Alaa E. El-Sharkawy,
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Current Position:

Adjunct Professor:
Lawrence Technical University
21000 West 10 Mile Road
Southfield, MI 48075
United States

Previous position:

Manager & Technical Fellow - Thermal Systems
FIAT Chrysler Automobiles (FCA),
Auburn Hills MI 48226
United States

Education:

- Wayne State University, Detroit, Michigan:
  - Ph.D. in Chemical Engineering
  - M.Sc. in Chemical Engineering
- Alexandria University, Egypt:
  - B.Sc. in Chemical Engineering

Technical Position:

1. Global Manager & Technical Fellow of Vehicle Thermal Systems, FIAT Chrysler Automobiles (FCA)- Retired at January 2024
2. Adjunct Professor at Lawrence Technological University, Southfield, Michigan, USA

Certifications:

1. Certified Professional Engineer (PE) in the state of Michigan
2. Design for Six Sigma (DFSS) Black Belt

Awards and Recognitions:

1. Chrysler Technical Fellow Award
2. Stellantis award for most scheduled and offered training classes
3. Chrysler Engineering College Certificate of Recognition: “Exceptional Delivery of Technical Training Award”
4. General Motors Research Labs: Special Achievement Award
5. Wayne State University- Excellence in Teaching Award
6. Participant in the United Nations TOKTEN (Transfer of Knowledge through Expatriate Nationals) program
7. Keynote Lecture: "Computer Simulations for Development of Electric Vehicles Thermal Management Systems," 2022 32nd International Conference on Computer Theory and Applications (ICCTA), Alexandria, Egypt
8. Keynote Lecture: “Thermal Management and Development of Electric Vehicles for Improved Environmental Quality,” ICNTSE 2021 International Conference on New Trends in Sustainable Energy, Pharos University, Alexandria, Egypt
9. Keynote Lecture: “A Comprehensive Approach for Estimation of Automotive Component Life Due to Thermal effects,” 2018 Academic Annual Conference of Automotive Aerodynamics, Shanghai, China

Academic Teaching and Training Experience:

Lawrence Technological University (LTU), Michigan, USA:

- Batteries for Electric Vehicles
- Thermal Management for Electric Vehicles
- Thermal Protection of Automotive Components

Wayne State University:

- Environmental Chemodynamics
- Chemical Process Simulation using ASPEN
- Process Dynamics and Control
- Chemical Engineering Kinetics
- Chemical Engineering Thermodynamics
- Computers and Numerical Methods

FCA: Chrysler Engineering College:

- Thermal Analysis for Electric Vehicles
- Thermal Protection of Vehicle Components
- Fundamentals of Heat Transfer and Applications for Powertrain Cooling, Climate Control, and Thermal Protection
- Thermal Degradation of Rubber and Synthetic Materials
- Thermal Clearance Guidelines for Component Packaging
- Introduction of Virtual Time-Temperature Analysis

Supervised/Coordinated:

- 5 Master's degree students for a dual Master program between the University of Windsor, Canada, and Turin Polytechnic Institute, Italy
- Training of 10 Chrysler engineers to receive DFSS Green Belt

Employment History:

Date	**Job Title**	**Employer**	**Department**
Sep 2022 - Present	Adjunct Professor	Lawrence Technical University (LTU), Michigan, USA	Mechanical Engineering
Feb 2013 – Dec 31, 2023	Manager & Technical Fellow - Thermal Systems	FIAT Chrysler Automobiles (FCA)	Chrysler Scientific Labs
May 2009 - Feb 2013	Sr. Specialist - Thermal Protection	FIAT Chrysler Automobiles (FCA)	Chrysler Scientific Labs
Dec 2006 - May 2009	Thermal Engineering Specialist	Chrysler	Chrysler Scientific Labs
Jul 2005 - Dec 2006	Engineer - Thermal Protection	Chrysler	Chrysler Scientific Labs
Jul 1999 - Jul 2005	Sr. Engineering Specialist	Modern Engineering (Contracted to Chrysler)	Chrysler Scientific Labs
Nov 1988 - Jul 1999	Sr. Engineer: Fluid & Thermal Analysis	General Motors / EDS	GM Research Labs
Jan 1987 - Nov 1988	Sr. Engineer - Chemical	Urban Consultants	Systems Operations Standards
Spring 1990 - Fall 2005	Adjunct Faculty Member	Wayne State University	Chemical Engineering

Accomplishments and Significant Contributions:

