

Tulga Ersal

2019 Walter E. Lay Laboratory, 1231 Beal Ave, Ann Arbor, MI 48109 • (734) 763-7388 • tersal@umich.edu

Dr. Tulga Ersal's research is in the field of system dynamics and control. He is interested in mathematical modeling of dynamic systems, system identification, and advanced control with applications to vehicle and energy systems and human factors in driving. Example vehicle applications include unmanned ground vehicles at all levels of autonomy ranging from teleoperation to semi and full autonomy; connected and automated vehicles; and connected powertrain testbeds. Example applications in the energy domain include fuel cells; batteries; microgrids; and vehicle powertrains. His research on human factors in driving focuses on distraction, workload, and human driving performance in teleoperated and semi-autonomous vehicles.

EDUCATION

PhD, Mechanical Engineering University of Michigan (GPA 4.00/4.00)	Ann Arbor, MI Dec 2007
MSE, Mechanical Engineering University of Michigan (GPA 4.00/4.00)	Ann Arbor, MI Dec 2003
BSE, Mechanical Engineering Istanbul Technical University (GPA 3.90/4.00, best in University)	Istanbul, Turkey Jul 2001

ACADEMIC APPOINTMENTS

Associate Professor Department of Mechanical Engineering, University of Michigan	Ann Arbor, MI Aug 2023 – Present
Associate Research Scientist Department of Mechanical Engineering, University of Michigan	Ann Arbor, MI Sep 2017 – Aug 2023
Assistant Research Scientist Department of Mechanical Engineering, University of Michigan	Ann Arbor, MI Jan 2011 – Aug 2017

PROFESSIONAL EXPERIENCE

Chief Scientist Automotive Research Center, University of Michigan Shaping the scientific vision of the ARC • Balancing the ARC project portfolio to align with the vision • Strengthening cross-cutting efforts for convergence among ARC projects as well as between the stakeholders of the Ground Vehicle Alliance • Participating in Center administration	Ann Arbor, MI Jun 2022 – present
Center Research Integration Lead Automotive Research Center, University of Michigan Coordinating research integration activities of the Center • Preparing case studies for the Center Annual Review • Participating in Center administration • Representing the Center during visits	Ann Arbor, MI Sep 2011 – Jun 2022
Associate Director Automated Modeling Laboratory, University of Michigan Assisted with the administration of the Laboratory • Mentored the students in the Laboratory • Raised and managed funding for the Laboratory	Ann Arbor, MI Jan 2011 – Dec 2021
Research Initiatives Lead Energy Institute, University of Michigan Identified center level funding opportunities • Led proposal teams and efforts	Ann Arbor, MI Sep 2019 – Dec 2020
Thrust Area Leader, Dynamics and Control of Vehicles Automotive Research Center, University of Michigan Coordinated the research activities of the Dynamics and Control of Vehicles Thrust Area, one of the five Thrust Areas of the Automotive Research Center • Facilitated the communication among the Thrust Area members • Created the Thrust Area road maps	Ann Arbor, MI Sep 2012 – Jun 2018
Post-Doctoral Research Fellow Automated Modeling Laboratory, University of Michigan Developed an internet-distributed hardware-in-the-loop simulation platform and analyzed and improved its performance • Developed machine learning models and methods to detect driver distraction • Developed models to evaluate and improve the design of a balance prosthesis for patients with vestibular loss • Analyzed stability of microgrids • Wrote grant applications	Ann Arbor, MI Nov 2007 – Dec 2010

Graduate Student Research Assistant

Department of Mechanical Engineering, University of Michigan

Ann Arbor, MI
Sep 2002 – Oct 2007

Developed energy based, realization preserving, trajectory dependent structural simplification and order and structure reduction methods for dynamic system models with application to a multibody model of a military vehicle (High Mobility Multipurpose Wheeled Vehicle) • Developed a bond graph based, acausal, modular modeling framework for multibody systems with application to reconfigurable machine tools

Graduate Student Instructor

Department of Mechanical Engineering, University of Michigan

Ann Arbor, MI
Jan 2006 – Apr 2006

Assisted with the instruction of 141 undergraduate students in both sections of ME 360 (Modeling, Analysis, and Control of Dynamic Systems) by holding weekly recitations, creating homework solutions, grading exams, and holding office hours

Technical Advisory Committee/Site Visit Coordinator

NSF ERC for Reconfigurable Manufacturing Systems, University of Michigan

Ann Arbor, MI
Sep 2004 – May 2005

Elected by the 50+ students in the ERC as one of the six members of the Student Leadership Committee • Organized and managed student responsibilities for the quarterly Technical Advisory Committee meetings and the annual NSF site visit • Facilitated the collaboration with Morgan State University (MSU) by helping the MSU students form a local Student Leadership Committee and supervising their operation • Organized and managed the student responsibilities for the 3rd CIRP International Conference on Reconfigurable Manufacturing • Prepared, conducted and analyzed the annual Strengths, Weaknesses, Opportunities and Threats survey for students • Organized weekly facility tours for prospective students during the Winter term

Science Mentor

Pattengill Elementary School

Ann Arbor, MI
Jan 2006 – Apr 2006

Helped 3rd to 5th graders do weekly science projects as part of the Reach Out! program

Intern

EMO Teknik Malz. Tic. ve San. Ltd. Şti

Istanbul, Turkey
Aug – Sep 2000

Assisted in the design of building automation systems by performing valve calculations and selections, and preparing quotes

Intern

FAS GmbH

Erlensee, Germany
Jul – Aug 1999

Manufactured parts for and performed assembly and maintenance of custom designed machines and conveyors

Intern

Istanbul Technical University Machining Shop

Istanbul, Turkey
Jul 1998

Developed milling, casting, welding, turning and planing skills

MENTORING**PhD Students**

- [1] **Jiechao Liu**
Vehicle-Dynamics-Conscious Real-Time Hazard Avoidance in Autonomous Ground Vehicles, 2016
- [2] **Xin Zhou**
Data-Based Techniques for Battery-Health Prediction, 2017
- [3] **Xinyi Ge**
A Frequency Domain Design Approach for Norm-Optimal Iterative Learning Control, 2017
- [4] **Yingshi Zheng**
Improving Mobility Through Latency Compensation in Teleoperated Ground Vehicles, 2018
- [5] **Huckleberry Febbo**
Real-time Trajectory Planning to Enable Safe and Performant Automated Vehicles Operating in Unknown Dynamic Environments, 2019
- [6] **Alireza Goshtasbi**
Modeling, Parameter Identification, and Degradation-Conscious Control of Polymer Electrolyte Membrane (PEM) Fuel Cells, 2019
- [7] **John Wurts**
Collision Avoidance Guardian at the Dynamic Limits of Handling, 2020
- [8] **Chunan Huang**
Energy and Emissions Conscious Optimal Speed Planning for Diesel-Powered Vehicles, 2021
- [9] **Su-Yang Shieh**
Periodic Control of Automotive Vehicles to Improve Fuel Economy, 2021

- [10] **James Dallas**
Terrain-Aware Autonomous Navigation, 2021
- [11] **Eunjeong Hyeon**
Forecasting Vehicle Speed Trajectories for the Ecological Adaptive Cruise Control of Connected Autonomous Vehicles, 2022
- [12] **Yifan Weng**
Mutually-Adaptive Shared Control between Human Operators and Autonomy in Ground Vehicles, 2022
- [13] **Chen Li**
Cognitive Modeling of Human Driver Behavior During Interaction with Autonomous Vehicles, 2023
- [14] **Siyuan Yu**
A Haptic Shared Control Framework Leveraging High-Performance Trajectory Planning and Control to Teach Advanced Driving Skills, 2025
- [15] **Congkai Shen**
A Topology-Aware Hierarchical Planning and Control Framework for Highly Dynamical Autonomous Ground Vehicles, 2025
- [16] **James Baxter**
TBD
- [17] **Eugene Kochergin**
TBD
- [18] **Anirudh Kanchi**
TBD
- [19] **Haoran Ma**
TBD
- [20] **Junsik Eom**
TBD
- [21] **Shuyu Long**
TBD
- [22] **Yufei Xi**
TBD

PhD Committee Memberships

- [1] **Youngki Kim**
Power Capability Estimation Accounting for Thermal and Electrical Constraints of Lithium-Ion Batteries, 2014
- [2] **Ingyu Lim**
Multi-Objective Iterative Learning Control: An Advanced ILC Approach for Application Diversity, 2016
- [3] **Tianyou Guo**
Power Consumption Models for Tracked and Wheeled Small Unmanned Ground Vehicles on Deformable Terrains, 2016
- [4] **Kai Wu**
Real-Time Energy Management and Transient Power Control for Fuel Cell Electrified Vehicles, 2019
- [5] **Zicheng Bi**
Enhancing the Sustainability of Electrified Vehicles by Wireless Charging: A Life Cycle Framework to Assess and Optimize the Sustainability Performance of Wireless Charging Electric Vehicle Systems, 2018
- [6] **Ziheng Pan**
Design and Control Optimization of All-Wheel-Drive Hybrid Electric Vehicles, 2018
- [7] **Isaac Spiegel**
Hybrid Systems, Iterative Learning Control, and Non-minimum Phase, 2021
- [8] **Ruikun Luo**
Real-time Human Workload Estimation and Its Application in Adaptive Haptic Shared Control, 2021
- [9] **Akshay Bhardwaj**
Intuitive Steering Interfaces to Support Driver-Automation Control Sharing, 2021

- [10] **Xinpeng Wang**
Scenario-Based Safety Evaluation for Highly Automated Vehicles, 2023
- [11] **Anil Alan**
On Robustness of Control Barrier Functions with Application to Automated Vehicles, 2024
- [12] **Haochen Wu**
Coordination Strategies for Human-Autonomy Teams: Learning, Interpretation, and Adaptation, 2024
- [13] **Hannah Larson**
Examination of the Influence of Automated Spacecraft Motion on Operational Decision-Making in Autonomous Rendezvous & Docking Maneuvers, 2025
- [14] **Xunbi Ji**
Learning Time Delay Systems with Applications on Intelligent Vehicles, 2025
- [15] **Ted Sender**
Adversarial Scenario Generation for Virtual Testing of Off-Road Autonomous Vehicles, 2025

DEng Committee Memberships

- [1] **Mizuho Takayama**
Virtual Testing with Parametric THUMS for Whiplash Injury Assessment in Rear Impact, TBD

Masters Students

- [1] Akshar Tandon, 2012
- [2] Jingxuan Liu, 2015
- [3] Alireza Goshtasbi, 2015
- [4] Wei Zhou, 2016
- [5] Yue Tang, 2018
- [6] Kshitij Jain, 2018
- [7] Jiahui Fu, 2018
- [8] Yifan Weng, 2018
- [9] James Dallas, 2018
- [10] Weilin Xu, 2018
- [11] Zheng Dong, 2019
- [12] Joseph Lowman, 2019
- [13] Huy Quyen Ngo, 2019
- [14] Peter Westra, 2021
- [15] Timothy Ohtake, 2021
- [16] Siyuan Yu, 2022
- [17] Congkai Shen, 2022
- [18] Huu Hieu Ta, 2023
- [19] Xuanlang Huang, 2023
- [20] Dingqian Liu, 2023
- [21] Xingqiao Zhu, 2023
- [22] Kamil Nocon, 2023-2024
- [23] Haofan Wang, 2024-2025
- [24] Rishitha Paga, 2024-2025
- [25] Hanyu Gan, 2024
- [26] Yingxuan Guo, 2024
- [27] Zijun Zhou, 2025
- [28] Yuan Chen, 2025
- [29] Phurithat Tangsripairoje, 2025

