

Stanford



J. Christian Gerdes

Professor of Mechanical Engineering and, by courtesy, of Aeronautics and Astronautics

CONTACT INFORMATION

- **Alternate Contact**

Erina DuBois - Lab Manager

Email edubois@stanford.edu

Bio

BIO

Chris Gerdes is a Professor of Mechanical Engineering at Stanford University, Director of the Center for Automotive Research at Stanford (CARS) and Director of the Revs Program at Stanford. His laboratory studies how cars move, how humans drive cars and how to design future cars that work cooperatively with the driver or drive themselves. When not teaching on campus, he can often be found at the racetrack with students, instrumenting historic race cars or trying out their latest prototypes for the future. Vehicles in the lab include X1, an entirely student-built test vehicle, and Shelley, an Audi TT-S capable of turning a competitive lap time around the track without a human driver. Professor Gerdes and his team have been recognized with a number of awards including the Presidential Early Career Award for Scientists and Engineers, the Ralph Teetor award from SAE International and the Rudolf Kalman Award from the American Society of Mechanical Engineers.

ACADEMIC APPOINTMENTS

- Professor, Mechanical Engineering

HONORS AND AWARDS

- Presidential Early Career Award for Scientists and Engineers, National Science Foundation (2002)
- Best Paper Award, 6th International Symposium on Advanced Vehicle Control (AVEC) (2002)
- CAREER Award, National Science Foundation
- Frederick Emmons Terman Fellowship, Stanford University (1998-2001)

PROFESSIONAL EDUCATION

- PhD, UC Berkeley, Mechanical Engineering (1996)

LINKS

- <http://ddl.stanford.edu/>: <http://ddl.stanford.edu/>

Teaching

COURSES

2016-17

- Vehicle Dynamics and Control: ME 227 (Spr)

2015-16

- Vehicle Dynamics and Control: ME 227 (Spr)

2014-15

- Mechanical Engineering Design: ME 113 (Spr)
- Mechanical Systems Design: ME 112 (Win)
- Vehicle Dynamics and Control: ME 227 (Spr)

2013-14

- Vehicle Dynamics and Control: ME 227 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Advisor (AC)

John Kegelman

Master's Program Advisor

Abisola Kusimo

Publications

PUBLICATIONS

- **Design of Variable Vehicle Handling Characteristics Using Four-Wheel Steer-by-Wire** *IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY*
Russell, H. E., Gerdes, J. C.
2016; 24 (5): 1529-1540
- **A Sequential Two-Step Algorithm for Fast Generation of Vehicle Racing Trajectories** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*
Kapania, N. R., Subosits, J., Gerdes, J. C.
2016; 138 (9)
- **Shared Steering Control Using Safe Envelopes for Obstacle Avoidance and Vehicle Stability** *IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS*
Erlie, S. M., Fujita, S., Gerdes, J. C.
2016; 17 (2): 441-451
- **Predictive Haptic Feedback for Obstacle Avoidance Based on Model Predictive Control** *IEEE TRANSACTIONS ON AUTOMATION SCIENCE AND ENGINEERING*
Balachandran, A., Brown, M., Erlie, S. M., Gerdes, J. C.
2016; 13 (1): 26-31
- **Design of a feedback-feedforward steering controller for accurate path tracking and stability at the limits of handling** *VEHICLE SYSTEM DYNAMICS*
Kapania, N. R., Gerdes, J. C.
2015; 53 (12): 1687-1704
- **An analytical method for reducing combustion instability in homogeneous charge compression ignition engines through cycle-to-cycle control** *INTERNATIONAL JOURNAL OF ENGINE RESEARCH*
Jungkunz, A. F., Ravi, N., Liao, H., Erlie, S. M., Gerdes, J. C.
2015; 16 (3): 485-500
- **Designing Steering Feel for Steer-by-Wire Vehicles Using Objective Measures** *IEEE-ASME TRANSACTIONS ON MECHATRONICS*
Balachandran, A., Gerdes, J. C.
2015; 20 (1): 373-383
- **A Controller Framework for Autonomous Drifting: Design, Stability, and Experimental Validation** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*

