MEng, MS

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EDUCATION

 Purdue University D-PhD in Mechanical Engineering (MS received August 2023) Supervisors: Prof. Davide Ziviani, Prof. Kevin J. Kircher. Concentration: Thermal systems & controls Research Focus: Numerical and experimental validation of emerging heat pump cycles and advance Current GPA: 3.97/4.0. 	06/2021- 10/2024 ed controls.
 University of Michigan at Ann Arbor D-PhD in Mechanical Engineering (4.0/4.0 GPA) Transitioned to Purdue University after Year 1 due to a change in research focus. Supervisors: Prof. Pramod S. Reddy and Prof. Edgar Meyhofer Concentration: Energy Research Focus: Use of surface structuring for utilization in nanophotonics. 	09/2020 - 05/2021
 University of Bristol – United Kingdom MEng in Mechanical Engineering with First Class Honors (4-year joint degree) Grade: <u>74/100, GPA 3.92/4.0 (9th in a class of 95 students)</u> Concentration: Computational Fluid Dynamics and Renewable Power Generation (Wind & PV). 	09/2015 - 09/2019
PROFESSIONAL AND RESEARCH EXPERIENCE	
Advanced Technology Intern, Lennox International, PD&R, 1600 Metrocrest Dr Carrollton, TX 75006, Supervisors: S. Rajan, R. Goel, R. Brahme.	05/2023 - 07/2023
 Flammable refrigerant leakage mitigation testing to meet 2023 UL 60335-2-40 standard. Sensor integration and multi-processing. Hardware in-the-loop (HIL) testing. 	
Graduate Research Assistant, Center of High-Performance Buildings, Ray W. Herrick Laboratories, Purdue University, US – Supervisors: Prof. Davide Ziviani, Prof. Kevin J. K	06/2021 - 10/2024 ircher.
Research Projects	
Electrochemical Looping Heat-Pump (06/2021 – 12/2022)	
 NO-Vapor compression, Electrochemical Looping Heat Pump (NOVEL HP), DE-EE0008673. Prototyping and experimental verification of a novel fuel cell-based heat pump cycle. 	
Thermodynamic Cycles for two-compartment Ultra Low Temperature Vaccine Refrigeration (10/2021	-04/2022)
Thermodynamic modeling of advanced vapor compression cycles (IHX, Economization, Cascade)Optimized vapor compression and air cycles identified and published.	in EES.
Advanced Cycles and Applications for High Temperature Heat-Pumping (04/2022 – 09/2022)	
 Thermodynamic modeling of three stage compression heat pumps and their benefits for heat delive Technoeconomic analysis of synergetic waste heat recovery applications of HTHPs. 	ery.
Multi-scale sensing for real-time and variable-horizon optimization of energy consumption (04/202	2-ongoing)
 Center for High Performance Buildings (CHPB) at Purdue University funded research. Investigation of machine learning integration with advanced building controls for optimization of a operation in cold climate. Extensive experience in field testing, data acquisition and system troubleshooting. 	a heat pump's

Graduate Student Instructor, Heat Transfer (ME 335), University of Michigan	01/2021 - 05/2021
 300-level course on different modes of heat transfer Organized MatLab computing and programming sections. Assisted students in comprehension of course material & graded HWs and Exams. 	
Graduate Research Assistant, NanoHeat Transport Research Group, Faculty of Mechanical, Engineering, University of Michigan, US – Directors: Profs. E. Meyhofer & P. S. Reddy	09/2020 - 05/2021
 Research unto how surface structuring and 1D photonic crystals can be used for enhanced TE in the infrared. Lurie Nanofabrication Facility, Clean Room Training. 	
Freelance Mathematics and Physics Tutor, Athens, Greece	09/2019 - 09/2020
 Privately tutored senior high school student for their Panhellenic examinations. Aided undergraduate students in advanced computational modelling relating to Heat Transfer and CFD. 	
Lab & Research Assistant, Biofluids Research Group, Faculty of Mechanical Engineering, Bristol University, UK – Director: Dr. Alberto Gambaruto	09/2018 - 06/2019
 Created a swallowing simulation software using 360-CT scans from the Fujita Hospital University in Japan. Collaborated with lab researchers to connect my Langrangian fluid solver with a surface morpher (MIRTK) and w Least Squares automatic segmentation software. 	

Engineering & Research Intern, DNV GL Energy Group, Bristol, United Kingdom 06/2018 - 08/2018
Worked on verifying the wake deflection aspects of DNV GL's real-time dynamic wind farm controller LongSim. Supervisor: Dr. Ervin Bossanyi, Senior Principal Researcher.