Undergraduate Researchers

- [1] Yingshi Zheng, 2012-2014
- [2] Sicong Guo, 2018-2019
- [3] Yuzhang Liu, 2018-2019
- [4] Siyuan Yu, 2019-2020
- [5] Congkai Shen, 2019-2020
- [6] Junsik Eom, 2020-2021, 2023-2024

- [7] Rabia Konuk, 2021-2022
- [8] Yiming Zhang, 2022
- [9] Haoran Ma, 2023-2024
- [10] Yufei Xi, 2024-2025
- [11] Art Boyarov, 2024
- [12] Ruthesh Thavamani, 2024
- [13] Yijie Liao, 2024-2025

Post Doctoral Scholars

- [1] Hossein Mirinejad (May 2016 - Oct 2017)
- [2] Rasoul Salehi (Sep 2016 – Jul 2018)
- [3] Chen Li (Sep 2023 – Aug 2024)

MEMBERSHIPS

- [1] American Society of Mechanical Engineers (ASME)

PUBLICATIONS

Archival Publications

- [1] **Real-time topology-aware local planning and control for highly dynamical vehicles on 3D terrains**
S. Yu, C. Shen, B. I. Epureanu and T. Ersal
IEEE Transactions on Control Systems Technology doi:10.1109/TCST.2026.3653919, 2026 [\[PDF\]](#)
- [2] **A real-time terrain-adaptive local trajectory planner for high-speed autonomous off-road navigation on deformable terrains**
S. Yu, C. Shen, J. Dallas, B. I. Epureanu, P. Jayakumar and T. Ersal
IEEE Transactions of Intelligent Transportation Systems doi:10.1109/TITS.2024.3520520, 2024 [\[PDF\]](#)
- [3] **Real-time workload estimation using eye tracking: A Bayesian inference approach**
R. Luo, Y. Weng, P. Jayakumar, M. J. Brudnak, V. Paul, V. Desaraju, J. L. Stein, T. Ersal and X. J. Yang
International Journal of Human-Computer Interaction 40(15), pp. 4042-4057, 2024 [\[PDF\]](#)
- [4] **Modeling human steering behavior in haptic shared control of autonomy-enabled unmanned ground vehicles**
C. Li, M. Cole, P. Jayakumar and T. Ersal
Human Factors 66(4), pp. 1235-1248, 2024 [\[PDF\]](#)
- [5] **An efficient global trajectory planner for highly dynamical nonholonomic autonomous vehicles on 3D terrains**
C. Shen, S. Yu, B. I. Epureanu and T. Ersal
IEEE Transactions on Robotics doi:10.1109/TRO.2023.3344030, 2023 [\[PDF\]](#)
- [6] **Pulse-and-glide operations for hybrid electric vehicles in the car-following scenario**
S.-Y. Shieh, T. Ersal and H. Peng
IEEE Transactions on Vehicular Technology 72(8), pp. 9922-9937, 2023 [\[PDF\]](#)
- [7] **Terrain characterization via machine vs. deep learning using remote sensing**
J. Ewing, T. Oommen, J. Thomas, A. Kasaragod, R. Dobson, C. Brooks, P. Jayakumar, M. Cole and T. Ersal
Sensors 23(12), pp. 5505, 2023 [\[PDF\]](#)
- [8] **Loss function design for data-driven predictors to enhance the energy efficiency of connected and automated vehicles**
E. Hyeon, T. Ersal, Y. Kim and A. G. Stefanopoulou
IEEE Transactions on Intelligent Transportation Systems 24(1), pp. 827-837, 2023 [\[PDF\]](#)
- [9] **Hardware-in-the-loop exploration of energy vs. emissions trade-off in eco-following scenarios for connected automated vehicles**
C. Huang, R. Salehi, A. G. Stefanopoulou and T. Ersal
International Journal of Engine Research, doi:10.1177/14680874221098212, 2022 [\[PDF\]](#)

- [10] **Design for real-time nonlinear model predictive control with application to collision imminent steering**
J. Wurts, J. L. Stein and T. Ersal
IEEE Transactions on Control Systems Technology 30(6), pp. 2450-2465, 2022 [\[PDF\]](#)
- [11] **Data-driven forgetting and discount factors for vehicle speed forecasting in ecological adaptive cruise control**
E. Hyeon, Y. Kim, T. Ersal and A. Stefanopoulou
Journal of Dynamic Systems Measurement and Control 144(1), pp. 011101 (12 pages), 2022 [\[PDF\]](#)
- [12] **A delay compensation framework for connected testbeds**
S. Guo, Y. Liu, Y. Zheng and T. Ersal
IEEE Transactions on Systems, Man, and Cybernetics: Systems 52(7), pp. 4163-4176, 2022 [\[PDF\]](#)
- [13] **Modeling human steering behavior in teleoperation of unmanned ground vehicles with varying speed**
C. Li, Y. Tang, Y. Zheng, P. Jayakumar and T. Ersal
Human Factors 64(3), pp. 589-600, 2022 [\[PDF\]](#)
- [14] **Model-free speed management for a heterogeneous platoon of connected ground vehicles**
Y. Weng, R. Salehi, X. Ge, D. Rizzo, M. P. Castanier, S. Heim and T. Ersal
Journal of Intelligent Transportation Systems: Technology, Planning, and Operations 26(2), pp. 183-197, 2022 [\[PDF\]](#)
- [15] **Real-time trajectory planning for automated vehicle safety and performance in dynamic environments**
H. Febbo, P. Jayakumar, J. L. Stein and T. Ersal
Journal of Autonomous Vehicles and Systems 1, pp. 041001 (12 pages), 2021 [\[PDF\]](#)
- [16] **Terrain adaptive trajectory planning and tracking on deformable terrains**
J. Dallas, M. Cole, P. Jayakumar and T. Ersal
IEEE Transactions on Vehicular Technology 70(11), pp. 11255 - 11268, 2021 [\[PDF\]](#)
- [17] **Collision imminent steering on curved roads using one-level nonlinear model predictive control**
J. Wurts, J. L. Stein and T. Ersal
IEEE Access 9, pp. 39292-39302, 2021 [\[PDF\]](#)
- [18] **A workload adaptive haptic shared control scheme for semi-autonomous driving**
R. Luo, Y. Weng, Y. Wang, P. Jayakumar, M. J. Brudnak, V. Paul, V. Desaraju, J. L. Stein, T. Ersal and X. J. Yang
Accident Analysis and Prevention 152, pp. 105968 (13 pages), 2021 [\[PDF\]](#)
- [19] **Effects of cycle duration and test hardware in relative humidity cycling of a polymer electrolyte membrane**
J. Chen, A. Goshtasbi, A. P. Soleymani, M. Ricketts, J. Waldecker, C. Xu, J. Yang, T. Ersal and J. Jankovic
Journal of Power Sources 476, pp. 228576 (9 pages), 2020 [\[PDF\]](#)
- [20] **Evaluation of a predictor based framework in high-speed teleoperated military UGVs**
Y. Zheng, M. Brudnak, P. Jayakumar, J. L. Stein and T. Ersal
IEEE Transactions on Human-Machine Systems 50(6), pp. 561-572, 2020 [\[PDF\]](#)
- [21] **Collision imminent steering at high speed using nonlinear model predictive control**
J. Wurts, J. L. Stein and T. Ersal
IEEE Transactions on Vehicular Technology 69(8), pp. 8278-8289, 2020 [\[PDF\]](#)
- [22] **Online terrain estimation for autonomous vehicles on deformable terrains**
J. Dallas, K. Jain, Z. Dong, L. Sapronov, M. P. Cole, P. Jayakumar and T. Ersal
Journal of Terramechanics 91, pp. 11-22, 2020 [\[PDF\]](#)
- [23] **Degradation-conscious control for enhanced lifetime of automotive polymer electrolyte membrane fuel cells**
A. Goshtasbi and T. Ersal
Journal of Power Sources 457, pp. 227996 (15 pages), 2020 [\[PDF\]](#)
- [24] **Connected and automated road vehicles: State of the art and future challenges**
T. Ersal, I. Kolmanovsky, N. Masoud, N. Ozay, J. Scruggs, R. Vasudevan and G. Orosz
Vehicle System Dynamics 58(5), pp. 672-704, 2020 [\[PDF\]](#)

- [25] **An energy and emissions conscious adaptive cruise controller for a connected automated diesel truck**
C. Huang, R. Salehi, T. Ersal and A. Stefanopoulou
Vehicle System Dynamics 58(5), pp. 805-825, 2020 [\[PDF\]](#)
- [26] **Effective parameterization of PEM fuel cell models - Part II: Robust parameter subset selection, robust optimal experimental design, and parameter identification algorithm**
A. Goshtasbi, J. Chen, J. Waldecker, S. Hirano and T. Ersal
Journal of the Electrochemical Society 167(4), pp. 044505 (11 pages), 2020 [\[PDF\]](#)
- [27] **Effective parameterization of PEM fuel cell models - Part I: Sensitivity analysis and parameter identifiability**
A. Goshtasbi, J. Chen, J. Waldecker, S. Hirano and T. Ersal
Journal of the Electrochemical Society 167(4), pp. 044504 (18 pages), 2020 [\[PDF\]](#) (Editor's Choice paper)
- [28] **A mathematical model toward real-time monitoring of automotive PEM fuel cells**
A. Goshtasbi, B. Pence, J. Chen, M. DeBolt, C. Wang, J. Waldecker, S. Hirano and T. Ersal
Journal of the Electrochemical Society 167(2), pp. 024518 (21 pages), 2020 [\[PDF\]](#)
- [29] **Who's the boss? Arbitrating control authority between a human driver and automation system**
A. Bhardwaj, A. Ghasemi, Y. Zheng, H. Febbo, P. Jayakumar, T. Ersal, J. L. Stein and B. Gillespie
Transportation Research Part F: Traffic Psychology and Behaviour 68, pp. 144-160, 2020 [\[PDF\]](#)
- [30] **Predictive cruise control with private vehicle-to-vehicle communication for improving fuel consumption and emissions**
X. Zhang, C. Huang, M. Liu, A. Stefanopoulou and T. Ersal
IEEE Communications Magazine 57(10), pp. 91-97, 2019 [\[PDF\]](#)
- [31] **A delay compensation framework for predicting heading in teleoperated ground vehicles**
Y. Zheng, M. Brudnak, P. Jayakumar, J. L. Stein and T. Ersal
IEEE/ASME Transactions on Mechatronics 24(5), pp. 2365-2376, 2019 [\[PDF\]](#)
- [32] **Through-the-membrane transient phenomena in PEM fuel cells: A modeling study**
A. Goshtasbi, P. García-Salaberri, J. Chen, K. Talukdar, D. Sanchez and T. Ersal
Journal of The Electrochemical Society 166(7), pp. F3154-F3179, 2019 [\[PDF\]](#)
- [33] **Optimality of norm-optimal iterative learning control among linear time invariant iterative learning control laws in terms of balancing robustness and performance**
X. Ge, J. L. Stein and T. Ersal
Journal of Dynamic Systems Measurement and Control 141(4), pp. 044502 (5 pages), 2019 [\[PDF\]](#)
- [34] **Power loss minimization in islanded microgrids: A communication-free decentralized power control approach using extremum seeking**
S.-Y. Shieh, T. Ersal and H. Peng
IEEE Access 7(1), pp. 20879-20893, 2019 [\[PDF\]](#)
- [35] **Workload management in teleoperation of unmanned ground vehicles: Effects of a delay compensation aid on human operators' workload and teleoperation performance**
S. Lu, M. Y. Zhang, T. Ersal and X. J. Yang
Human-Computer Interaction 35(19), pp. 1820-1830, 2019 [\[PDF\]](#)
- [36] **Improving the robustness of an MPC-based obstacle avoidance algorithm to parametric uncertainty using worst-case scenarios**
J. Liu, P. Jayakumar, J. L. Stein and T. Ersal
Vehicle System Dynamics 57(6), pp. 874-913, 2019 [\[PDF\]](#)
- [37] **A predictor based framework for delay compensation in networked closed-loop systems**
Y. Zheng, M. J. Brudnak, P. Jayakumar, J. L. Stein and T. Ersal
IEEE/ASME Transactions on Mechatronics 23(5), pp. 2482-2493, 2018 [\[PDF\]](#)
- [38] **Wireless charger deployment for an electric bus network: A multi-objective life cycle optimization**
Z. Bi, G. A. Keoleian and T. Ersal
Applied Energy 225, pp. 1090-1101, 2018 [\[PDF\]](#) (Selected for the Progress in Applied Energy special section)
- [39] **Model-based analysis of PFSA membrane mechanical response to relative humidity and load cycling in PEM fuel cells**
M. Hasan, A. Goshtasbi, J. Chen, M. H. Santare and T. Ersal
Journal of the Electrochemical Society 165(6), pp. F3359-F3372, 2018 [\[PDF\]](#)