-
- Hindiyeh, R. Y., Gerdes, J. C.
2014; 136 (5)
- **Hybrid Model Predictive Control of Exhaust Recompression Hcci** *ASIAN JOURNAL OF CONTROL*
Widd, A., Liao, H., Gerdes, J. C., Tunestal, P., Johansson, R.
2014; 16 (2): 370-381
 - **Incorporating Non-Linear Tire Dynamics into a Convex Approach to Shared Steering Control** *American Control Conference*
Erlie, S. M., Funke, J., Gerdes, J. C.
IEEE.2014: 3468–3473
 - **Low Friction Emulation of Lateral Vehicle Dynamics Using Four-Wheel Steer-by-Wire** *American Control Conference*
Russell, H. E., Gerdes, J. C.
IEEE.2014: 3924–3929
 - **Multicylinder HCCI Control With Coupled Valve Actuation Using Model Predictive Control** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*
Erlie, S. M., Jungkunz, A. F., Gerdes, J. C.
2013; 135 (5)
 - **Model Predictive Control for Vehicle Stabilization at the Limits of Handling** *IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY*
Beal, C. E., Gerdes, J. C.
2013; 21 (4): 1258-1269
 - **Staying within the nullcline boundary for vehicle envelope control using a sliding surface** *VEHICLE SYSTEM DYNAMICS*
Bobier, C. G., Gerdes, J. C.
2013; 51 (2): 199-217
 - **Control of recompression HCCI with a three region switching controller** *CONTROL ENGINEERING PRACTICE*
Liao, H., Widd, A., Ravi, N., Jungkunz, A. F., Kang, J., Gerdes, J. C.
2013; 21 (2): 135-145
 - **MULTI-CYLINDER HCCI CONTROL WITH CAM PHASER VARIABLE VALVE ACTUATION USING MODEL PREDICTIVE CONTROL** *5th Annual Dynamic Systems and Control Division Conference / 11th JSME Motion and Vibration Conference*
Erlie, S. M., Jungkunz, A. F., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2013: 823–831
 - **SIMPLE CLOTHOID PATHS FOR AUTONOMOUS VEHICLE LANE CHANGES AT THE LIMITS OF HANDLING** *ASME Dynamic Systems and Control Conference (DSCC)*
Funke, J., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2013
 - **USING A PATH-FITTING ALGORITHM TO ANALYZE THE RACING TECHNIQUES OF A SKILLED DRIVER** *ASME Dynamic Systems and Control Conference (DSCC)*
Mejia, J. P., Theodosis, P. A., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2013
 - **NONLINEAR OPTIMIZATION OF A RACING LINE FOR AN AUTONOMOUS RACECAR USING PROFESSIONAL DRIVING TECHNIQUES** *5th Annual Dynamic Systems and Control Division Conference / 11th JSME Motion and Vibration Conference*
Theodosis, P. A., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2013: 235–241
 - **Modeling and Control of Exhaust Recompression HCCI SPLIT FUEL INJECTION FOR CYLINDER-INDIVIDUAL COMBUSTION CONTROL** *IEEE CONTROL SYSTEMS MAGAZINE*
Ravi, N., Liao, H., Jungkunz, A. F., Song, H. H., Gerdes, J. C.
2012; 32 (4): 26-42
 - **Model predictive control of HCCI using variable valve actuation and fuel injection** *IFAC Symposium on Advanced Control of Chemical Processes (ADCHEM)*
Ravi, N., Liao, H., Jungkunz, A. F., Widd, A., Gerdes, J. C.
PERGAMON-ELSEVIER SCIENCE LTD.2012: 421–30

- **Sliding Surface Vehicle Envelope Control: A Cooperative Design Between Controller and Envelope** *American Control Conference (ACC)*
Bobier, C. G., Gerdes, J. C.
IEEE COMPUTER SOC.2012: 6521–6526
- **Nonlinear optimization of a racing line for an autonomous racecar using professional driving techniques**
Theodosis, P., Gerdes, J. C.
2012
- **Modeling and control of exhaust recompression HCCI: split fuel injection for cylinder-individual combustion control** *IEEE Control Systems Magazine*
Ravi, N., Liao, H., Jungkunz, Adam, F., Song, H. H., Gerdes, J., Christian
2012; 4 (32): 26-42
- **Multi-Cylinder HCCI Control with Cam Phaser Variable Valve Actuation Using Model Predictive Control**
Erlie, S., Jungkunz, A., Gerdes, J., Christian
2012
- **Autonomous vehicle control at the limits of handling** *International Journal of Vehicle Autonomous Systems*
Kritayakirana, K., Gerdes, J., Christian
2012; 4 (10): 271-296
- **Using the center of percussion to design a steering controller for an autonomous race car** *Vehicle System Dynamics, 50 (Supplement)*
Kritayakirana, K., Gerdes, J., Christian
2012: 33-51
- **Analysis of Measured Racing Lines: A Path Primitive Based Curve Fitting Approach**
Koch, G., Kegelman, John, C., Gerdes, J., Christian
2012
- **Up to the Limits: Autonomous Audi TTS** *IEEE Intelligent Vehicles Symposium (IV)*
Funke, J., Theodosis, P., Hindiyeh, R., Stanek, G., Kritayakirana, K., Gerdes, C., Langer, D., Hernandez, M., Mueller-Bessler, B., Huhnke, B.
IEEE.2012: 541–547
- **CONTROLLING VEHICLE INSTABILITY THROUGH STABLE HANDLING ENVELOPES** *ASME Dynamic Systems and Control Conference / Bath/ ASME Symposium on Fluid Power and Motion Control*
Beal, C. E., Bobier, C. G., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2012: 861–868
- **COMBUSTION PHASING VARIATION REDUCTION FOR LATE-PHASING HCCI THROUGH CYCLE-TO-CYCLE PILOT INJECTION TIMING CONTROL** *ASME Dynamic Systems and Control Conference / Bath/ASME Symposium on Fluid Power and Motion Control*
Jungkunz, A. F., Ravi, N., Liao, H., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2012: 685–692
- **A CONTROLLER FRAMEWORK FOR AUTONOMOUS DRIFTING: DESIGN, STABILITY, AND EXPERIMENTAL VALIDATION** *ASME Dynamic Systems and Control Conference / Bath/ASME Symposium on Fluid Power and Motion Control*
Hindiyeh, R. Y., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2012: 901–908
- **GENERATING A RACING LINE FOR AN AUTONOMOUS RACECAR USING PROFESSIONAL DRIVING TECHNIQUES** *ASME Dynamic Systems and Control Conference / Bath/ASME Symposium on Fluid Power and Motion Control*
Theodosis, P. A., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2012: 853–860
- **Using the centre of percussion to design a steering controller for an autonomous race car** *22nd Symposium of the International-Association-of-Vehicle-System-Dynamics (IAVSD)*
Kritayakirana, K., Gerdes, J. C.
TAYLOR & FRANCIS LTD.2012: 33–51
- **Late Phasing Homogeneous Charge Compression Ignition Cycle-to-Cycle Combustion Timing Control With Fuel Quantity Input** *American Control Conference (ACC)*
Jungkunz, A. F., Erlie, S., Gerdes, J. C.

