

Matthias Althoff

List of Publications by Year in descending order

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Version: 2024-02-01

156
papers

4,645
citations

218677

26
h-index

233421

45
g-index

157
all docs

157
docs citations

157
times ranked

2067
citing authors

#	ARTICLE	IF	CITATIONS
1	Online Verification of Automated Road Vehicles Using Reachability Analysis. IEEE Transactions on Robotics, 2014, 30, 903-918.	10.3	282
2	Model-Based Probabilistic Collision Detection in Autonomous Driving. IEEE Transactions on Intelligent Transportation Systems, 2009, 10, 299-310.	8.0	228
3	CommonRoad: Composable benchmarks for motion planning on roads. , 2017, , .		192
4	Reachability analysis of nonlinear systems with uncertain parameters using conservative linearization. , 2008, , .		187
5	Computing reachable sets of hybrid systems using a combination of zonotopes and polytopes. Nonlinear Analysis: Hybrid Systems, 2010, 4, 233-249.	3.5	129
6	Comparison of Markov Chain Abstraction and Monte Carlo Simulation for the Safety Assessment of Autonomous Cars. IEEE Transactions on Intelligent Transportation Systems, 2011, 12, 1237-1247.	8.0	108
7	High-level Decision Making for Safe and Reasonable Autonomous Lane Changing using Reinforcement Learning. , 2018, , .		108
8	Set Propagation Techniques for Reachability Analysis. Annual Review of Control, Robotics, and Autonomous Systems, 2021, 4, 369-395.	11.8	102
9	Reachability analysis of nonlinear systems using conservative polynomialization and non-convex sets. , 2013, , .		92
10	Reachability Analysis of Nonlinear Differential-Algebraic Systems. IEEE Transactions on Automatic Control, 2014, 59, 371-383.	5.7	84
11	Generating Critical Test Scenarios for Automated Vehicles with Evolutionary Algorithms. , 2019, , .		81
12	Automatic Generation of Safety-Critical Test Scenarios for Collision Avoidance of Road Vehicles. , 2018, , .		78
13	Set-Based Prediction of Traffic Participants on Arbitrary Road Networks. IEEE Transactions on Intelligent Vehicles, 2016, 1, 187-202.	12.7	72
14	Zonotope bundles for the efficient computation of reachable sets. , 2011, , .		71
15	Using online verification to prevent autonomous vehicles from causing accidents. Nature Machine Intelligence, 2020, 2, 518-528.	16.0	70
16	Reachability analysis of linear systems with uncertain parameters and inputs. , 2007, , .		64
17	Adaptive Cruise Control with Safety Guarantees for Autonomous Vehicles. IFAC-PapersOnLine, 2017, 50, 5774-5781.	0.9	62
18	Pedestrian Models for Autonomous Driving Part II: High-Level Models of Human Behavior. IEEE Transactions on Intelligent Transportation Systems, 2021, 22, 5453-5472.	8.0	62