- [40] **Modeling human steering behavior during path following in teleoperation of unmanned ground vehicles**
H. Mirinejad, P. Jayakumar and T. Ersal
Human Factors 60(5), pp. 669–684, 2018 [\[PDF\]](#)
- [41] **A nonlinear model predictive control formulation for obstacle avoidance in high-speed autonomous ground vehicles in unstructured environments**
J. Liu, P. Jayakumar, J. L. Stein and T. Ersal
Vehicle System Dynamics 56(6), pp. 853–882, 2018 [\[PDF\]](#)
- [42] **Evaluating mobility vs. latency in unmanned ground vehicles**
D. Gorsich, P. Jayakumar, M. Cole, C. Crean, A. Jain, and T. Ersal
Journal of Terramechanics 80, pp. 11–19, 2018 [\[PDF\]](#)
- [43] **Frequency domain analysis of robust monotonic convergence of norm-optimal iterative learning control**
X. Ge, J. L. Stein and T. Ersal
IEEE Transactions on Control Systems Technology 26(2), pp. 637–651, 2018 [\[PDF\]](#)
- [44] **A frequency-dependent filter design approach for norm-optimal iterative learning control and its fundamental trade-off between robustness, convergence speed and steady state error**
X. Ge, J. L. Stein and T. Ersal
Journal of Dynamic Systems Measurement and Control 140(2), pp. 021004 (10 pages), 2018 [\[PDF\]](#)
- [45] **Battery state of health monitoring by estimation of the number of cyclable Li-ions**
X. Zhou, J. L. Stein and T. Ersal
Control Engineering Practice 66(Sep 2017), pp. 51–63, 2017 [\[PDF\]](#)
- [46] **Combined speed and steering control in high speed autonomous ground vehicles for obstacle avoidance using model predictive control**
J. Liu, P. Jayakumar, J. L. Stein and T. Ersal
IEEE Transactions on Vehicular Technology 66(10), pp. 8746–8763, 2017 [\[PDF\]](#)
- [47] **Battery state of health monitoring by estimation of side reaction current density via retrospective-cost subsystem identification**
X. Zhou, D. S. Bernstein, J. L. Stein and T. Ersal
Journal of Dynamic Systems Measurement and Control 139(9), pp. 091007 (15 pages), 2017 [\[PDF\]](#)
- [48] **Computationally efficient pseudo-2d non-isothermal modeling of polymer electrolyte membrane fuel cells with two-phase phenomena**
A. Goshtasbi, B. Pence and T. Ersal
Journal of The Electrochemical Society 163(3), pp. F1412–F1432, 2016 [\[PDF\]](#)
- [49] **A study on model fidelity for model predictive control based obstacle avoidance in high speed autonomous ground vehicles**
J. Liu, P. Jayakumar, J. L. Stein and T. Ersal
Vehicle System Dynamics 54(11), pp. 1629–1650, 2016 [\[PDF\]](#)
- [50] **Sustainability, resiliency, and grid stability of the coupled electricity and transportation infrastructures: Case for an integrated analysis**
J. C. Kelly, T. Ersal, C.-T. Li, B. M. Marshall, S. Kundu, G. A. Keoleian, I. A. Hiskens, J. L. Stein and H. Peng
Journal of Infrastructure Systems 21(4), pp. 04015001 (11 pages), 2015 [\[PDF\]](#)
- [51] **Reducing soot emissions in a diesel series hybrid electric vehicle using a power rate constraint map**
Y. Kim, A. Salvi, A. Stefanopoulou and T. Ersal
IEEE Transactions on Vehicular Technology 64(1), pp. 2–12, 2015 [\[PDF\]](#)
- [52] **An iterative learning control approach to improving fidelity in internet-distributed hardware-in-the-loop simulation**
T. Ersal, M. J. Brudnak, A. Salvi, Y. Kim, J. B. Siegel and J. L. Stein
Journal of Dynamic Systems Measurement and Control 136(6), pp. 061012 (8 pages), 2014 [\[PDF\]](#)
- [53] **Hardware-in-the-loop validation of a power management strategy for hybrid powertrains**
Y. Kim, A. Salvi, J. B. Siegel, Z. Filipi, A. Stefanopoulou and T. Ersal
Control Engineering Practice 29, pp. 277–286, 2014 [\[PDF\]](#)

- [54] **Keeping ground robots on the move through battery and mission management**
T. Ersal, Y. Kim, J. Broderick, T. Guo, A. Sadrpour, A. Stefanopoulou, J. B. Siegel, D. Tilbury, E. Atkins, H. Peng, J. Jin and A. G. Ulsoy
ASME Dynamic Systems and Control Magazine 2(2), pp. 1-6, 2014 [\[PDF\]](#)
- [55] **Theoretical and experimental indicators of falls during pregnancy as assessed by postural perturbations**
T. Ersal, J. L. McCrory and K. H. Sienko
Gait and Posture 39(1), pp. 218-223, 2014 [\[PDF\]](#)
- [56] **Coupling between component sizing and regulation capability in microgrids**
T. Ersal, C. Ahn, D. L. Peters, J. Whitefoot, A. R. Mechtenberg, I. A. Hiskens, H. Peng, A. Stefanopoulou, P. Y. Papalambros and J. L. Stein
IEEE Transactions on Smart Grid 4(3), pp. 1576-1585, 2013 [\[PDF\]](#)
- [57] **A mathematical model for incorporating biofeedback into human postural control**
T. Ersal and K. H. Sienko
Journal of NeuroEngineering and Rehabilitation 10, pp.14 (12 pages), 2013 [\[PDF\]](#)
- [58] **Effect of coupling point selection on distortion in internet-distributed hardware-in-the-loop simulation**
T. Ersal, R. B. Gillespie, M. Brudnak, J. L. Stein and H. K. Fathy
International Journal of Vehicle Design 61(1-4), pp. 67-85, 2013 [\[PDF\]](#)
- [59] **Statistical transparency analysis in internet-distributed hardware-in-the-loop simulation**
T. Ersal, M. Brudnak, J. L. Stein and H. K. Fathy
IEEE/ASME Transactions on Mechatronics 17(2), pp. 228-238, 2012 [\[PDF\]](#)
- [60] **Development and model-based transparency analysis of an internet-distributed hardware-in-the-loop simulation platform**
T. Ersal, M. Brudnak, A. Salvi, J. L. Stein, Z. Filipi and H. K. Fathy
Mechatronics 21(1), pp. 22-29, 2011 [\[PDF\]](#)
- [61] **Model-based analysis and classification of driver distraction under secondary tasks**
T. Ersal, H. J. A. Fuller, O. Tsimhoni, J. L. Stein and H. K. Fathy
IEEE Transactions on Intelligent Transportation Systems 11(3), pp. 692-701, 2010 [\[PDF\]](#)
- [62] **Model reduction in vehicle dynamics using importance analysis**
T. Ersal, B. Kittirungsri, H. K. Fathy and J. L. Stein
Vehicle System Dynamics 47(7), pp. 851–865, 2009 [\[PDF\]](#)
- [63] **Structural simplification of modular bond-graph models based on junction inactivity**
T. Ersal, H. K. Fathy and J. L. Stein
Simulation Modelling Practice and Theory 17(1), pp. 175-196, 2009 [\[PDF\]](#)
- [64] **Orienting body coordinate frames using Karhunen-Loève expansion for more effective structural simplification**
T. Ersal, H. K. Fathy and J. L. Stein
Simulation Modelling Practice and Theory 17(1), pp. 197-210, 2009 [\[PDF\]](#)
- [65] **Realization-preserving structure and order reduction of nonlinear energetic system models using energy trajectory correlations**
T. Ersal, H. K. Fathy and J. L. Stein
Journal of Dynamic Systems Measurement and Control 131(3), pp. 031004 (8 pages), 2009 [\[PDF\]](#)
- [66] **A review of proper modeling techniques**
T. Ersal, H. K. Fathy, L. S. Louca, D. G. Rideout and J. L. Stein
Journal of Dynamic Systems Measurement and Control 130(6), pp. 061008 (13 pages), 2008 [\[PDF\]](#)

Conference Publications

- [1] **Obtaining computationally efficient solutions for high-speed emergency maneuvers using a Koopman operator-based framework**
E. Kochergin, C. Shen, S. Yu, B. Epureanu and T. Ersal
IEEE Intelligent Vehicles Symposium, 2026 [\[PDF\]](#)

- [2] **Autonomous driving using linear model predictive control with a Koopman operator based bilinear vehicle model**
S. Yu, C. Shen and T. Ersal
IFAC International Symposium on Advances in Automotive Control, 2022 [\[PDF\]](#) (IFAC Young Author Award Finalist)
- [3] **Designing the loss function of vehicle speed predictors to enhance ecological adaptive cruise control performance**
E. Hyeon, T. Ersal, Y. Kim and A. Stefanopoulou
American Control Conference, 2022 [\[PDF\]](#)
- [4] **A three-phase framework for global path planning for nonholonomic autonomous vehicles on 3D terrains**
C. Shen, S. Yu and T. Ersal
Modeling, Estimation and Control Conference, 2021 [\[PDF\]](#) (ASME Automotive and Transportation Systems Technical Committee Best Paper Award)
- [5] **Nonlinear model predictive planning and control for high-speed autonomous vehicles on 3D terrains**
S. Yu, C. Shen and T. Ersal
Modeling, Estimation and Control Conference, 2021 [\[PDF\]](#)
- [6] **Combined trajectory planning and tracking for autonomous vehicles on deformable terrains**
J. Dallas, Y. Weng and T. Ersal
Dynamic Systems and Control Conference, 2020 [\[PDF\]](#)
- [7] **Contingent nonlinear model predictive control for collision imminent steering in uncertain environments**
J. Dallas, J. Wurts, J. L. Stein and T. Ersal
IFAC World Congress, 2020 [\[PDF\]](#)
- [8] **A robust energy and emissions conscious speed control framework for connected vehicles with privacy considerations**
C. Huang, X. Zhang, R. Salehi, T. Ersal and A. G. Stefanopoulou
American Control Conference, 2020 [\[PDF\]](#) (ASME Automotive and Transportation Systems Best Paper Award Finalist)
- [9] **Design and evaluation of a workload-adaptive haptic shared control framework for semi-autonomous driving**
Y. Weng, R. Luo, P. Jayakumar, M. Brudnak, V. Paul, V. Desaraju, J. L. Stein, X. J. Yang and T. Ersal
American Control Conference, 2020 [\[PDF\]](#)
- [10] **Adaptive nonlinear model predictive control for collision imminent steering with uncertain coefficient of friction**
J. Wurts, J. Dallas, J. L. Stein and T. Ersal
American Control Conference, 2020 [\[PDF\]](#)
- [11] **Robust parameter subset selection and optimal experimental design for effective parameterization of PEM fuel cell models**
A. Goshtasbi, J. Chen, J. Waldecker, S. Hirano and T. Ersal
American Control Conference, 2020 [\[PDF\]](#)
- [12] **Synchronization of pulse-and-glide operation in vehicle platooning using cooperative adaptive cruise control**
S.-Y. Shieh, T. Ersal and H. Peng
American Control Conference, 2020 [\[PDF\]](#) (ASME Automotive and Transportation Systems Best Paper Award Finalist)
- [13] **Minimum slip collision imminent steering in curved roads using nonlinear model predictive control**
J. Wurts, J. L. Stein and T. Ersal
American Control Conference, 2019 [\[PDF\]](#)
- [14] **Pulse-and-glide operation for parallel hybrid electric vehicles with step-gear transmission in automated car-following scenario with ride comfort consideration**
S.-Y. Shieh, T. Ersal and H. Peng
American Control Conference, 2019 [\[PDF\]](#)