IEEE COMPUTER SOC.2012: 2078–2083

- **Modeling and Control of an Exhaust Recompression HCCI Engine Using Split Injection** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*
Ravi, N., Liao, H., Jungkunz, A. F., Chang, C., Song, H. H., Gerdes, J. C.
2012; 134 (1)
- **Implementation and Analysis of a Repetitive Controller for an Electro-Hydraulic Engine Valve System** *IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY*
Liao, H., Roelle, M. J., Chen, J., Park, S., Gerdes, J. C.
2011; 19 (5): 1102-1113
- **Pushing the limits: From lanekeeping to autonomous racing** *ANNUAL REVIEWS IN CONTROL*
Talvala, K. L., Kritayakirana, K., Gerdes, J. C.
2011; 35 (1): 137-148
- **Control of Exhaust Recompression HCCI using Hybrid Model Predictive Control** *American Control Conference (ACC)*
Widd, A., Liao, H., Gerdes, J. C., Tunestal, P., Johansson, R.
IEEE.2011: 420–425
- **Combustion Phasing Variation Reduction for Late-phasing HCCI Through Cycle-to-cycle Pilot Injection Timing Control**
Jungkunz, A., Ravi, N., Liao, H., Gerdes, J., Christian
2011
- **Driftkeeping: Path tracking at the friction limits using high sideslip cornering**
Hindiyeh, R., Gerdes, J., Christian
2011
- **Using the center of percussion to generate feedforward steering for an autonomous race car**
Kritayakirana, K., Gerdes, J., Christian
2011
- **Controlling Vehicle Instability Through Stable Handling Envelopes**
Beal, Craig, E., Bobier, Carrie, G., Gerdes, J., Christian
2011
- **Implementation and analysis of a repetitive controller for an electro-hydraulic engine valve system** *IEEE Transactions on Control Systems Technology*
Liao, H., Roelle, M., Chen, J., Park, S., Gerdes, J., Christian
2011; 5 (19): 1102-1113
- **A controller framework for autonomous drifting: Design, stability, and experimental validation**
Hindiyeh, R., Gerdes, J., Christian
2011
- **Model-Based Control of HCCI Engines Using Exhaust Recompression** *IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY*
Ravi, N., Roelle, M. J., Liao, H., Jungkunz, A. F., Chang, C., Park, S., Gerdes, J. C.
2010; 18 (6): 1289-1302
- **Estimation of Tire Slip Angle and Friction Limits Using Steering Torque** *IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY*
Hsu, Y. J., Laws, S. M., Gerdes, J. C.
2010; 18 (4): 896-907
- **Representing Recompression HCCI Dynamics with a Switching Linear Model** *American Control Conference*
Liao, H., Ravi, N., Jungkunz, A. F., Kang, J., Gerdes, J. C.
IEEE.2010: 3803–3808
- **Experimental Validation of a Linear Model Predictive Envelope Controller in the Presence of Vehicle Nonlinearities**
Beal, Craig, E., Gerdes, J., Christian
2010
- **Controlling Combustion Phasing of Recompression HCCI with a Switching Controller**

-
- Liao, H., Ravi, N., Jungkunz, A., Widd, A., Gerdes, J., Christian
2010
- **Mid-Ranging Control of a Multi-Cylinder HCCI Engine Using Split Fuel Injection and Valve Timings**
Ravi, N., Liao, H., Jungkunz, A., Gerdes, J., Christian
2010
 - **Autonomous Cornering at the Limits: Maximizing a ‘g-g’ Diagram by Using Feedforward Trail-Braking and Throttle-On-Exit**
Kritayakirana, K., Gerdes, J., Christian
2010
 - **Envelope Control: Stabilizing within the Limits of Handling Using a Sliding Surface**
Bobierand, C., Gerdes, J., Christian
2010
 - **Autonomous Cornering at the Limits: Designing a Longitudinal Feedback Controller Using a Tire Slip Circle**
Kritayakirana, K., Gerdes, J., Christian
2010
 - **Model based control of HCCI engines using exhaust recompression** *IEEE Transactions on Control Systems Technology*
Ravi, N., Liao, H., Jungkunz, Adam, F., Chang, C., Park, S., Gerdes, J., Christian
2010; 6 (18): 1289-1302
 - **Design of a Dynamic Surface Controller for Vehicle Sideslip Angle During Autonomous Drifting**
Hindiyehand, Rami, Y., Gerdes, J., Christian
2010
 - **Reducing Combustion Variation of Late-Phasing HCCI with Cycle-To-Cycle Exhaust Valve Timing Control**
Jungkunz, A., Liao, H., Ravi, N., Gerdes, J., Christian
2010
 - **Predictive control of vehicle roll dynamics with rear wheelsteering**
Beal, Craig, E., Gerdes, J., Christian
2010
 - **Autonomous Cornering at the Limits: Designing a Longitudinal Feedback Controller Using a Tire Slip Circle**
Kritayakirana, K., Gerdes, J., Christian
2010
 - **A METHOD FOR INCORPORATING NONLINEAR TIRE BEHAVIOR INTO MODEL PREDICTIVE CONTROL FOR VEHICLE STABILITY** *ASME Dynamic Systems and Control Conference*
Beal, C. E., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2010: 157–164
 - **SLIDING SURFACE ENVELOPE CONTROL: KEEPING THE VEHICLE WITHIN A SAFE STATE-SPACE BOUNDARY** *ASME Dynamic Systems and Control Conference*
Bobier, C. G., Joe, S., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2010: 149–156
 - **PHYSICAL MODELING AND CONTROL OF A MULTI-CYLINDER HCCI ENGINE** *2nd Annual Dynamic Systems and Control Conference (DSCC 2009)/Bath/ASME Symposium on Fluid Power and Motion Control*
Ravi, N., Roelle, M. J., Liao, H., Jungkunz, A. F., Chang, C., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2010: 549–556
 - **EQUILIBRIUM ANALYSIS OF DRIFTING VEHICLES FOR CONTROL DESIGN** *2nd Annual Dynamic Systems and Control Conference (DSCC 2009)/ Bath/ASME Symposium on Fluid Power and Motion Control*
Hindiyeh, R. Y., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2010: 181–188
 - **CONTROLLING AN AUTONOMOUS RACING VEHICLE: USING FEEDFORWARD AND FEEDBACK TO CONTROL STEERING AND SPEED** *2nd Annual Dynamic Systems and Control Conference (DSCC 2009)/Bath/ASME Symposium on Fluid Power and Motion Control*
-