#	ARTICLE	IF	CITATIONS
19	Formalising Traffic Rules for Accountability of Autonomous Vehicles. , 2015, , .		61
20	SPOT: A tool for set-based prediction of traffic participants. , 2017, , .		57
21	Reachable set computation for uncertain time-varying linear systems. , 2011, , .		56
22	Verifying the safety of lane change maneuvers of self-driving vehicles based on formalized traffic rules. , 2017, , .		56
23	Computing the Drivable Area of Autonomous Road Vehicles in Dynamic Road Scenes. IEEE Transactions on Intelligent Transportation Systems, 2018, 19, 1855-1866.	8.0	54
24	Set-Based Prediction of Traffic Participants Considering Occlusions and Traffic Rules. IEEE Transactions on Intelligent Vehicles, 2021, 6, 249-265.	12.7	53
25	Safety verification of autonomous vehicles for coordinated evasive maneuvers. , 2010, , .		51
26	Fail-safe motion planning of autonomous vehicles. , 2016, , .		51
27	Formalising and Monitoring Traffic Rules for Autonomous Vehicles in Isabelle/HOL. Lecture Notes in Computer Science, 2017, , 50-66.	1.3	50
28	Using Reachable Sets for Trajectory Planning of Automated Vehicles. IEEE Transactions on Intelligent Vehicles, 2021, 6, 232-248.	12.7	44
29	Provably safe motion of mobile robots in human environments. , 2017, , .		43
30	Formal and Compositional Analysis of Power Systems Using Reachable Sets. IEEE Transactions on Power Systems, 2014, 29, 2270-2280.	6.5	42
31	Effortless creation of safe robots from modules through self-programming and self-verification. Science Robotics, 2019, 4, .	17.6	42
32	Provably-Correct and Comfortable Adaptive Cruise Control. IEEE Transactions on Intelligent Vehicles, 2021, 6, 159-174.	12.7	42
33	Set-Based Prediction of Pedestrians in Urban Environments Considering Formalized Traffic Rules. , 2018, , .		40
34	Pedestrian Models for Autonomous Driving Part I: Low-Level Models, From Sensing to Tracking. IEEE Transactions on Intelligent Transportation Systems, 2021, 22, 6131-6151.	8.0	40
35	Probabilistic collision state checker for crowded environments. , 2010, , .		39
36	Computationally Efficient Fail-safe Trajectory Planning for Self-driving Vehicles Using Convex Optimization. , 2018, , .		39

#	ARTICLE	IF	CITATIONS
37	Formal verification of phase-locked loops using reachability analysis and continuization. Communications of the ACM, 2013, 56, 97-104.	4.5	38
38	Ensuring drivability of planned motions using formal methods. , 2017, , .		35
39	A Formally Verified Checker of the Safe Distance Traffic Rules for Autonomous Vehicles. Lecture Notes in Computer Science, 2016, , 175-190.	1.3	34
40	Fail-Safe Motion Planning for Online Verification of Autonomous Vehicles Using Convex Optimization. IEEE Transactions on Robotics, 2021, 37, 798-814.	10.3	34
41	Probabilistic mapping of dynamic obstacles using Markov chains for replanning in dynamic environments. , 2008, , .		33
42	Set-based computation of vehicle behaviors for the online verification of autonomous vehicles. , 2011, , .		33
43	Sparse Polynomial Zonotopes: A Novel Set Representation for Reachability Analysis. IEEE Transactions on Automatic Control, 2021, 66, 4043-4058.	5.7	33
44	Avoiding geometric intersection operations in reachability analysis of hybrid systems. , 2012, , .		32
45	Overapproximative Human Arm Occupancy Prediction for Collision Avoidance. IEEE Transactions on Automation Science and Engineering, 2018, 15, 818-831.	5.2	31
46	Safe Reinforcement Learning for Autonomous Lane Changing Using Set-Based Prediction. , 2020, , .		30
47	Online safety verification of trajectories for unmanned flight with offline computed robust invariant sets. , 2015, , .		29
48	Methods for order reduction of zonotopes. , 2017, , .		29
49	Safety control of robots under Computed Torque control using reachable sets. , 2015, , .		28
50	Safety Assessment of Autonomous Cars using Verification Techniques. Proceedings of the American Control Conference, 2007, , .	0.0	27
51	Reachability computation of low-order models for the safety verification of high-order road vehicle models. , 2012, , .		27
52	Guaranteeing Constraints of Disturbed Nonlinear Systems Using Set-Based Optimal Control in Generator Space. IFAC-PapersOnLine, 2017, 50, 11515-11522.	0.9	27
53	Efficient Mixed-Integer Programming for Longitudinal and Lateral Motion Planning of Autonomous Vehicles. , 2018, , .		27
54	Stochastic reachable sets of interacting traffic participants. , 2008, , .		26