- [15] **Toward real-time assessment of workload: A Bayesian inference approach**
R. Luo, Y. Wang, Y. Weng, V. Paul, M. J. Brudnak, P. Jayakumar, M. Reed, J. L. Stein, T. Ersal and J. Yang
Annual Meeting of the Human Factors and Ergonomics Society, 2019 [\[PDF\]](#)
- [16] **LQ-MPC design for degradation-conscious control of PEM fuel cells**
A. Goshtasbi and T. Ersal
American Control Conference, 2019 [\[PDF\]](#)
- [17] **On parameterizing PEM fuel cell models**
A. Goshtasbi, J. Chen, J. Waldecker, S. Hirano and T. Ersal
American Control Conference, 2019 [\[PDF\]](#)
- [18] **Degradation-conscious control for PEM fuel cell systems**
A. Goshtasbi and T. Ersal
236th ECS Meeting, 2019 [\[PDF\]](#)
- [19] **Optimal experimental design for parameter identification of PEM fuel cell models**
A. Goshtasbi, J. Chen, J. Waldecker, S. Hirano and T. Ersal
236th ECS Meeting, 2019 [\[PDF\]](#)
- [20] **Soft sensor for real-time monitoring of automotive PEM fuel cell systems**
A. Goshtasbi, B. Pence, J. Chen, J. Waldecker, S. Hirano and T. Ersal
236th ECS Meeting, 2019 [\[PDF\]](#)
- [21] **Modeling mechanical behaviors and lifetime of a polymer electrolyte membrane in fuel cell dynamic operations**
M. Hasan, A. Goshtasbi, J. Chen, M. H. Santare and T. Ersal
236th ECS Meeting, 2019 [\[PDF\]](#)
- [22] **Increasing computational speed of nonlinear model predictive control using analytic gradients of the explicit integration scheme with application to collision imminent steering**
J. Wurts, J. L. Stein and T. Ersal
IEEE Conference on Control Technology and Applications, 2018 [\[PDF\]](#)
- [23] **Collision imminent steering using nonlinear model predictive control**
J. Wurts, J. L. Stein and T. Ersal
American Control Conference, 2018 [\[PDF\]](#)
- [24] **Optimal speed planning using limited preview for connected vehicles with diesel engines**
C. Huang, R. Salehi, T. Ersal and A. G. Stefanopoulou
International Symposium on Advanced Vehicle Control, 2018 [\[PDF\]](#)
- [25] **Modeling mechanical behaviors of a polymer electrolyte membrane in fuel cell dynamic operations**
M. Hasan, A. Goshtasbi, J. Chen, M. H. Santare and T. Ersal
233rd ECS Meeting, 2018 [\[PDF\]](#)
- [26] **Effects of a delay compensation aid on teleoperation of unmanned ground vehicles**
S. Lu, M. Y. Zhang, T. Ersal and X. J. Yang
Human-Robot Interaction, 2018 [\[PDF\]](#)
- [27] **A 2d through-the-membrane transient model for polymer electrolyte membrane fuel cells**
A. Goshtasbi, B. Pence and T. Ersal
232nd ECS Meeting, 2017 [\[PDF\]](#)
- [28] **A communication-free distributed power control approach for power loss minimization in microgrids using extremum seeking**
S.-Y. Shieh, T. Ersal and H. Peng
Dynamic Systems and Control Conference, 2017 [\[PDF\]](#) (ASME Energy Systems Best Paper Award)
- [29] **A real-time pseudo-2D bi-domain model of PEM fuel cells for automotive applications**
A. Goshtasbi, B. Pence and T. Ersal
Dynamic Systems and Control Conference, 2017 [\[PDF\]](#)
- [30] **A driver model for predicting human steering performance in teleoperated path following of unmanned ground vehicles**
H. Mirinejad, P. Jayakumar and T. Ersal
Dynamic Systems and Control Conference, 2017 [\[PDF\]](#)

- [31] **Moving obstacle avoidance for large, high-speed autonomous ground vehicles**
H. Febbo, J. Liu, P. Jayakumar, J. L. Stein and T. Ersal
American Control Conference, 2017 [\[PDF\]](#) (ASME DSCD Automotive and Transportation Systems Best Paper Award)
- [32] **A double-worst-case formulation for improving the robustness of an MPC-based obstacle avoidance algorithm to parametric uncertainty**
J. Liu, P. Jayakumar, J. L. Stein and T. Ersal
American Control Conference, 2017 [\[PDF\]](#)
- [33] **Battery state of health monitoring by estimation of the number of cyclable Li-ions**
X. Zhou, J. L. Stein and T. Ersal
ASME Dynamic Systems and Control Conference, 2016 [\[PDF\]](#) (ASME Energy Systems Best Paper Award Finalist; Best Student Paper Finalist)
- [34] **Optimization based weighting matrices design for norm optimal iterative learning control**
X. Ge, J. L. Stein and T. Ersal
ASME Dynamic Systems and Control Conference, 2016 [\[PDF\]](#)
- [35] **An experimental evaluation of a model-free predictor framework in teleoperated vehicles**
Y. Zheng, M. J. Brudnak, P. Jayakumar, J. L. Stein and T. Ersal
IFAC Workshop on Time Delay Systems, 2016 [\[PDF\]](#)
- [36] **A combined plant/controller optimization framework for hybrid vehicles with mpg, emissions and drivability considerations**
H. Febbo, T. Ersal and J. L. Stein
ASME International Design Engineering Technical Conference, 2016 [\[PDF\]](#)
- [37] **1+1d non-isothermal and two-phase transient model of PEM fuel cells for real-time estimation**
A. Goshtasbi, B. Pence and T. Ersal
ECS Meeting, 2016 [\[PDF\]](#)
- [38] **A frequency domain approach for designing filters for norm-optimal iterative learning control and its fundamental tradeoff between robustness, convergence speed and steady state error**
X. Ge, J. L. Stein and T. Ersal
American Control Conference, 2016 [\[PDF\]](#)
- [39] **An MPC algorithm with combined speed and steering control for obstacle avoidance in autonomous ground vehicles**
J. Liu, P. Jayakumar, J. L. Stein and T. Ersal
Dynamic Systems and Control Conference, 2015 [\[PDF\]](#) (Best Student Paper Finalist)
- [40] **Performance analysis of a model-free predictor for delay compensation in networked systems**
X. Ge, Y. Zheng, M. J. Brudnak, P. Jayakumar, J. L. Stein and T. Ersal
IFAC Workshop on Time Delay Systems, 2015 [\[PDF\]](#)
- [41] **A model-free predictor framework for tele-operated vehicles**
X. Ge, M. J. Brudnak, P. Jayakumar, J. L. Stein and T. Ersal
American Control Conference, 2015 [\[PDF\]](#)
- [42] **A subsystem identification technique towards battery state of health monitoring under state of charge estimation errors**
X. Zhou, T. Ersal, J. L. Stein and D. S. Bernstein
American Control Conference, 2015 [\[PDF\]](#)
- [43] **A multi-stage optimization formulation for MPC-based obstacle avoidance in autonomous vehicles using a LIDAR sensor**
J. Liu, P. Jayakumar, J. L. Stein and T. Ersal
ASME Dynamic Systems and Control Conference, 2014 [\[PDF\]](#)
- [44] **Battery state of health monitoring by side reaction current density estimation via retrospective-cost subsystem identification**
X. Zhou, T. Ersal, J. L. Stein and D. S. Bernstein
ASME Dynamic Systems and Control Conference, 2014 [\[PDF\]](#) (Best Student Paper Finalist)
- [45] **A norm optimal iterative learning control framework towards internet-distributed hardware-in-the-loop simulation**
X. Ge, M. J. Brudnak, J. L. Stein and T. Ersal
American Control Conference, 2014 [\[PDF\]](#)

- [46] **Battery health diagnostics using retrospective-cost system identification: Sensitivity to noise and initialization errors**
X. Zhou, T. Ersal, J. L. Stein and D. S. Bernstein
Dynamic Systems and Control Conference, 2013 [\[PDF\]](#) (Best Student Paper Finalist)
- [47] **An observer based framework to improve fidelity in internet-distributed hardware-in-the-loop simulations**
A. Tandon, M. J. Brudnak, J. L. Stein and T. Ersal
Dynamic Systems and Control Conference, 2013 [\[PDF\]](#)
- [48] **The role of model fidelity in model predictive control based hazard avoidance in unmanned ground vehicles using lidar sensors**
J. Liu, P. Jayakumar, J. L. Overholt, J. L. Stein and T. Ersal
Dynamic Systems and Control Conference, 2013 [\[PDF\]](#)
- [49] **Engine-in-the-loop validation of a frequency domain power distribution strategy for series hybrid powertrains**
Y. Kim, T. Ersal, A. Salvi, Z. Filipi and A. Stefanopoulou
IFAC Workshop on Engine and Powertrain Control, Simulation and Modeling, 2012 [\[PDF\]](#)
- [50] **Characterizing postural stability in pregnant fallers and nonfallers**
T. Ersal, J. L. McCrory and K. H. Sienko
Gait and Clinical Movement Analysis Society Conference, 2012 [\[PDF\]](#)
- [51] **An iterative learning control approach to improving fidelity in internet-distributed hardware-in-the-loop simulation**
T. Ersal, M. Brudnak and J. L. Stein
ASME Dynamic Systems and Control Conference, 2012 [\[PDF\]](#) (Semi-Plenary Paper Award)
- [52] **A method to achieve high fidelity in internet-distributed hardware-in-the-loop simulation**
T. Ersal, M. Brudnak, Y. Kim, A. Salvi, J. B. Siegel, A. Stefanopoulou, J. L. Stein and Z. Filipi
NDIA Ground Vehicle Systems Engineering and Technology Symposium, 2012 [\[PDF\]](#)
- [53] **On the effect of dc source voltage on inverter-based frequency and voltage regulation in a military microgrid**
T. Ersal, C. Ahn, I. A. Hiskens, H. Peng, A. G. Stefanopoulou and J. L. Stein
American Control Conference, 2012 [\[PDF\]](#)
- [54] **Noninvasive battery-health diagnostics using retrospective-cost identification of inaccessible subsystems**
A. M. D'Amato, J. Forman, T. Ersal, A. A. Ali, J. L. Stein, H. Peng and D. S. Bernstein
ASME Dynamic Systems and Control Conference, 2012 [\[PDF\]](#)
- [55] **Effect of coupling point selection on distortion in internet-distributed hardware-in-the-loop simulation**
T. Ersal, R. B. Gillespie, M. Brudnak, J. L. Stein and H. K. Fathy
American Control Conference, 2011 [\[PDF\]](#)
- [56] **Impact of controlled plug-in EVs on microgrids: A military microgrid example**
T. Ersal, C. Ahn, I. A. Hiskens, H. Peng and J. L. Stein
IEEE Power and Energy Society General Meeting, 2011 [\[PDF\]](#)
- [57] **Integration of vibrotactile feedback in a 3D model of human balance**
T. Ersal, V. V. Vichare and K. H. Sienko
The Annual Meeting for the American Society of Biomechanics, 2009 [\[PDF\]](#)
- [58] **Variation-based transparency analysis of an internet-distributed hardware-in-the-loop simulation platform for vehicle powertrain systems**
T. Ersal, M. Brudnak, J. L. Stein and H. K. Fathy
ASME Dynamic Systems and Control Conference, 2009 [\[PDF\]](#)
- [59] **Development of an internet-distributed hardware-in-the-loop simulation platform for an automotive application**
T. Ersal, M. Brudnak, A. Salvi, J. L. Stein, Z. Filipi and H. K. Fathy
ASME Dynamic Systems and Control Conference, 2009 [\[PDF\]](#)
- [60] **Model reduction in vehicle dynamics using importance analysis**
T. Ersal, B. Kittirungsri, H. K. Fathy and J. L. Stein
ASME Dynamic Systems and Control Conference, 2008 [\[PDF\]](#)