-
- Kritayakirana, K., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2010: 173–180
- **Analysis and control of high sideslip manoeuvres** *VEHICLE SYSTEM DYNAMICS*
Voser, C., Hindiyeh, R. Y., Gerdes, J. C.
2010; 48: 317-336
 - **Modeling and control of exhaust recompression HCCI using split injection** *American Control Conference*
Ravi, N., Liao, H., Jungkunz, A. F., Gerdes, J. C.
IEEE.2010: 3797–3802
 - **ENHANCING VEHICLE STABILITY THROUGH MODEL PREDICTIVE CONTROL** *2nd Annual Dynamic Systems and Control Conference (DSCC 2009)/Bath/ASME Symposium on Fluid Power and Motion Control*
Beal, C. E., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2010: 197–204
 - **PREDICTIVE CONTROL OF VEHICLE ROLL DYNAMICS WITH REAR WHEEL STEERING** *American Control Conference*
Beal, C. E., Gerdes, J. C.
IEEE.2010: 1489–1494
 - **Physics-Based Modeling and Control of Residual-Affected HCCI Engines** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*
Shaver, G. M., Gerdes, J. C., Roelle, M. J.
2009; 131 (2)
 - **LANEKEEPING AT THE LIMITS OF HANDLING: STABILITY VIA LYAPUNOV FUNCTIONS AND A COMPARISON WITH STABILITY CONTROL** *1st Annual Dynamic Systems and Control Conference (DSCC 2008)*
Talvala, K. L., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2009: 1161–1168
 - **Analysis and Control of High Sideslip Maneuvers**
Voser, C., Hindiyeh, Rami, Y., Gerdes, J., Christian
2009
 - **Rollover event prevention through predictive control of coordinated actuators**
Beal, Craig, E., Gerdes, J., Christian
2009
 - **Steer-by-wire suspension design: geometries to enhance peak tire force estimation**
Bobier, Carrie, G., Gerdes, J., Christian
2009
 - **Controlling an Autonomous Racing Vehicle: Using Feedforward and Feedback to Control Steering and Speed**
Kritayakirana, K., Gerdes, J., Christian
2009
 - **Envelope control: keeping the vehicle within its handling limits using front steering**
Hsu, Y. J., Gerdes, J., Christian
2009
 - **Robust fault detection filter design with applications to steer-by-wire vehicles** *ASME International Mechanical Engineering Congress and Exposition*
Gadda, C. D., Laws, S. M., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2008: 215–223
 - **Changing lanes with active lanekeeping assistance: a simulator study** *Human Factors for assistance and automation*
Schmidt, G., Talvala, Kirstin, L.R., Switkes, Joshua, P., Kiss, M., Gerdes, J., Christian
edited by de Waard, D., Flemisch, F., Lorenz, B.
Shaker Publishing, Maastricht, the Netherlands.2008: 1
 - **Lanekeeping at the Handling Limits**
Hindiyeh, Rami, Y., Talvala, Kirstin, L. R., Gerdes, J., Christian