#	ARTICLE	IF	CITATIONS
55	Combining zonotopes and support functions for efficient reachability analysis of linear systems. , 2016, , .		26
56	Model Conformance for Cyber-Physical Systems. ACM Transactions on Cyber-Physical Systems, 2019, 3, 1-26.	2.5	26
57	Reachset Conformance Testing of Hybrid Automata. , 2016, , .		26
58	Formal verification of phase-locked loops using reachability analysis and continuization. , 2011, , .		24
59	Automatic centralized controller design for modular and reconfigurable robot manipulators. , 2015, , .		24
60	Probabilistic Map-based Pedestrian Motion Prediction Taking Traffic Participants into Consideration. , 2018, , .		24
61	Optimal control of sets of solutions to formally guarantee constraints of disturbed linear systems. , 2017, , .		23
62	Reachset Model Predictive Control for Disturbed Nonlinear Systems. , 2018, , .		23
63	Worst-case Analysis of the Time-To-React Using Reachable Sets. , 2018, , .		23
64	STL Model Checking of Continuous and Hybrid Systems. Lecture Notes in Computer Science, 2016, , 412-427.	1.3	23
65	Road occupancy prediction of traffic participants. , 2013, , .		22
66	On the Combined Inverse-Dynamics/Passivity-Based Control of Elastic-Joint Robots. IEEE Transactions on Robotics, 2018, 34, 1461-1471.	10.3	22
67	Comparison of guaranteed state estimators for linear time-invariant systems. Automatica, 2021, 130, 109662.	5.0	22
68	Safety assessment of driving behavior in multi-lane traffic for autonomous vehicles. , 2009, , .		21
69	Design and capabilities of the Munich Cognitive Automobile. , 2008, , .		20
70	Computationally Efficient Safety Falsification of Adaptive Cruise Control Systems. , 2019, , .		20
71	Reachability Analysis of Large Linear Systems With Uncertain Inputs in the Krylov Subspace. IEEE Transactions on Automatic Control, 2020, 65, 477-492.	5.7	20
72	Convex Interpolation Control with Formal Guarantees for Disturbed and Constrained Nonlinear Systems. , 2017, , .		20

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73	Tactical Decision Making for Cooperative Vehicles Using Reachable Sets. , 2018, , .		19
74	Formal verification of maneuver automata for parameterized motion primitives. , 2014, , .		18
75	Can automated road vehicles harmonize with traffic flow while guaranteeing a safe distance?. , 2016, , .		18
76	Estimating the region of attraction via forward reachable sets. , 2017, , .		18
77	Efficient Computation of Invariably Safe States for Motion Planning of Self-Driving Vehicles. , 2018, , .		18
78	CommonRoad Drivability Checker: Simplifying the Development and Validation of Motion Planning Algorithms. , 2020, , .		18
79	On-the-Fly Control Design of Modular Robot Manipulators. IEEE Transactions on Control Systems Technology, 2018, 26, 1484-1491.	5.2	17
80	Cognition and emotion in autonomous cars. , 2009, , .		16
81	Nonlinear Modeling and Control Design of Active Helicopter Blades. Journal of the American Helicopter Society, 2012, 57, 1-11.	0.8	16
82	Formal Analysis of Drum-Boiler Units to Maximize the Load-Following Capabilities of Power Plants. IEEE Transactions on Power Systems, 2016, 31, 4691-4702.	6.5	16
83	Interaction-aware occupancy prediction of road vehicles. , 2017, , .		16
84	Analyzing Reachability of Linear Dynamic Systems with Parametric Uncertainties. , 2011, , 69-94.		16
85	Verification of Uncertain Embedded Systems by Computing Reachable Sets based on Zonotopes. IFAC Postprint Volumes IPPV / International Federation of Automatic Control, 2008, 41, 5125-5130.	0.4	15
86	Comparison of trajectory tracking controllers for emergency situations. , 2013, , .		15
87	Flexible Automation Driven by Demonstration: Leveraging Strategies that Simplify Robotics. IEEE Robotics and Automation Magazine, 2018, 25, 18-27.	2.0	15
88	Automated generation of hybrid system models for reachability analysis of nonlinear analog circuits. , 2015, , .		14
89	Robust Control of Continuum Robots using Interval Arithmetic. IFAC-PapersOnLine, 2017, 50, 5660-5665.	0.9	14
90	Anytime Safety Verification of Autonomous Vehicles. , 2018, , .		14