- [61] **Realization-preserving structure and order reduction of nonlinear energetic system models using energy trajectory correlations**
T. Ersal, H. K. Fathy and J. L. Stein
ASME International Mechanical Engineering Congress and Exposition, 2007 [\[PDF\]](#)
- [62] **A review of proper modeling techniques**
T. Ersal, H. K. Fathy, L. S. Louca, D. G. Rideout and J. L. Stein
ASME International Mechanical Engineering Congress and Exposition, 2007 [\[PDF\]](#)
- [63] **Orienting body coordinate frames using Karhunen-Loève expansion for more effective structural simplification**
T. Ersal, H. K. Fathy and J. L. Stein
ASME International Mechanical Engineering Congress and Exposition, 2006 [\[PDF\]](#)
- [64] **Structural simplification of modular bond-graph models based on junction inactivity**
T. Ersal, H. K. Fathy and J. L. Stein
ASME International Mechanical Engineering Congress and Exposition, 2006 [\[PDF\]](#)
- [65] **A bond graph based modular modeling approach towards an automated modeling environment for reconfigurable machine tools**
T. Ersal, J. L. Stein and L. S. Louca
International Conference on Integrated Modeling and Analysis in Applied Control and Automation, 2004 [\[PDF\]](#)
- [66] **A modular modeling approach for the design of reconfigurable machine tools**
T. Ersal, J. L. Stein and L. S. Louca
ASME International Mechanical Engineering Congress and Exposition, 2004 [\[PDF\]](#)

Books

- [1] **Time Delay Systems - Theory, Numerics, Applications, and Experiments**
T. Insperger, T. Ersal, and G. Orosz
Advances in Delays and Dynamics 7, Springer: Cham, 2017

Book Chapters

- [1] **Analysis of a model-free predictor for delay compensation in networked systems**
X. Ge, Y. Zheng, M. J. Brudnak, P. Jayakumar, J. L. Stein and T. Ersal
Time-Delay Systems - Theory, Numerics, Applications and Experiments, T. Insperger, T. Ersal and G. Orosz (Ed.), vol. 7 of Advances in Delays and Dynamics, Springer: Cham, 2017 [\[PDF\]](#)
- [2] **Energy-based bond graph model reduction**
L. S. Louca, D. G. Rideout, T. Ersal and J. L. Stein
Bond graph modelling of engineering systems, W. Borutzky (Ed.), Springer: New York, 2011 [\[PDF\]](#)

Theses

- [1] **Realization-preserving simplification and reduction of dynamic system models at the graph level**
T. Ersal
Ph.D. Dissertation, University of Michigan, Ann Arbor, 2007
- [2] **A modular modeling system for reconfigurable machine tools**
T. Ersal
Master's Thesis, University of Michigan, Ann Arbor, 2003

Other Publications

- [1] **Mobility Assessment Methods and Tools for Autonomous Military Ground Systems**
M. Letherwood, P. Jayakumar, L. Chermak, T. Ersal, et al.
NATO Science and Technology Organization, Technical Memorandum TM-AVT-ET-194, 286 pages, 2021
- [2] **Energy Intelligence**
T. Ersal
TARDEC Accelerate Magazine, pp. 16-19, 2014

PATENTS

- [1] **Lane change maneuvers with minimized tire slip**
Tulga Ersal, Jeffrey L. Stein, John B. Wurts
US Patent 12,195,083, January 14, 2025
- [2] **Contingent model predictive control incorporating online estimation of nominal and uncertain parameters**
Tulga Ersal, Jeffrey L. Stein, John B. Wurts, James Dallas
US Patent 12,122,365, October 22, 2024
- [3] **Degradation-conscious control for PEM fuel cells**
A. Goshtasbi and T. Ersal
US Patent 11,515,553, November 29, 2022
- [4] **Collision imminent steering control systems and methods**
T. Ersal, J.L. Stein, J. Wurts
U.S. Patent 10,836,383, November 17, 2020

PRESENTATIONS

- [1] **Off-road Ground Vehicle Mobility and Assessment**
Keynote, Autonomy Workshop, 55th Conference of the International Society for Terrain-Vehicle Systems, Lebanon, NH, Oct 10, 2025.
- [2] **Resilient Trajectory Planning for Extreme Mobility on Challenging Slopes**
Mercedes-Benz Innovation Talk, Farmington Hills, MI, July 29, 2025.
- [3] **Resilient Trajectory Planning for Extreme Mobility on Challenging Slopes**
ARC Annual Review, Ann Arbor, MI, Jun 17, 2025.
- [4] **Forging Further with Foliar Foresight: Perception and Planning for Autonomous Navigation through Vegetated Terrains**
Plenary, ARC Annual Review, Ann Arbor, MI, Jun 17, 2025.
- [5] **Enhancing Autonomous Vehicle Navigation in Challenging Off-Road Environments**
Invited Talk, Technical Talk Series, US Army Ground Vehicle Systems Center, online, Jan 6, 2025.
- [6] **Pushing the Mobility Limits of Autonomous Off-Road Vehicles**
Workshop on Challenges and Opportunities for Modeling, Identification, and Control of Off-Road Vehicle Autonomy, Modeling, Estimation and Control Conference, Chicago, IL, Oct 27, 2024.
- [7] **State of and Open Issues in the NATO Autonomy Stack**
NATO Science and Technology Organization Panel Business Meeting, Koblenz, Germany, Oct 17, 2024.
- [8] **What's a Little Dirt in the Eye? Detection and Adaptive Planning for Off-Road Autonomous Navigation under Soiled Sensors**
Plenary, ARC Annual Review, Ann Arbor, MI, Jun 5, 2024.
- [9] **A Shared Control Framework for Teaching Advanced Driving Skills**
Toyota Research Institute Seminar, Online, Feb 29, 2024.
- [10] **Chrono as an Enabler in Pushing the Mobility Limits of Autonomous Off-Road Vehicles**
Machine-Ground Interaction Consortium, Madison, WI, Dec 5, 2023.
- [11] **Pushing the Mobility Limits of Autonomous Driving**
External Review Board, Mechanical Engineering, University of Michigan, Nov 3, 2023.
- [12] **Shared Control: A Means for Pushing the Capabilities of Advanced Driver Assistance Systems on the Way to Full Autonomy**
Toyota Research Institute Seminar, online, Feb 16, 2023.
- [13] **Autonomy Demo Evaluation**
NATO Science and Technology Organization Panel Business Meeting, Varna, Bulgaria, Sep 29, 2022.
- [14] **ARL Phoenix Stack Evaluation**
NATO Science and Technology Organization Panel Business Meeting, Varna, Bulgaria, Sep 28, 2022.
- [15] **NATO Autonomy Stack Gaps**
NATO Science and Technology Organization Panel Business Meeting, Varna, Bulgaria, Sep 28, 2022.

- [16] **Terrain-Aware Local Planning**
NATO Science and Technology Organization Panel Business Meeting, Varna, Bulgaria, Sep 28, 2022.
- [17] **Evaluation of Progress in Demonstration of Autonomy Challenges**
NATO Science and Technology Organization Panel Business Meeting, Varna, Bulgaria, Sep 26, 2022.
- [18] **Fast and Curious: How to Predict and Push Limits of Autonomous Mobility on Deformable Terrains**
Plenary, ARC Annual Review, Ann Arbor, MI, Jun 21, 2022.
- [19] **Cognitive Modeling of Human Operator Behavior during Interaction with Autonomous Systems**
ARC Annual Review, Ann Arbor, MI, Jun 21, 2022.
- [20] **Autonomy for Mobility Assessment Methods and Tools for Autonomous Military Ground Systems**
NATO Science and Technology Organization Panel Business Meeting, Sibiu, Romania, May 24, 2022.
- [21] **Cognitive Modeling of Human Operator Behavior during Interaction with Autonomous Systems**
ARC Research Seminar Series, online, Dec 3, 2021.
- [22] **Terrain Adaptive Planning**
NATO Science and Technology Organization Panel Business Meeting, online, Oct 15, 2021.
- [23] **Autonomy for Mobility Assessment Methods and Tools for Autonomous Military Ground Systems**
NATO Science and Technology Organization Panel Business Meeting, online, Sep 27, 2021.
- [24] **Autonomy for Mobility Assessment Methods and Tools for Autonomous Military Ground Systems**
NATO Science and Technology Organization Panel Business Meeting, online, Apr 28, 2021.
- [25] **Mutually Adaptive Haptic Shared Control for Semi-Autonomous Driving**
TRI Guardian Special Interest Group Seminar, online, Mar 18, 2021.
- [26] **Terrain Adaptive Autonomous Vehicles for Uncertain Off-Road Environments**
ARC Research Seminar Series, online, Jan 29, 2021.
- [27] **Pushing the Capabilities of Advanced Driver Assistance Systems on the Way to Full Autonomy**
GM UXT Seminar, online, Nov 17, 2020.
- [28] **Degradation Conscious Control of PEM Fuel Cells**
Finland-Michigan Energy Circle Webinar, online, Nov 10, 2020.
- [29] **Pushing the Capabilities of Advanced Driver Assistance Systems on the Way to Full Autonomy**
GM R&D Seminar, online, Oct 26, 2020.
- [30] **Combined Trajectory Planning and Tracking for Autonomous Vehicles on Deformable Terrains**
NATO Science and Technology Organization Panel Business Meeting, online, Oct 2, 2020.
- [31] **Autonomy for Mobility Assessment Methods and Tools for Autonomous Military Ground Systems**
NATO Science and Technology Organization Panel Business Meeting, online, Sep 23, 2020.
- [32] **Introduction to Scenario for Mobility Assessment Methods and Tools for Autonomous Military Ground Systems**
NATO Science and Technology Organization Panel Business Meeting, online, Sep 21, 2020.
- [33] **Collision Avoidance Guardian at the Dynamic Limits of Handling**
Toyota Research Institute Joint University Workshop, Stanford, CA, Jan 14, 2020.
- [34] **Collision Avoidance Guardian at the Dynamic Limits of Handling**
Toyota Research Institute Annual Review, Ann Arbor, MI, Oct 30, 2019.
- [35] **Scope, Definitions and Scenarios & Perception, Planning, and Control**
NATO Science and Technology Organization Panel Business Meeting, Trondheim, Norway, Oct 8, 2019.
- [36] **Mutually-Adaptive Shared Control between Human Operators and Autonomy in Ground Vehicles**
ARC Research Seminar Series, Ann Arbor, MI, Mar 29, 2019.
- [37] **Collision Avoidance Guardian at the Dynamic Limits of Handling**
Toyota Research Institute Joint University Workshop, Ann Arbor, MI, Jan 17, 2019.
- [38] **Increasing Mobility of Unmanned Ground Vehicles across different Modes of Control – From Teleoperation to Full Autonomy**
Keynote, 2018 Turkish Automatic Control Conference, Kayseri, Turkey, Sep 13, 2018.
- [39] **Connected Testbeds for Connected Automated Vehicles**
14th IFAC Workshop on Time Delay Systems, Budapest, Hungary, Jun 30, 2018.