• Performed k- ϵ CFD simulations of air over a wind turbine in StarCCM+ using DNV GL's cluster HORNET.

SCHOLARSHIPS & FELLOWSHIPS & AWARDS

Recognition award Mechanical Engineering Faculty, Purdue University	03/2023
Best Poster Presentation, IEA Heat Pump Conference 2023	05/2023
Grant-in-Aid, ASHRAE	09/2023 - 09/2024
Research Assistantship, Faculty of Mechanical Engineering, Purdue University	06/2021 - present
Onassis Foundation Scholar	09/2022 - present
Departmental Fellowship, College of Engineering, University of Michigan	09/2020
Uete, Dr. Hiroyuki and Reinhart Fellowship, University of Michigan	09/2020
British Universities Chess Championship (BUCA), Bronze Medal 2019.	03/2019
• Scholarship, University of Bristol Summer Research Funding for Outstanding Students.	06/2018 - 08/2018
• Amphibious Vehicle 2 nd Prize – University of Bristol Design Manufacturing Contest.	12/2017

SKILLS

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PATENTS

 Logic and Apparatus for Cost-Effective Heat Comfort Control for Air-Source Single-Speed 01/15/2023 Unitary Heat Pump Systems (Preliminary disclosure to USPTO)

• Whole home smart controller (Patent in preparation)

SOCIETIES & AFFILIATIONS

03/01/2023

•	International Building Performance Simulation Association (IBPSA)	06/2022 - present
•	American Society of Heating, Refrigerating and Air-Conditioning Engineers	07/2021 - present
•	Air Conditioning, Heating and Refrigeration Institute (AHRI)	07/2021 - present
•	International Institute of Refrigeration (IIR)	07/2021 - present
•	Bristol University Chess Society Committee Member and Treasurer	09/2015 - 06/2019
•	Bristol University Jazz Orchestra, Alto Saxophone	09/2018 - 07/2019
•	Scout and Scout Leader	06/2003 - 08/2018

CONFERENCES

ASHRAE 2024 Winter Conference, Chicago, USA	20 - 24/01/2024
• 26 th International Congress of Refrigeration, Paris, France	21 - 25/08/2023
• 14 th IEA Heat Pump Conference, Chicago, USA	15 - 18/05/2023
• 2022 Building Performance Analysis Conference and SimBuild, Chicago, USA	14 - 16/09/2022
• 19th International Refrigeration and Air Conditioning Conference, West Lafayette,	USA 11 - 14/07/2022
ASHRAE 2022 Winter Conference, Las Vegas, USA	29/01 - 02/02/2022
• 18th International Refrigeration and Air Conditioning Conference, West Lafayette,	USA 24 - 28/06/2021
• 5 th PRIMARE CONFERENCE, Cardiff University 2018	15 - 17/06/2021

REVIEWER

ASHRAE 2024 Annual Conference, Indianapolis, IN	22 - 26/06/2024
ASHRAE 2024 Winter Conference, Chicago, USA	20 - 24/01/2024
ASHRAE 2023 Annual Conference, Tampa, Florida	24 - 28/06/2023
• 26 th International Congress of Refrigeration, Paris, France	21 - 25/08/2023
ASHRAE 2023 Winter Conference, Atlanta, USA	4 - 8/02/2023
• ASHRAE and SCANVAC, HVAC Cold Climate Conference 2023, Anchorage, USA	6 - 8/03/2023
• 19 th International Refrigeration and Air Conditioning Conference, West Lafayette, USA	11 - 8/07/2022

COMMITTEES

- 19th International Refrigeration and Air Conditioning Conference, West Lafayette, USA 11 14/07/2022
 - Alternative Air-Conditioning, Refrigeration and Heat Pumping I, Chair: P. Domanski (NIST), Co-Chair: E. Pergantis (Purdue)
 - Alternative Technologies for Sensible and Latent Load Management, Chair: J. LeRoy (Trane), Co-Chair: E. Pergantis