#	ARTICLE	IF	CITATIONS
91	Reachset Conformance of Forward Dynamic Models for the Formal Analysis of Robots. , 2018, , .		13
92	Energy-Consistent, Galerkin Approach for the Nonlinear Dynamics of Beams Using Mixed, Intrinsic Equations. , 2006, , .		12
93	Determining the Nonexistence of Evasive Trajectories for Collision Avoidance Systems. , 2015, , .		12
94	Distributed Formal Analysis for Power Networks With Deep Integration of Distributed Energy Resources. IEEE Transactions on Power Systems, 2019, 34, 5147-5156.	6.5	12
95	Predictive Monitoring of Traffic Rules. , 2021, , .		12
96	Utilizing dependencies to obtain subsets of reachable sets. , 2020, , .		12
97	Control synthesis for non-polynomial systems: A domain of attraction perspective. , 2015, , .		11
98	Estimating the domain of attraction based on the invariance principle. , 2016, , .		11
99	Computing possible driving corridors for automated vehicles. , 2017, , .		11
100	On the co-NP-completeness of the zonotope containment problem. European Journal of Control, 2021, 62, 84-91.	2.6	11
101	A task-driven algorithm for configuration synthesis of modular robots. , 2016, , .		10
102	On estimating the Robust Domain of Attraction for uncertain non-polynomial systems: An LMI approach. , 2016, , .		10
103	Compositional transient stability analysis of power systems via the computation of reachable sets. , 2017, , .		10
104	Evolutionary cost-optimal composition synthesis of modular robots considering a given task. , 2017, , .		10
105	Computing Safe Sets of Linear Sampled-Data Systems. , 2021, 5, 385-390.		10
106	Provably Safe Deep Reinforcement Learning for Robotic Manipulation in Human Environments. , 2022, , .		10
107	Closed-form expressions of convex combinations. , 2016, , .		9
108	Set-based control for disturbed piecewise affine systems with state and actuation constraints. Nonlinear Analysis: Hybrid Systems, 2020, 36, 100826.	3.5	9

#	ARTICLE	IF	CITATIONS
109	Computing Non-Convex Inner-Approximations of Reachable Sets for Nonlinear Continuous Systems. , 2020, , .		9
110	Interval-Arithmetic-Based Robust Control of Fully Actuated Mechanical Systems. IEEE Transactions on Control Systems Technology, 2022, 30, 1525-1537.	5.2	9
111	Safety assessment for stochastic linear systems using enclosing hulls of probability density functions. , 2009, , .		8
112	Ultimate robust performance control of rigid robot manipulators using interval arithmetic. , 2016, , .		8
113	Online motion synthesis with minimal intervention control and formal safety guarantees. , 2016, , .		8
114	Efficient Computation of Interval-Arithmetic-Based Robust Controllers for Rigid Robots. , 2017, , .		8
115	Enhancing motion safety by identifying safety-critical passageways. , 2017, , .		8
116	Reachability analysis for hybrid systems with nonlinear guard sets. , 2020, , .		8
117	Sampling-Based Trajectory Repairing for Autonomous Vehicles. , 2021, , .		8
118	Online Verification of Cognitive Car Decisions. Intelligent Vehicles Symposium, 2009 IEEE, 2007, , .	0.0	7
119	Establishing Reachset Conformance for the Formal Analysis of Analog Circuits. , 2020, , .		7
120	Adaptive parameter tuning for reachability analysis of nonlinear systems. , 2021, , .		7
121	SaRA: A Tool for Safe Human-Robot Coexistence and Collaboration through Reachability Analysis. , 2022, , .		7
122	Combined inverse-dynamics/passivity-based control for robots with elastic joints. , 2017, , .		6
123	Calculating human reachable occupancy for guaranteed collision-free planning. , 2017, , .		6
124	Scalable Robust Model Predictive Control for Linear Sampled-Data Systems. , 2019, , .		6
125	Distributed Secure State Estimation Using Diffusion Kalman Filters and Reachability Analysis. , 2019, , .		6
126	Optimizing Sets of Solutions for Controlling Constrained Nonlinear Systems. IEEE Transactions on Automatic Control, 2021, 66, 981-994.	5.7	6