1. Initiated and supported the development of academic certification for electric vehicles program at Lawrence Technical University (LTU)
2. Developed and taught two graduate-level classes on “Batteries for Electric Vehicles” and “Thermal Management for Electric Vehicles” at LTU
3. Served as a corporate-wide and global technical expert within FCA in vehicle thermal protection and thermal management
4. Led the development of thermal analysis models for predicting high voltage battery temperatures
5. Developed thermal degradation models for estimating battery life in automotive applications
6. Led global efforts to address battery thermal runaway issues in Stellantis
7. Developed a state-of-the-art analytical tool (Time-Temperature Analysis) for predicting vehicle component life due to heat exposure
8. Initiated and led development of transient thermal simulation of vehicle exhaust systems
9. Implemented Virtual Time-Temperature Analysis (VTTA) tool to predict exhaust surface and component temperatures
10. Managed software tools for thermal simulation during early stages of vehicle development
11. Developed a transient fuel system thermal and emissions analysis model
12. Led various innovation/development projects including:
    - Lead acid battery thermal and degradation analysis models
    - Li-Ion battery electric and thermal models
    - Estimation of under-hood and underbody heat transfer coefficients
    - Urea tank solution warm-up and phase change analysis for diesel applications
    - Simulation of Diesel Particulate Filter (DPF) regeneration process
    - Integration of sensitivity analysis and DFSS methodology into transient thermal analysis
13. Developed a science-based approach for vehicle instrumentation and temperature measurement error evaluation
14. Developed corporate-wide thermal clearance guidelines for component packaging
15. Led international road test trips for evaluation of climate control and thermal protection
16. Provided technical training classes for over 4000 Stellantis engineers
17. Sponsored and supervised 10 FCA engineers for DFSS Green Belt certification
18. Coordinated project funding for developing new design and testing technologies in aerothermal areas
19. Supported thermal analysis tools and test procedures for FCA engineers globally
20. Fifteen years of experience teaching graduate and undergraduate courses at Wayne State University
21. Received distinction and achievement awards from General Motors and Chrysler Group
22. Participant in international programs for technology transfer to third-world countries
23. Over 40 technical papers and presentations
24. Distinguished in teaching and technical training in both academic and industrial settings
25. Introduced Fourier Amplitude Sensitivity Test (FAST) for sensitivity and uncertainty analysis in chemical engineering and automotive applications

Selected Publications/Presentations:

1. **Keynote Speaker** at the *SPEED Workshop* (Strategies for Regional Capacity Building of Hybrid Electric Vehicles in Engineering Division), co-funded by the European Union (ERASMUS+ Grant 101179223), where I presented *"Bridging the Gap Between Education and Industry in the Field of Electric Vehicles"* to international partners, addressing skill development challenges and fostering collaboration among academic and industry stakeholders (16 June 2025, Online).
2. Keynote lecture: "Thermal Management and Development of Electric Vehicles for Improved Environmental Quality,". ICNTSE 2021: Third International Conference on New Trends in Sustainable Energy" 1-2 March, 2022, Pharos University, Egypt
3. Keynote lecture: "Role of Digitization in the Development of Electric Vehicles and Energy Sustainability," ICNTSE 2024 4Th International Conference on new trends in Sustainable energy: Sustainability in the Digital Era"
4. Keynote title: "Computer Simulations for Development of Electric Vehicles Thermal Management Systems," 2022 32nd International Conference on Computer Theory and Applications (ICCTA), Alexandria, Egypt, 2022, pp. 9-10, doi: 10.1109/ICCTA58027.2022.10206190.
5. Arora, D., El-Sharkawy, A., and Panchal, S., "Development of Time-Temperature Analysis Algorithm for Estimation of Lithium-Ion Battery Useful Life," SAE Technical Paper 2024-01-2191, 2024.
6. Nicholas Vinten, Ofelia Jianu, Alaa El-Sharkawy, Dipan Arora, "Transient Thermal Simulation of Lithium-ion Batteries for Hybrid/Electric Vehicles" (2023). Electronic Theses and Dissertations. 9251
7. El-Sharkawy, A., Sami, A., Arora, D., Gaffar, S. et al., "Three-Dimensional Thermal Simulation of a Hybrid Vehicle with Energy Consumption Estimation and Prediction of Battery Degradation under Modern Drive-Cycles," SAE Technical Paper 2023-01-0135, 2023.
8. Alaa El-Sharkawy, "Development of Time-Temperature Analysis Algorithm for Estimation of Lithium-Ion Battery Useful Life for Electric and Hybrid Vehicles," 50th International Conference for the Association of Egyptian-American Scholars, Cairo, Egypt, December 26-29, 2023.
9. Alaa El-Sharkawy, "Simulation of Hybrid Electric Vehicles for Energy Consumption and Estimation of Battery Life under Modern Drive-Cycles," 50th International Conference for the Association of Egyptian-American Scholars, Cairo, Egypt, December 26- 29, 2023.
10. Alaa El-Sharkawy, "Thermal Management and Development of Electric Vehicles for Improved Environmental Quality," 49th International Conference for the Association of Egyptian-American Scholars, Cairo, Egypt, December 27- 29, 2022.
11. Alaa El-Sharkawy, "Engineering Education and Future Opportunities in the Development of Hybrid and Electric Vehicles," 49th International Conference for the Association of Egyptian-American Scholars, Cairo, Egypt, December 27- 29, 2022.
12. "Analysis of the Effect of Heat Pipes on Enhancement of HEV/PHEV Battery Thermal Management," SAE Technical Paper 2021-01-0219, 2021
13. "Development of a Robust Thermal Management System for Lead-Acid Batteries," SAE Technical Paper 2021-01-0232, 2021
14. "A Vehicle Level Transient Thermal Analysis of Automotive Fuel Tanks," SAE Technical Paper 2020-01-1342, 2020
15. "Integration of Sensitivity Analysis and Design for Six Sigma (DFSS) Methodology into Transient Thermal Analysis," SAE Technical Paper 2020-01-1389, 2020
16. "Development of A Computational Algorithm for Estimation of Lead Acid Battery Life," SAE Technical Paper 2020-01-1391, 2020