2008

- **Design and Tests of a Controller for Autonomous Vehicle Path Tracking Using GPS/INS Sensors**
Kang, J., Hindiyeh, Rami, Y., Moon, S., Yi, K., Gerdes, J., Christian
2008
- **The Jacobian Expression of Roll Center: Derivation and Interpretation with Application to a Suspension with Active Camber**
Laws, Shad, M., Gerdes, J., Christian
2008
- **Lanekeeping at the Limits of Handling: Stability via Lyapunov Functions and a Comparison with Stability Control**
Talvala, Kirstin, L.R., Gerdes, J., Christian
2008
- **The Predictive Nature of Pneumatic Trail: Tire Slip Angle and Peak Force Estimation using Steering Torque**
Hsu, Y. J., Gerdes, J., Christian
2008
- **Controller-observer implementation for cycle-by-cycle control of an HCCI engine** *ASME International Mechanical Engineering Congress and Exposition*
Ravi, N., Roelle, M. J., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2008: 177–185
- **Estimating thermodynamic state and ignition in HCCI with variable fuel injection timing** *ASME International Mechanical Engineering Congress and Exposition*
Roelle, M. J., Ravi, N., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2008: 195–204
- **Repetitive control of an electro-hydraulic engine valve actuation system** *American Control Conference 2008*
Liao, H., Roelle, M. J., Gerdes, J. C.
IEEE.2008: 975–980
- **Transient responses of alternative vehicle configurations: A theoretical and experimental study on the effects of atypical moments of inertia** *American Control Conference 2008*
Bobier, C. G., Laws, S. M., Gerdes, J. C.
IEEE.2008: 230–235
- **Generating diagnostic residuals for steer-by-wire vehicles** *IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY*
Gadda, C. D., Laws, S. M., Gerdes, J. C.
2007; 15 (3): 529-540
- **Experimental vehicle handling modification through steer-by-wire and differential drive** *26th American Control Conference*
Brown, J. W., MacLean, R. K., Laws, S., Gadda, C., Gerdes, J. C.
IEEE.2007: 3814–3819
- **Driver Response to Steering Torque Disturbances: A User Study on Assisted Lane-keeping**
Switkes, Joshua, P., Gerdes, J., Christian, Schmidt, Gerrit, F., Kiss, M.
2007
- **Degenerate Mechanical Systems – A Framework for Tracking Control**
Chang, Samuel, Y., Gerdes, J., Christian
2007
- **Model Based Control of Exhaust Recompression HCCI**
Ravi, N., Roelle, Matthew, J., Jungkunz, Adam, F., Gerdes, J., Christian
2007
- **Experimental Studies of Using Steering Torque Under Various Road Conditions for Sideslip and Friction Estimation**
Hsu, Y. J., Laws, S., Gerdes, J., Christian
2007
- **Degenerate mechanical systems - A framework for tracking control** *26th American Control Conference*

-
- Chang, S. Y., Gerdes, J. C.
IEEE.2007: 3729–3734
- **Integrating INS sensors with GPS measurements for continuous estimation of vehicle sideslip, roll, and tire cornering stiffness** *IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS*
Bevly, D. A., Ryu, J., Gerdes, J. C.
2006; 7 (4): 483-493
 - **Lyapunov based performance guarantees for the potential field lane-keeping assistance system** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*
Rossetter, E. J., Gerdes, J. C.
2006; 128 (3): 510-522
 - **Handwheel force feedback for lanekeeping assistance: Combined dynamics and stability** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*
Switkes, J. P., Rossetter, E. J., Coe, I. A., Gerdes, J. C.
2006; 128 (3): 532-542
 - **Modeling cycle-to-cycle dynamics and mode transition in HCCI engines with variable valve actuation** *CONTROL ENGINEERING PRACTICE*
Shaver, G. M., Roelle, M. J., Gerdes, J. C.
2006; 14 (3): 213-222
 - **A two-input two-output control model of HCCI engines** *American Control Conference 2006*
Shaver, G. M., Roelle, M., Gerdes, J. C.
IEEE.2006: 472–477
 - **A 2-Input, 2-State Model of Residual-Affected HCCI Engines**
Shaver, Gregory, M., Roelle, Matthew, J., Gerdes, J., Christian
2006
 - **A Physically Based Two-State Model for Controlling Exhaust Recompression HCCI in Gasoline Engines**
Ravi, N., Roelle, Matthew, J., Jungkunz, Adam, F., Gerdes, J., Christian
2006
 - **Lyapunov based performance guarantees for the potential field lanekeeping assistance system** *ASME Journal of Dynamic Systems, Measurement and Control*
Rossetter, Eric, J., Gerdes, J., Christian
2006; 3 (128): 532-542
 - **An Energy Based Performance Bound for Lanekeeping Assistance with Force Feedback**
Switkes, Joshua, P., Gerdes, J., Christian
2006
 - **A Dynamic Model of Recompression HCCI Combustion Including Cylinder Wall Temperature**
Roelle, Matthew, J., Ravi, N., Jungkunz, Adam, F., Gerdes, J., Christian
2006
 - **Cycle-to-cycle dynamics and mode transition in HCCI engines with variable valve actuation** *Control Engineering Practice*
Shaver, Gregory, M., Roelle, Matthew, J., Gerdes, J., Christian
2006; 3 (14): 213-222
 - **High-Frequency Vehicle Characteristics: Modeling and Experimental Validation of Yaw, Sideslip, and Roll Modes**
Law, S., Gerdes, J., Christian
2006
 - **A Method to Estimate the Friction Coefficient and Tire Slip Angle Using Steering Torque**
Hsu, Y. J., Laws, S., Gadda, Christopher, D., Gerdes, J., Christian
2006
 - **GPS-Augmented vehicle dynamics control** *SAE Transactions, Journal of Passenger Cars: Mechanical Systems*
Beiker, Sven, A., Gaubatz, K., Gerdes, J., Christian, Rock, Kirstin, L.
2006: 1174-1182