- [40] **Latency Compensation and Human Performance in Teleoperated Unmanned Ground Vehicles**
Annual Review of the Automotive Research Center, Ann Arbor, MI, May 16, 2018.
- [41] **Needs for perception, planning, and control within an autonomy M&S framework**
NATO Science and Technology Organization Panel Business Meeting, Athens, Greece, Dec 15, 2018.
- [42] **An overview of the autonomy thrust**
2017 TRI Joint University Workshop, Cambridge, MA, Dec 20, 2017.
- [43] **Pushing autonomous vehicles to their dynamic limits**
Invited Seminar, Clemson University Automotive Engineering Department and CU-ICAR Seminar Series, Greenville, SC, Nov 21, 2017.
- [44] **Collision Avoidance Guardian at the Dynamic Limits of Handling**
Toyota Research Institute Annual Review, Ann Arbor, MI, Oct 26, 2017.
- [45] **Pushing autonomous vehicles to their dynamic limits**
UM Alumni Event, Ann Arbor, MI, Jul 28, 2017.
- [46] **A Double-Worst-Case Formulation for Improving the Robustness of an MPC-Based Obstacle Avoidance Algorithm to Parametric Uncertainty**
American Control Conference, Seattle, WA, May 26, 2017.
- [47] **Who's the Boss: A Haptic Interface for Negotiating Control Authority between Human Drivers and Automation Systems**
Plenary Case Study Presentation, Annual Review of the Automotive Research Center, Ann Arbor, MI, May 9, 2017.
- [48] **Pushing autonomous vehicles to their dynamic limits during obstacle avoidance**
Invited Talk, IEEE Robotics and Automation Society Meeting, Southfield, MI, Mar 18, 2017.
- [49] **Pushing autonomous vehicles to their dynamic limits: A control-centric approach to obstacle avoidance**
Invited Talk, Fall 2016 Meeting of the IEEE Southeast Michigan Section, Troy, MI, Nov 30, 2016.
- [50] **Enabling High-Fidelity Closed-Loop Integration of Remotely Accessible Testbeds**
Invited Talk, NSF Workshop on Accessible Remote Testbeds, Arlington, VA, November 12, 2015.
- [51] **Driving Unmanned Ground Vehicles at High Speeds: From Teleoperation to Full Autonomy**
Invited Talk, TARDEC Innovation Talk Series, Warren, MI, Nov 2, 2015.
- [52] **No Driver? No Problem! Mobility Across the Autonomy Spectrum in Unmanned Ground Vehicles**
ARC Annual Program Review, Ann Arbor, MI, May 20, 2015
- [53] **Pushing autonomous vehicles to their dynamic limits: A model predictive control formulation for obstacle avoidance in high speed**
Invited Talk, CrIS University Transportation Center (UTC) Seminar Series at The Ohio State University, Columbus, OH, May 11, 2015.
- [54] **Improving Mobility Through Latency Compensation in Teleoperated Ground Vehicles**
Invited Talk, Quantum Signal, Saline, MI, Mar 17, 2015.
- [55] **Improving Mobility Through Latency Compensation in Teleoperated Ground Vehicles**
ARC Research Seminar Series, Ann Arbor, MI, Feb 13, 2015.
- [56] **Internet-Distributed Hardware-in-the-Loop Simulation**
Invited Talk, North American PUMA Open User Group Meeting, May 20, 2014.
- [57] **Demonstration of Internet-Distributed Hardware-in-the-Loop Simulation technology in an ADI setup**
Invited Seminar, Applied Dynamics International, Ann Arbor, MI, May 13, 2014.
- [58] **Embedding Energy Intelligence in Robotic Mobility**
ARC Annual Program Review, Ann Arbor, MI, 2013.
- [59] **Vehicle-Dynamics-Conscious Real-Time Hazard Avoidance in Autonomous Ground Vehicles**
Invited Seminar, Army Research Laboratory, Aberdeen, MD, May 8, 2013.
- [60] **Enabling Integrated Powertrain Experiments in Networked Distributed Laboratories**
SAE World Congress, Detroit, MI, April 17, 2013.
- [61] **Vehicle-Dynamics-Conscious Real-Time Hazard Avoidance in Autonomous Ground Vehicles**
Invited Seminar, U.S. Army TARDEC, Warren, MI, Feb 20, 2013.

- [62] **An iterative learning control approach to improving fidelity in internet-distributed hardware-in-the-loop simulation**
ASME Dynamic Systems and Control Conference, Ft. Lauderdale, FL, Oct 19, 2012.
- [63] **The evolution and future of Internet-distributed hardware-in-the-loop simulation from a dynamic systems and control perspective**
Semi-plenary presentation, ASME Dynamic Systems and Control Conference, Ft. Lauderdale, FL, Oct 17, 2012.
- [64] **Internet-Distributed Hardware-in-the-Loop Simulation: A Sliding Mode Control Approach to Improving Fidelity and an Overview of Efforts to Expand into Multi-Site ID-HIL**
ARC Collaborative Research Seminar Series, Ann Arbor, MI, Jan 27, 2012.
- [65] **Effect of Coupling Point Selection on Distortion in Internet-Distributed Hardware-in-the-Loop Simulation**
American Control Conference, San Francisco, CA, Jun 30, 2011.
- [66] **Vehicle supported military microgrids: Design, Scheduling, and Regulation for a Forward Operating Base**
Invited Seminar, TARDEC, Warren, MI, Jun 23, 2011
- [67] **Internet-distributed hardware-in-the-loop simulation: development of a linear experimental platform**
2011 ARC Conference, Ypsilanti, MI, May 24, 2011.
- [68] **Vehicle supported military microgrids: Design, Scheduling, and Regulation for a Forward Operating Base**
2011 ARC Conference, Ypsilanti, MI, May 24, 2011.
- [69] **A control theoretic perspective to characterizing and improving transparency in internet-distributed hardware-in-the-loop simulation**
ARC Collaborative Research Seminar Series, Ann Arbor, MI, Mar 11, 2011.
- [70] **Internet-distributed hardware-in-the-loop simulation**
Invited Seminar, TARDEC, Warren, MI, Jul 29, 2010.
- [71] **Effect of coupling point selection on Internet-distributed hardware-in-the-loop simulation**
2010 ARC Conference, Ann Arbor, MI, May 10-11, 2010.
- [72] **Model-based analysis and classification of driver distraction under secondary tasks**
ARC Collaborative Research Seminar Series, Ann Arbor, MI, Oct 28, 2009.
- [73] **Variation-based transparency analysis of an Internet-distributed hardware-in-the-loop simulation platform for vehicle powertrain systems**
ASME Dynamic Systems and Control Conference, Hollywood, California, Oct 12-14, 2009.
- [74] **Development of an Internet-distributed hardware-in-the-loop simulation platform for an automotive application**
ASME Dynamic Systems and Control Conference, Hollywood, California, Oct 12-14, 2009.
- [75] **Integration of vibrotactile feedback in a 3D model of human balance**
The Annual Meeting for the American Society of Biomechanics, State College, Pennsylvania, Aug 26–29, 2009.
- [76] **Internet-distributed hardware-in-the-loop simulation for cyber-enabled concurrent powertrain systems engineering**
15th Annual ARC Conference, Ann Arbor, MI, May 12-13, 2009.
- [77] **Internet-distributed hardware-in-the-loop simulation for cyber-enabled concurrent automotive systems engineering: A TARDEC/UM case study**
ARC Collaborative Research Seminar Series, Ann Arbor, MI, Dec 2008.
- [78] **Model reduction in vehicle dynamics using importance analysis**
2008 ASME Dynamic Systems and Control Conference", Ann Arbor, MI, Oct 2008.
- [79] **Progress towards Internet-distributed hardware-in-the-loop simulation**
14th Annual ARC Conference, Ann Arbor, MI, May 2008.
- [80] **A review of proper modeling techniques**
2007 International Mechanical Engineering Congress and Exposition, Seattle, WA, Nov 2006.

- [81] **Realization-preserving structure and order reduction of nonlinear energetic system models using energy trajectory correlations**
2007 International Mechanical Engineering Congress and Exposition, Seattle, WA, Nov 2006.
- [82] **HMMWV model reduction using energy trajectory correlations**
ARC Collaborative Research Seminar Series, Ann Arbor, MI, Oct 2007.
- [83] **Realization-preserving simplification and reduction of dynamic system models at the graph level**
Ph.D. Defense, Ann Arbor, MI, Sep 2007.
- [84] **Structural reduction of dynamic system models with application to HMMWV multibody dynamics model**
13th Annual ARC Conference, Ann Arbor, MI, May 2007.
- [85] **Structural simplification of modular models based on inactivity of energetic connections**
invited presentation, MSC Software, Ann Arbor, MI, Dec 2006.
- [86] **Structural simplification of modular bond-graph models based on junction inactivity**
2006 International Mechanical Engineering Congress and Exposition, Chicago, IL, Nov 2006.
- [87] **Orienting body coordinate frames using Karhunen-Loève expansion for more effective structural simplification**
2006 International Mechanical Engineering Congress and Exposition, Chicago, IL, Nov 2006.
- [88] **Structural simplification of modular bond-graph models based on junction inactivity**
Engineering Graduate Student Symposium, Ann Arbor, MI, Nov 2006.
- [89] **A simplification technique for modular models of reconfigurable machine tools**
Student-Faculty Seminar, NSF Engineering Research Center for Reconfigurable Manufacturing Systems, University of Michigan, Nov 2005.
- [90] **A simplification technique for modular models of reconfigurable machine tools**
Graduate Student Symposium, University of Michigan, Oct 2005.
- [91] **Arch-type reconfigurable machine tool**
J. Dhupia and T. Ersal, 3rd International CIRP Conference on Reconfigurable Manufacturing, May 2005.
- [92] **Design of reconfigurable machine tools**
T. Ersal and J. Dhupia, Guest Lecture, ME583 Scientific Basis for Reconfigurable Manufacturing, University of Michigan, Mar 2005.
- [93] **Modeling Reconfigurable Machine Tools**
Student-Faculty Seminar, NSF Engineering Research Center for Reconfigurable Manufacturing Systems, University of Michigan, Jan 2005.
- [94] **A modular modeling approach for the design of reconfigurable machine tools**
2004 International Mechanical Engineering Congress and Exposition, Anaheim, CA, Nov 2004.
- [95] **A bond graph based modular modeling approach towards an automated modeling environment for reconfigurable machine tools**
IMAACA '04, Bond Graph Techniques for Modeling Dynamic Systems, Genoa, Italy, Oct 2004.
- [96] **Integrated machine and control design of reconfigurable machine tools**
Technical Advisory Committee Meeting, NSF Engineering Research Center for Reconfigurable Manufacturing Systems, University of Michigan, May 2004.
- [97] **RMT Mechatronics Design**
Student Meeting, NSF Engineering Research Center for Reconfigurable Manufacturing Systems, University of Michigan, Feb 2004.
- [98] **Modeling and performance analysis of reconfigurable machine tools**
T. Ersal and J. Dhupia, Technical Advisory Committee Meeting, NSF Engineering Research Center for Reconfigurable Manufacturing Systems, University of Michigan, Oct 2003.
- [99] **Arch-type reconfigurable machine tool**
J. Dhupia and T. Ersal, 2nd International CIRP conference on Reconfigurable Manufacturing, Ann Arbor, Aug 2003.
- [100] **Integrated machine and control design of reconfigurable machine tools**
Technical Advisory Committee Meeting, NSF Engineering Research Center for Reconfigurable Manufacturing Systems, University of Michigan, May 2003.