SEMINARS

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•	Progress in Heat Pumps with Low GWP Refrigerants, IEA 2023 Chicago	05/15/2023
•	Flexibility in energy grids provided by heat pumps, IEA 2023 Chicago	05/15/2023
•	Investors' role in different parts of the value chain of heat pumps, IEA 2023 Chicago	05/15/2023
•	Trane La Crosse branch (Commercial), Chiller factory tour	10/01/2022
•	Updates on Flammable Refrigerants, 19th International Refrigeration and Air Conditioning Conference	07/10/2022
•	Ejectors and their application, 19th International Refrigeration and Air Conditioning Conference	07/10/2022
•	Building Technology and routes to Zero Net Emissions, ASHRAE 2022 Winter Conference	01/30/2022
•	Combined Heat and Power (CHP) Technology and its future in the US, ASHRAE 2022 W. Conf.	01/31/2022

PUBLICATIONS - JOURNAL

- **Pergantis E. N.,** Priyadarshan, Altheeb N., Dhillon P., Ore, J., Ziviani D., Groll E. A., Kircher K. J. (2024). *Field demonstration of predictive heating control for an all- electric house in a cold climate*, Applied Energy 360 (2024) 122820
- **Pergantis E. N.,** Dhillon P., Premer L., Lee, A. H., Ziviani D., Groll E. A., Kircher K. J. (2024). *Humidity-Aware Model Predictive Control for Residential Air Conditioning: A Field Study*, Journal under review (Building and Environment).
- **Pergantis E. N.,** Bani Issa, A. A. M., Ziviani D., Groll E. A., Kircher K. J (2024). The potential of smart load reduction for mitigating frost in domestic heat pumps. Journal in Preparation.

- Premer L., **Pergantis E. N.**, Lee, A. H., Priyadarshan, Dhillon P., Ziviani D., Groll E. A., Kircher K. J. (2024). *Benefits of water heater and combined water heater-heat pump predictive controls in residential buildings* Journal in preparation.
- Zhu M., Lim J., **Pergantis E.N.**, Kim J., Mishra A., Groll E.A., Braun J., Rodríguez-López J., Ziviani, D., (2024). *A review of electrochemical refrigeration and heating technology*, Journal in Preparation
- **Pergantis E. N.,** Lee, A. H., Priyadarshan, Altheeb N., Premer L., Dhillon P., Ziviani D., Groll E. A., Kircher K. J. (2024). *Optimal controls for residential electrical infrastructure protection*, Journal under review (Applied Energy).

PUBLICATIONS - CONFERENCE

- Pergantis, E.N., Park, J., Priyadarshan, Bird, T.J., Ziviani, D., Kircher, K.J. 2023. Novel RC model for residential buildings by combining a gray-box model with a Support Vector Machine. Under review, CDC 2023
- **Pergantis, E.N.,** Priyadarshan, Altheeb, N., Bird, T.J., Dhillon, P., Ziviani, D., Groll, E.A., Kircher, K.J. 2023. *Experimental demonstration of power-limiting control for electric heating systems. Under review CDC 2023.*
- E. N. Pergantis, A. S. Sangamnerkar, Priyadarshan, J. Ore, P. Dhillon, D. Ziviani, E. A. Groll, K. J. Kircher (2023). Sensors, storage, and algorithms for practical optimal controls in residential buildings, ASHRAE Annual Conference, Tampa, Florida.
- **Pergantis, E.N.**, Bani Issa, A. A. M., Brehm, J. K, Groll, E. A., Ziviani, D. (2022). Thermodynamic Analysis of the Cascade Economization Cycle for High Temperature Heat Pump Applications, 14th IEA Heat Pump Conference.
- Pergantis, E.N., Braun, J. E., Groll, E. A., Ziviani, D., (2022). Investigation of Electrochemical Looping Heat Pump Technology in Heating Mode. Int'l Refrigeration and Air Conditioning Conf. Paper 2366.
- Bani Issa, A. A. M., **Pergantis, E. N.**, Brehm, J. K., Groll, E. A., Ziviani, D., (2022). Modeling of an Ultra-Low Temperature Refrigeration System for Independent Vaccines and Medical Supplies Storage. *Int'l Refrigeration and Air Conditioning Conf. Paper 2400*.
- Brehm, J. K, **Pergantis, E. N.**, Bani Issa, A. A. M., Groll, E. A., Ziviani, D. (2022). Thermodynamic Assessment of Air-Cycles for Ultra-Low-Temperature Refrigerated Container Applications. *Int'l Refrigeration and Air Conditioning Conf. Paper 2536*.
- E. N. Pergantis, A. Gambaruto, *Developing a numerical swallowing simulation*, Research Archives, University of Bristol, September 2019 DOI: https://research-information.bris.ac.uk/en/studentTheses/developing-a-numerical-swallowing-simulation

LANGUAGES

• English (fluent), French (intermediate), Greek (native)