- **Integrating INS sensors with GPS velocity measurements for continuous estimation of vehicle sideslip and tire cornering stiffness** *IEEE Transactions on Intelligent Transportation Systems*
Bevly, David, M., Ryu, J., Gerdes, J., Christian
2006; 4 (7): 483-493
- **GPS Augmented Vehicle Dynamics Control**
Beiker, S. A., Gaubatz, K. H., Gerdes, J., Christian, Rock, Kirstin, L.
2006
- **Real-time Tire Parameter Estimation in a Steer-by-wire Vehicle**
Hsu, Y. J., Gerdes, J., Christian
2006
- **Eliminating the Need for Sensor Redundancy in Diagnostic Systems for Steer-by-Wire Vehicles**
Gadda, Christopher, D., Gerdes, J., Christian
2006
- **Modification of vehicle handling characteristics via steer-by-wire** *IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY*
Yih, P., Gerdes, J. C.
2005; 13 (6): 965-976
- **Consistent nonlinear estimation of longitudinal tire stiffness and effective radius** *IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY*
Carlson, C. R., Gerdes, J. C.
2005; 13 (6): 1010-1020
- **Dynamic modeling of residual-affected homogeneous charge compression ignition engines with variable valve actuation** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*
Shaver, G. M., Gerdes, J. C., Roelle, M. J., Caton, P. A., Edwards, C. F.
2005; 127 (3): 374-381
- **Validating GPS based measurements for vehicle control** *ASME International Mechanical Engineering Congress and Exposition*
Rock, K. L., Beiker, S. A., Laws, S., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2005: 583-592
- **Residual autocorrelation in probabilistic model-based diagnostics** *ASME International Mechanical Engineering Congress and Exposition*
Schwall, M. L., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2005: 1255-1264
- **Steer-by-Wire Suspension and Steering Design for Controllability and Observability**
Laws, S., Gadda, C., Kohn, S., Yih, P., Gerdes, J., Christian, Milroy, J., Craig
2005
- **Residual Autocorrelation in Probabilistic Model-Based Diagnostics**
Schwall, Matthew, L., Gerdes, J., Christian
2005
- **A physically based approach to control of HCCI engines with variable valve actuation** *International Journal of Engine Research*
Shaver, Gregory, M., Roelle, Matthew, J., Caton, Patrick, A., Kaahaaina, Nalu, B., Ravi, N., Hathout, J., Gerdes, J. C.
2005; 4 (6): 361-375
- **Decoupled Control of Combustion Timing and Peak Pressure on an HCCI Engine**
Shaver, Gregory, M., Roelle, Matthew, J., Gerdes, J., Christian
2005
- **Automotive Diagnostic Decisions Using Probabilistic Information**
Schwall, Matthew, L., Gerdes, J., Christian
2005
- **Stabilization of a steer-by-wire vehicle at the limits of handling using feedback linearization** *ASME International Mechanical Engineering Congress and Exposition*

-
- Hsu, Y. J., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2005: 483–492
- **Decoupled control of combustion timing and work output in residual-affected HCCI engines** *American Control Conference 2005 (ACC)*
Shaver, G. M., Roelle, M., Gerdes, J. C.
IEEE.2005: 3871–3876
 - **Differential geometric structures in vehicle lane keeping and roll mitigation** *American Control Conference 2005 (ACC)*
Chang, S. Y., Gerdes, J. C.
IEEE.2005: 441–446
 - **Guaranteeing lanekeeping performance with tire saturation using computed polynomial lyapunov functions** *ASME International Mechanical Engineering Congress and Exposition*
Switkes, J. P., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2005: 415–424
 - **Automotive diagnostic decisions using probabilistic information** *ASME International Mechanical Engineering Congress and Exposition*
Schwall, M. L., Gerdes, J. C.
AMER SOC MECHANICAL ENGINEERS.2005: 157–166
 - **Integrating inertial sensors with global positioning system (GPS) for vehicle dynamics control** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*
Ryu, J., Gerdes, J. C.
2004; 126 (2): 243-254
 - **Experimental validation of the potential field lanekeeping system** *INTERNATIONAL JOURNAL OF AUTOMOTIVE TECHNOLOGY*
Rossetter, E. J., Switkes, J. R., Gerdes, J. C.
2004; 5 (2): 95-108
 - **Physics-based closed-loop control of phasing, peak pressure and work output in HCCI engines utilizing variable valve actuation** *American Control Conference*
Shaver, G. M., Gerdes, J. C., Roelle, M.
IEEE.2004: 150–155
 - **Vehicle sideslip and road bank angle estimation using GPS** *Review of Automotive Engineering JSAE*
Ryu, J., Gerdes, J., Christian
2004; 3 (25): 347-359
 - **Multi-cycle modeling of HCCI Engines**
Shaver, Gregory, M., Roelle, M., Gerdes, J., Christian
2004
 - **Tackling theTransition: A Multi-Mode Combustion Model of SI and HCCI for Mode Transition Control**
Roelle, M., Shaver, Gregory, M., Gerdes, J., Christian
2004
 - **Steer-by-Wire for Vehicle State Estimation and Control**
Yih, P., Gerdes, J., Christian
2004
 - **Using MEMS Accelerometers to Improve Automobile Handwheel State Estimation for Force Feedback**
Switkes, Joshua, P., Coe, Ian, A., Gerdes, J., Christian
2004
 - **Vehicle State Estimation in Diagnostic Systems for Steer-by-Wire Vehicles**
Gadda, Christopher, D., Yih, P., Gerdes, J., Christian
2004
 - **Handwheel Force Feedback for Lanekeeping Assistance: Combined Dynamics and Stability**
Switkes, Joshua, P., Rossetter, Eric, J., Coe, Ian, A., Gerdes, J., Christian
2004