[101] Reconfigurable models for reconfigurable machine tools

Student Meeting, NSF Engineering Research Center for Reconfigurable Manufacturing Systems, University of Michigan, Mar 2003.

GRANTS

- [1] Beyond the Track: Elevating Autonomous Driving with Algorithms for Rallying in the Real World**
Tulga Ersal (PI)
Toyota Research Institute, 04/01/2026 - 03/31/2029, Total: \$694,659.
- [2] Trajectory Planning with Omni-Experiential Learning for Robust Fleet Mobility on Extreme Off-Road Terrain**
Tulga Ersal (PI), Bogdan Epureanu (Co-PI)
Automotive Research Center, 01/01/2026 - 12/31/2026, Total: \$129,000.
- [3] The Goldilocks Zone for Off-Road Autonomy: Determining the Just-Right Terramechanics Model Fidelity for Model-Predictive Extreme Mobility Planning**
Hiroyuki Sugiyama (PI), Tulga Ersal (PI), Bogdan Epureanu (Co-PI)
Automotive Research Center, 01/01/2026 - 06/30/2027, Total: \$120,060.
- [4] Reimagining the Driving Experience: Extended Models and Interfaces for a Shared Control Cockpit**
Tulga Ersal (PI), Brent Gillespie (PI)
Toyota Research Institute, 04/01/2024 - 03/31/2026, Total: \$649,893.
- [5] Automotive Research Center Phase VI**
Bogdan Epureanu (PI), Tulga Ersal (Center Research Integration Lead)
US Army, 01/01/2024 - 12/31/2028, Total: \$104,000,000.
- [6] Integrated Perception and Planning for Autonomous Navigation through Vegetated Terrains**
Chris Goodin (MSU PI), Tulga Ersal (UM PI)
Automotive Research Center, 01/01/2024 - 04/30/2025, Total: \$120,295.
- [7] Online and Offline Terrain Strength Estimation Using Remote Sensing for Ground Vehicle Mobility - Phase II**
MTRI (Lead Company), Thomas Oommen (Academic PI), Tulga Ersal (Academic PI)
US Army, 09/20/2023 - 09/19/2025, Total: \$ 1,128,582.24.
- [8] A Shared Control Framework for Teaching Advanced Driving Skills**
Tulga Ersal (PI)
Toyota Research Institute, 07/01/2023 - 03/31/2024, Total: \$134,882.
- [9] Resilient Trajectory Planning for Extreme Mobility on Challenging Slopes**
Tulga Ersal (PI), Bogdan Epureanu (Co-PI)
Automotive Research Center, 01/01/2023 - 12/31/2025, Total: \$411,232.
- [10] Adaptive Trajectory Planning in Response to Partial Loss of Sensor Data**
Daniel Carruth (MSU PI), Tulga Ersal (UM PI)
Automotive Research Center, 01/01/2023 - 04/30/2024, Total: \$121,613.
- [11] Terrain Adaptive Autonomous Vehicles for Uncertain Off-Road Environments**
Tulga Ersal (PI)
Automotive Research Center, 09/01/2020 - 12/05/2024, Total: \$242,828.
- [12] Cognitive Modeling of Human Operator Behavior during Interaction with Autonomous Systems**
Tulga Ersal (PI)
Automotive Research Center, 05/01/2019 - 12/31/2022, Total: \$379,666.
- [13] Automotive Research Center Phase V**
Bogdan Epureanu (PI), Tulga Ersal (Center Research Integration Lead)
US Army, 01/01/2019 - 12/31/2024, Total: \$50,000,000.
- [14] Complexity Reduction for Control Oriented Fuel Cell Modeling: Part 2**
Tulga Ersal (PI)
Ford Motor Company, 04/01/2018 - 10/27/2020, Total: \$209,809.
- [15] Mutually-Adaptive Shared Control between Human Operators and Autonomy in Ground Vehicles**
Tulga Ersal (PI), Xi Jessie Yang (Co-PI), Jeffrey L. Stein (Co-PI)
Automotive Research Center, 01/01/2018 - 06/30/2021, Total: \$581,337.

- [16] STTR: Terrain Aware Mobility Planning**
Robotic Research, LLC (Lead institution), Tulga Ersal (Academic PI)
US Army, 09/01/2017 - 02/28/2019, Total: \$1,000,000.
- [17] Simultaneous Optimization of Vehicle and Powertrain Operation Using Connectivity and Automation**
Andreas Malikopoulos (PI), Christos Cassandras (Co-PI), Huei Peng (Co-PI), Jackeline Rios-Torres (Co-PI), Jason Schwanke (Co-PI), Tulga Ersal (Co-PI)
Advanced Research Projects Agency - Energy (ARPA-E), U.S. Department of Energy, 03/29/2017 - 12/31/2020, Total: \$4,220,000.
- [18] CPS: Synergy: Connected Testbeds for Connected Vehicles**
Tulga Ersal (PI), Anna Stefanopoulou (Co-PI), Mingyan Liu (Co-PI)
National Science Foundation, 01/01/2017 - 09/30/2021, Total: \$800,001.
- [19] Collision Avoidance Guardian at the Dynamic Limits of Handling**
Tulga Ersal (PI), Jeffrey L. Stein (Co-PI)
Toyota Research Institute, 01/01/2017 - 03/31/2021, Total: \$584,462.
- [20] Connected Laboratories for Connected Automated Vehicles**
Tulga Ersal (PI)
Automotive Research Center, 09/01/2016 - 06/30/2017, Total: \$186,902.
- [21] Advanced Hazard Avoidance in Autonomous Ground Vehicles**
Jeffrey L. Stein (PI), Tulga Ersal (Co-PI)
Automotive Research Center, 09/01/2016 - 08/31/2018, Total: \$160,116.
- [22] Modeling Human Performance in Operating Unmanned Ground Vehicles**
Tulga Ersal (PI)
Automotive Research Center, 10/01/2015 - 03/31/2019, Total: \$175,383.
- [23] SBIR: Compact Auxiliary Diesel Generator Enhanced with Electronic Fuel Injection**
Busek (Lead institution), Jeffrey L. Stein (Academic PI), Tulga Ersal (Academic Co-PI)
US Navy, 10/01/2015 - 11/30/2015, Total: \$15,000.
- [24] Complexity Reduction for Control Oriented Fuel Cell Modeling**
Tulga Ersal (PI)
Ford Motor Company, 06/01/2015 - 12/31/2017, Total: \$209,992.
- [25] STTR: Robust Terrain-Adaptive Vehicle Planning and Control**
Quantum Signal (Lead institution), Tulga Ersal (Academic PI), Karl Iagnemma (Academic PI, MIT)
US Army, 10/01/2014 - 03/31/2015, Total: \$150,000.
- [26] Collaborative Research: Control of Reconfigurable Microgrids with Significant Renewable Power Sources**
Huei Peng (PI), Tulga Ersal (Co-PI)
National Science Foundation, 09/01/2014 - 08/31/2017, Total: \$200,000.
- [27] Road Map of Autonomous Vehicle Deployment Priorities in Ann Arbor: Travel Demand, Vehicle Design and Sustainability Performance**
Gregory Keoleian (PI), Tulga Ersal (Co-PI), Jeffrey L. Stein (Co-PI), Lidia Kostyniuk (Co-PI)
Mobility Transformation Center, 05/01/2014 - 04/30/2016, Total: \$91,404.
- [28] Improving Mobility through Latency Compensation in Teleoperated Ground Vehicles**
Tulga Ersal (PI)
Automotive Research Center, 05/01/2014 - 12/31/2017, Total: \$420,856.
- [29] Automotive Research Center Phase IV**
Anna Stefanopoulou (PI), Tulga Ersal (Thrust Area 1 Leader, Center Research Integration Lead)
US Army, 01/01/2014 - 12/31/2018, Total: \$40,000,000.
- [30] Sustainable Transportation for a 3rd Century: An Interdisciplinary Approach to Addressing the Last Mile Problem for Enhanced Accessibility**
Jeffrey L. Stein (PI), Tulga Ersal (Co-PI), Jonathan Levine (Co-PI), Ian Hiskens (Co-PI), Gregory Keoleian (Co-PI), Shobita Parthasarathy (Co-PI), Owen Wu (Co-PI), Jarod Kelly (Co-PI)
Office of the Provost, University of Michigan, 06/01/2013 - 12/01/2014, Total: \$299,878.

- [31] Data-Based Techniques for Battery-Health Prediction**
 Jeffrey L. Stein (PI), Tulga Ersal (Co-PI), Dennis Bernstein (Co-PI)
 US-China Clean Energy Research Center-Clean Vehicles Consortium, 09/01/2012 - 08/31/2016, Total: \$297,436.
- [32] Vehicle-Dynamics-Conscious Real-Time Hazard Avoidance in Autonomous Ground Vehicles**
 Jeffrey L. Stein (PI), Tulga Ersal (Co-PI)
 Automotive Research Center, 01/01/2012 - 08/31/2016, Total: \$639,519.
- [33] Internet-Distributed Hardware-in-the-Loop Simulation**
 Tulga Ersal (PI)
 Automotive Research Center, 01/01/2011 - 12/31/2013, Total: \$319,627.
- [34] Modeling, Design and Control of Military V2MG2V Micro-Grid Systems**
 Panos Papalambros (PI), Huei Peng (Co-PI), Ian Hiskens (Co-PI), Jeffrey L. Stein (Co-PI), Tulga Ersal (Senior Personnel)
 Automotive Research Center, 01/06/2010 - 05/31/2011, Total: \$350,000.

SERVICE

- Competition Co-Chair, IEEE Intelligent Vehicles Symposium (2025-2026)
- Guest Associate Editor, Special Issue on "Ground Vehicle Autonomy for Off-road and Unstructured Environments," ASME Journal of Autonomous Vehicles and Systems (2025)
- Autonomy Leader, NATO Research Task Group AVT-408: Autonomous Mobility Assessment for Military Ground Systems (CDT) (2024-2026)
- Member, Diversity Equity and Inclusion Committee, Department of Mechanical Engineering, University of Michigan (2023-)
- International Program Committee Member, International Conference on Integrated Modeling and Analysis in Applied Control and Automation (2023)
- Member, Research Pillar of the Mechanical Engineering Strategic Plan, Department of Mechanical Engineering, University of Michigan (2022)
- Alternate Primary Research Staff Representative to the Advisory Committee, Department of Mechanical Engineering, University of Michigan (2022-2023)
- International Program Committee Member, 19th International Multidisciplinary Modeling & Simulation Multiconference (2022)
- International Program Committee Member, 10th IFAC Symposium on Advances in Automotive Control (2021-2022)
- International Program Committee Member, International Conference on Integrated Modeling and Analysis in Applied Control and Automation (2021)
- Best Paper Award Judge, ASME Dynamic Systems and Control Division Energy Systems Technical Committee (2020)
- International Program Committee Member, International Conference on Integrated Modeling and Analysis in Applied Control and Automation (2020)
- Autonomy Task Leader, NATO Research Task Group AVT-341: Mobility Assessment Methods and Tools for Autonomous Military Ground Systems (2020-2023)
- Scenarios Task Leader, NATO Research Task Group AVT-341: Mobility Assessment Methods and Tools for Autonomous Military Ground Systems (2020)
- Supported the Research Education and Activities for Classroom Teachers (REACT) workshop that provided 45 K-12 STEM teachers free exposure to research (2019)
- Task Leader, NATO Exploratory Team AVT-ET-194: Mobility Assessment Methods and Tools for Autonomous Military Ground Systems (2019)
- International Program Committee Member, International Conference on Integrated Modeling and Analysis in Applied Control and Automation (2019)
- Invited Session Organizer, American Control Conference (2019)
- Co-Organizer, 3rd IAVSD Workshop on Dynamics of Road Vehicles (2019)
- Supported the Research Education and Activities for Classroom Teachers (REACT) workshop that provided 61 K-12 STEM teachers free exposure to research (2018)
- Associate Editor, 14th IFAC Workshop on Time Delay Systems (2018)