#	ARTICLE	IF	CITATIONS
127	Time-Triggered Conversion of Guards for Reachability Analysis of Hybrid Automata. Lecture Notes in Computer Science, 2017, , 133-150.	1.3	6
128	A Multi-Step Approach to Accelerate the Computation of Reachable Sets for Road Vehicles. , 2020, , .		6
129	Transient stability analysis by reachable set computation. , 2012, , .		5
130	Overapproximative arm occupancy prediction for human-robot co-existence built from archetypal movements. , 2016, , .		5
131	On enlarging backward reachable sets via Zonotopic set membership. , 2016, , .		5
132	Formal LPV control for transient stability of power systems. , 2017, , .		5
133	Interval-Arithmetic-Based Trajectory Scaling and Collision Detection for Robots with Uncertain Dynamics. , 2018, , .		5
134	Model-based Offline Vehicle Tracking in Automotive Applications Using a Precise 3D Model. , 2019, , .		5
135	Sampling-Based Optimal Trajectory Generation for Autonomous Vehicles Using Reachable Sets. , 2021, , .		5
136	On time-memory trade-off for collision detection. , 2015, , .		4
137	Reachset Conformance Testing of Human Arms with a Biomechanical Model. , 2018, , .		4
138	Offline Dynamic Grid Generation for Automotive Environment Perception Using Temporal Inference Methods. IEEE Robotics and Automation Letters, 2021, 6, 5501-5508.	5.1	4
139	Adaptive Parameter Tuning for Reachability Analysis of Linear Systems. , 2020, , .		4
140	Computing Specification-Compliant Reachable Sets for Motion Planning of Automated Vehicles. , 2021, , .		4
141	Falsifying Motion Plans of Autonomous Vehicles With Abstractly Specified Traffic Scenarios. IEEE Transactions on Intelligent Vehicles, 2023, 8, 1717-1730.	12.7	4
142	Cost-optimal composition synthesis for modular robots. , 2016, , .		3
143	Risk-aware motion planning for automated vehicle among human-driven cars. , 2019, , .		3
144	Scalable Zonotope-Ellipsoid Conversions using the Euclidean Zonotope Norm. , 2020, , .		3

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145	ARCH-COMP19 Category Report: Continuous and Hybrid Systems with Nonlinear Dynamics. , 0, , .		3
146	Provably-Safe Cooperative Driving via Invariably Safe Sets. , 2020, , .		3
147	Nonlinear Modeling and Control Design of Active Helicopter Blades. , 2006, , .		2
148	Should collision avoidance systems use yaw stabilization?. , 2013, , .		2
149	Evaluating Location Compliance Approaches for Automated Road Vehicles. , 2018, , .		2
150	Temporal Logic Formalization of Marine Traffic Rules. , 2021, , .		2
151	Online Verification of Impact-Force-Limiting Control for Physical Human-Robot Interaction. , 2021, , .		2
152	Scalable robust output feedback MPC of linear sampled-data systems. , 2021, , .		2
153	Determining the maximum time horizon for vehicles to safely follow a trajectory. , 2017, , .		1
154	Verified Polynomial Controller Synthesis for Disturbed Nonlinear Systems. IFAC-PapersOnLine, 2021, 54, 85-90.	0.9	1
155	Formal synthesis of closed-form sampled-data controllers for nonlinear continuous-time systems under STL specifications. Automatica, 2022, 139, 110184.	5.0	1
156	Calibration of Controlled Markov Chains for Predicting Pedestrian Crossing Behavior Using Multi-objective Genetic Algorithms. , 2019, , .		0