- **Contraction and Sum of Squares Analysis of HCCI Engines**
Shaver, Gregory, M., Kojic, A., Gerdes, J., Christian, Hathout, J., Ahmed, J.
2004
- **Integrating inertial sensors with GPS for vehicle dynamics control** *ASME Journal of Dynamic Systems, Measurement and Control*
Ryu, J., Gerdes, J., Christian
2004; 2 (126): 243-254
- **Error sources when land vehicle dead reckoning with differential wheelspeeds** *Navigation*
Carlson, Christopher, R., Gerdes, J., Christian, Powell, J., David
2004; 1 (51): 13-29
- **Vehicle state estimation using steering torque** *American Control Conference*
Yih, P., Ryu, J., Gerdes, J. C.
IEEE.2004: 2116–2121
- **Input shaper design in convex optimization framework with frequency domain constraints** *American Control Conference*
Bae, H. S., Gerdes, J. C.
IEEE.2004: 2687–2692
- **Estimation of vehicle roll and road bank angle** *American Control Conference*
Ryu, J., Gerdes, J. C.
IEEE.2004: 2110–2115
- **Command modification using input shaping for automated highway systems with heavy trucks** *Annual American Control Conference (ACC 2003)*
Bae, H. S., Gerdes, J. C.
IEEE.2003: 54–59
- **Optimal Rollover Prevention with Steer by Wire and Differential Braking**
Carlson, Christopher, R., Gerdes, J., Christian
2003
- **Cam System Modeling** *Cam Design Handbook*
Gerdes, J., Christian
edited by Rothbart, Harold, A.
Mc-Graw-Hill.2003: 1
- **Safety Guarantees For Lanekeeping Assistance Systems With Time-Varying Disturbances: A Lyapunov Approach**
Rossetter, Eric, J., Gerdes, J., Christian
2003
- **Cycle-to-cycle control of HCCI Engines**
Shaver, Gregory, M., Gerdes, J., Christian
2003
- **Command Modification Using Input Shaping for Automated Systems with Heavy Trucks**
Bae, Hong, S., Gerdes, J., Christian
2003
- **Residual-effected homogeneous charge compression ignition at low compression ratio using exhaust reinduction** *International Journal of Engine Research*
Caton, Patrick, A., Simon, A., J., Gerdes, J., Christian, Edwards, Christopher, F.
2003; 3 (4): 163-177
- **A Probabilistic Vehicle Diagnostic System Using Multiple Models**
Schwall, Matthew, L., Gerdes, J., Christian
2003
- **Modeling for control of HCCI engines** *Annual American Control Conference (ACC 2003)*
Shaver, G. M., Gerdes, J. C., Jain, P., Caton, P. A., Edwards, C. F.
IEEE.2003: 749–754

- **A gentle nudge towards safety: Experimental validation of the potential field driver assistance system** *Annual American Control Conference (ACC 2003)*
Rossetter, E. J., Switkes, J. P., Gerdes, J. C.
IEEE.2003: 3744–3749
- **Modification of vehicle handling characteristics via steer-by-wire** *Annual American Control Conference (ACC 2003)*
Yih, P., Ryu, J., Gerdes, J. C.
IEEE.2003: 2578–2583
- **Nonlinear estimation of longitudinal tire slip under several driving conditions** *Annual American Control Conference (ACC 2003)*
Carlson, C. R., Gerdes, J. C.
IEEE.2003: 4975–4980
- **A new yaw dynamic model for improved high speed control of a farm tractor** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*
Bevly, D. M., Gerdes, J. C., Parkinson, B. W.
2002; 124 (4): 659-667
- **"Loop-at-a-time" design of Dynamic Surface Controllers for nonlinear systems** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*
Gerdes, J. C., Hedrick, J. K.
2002; 124 (1): 104-110
- **An error energy shaping interpretation of tracking controllers for mechanical systems** *20th Annual American Control Conference (ACC)*
Chang, S. Y., Gerdes, J. C.
IEEE.2002: 3968–3973
- **The use of GPS based velocity measurements for measurement of sideslip and wheel slip** *VEHICLE SYSTEM DYNAMICS*
Bevly, D. M., Gerdes, J. C., Wilson, C.
2002; 38 (2): 127-147
- **Loop-at-a-time' design of dynamic surface controllers for nonlinear systems** *ASME Journal of Dynamic Systems, Measurement and Control*
Gerdes, J., Christian, Hedrick, J., Karl
2002; 1 (124): 104-110
- **Performance Guarantees for Hazard Based Lateral Vehicle Control**
Rossetter, Eric, J., Gerdes, J., Christian
2002
- **Yaw dynamic modeling for improved high speed control of a farm tractor** *ASME Journal of Dynamic Systems, Measurement and Control*
Bevly, David, M.
2002; 4 (124): 659-667
- **The use of GPS based velocity measurements for measurement of sideslip and wheel slip** *Vehicle System Dynamics*
Bevly, David, M., Gerdes, J., Christian, Wilson, C.
2002; 2 (38): 127-147
- **Identifying Tire Pressure Variation by Nonlinear Estimation of Longitudinal Stiffness and Effective Radius**
Carlson, Christopher, R., Gerdes, J., Christian
2002
- **Practical Position and Yaw Rate Estimation with GPS and Differential Wheelspeeds**
Carlson, Christopher, R., Gerdes, J., Christian, Powell, J., David
2002
- **A Comparison of Several Sliding Surfaces for Stability Control**
Uematsu, K., Gerdes, J., Christian
2002
- **Vehicle Sideslip and Roll Parameter Estimation Using GPS**
Ryu, J., Rossetter, Eric, J., Gerdes, J., Christian