- International Program Committee Member, International Conference on Integrated Modeling and Analysis in Applied Control and Automation (2018)
- International Program Committee Member, 14th IFAC Workshop on Time Delay Systems (2017-2018)
- International Program Committee Member, International Conference on Integrated Modeling and Analysis in Applied Control and Automation (2017)
- Associate Editor, 2018 Vienna International Conference on Mathematical Modelling (2017-2018)
- Invited Speaker at the 2016 NextProf for the University of Michigan Spring Engineering Workshop (2016)
- Invited Speaker at the 2016 External NextProf Future Faculty Workshop (2016)
- International Program Committee Member, International Conference on Integrated Modeling and Analysis in Applied Control and Automation (2016)
- International Program Committee Member, International Conference on Integrated Modeling and Analysis in Applied Control and Automation (2015)
- Local Arrangements Chair, 12th IFAC Workshop on Time Delay Systems (2014-2015)
- Organizing Committee Volunteer, 2015 Dynamic Systems and Control Conference (2015)
- Reviewer, Advanced Research Projects Agency – Energy (ARPA-E) (2015)
- Vice-Chair, Model Identification and Intelligent Systems Technical Committee, ASME Dynamic Systems and Control Division (Oct 2012 – Oct 2016)
- Associate Editor, ASME Dynamic Systems and Control Conference (2014)
- Review Panelist, National Science Foundation (NSF) (2014)
- International Program Committee Member, International Conference on Integrated Modeling and Analysis in Applied Control and Automation (2013)
- International Program Committee Member, International Conference on Integrated Modeling and Analysis in Applied Control and Automation (2012)
- Liaison Member, SAE (Society of Automotive Engineers) Dynamical Modeling and Simulation Committee for creating a basis for multi-disciplinary, math-based engineering and development of automotive systems by developing standards and recommended practices for making models reusable and sharable and results repeatable. (Sep 2011 – Dec 2013)
- International Program Committee Member, International Conference on Integrated Modeling and Analysis in Applied Control and Automation (2011)
- Program Committee Member, 2009 ASME Dynamic Systems and Control Conference (2009)
- Invited Session Organizer, Model Identification and Intelligent Systems Technical Committee, ASME Dynamic Systems and Controls Division, 2009 ASME Dynamic Systems and Control Conference (2009)
- International Program Committee Member, 2009 European Conference on Modelling and Simulation (2009)
- Reviewer for the following journals:
 - Journal of Dynamic Systems Measurement and Control
 - IEEE/ASME Transactions on Mechatronics
 - Simulation Modeling Practice and Theory
 - Simulation: Transactions of the Society for Modeling and Simulation
 - Mathematical Problems in Engineering
 - IEEE Control Systems Magazine
 - Mechanism and Machine Theory
 - Journal of Aerospace Engineering
 - Building Simulation
 - International Journal of Powertrains
 - IEEE Intelligent Transportation Systems Magazine
 - IEEE Transactions on Intelligent Transportation Systems
 - Mathematical and Computer Modelling of Dynamical Systems
 - International Journal of Electrical Power and Energy Systems
 - International Journal of Vehicle Design
 - Journal of Mechanical Engineering Science
 - Journal of Systems and Control Engineering
 - World Journal of Modeling and Simulation
 - IEEE Transactions on Smart Grid
 - IEEE Transactions Industrial Informatics
 - International Journal of Simulation and Process Modelling
 - Acta of Bioengineering and Biomechanics
 - International Journal of Adaptive Control and Signal Processing

- Automatica
- Measurement
- Applied Energy
- Energies
- Journal of Computational and Nonlinear Dynamics
- IEEE Transactions on Control Systems Technology
- Mechanics Research Communications
- Mechatronics
- IEEE Transactions on Neural Networks and Learning Systems
- IET Intelligent Transport Systems
- IET Generation, Transmission & Distribution
- IEEE Transactions on Intelligent Vehicles
- Software and Systems Modeling
- IEEE Access
- Advances in Mechanical Engineering
- IEEE Transactions on Vehicular Technology
- Journal of the Electrochemical Society
- Journal of Autonomous Vehicles and Systems
- Reviewer for the following conferences:
 - American Control Conference
 - ASME Dynamic Systems and Control Conference
 - ASME International Mechanical Engineering Congress and Exposition
 - SAE World Congress
 - IFAC World Congress
 - European Control Conference
 - International Conference on Integrated Modeling and Analysis in Applied Control and Automation
 - IEEE Conference on Decision and Control
 - International Symposium on Mechatronics and its Applications
 - IEEE Multi-conference on Systems and Control
 - IEEE Conference on Control Technology and Applications
 - IFAC Workshop on Engine and Powertrain Control, Simulation and Modeling
 - IFAC International Symposium on Advances in Automotive Control
 - IEEE Intelligent Vehicles Symposium
- Mentored 3rd to 5th graders for weekly science projects as part of the Reach Out! program at the Pattengill Elementary School, Ann Arbor, MI (2002- 2004)

AWARDS AND HONORS

- [1] Invited Panelist, NAFEMS Conference on Simulation in the Automotive Industry: Automotive Hybrid Technologies, Electrification, ADAS, and CAE Process Democratization, Troy, MI, 6 Nov 2025 (2025)
- [2] Honor received by student Eugene Kochergin: NSF Graduate Research Fellowship, National Science Foundation (2024)
- [3] Honor received by student James Baxter: Best Poster Award Finalist, Automotive Research Center Annual Review (2023)
- [4] Invited Panelist, "Simulation Solutions: Opportunities and Challenges for the effective Delivery of Automotive Electrification and Autonomous Technologies," NAFEMS Conference on Simulation in the Automotive Industry: Driving Convergence to Electrification, Autonomous and Connectivity, Troy, MI, 7 Dec 2022 (2022)
- [5] Honor received by student Siyuan Yu: IFAC Young Author Award Finalist (2022) (S. Yu, C. Shen and T. Ersal, "Autonomous driving using linear model predictive control with a Koopman operator based bilinear vehicle model," IFAC International Symposium on Advances in Automotive Control, 2022.)
- [6] Honor received by students Congkai Shen and Siyuan Yu: Best Poster Winners, Automotive Research Center Annual Review (2022)
- [7] ASME Automotive and Transportation Systems Technical Committee Best Paper Award (2021) (C. Shen, S. Yu, and T. Ersal, "A three-phase framework for global path planning for nonholonomic autonomous vehicles on 3D terrains," Modeling, Estimation and Control Conference, 2021.)
- [8] Honor received by student Junsik Eom: S. Jack Hu Family and Friends Undergraduate Research Award (2021)
- [9] ASME Automotive and Transportation Systems Technical Committee Best Paper Award Finalist (2020) (C. Huang, X. Zhang, R. Salehi, T. Ersal, and A. G. Stefanopoulou, "A robust energy and emissions conscious speed control framework for connected vehicles with privacy considerations," American Control Conference, 2020.)
- [10] ASME Automotive and Transportation Systems Technical Committee Best Paper Award Finalist (2020) (S.-Y. Shieh, T. Ersal, and H. Peng, "Synchronization of pulse-and-glide operation in vehicle platooning using cooperative adaptive cruise control," American Control Conference, 2020.)
- [11] Editor's Choice Paper (2020) (A. Goshtasbi, J. Chen, J. Waldecker, S. Hirano, and T. Ersal, "Effective parameterization of PEM fuel cell models - Part I: Sensitivity analysis and parameter identifiability," Journal of the Electrochemical Society, vol. 167, no. 4, pp. 044504, 2020.)
- [12] Ted Kennedy Family Faculty Team Excellence Award, College of Engineering, University of Michigan (2020)
- [13] Honor received by student James Dallas: 2019-2020 J. Robert Beyster Computational Innovation Graduate Fellowship, College of Engineering, University of Michigan (2019)
- [14] Kenneth M. Reese Outstanding Research Scientist Award, College of Engineering, University of Michigan (2019)
- [15] Keynote Speaker, Turkish Automatic Control Conference (2018)
- [16] ASME Automotive and Transportation Systems Technical Committee Best Paper Award (2018)
- [17] Honor received by student Yingshi Zheng: Best Poster Winner, Automotive Research Center Annual Review (2018)
- [18] ASME Energy Systems Technical Committee Best Paper Award (2017)
- [19] ASME Energy Systems Technical Committee Best Paper Award Finalist (2016)
- [20] Honor received by student Xin Zhou: Best Student Paper Finalist, 2016 Dynamic Systems and Control Conference (2016)
- [21] Research Faculty Recognition Award, The University of Michigan Office of Research (2016)
- [22] Honor received by student Jiechao Liu: People's Choice Best Poster Award, Automotive Research Center Annual Review (2016)
- [23] Honor received by student Jiechao Liu: Best Student Paper Finalist, 2015 Dynamic Systems and Control Conference (2015)
- [24] Honor received by student Yingshi Zheng: Best Poster Winner, Automotive Research Center Annual Review (2015)
- [25] Honor received by student Jiechao Liu: Best Poster Winner, 2014 University of Michigan Engineering Graduate Symposium (2014)
- [26] Honor received by student Xin Zhou: Best Student Paper Finalist, 2014 Dynamic Systems and Control Conference (2014)
- [27] Honor received by student Xinyi Ge: Best Presentation in Session, 2014 American Control Conference (2014)

- [28] Honor received by student Jiechao Liu: Best Poster Finalist, Automotive Research Center Annual Review (2014)
- [29] Honor received by student Xin Zhou: Best Student Paper Finalist, 2013 Dynamic Systems and Control Conference (2013)
- [30] Semi-Plenary Paper Award at the 2012 Dynamic Systems and Control Conference (2012)
- [31] Best Presentation in Session Award ("Effect of coupling point selection on distortion in internet-distributed hardware-in-the-loop simulation," American Control Conference, 2011.) (2011)
- [32] Best Presentation in Session Award ("Model reduction in vehicle dynamics using importance analysis," Dynamic Systems and Control Conference, 2008.) (2008)
- [33] Departmental Merit Fellowship at the University of Michigan (2007)
- [34] Best Oral Presentation Award, 3rd place, Theoretical Dynamics, Systems, and Controls Session, Engineering Graduate Symposium, University of Michigan (2006)
- [35] Best Poster Award, 1st place, Dynamic Systems and Control Division, Graduate Student Symposium, University of Michigan (2005)
- [36] Departmental Merit Fellowship at the University of Michigan (2001-2002)
- [37] Ranked 1st among all 2001 graduates of the Istanbul Technical University (2001)
- [38] Siemens Excellence Award (2001)
- [39] President's Award at the Istanbul Technical University (2001)
- [40] Dean's Award at the Istanbul Technical University (2001)
- [41] 1st place in Dean's List in every term at the Istanbul Technical University (1997-2001)
- [42] Merit Scholarship at the Istanbul Technical University (1997-1998)
- [43] Ranked among the top 500 in the national university entrance exams within about 1,5 million test takers (1997)
- [44] Ranked 2nd among the 1997 graduates of Deutsche Schule Istanbul (German High School Istanbul) (1997)
- [45] Ranked 2nd in the Abitur exam (Germany's final exam at the end of secondary education formally enabling students to gain admittance to German universities) (1997)
- [46] Honor Award in every term at Deutsche Schule Istanbul (1989-1997)

OTHER EXPERIENCE

Communication Coordinator

United Nations Conference on Human Settlements: Habitat II City Summit

Coordinated the communication among and helped with the orientation of international conference participants

Istanbul, Turkey

Jun 1996