17. "Optimization of Catalytic Converter Design to Improve Under-Hood Thermal Management," SAE Technical Paper 2019-01-1263, 2019
18. "Estimates of the Convective Heat-Transfer Coefficients for Under-Hood and Under-Body Components," SAE Technical Paper 2019-01-0149, 2019
19. "A Comprehensive Approach for Estimation of Automotive Component Life due to Thermal Effects," SAE Technical Paper 2018-37-0019, 2018
20. "Development of a Transient Thermal Analysis Model for Engine Mounts," SAE Int. J. Mater. Manf. 9(2):268-275, 2016
21. "Evaluation of Heat Pipe Heat Exchanger for Automotive Applications," SAE Int. J. Mater. Manf.9(2):254-260, 2016
22. "Transient Modelling of Vehicle Exhaust Surface Temperature," SAE Int. J. Mater. Manf. 9(2):321-329, 2016
23. "Transient Modeling of Vehicle Under-hood and Underbody Component Temperatures," SAE Int. J. Mater. Manf. 9(2):330-337, 2016
24. "Development of Transient Thermal Models Based on Theoretical Analysis and Vehicle Test Data," SAE Int. J. Passeng. Cars - Mech. Syst. 7(1):188-195, 2014
25. "Sensitivity and Uncertainty Analysis in Computational Thermal Models," SAE Technical Paper 2014-01-0656, 2014
26. "Design for Six Sigma (DFSS) for Optimization of Automotive Heat Exchanger and Underhood Air Temperature," SAE Int. J. Mater. Manf. 7(2):256-261, 2014
27. "Sensitivity/Uncertainty Analysis of Material Thermal Degradation Models," SAE International Journal of Materials and Manufacturing, Paper no. 2012-01-0955
28. "Transient Thermal Analysis of Diesel Fuel Systems," SAE Int. J. Mater. Manf. 5(2):461-472, 2012
29. "Evaluation of Impact of Active Grille Shutter on Vehicle Thermal Management," SAE Int. J. Mater. Manuf. 4(1):1244-1254, 2011
30. "Application of Kinetics of Thermal Degradation for Time-Temperature Analysis of Automotive Components," SAE Technical Paper 2009-01-1178, 2009
31. "Development of an Engineering Analysis Tool for Time-Temperature Analysis of Automotive Components," SAE paper no. 2009-01-1179
32. "Analysis of Thermocouple Temperature Response under Actual Vehicle Test Conditions," SAE Technical Paper 2008-01-1175, 2008
33. "Transient One-Dimensional Thermal Analysis of Automotive Components for Determination of Thermal Protection Requirements," SAE Technical Paper 2008-01-0733, 2008
34. "Reliability Analysis of Dynamometer Loading Parameters during Vehicle Cell Testing," SAE Technical Paper 2007-01-0600, 2007
35. "Parametric Analysis for the Design of Compact Heat Exchangers," SAE Technical Paper 2006-01-1578, 2006
36. "Determination of Proper Test Conditions for Thermal Protection," SAE Technical Paper 2006-01-1572, 2006
37. "SENSITIVITY/UNCERTAINTY ANALYSIS OF AUTOMOTIVE HEAT EXCHANGER DESIGNS," SAE Technical Paper 2001-01-1013, 2001
38. "Sensitivity/Uncertainty Analysis of Material Thermal Degradation Models," SAE International Journal of Materials and Manufacturing, vol. 5, no. 2, 2012, pp. 440–448
39. "Transient Fuel System Thermal and Emissions Analysis," SAE Technical Paper 980049, 1998
40. "Potential Automotive Applications of Heat Pipes," SAE Technical Paper 980060, 1998

External Technical Activities:

- Participated in the TOKTEN program “Transfer of Knowledge Through Expatriate Nationals,” sponsored by the United Nations Development Program (UNDP)

- Played a key role in starting a series of international technical conferences on Energy and the Environment “The Cairo International Conference for Energy and the Environment,” between Wayne State University and the Egyptian government.
- Session Co-Chairman for the World Congress & Exhibition: SAE Reliability and Robust Design in Automotive Engineering: 2008-Present
- Session Co-Chairman for the World Congress & Exhibition: SAE World Congress & Exhibition: Thermal Systems for Electric and Hybrid Vehicles: 2018-Present
- Member of the Egyptian-American Scholars Association