2002

- **A Study of Lateral Vehicle Control Under a ‘Virtual’ Force Framework**
Rossetter, Eric, J., Gerdes, J., Christian
2002
- **A probabilistic approach to residual processing for vehicle fault detection** *20th Annual American Control Conference (ACC)*
Schwall, M. L., Gerdes, J. C.
IEEE.2002: 2552–2557
- **Combining lanekeeping and vehicle following with hazard maps** *VEHICLE SYSTEM DYNAMICS*
Gerdes, J. C., Rossetter, E. J., Saur, U.
2001; 36 (4-5): 391-411
- **A unified approach to driver assistance systems based on artificial potential fields** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*
Gerdes, J. C., Rossetter, E. J.
2001; 123 (3): 431-438
- **Road grade and vehicle parameter estimation for longitudinal control using GPS** *IEEE Intelligent Transportation Systems Conference (ITSC'01)*
Bae, H. S., Ryu, R. H., Gerdes, J. C.
IEEE.2001: 166–171
- **Multi-Modal Diagnostics for Vehicle Fault Detection**
Schwall, Matthew, L., Gerdes, J., Christian
2001
- **A Lyapunov Function Approach to Energy Based Model Reduction**
Chang, Samuel, Y., Carlson, Christopher, R., Gerdes, J., Christian
2001
- **Calculating longitudinal wheel slip and tire parameters using GPS velocity** *American Control Conference (ACC)*
Miller, S. L., YOUNGBERG, B., Millie, A., Schweizer, P., Gerdes, J. C.
IEEE.2001: 1800–1805
- **Integrating INS sensors with GPS velocity measurements for continuous estimation of vehicle sideslip and tire cornering stiffness** *American Control Conference (ACC)*
Bevly, D. M., Sheridan, R., Gerdes, J. C.
IEEE.2001: 25–30
- **Dynamic surface control for a class of nonlinear systems** *IEEE TRANSACTIONS ON AUTOMATIC CONTROL*
Swaroop, D., Hedrick, J. K., Yip, P. P., Gerdes, J. C.
2000; 45 (10): 1893-1899
- **The use of GPS based velocity measurements for improved vehicle state estimation** *2000 American Control Conference (ACC 2000)*
Bevly, D. M., Gerdes, J. C., Wilson, C., Zhang, G. S.
IEEE.2000: 2538–2542
- **Yaw dynamic modeling for improved high speed control of a farm tractor**
Bevly, David., M., Gerdes, J., Christian, Parkinson, B.
2000
- **Parameter Estimation and Command Modification for Longitudinal Control of Heavy Vehicles**
Bae, H. S., Gerdes, J., Christian
2000
- **Combining Lanekeeping and Vehicle Following with Hazard Maps**
Gerdes, J., Christian, Saur, U., Rossetter, Eric, J.
2000
- **The role of handling characteristics in driver assistance systems with environmental interaction** *2000 American Control Conference (ACC 2000)*

-
- Rossetter, E. J., Gerdes, J. C.
IEEE.2000: 2528–2532
- **Brake system modeling for simulation and control** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*
Gerdes, J. C., Hedrick, J. K.
1999; 121 (3): 496-503
 - **Hysteresis Control of Nonlinear Single-Acting Actuators as Applied to Brake/Throttle Switching**
Gerdes, J., Christian, Hedrick, J., Karl
1999
 - **A Unified Approach to Driver Assistance Systems Based On Artificial Potential Fields**
Gerdes, J., Christian, Rossetter, Eric, J.
1999
 - **Loop-at-a-time Design of Dynamic Surface Controllers for Nonlinear Systems**
Gerdes, J., Christian, Hedrick, J., Karl
1999
 - **Vehicle speed and spacing control via coordinated throttle and brake actuation** *CONTROL ENGINEERING PRACTICE*
Gerdes, J. C., Hedrick, J. K.
1997; 5 (11): 1607-1614
 - **Dynamic Surface Control of Nonlinear Systems**
Swaroop, D., V.A.H.G, Gerdes, J., Christian, Yip, Patrick, P., Hedrick, J., Karl
1997
 - **Fault tolerant control of automatically controlled vehicles in response to brake system failures** *1997 IEEE International Conference on Control Applications*
Swaroop, D., Gerdes, J. C., Hedrick, J. K.
I E E E.1997: 705–710
 - **Dynamic surface control of nonlinear system** *1997 American Control Conference*
Swaroop, D., Gerdes, J. C., Yip, P. P., Hedrick, J. K.
IEEE.1997: 3028–3034
 - **Vehicle speed and spacing control via coordinated throttle and brake actuation** *Control Engineering Practice*
Gerdes, J., Christian, Hedrick, J., Karl
1997; 11 (5): 1607-1614
 - **Fault Tolerant Control of Automatically Controlled Vehicles in Response to Brake System Failures**
Swaroop, D., V.A.H.G, Gerdes, J., Christian, Hedrick, J., Karl
1997
 - **Vehicle Speed and Spacing Control via Coordinated Throttle and Brake Actuation**
Gerdes, J., Christian, Hedrick, J., Karl
1996
 - **An Impact Model of Mechanical Backlash for Control System Analysis**
Gerdes, J., Christian, Kumar, V.
1995
 - **Brake system requirements for platooning on an automated highway** *1995 American Control Conference*
Gerdes, J. C., Hedrick, J. K.
AMER AUTOMATIC CONTROL COUNCIL.1995: 165–169
 - **Brake System Requirements for Platooning on an Automated Highway**
Gerdes, J., Christian, Hedrick, J., Karl
1995
 - **Brake System Modeling for Vehicle Control**
Gerdes, J., Christian, Brown, Aaron, S., Hedrick, J., Karl

1995

- **Brake System Modeling for IVHS Longitudinal Control, Advances in Robust and Nonlinear Control**

Gerdes, J., Christian, Maciuca, Dragos, B., Hedrick, J., Karl, Devlin, Peter, E.

1993

- **Incorporating Design Into an Undergraduate Laboratory Course**

Gerdes, J., Christian

1993