Wulfram Gerstner

List of Publications by Year
in descending order

129 papers	18,434 citations	26567 56 h-index	22102 113 g-index
150 all docs	150 docs citations	150 times ranked	9459 citing authors

#	Article	IF	Citations
1	A neuronal learning rule for sub-millisecond temporal coding. Nature, 1996, 383, 76-78.	13.7	1,038
2	Adaptive Exponential Integrate-and-Fire Model as an Effective Description of Neuronal Activity. Journal of Neurophysiology, 2005, 94, 3637-3642.	0.9	960
3	Noninvasive Brain-Actuated Control of a Mobile Robot by Human EEG. IEEE Transactions on Biomedical Engineering, 2004, 51, 1026-1033.	2.5	562
4	Hebbian learning and spiking neurons. Physical Review E, 1999, 59, 4498-4514.	0.8	526
5	Connectivity reflects coding: a model of voltage-based STDP with homeostasis. Nature Neuroscience, 2010, 13, 344-352.	7.1	517
6	Triplets of Spikes in a Model of Spike Timing-Dependent Plasticity. Journal of Neuroscience, 2006, 26, 9673-9682.	1.7	515
7	Phenomenological models of synaptic plasticity based on spike timing. Biological Cybernetics, 2008, 98, 459-478.	0.6	455
8	Time structure of the activity in neural network models. Physical Review E, 1995, 51, 738-758.	0.8	411
9	Population Dynamics of Spiking Neurons: Fast Transients, Asynchronous States, and Locking. Neural Computation, 2000, 12, 43-89.	1.3	372
10	A history of spike-timing-dependent plasticity. Frontiers in Synaptic Neuroscience, 2011, 3, 4.	1.3	311
11	Mathematical formulations of Hebbian learning. Biological Cybernetics, 2002, 87, 404-415.	0.6	289
12	Reduction of the Hodgkin-Huxley Equations to a Single-Variable Threshold Model. Neural Computation, 1997, 9, 1015-1045.	1.3	273
13	Diverse synaptic plasticity mechanisms orchestrated to form and retrieve memories in spiking neural networks. Nature Communications, 2015, 6, 6922.	5.8	268
14	Optimal Control of Transient Dynamics in Balanced Networks Supports Generation of Complex Movements. Neuron, 2014, 82, 1394-1406.	3.8	259
15	Firing patterns in the adaptive exponential integrate-and-fire model. Biological Cybernetics, 2008, 99, 335-347.	0.6	250
16	Predicting spike timing of neocortical pyramidal neurons by simple threshold models. Journal of Computational Neuroscience, 2006, 21, 35-49.	0.6	246
17	Spatial cognition and neuro-mimetic navigation: a model of hippocampal place cell activity. Biological Cybernetics, 2000, 83, 287-299.	0.6	240
18	Generalized Integrate-and-Fire Models of Neuronal Activity Approximate Spike Trains of a Detailed Model to a High Degree of Accuracy. Journal of Neurophysiology, 2004, 92, 959-976.	0.9	233

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19	Neuromodulated Spike-Timing-Dependent Plasticity, and Theory of Three-Factor Learning Rules. Frontiers in Neural Circuits, 2015, 9, 85.	1.4	233
20	Why spikes? Hebbian learning and retrieval of time-resolved excitation patterns. Biological Cybernetics, 1993, 69, 503-515.	0.6	225
21	What Matters in Neuronal Locking?. Neural Computation, 1996, 8, 1653-1676.	1.3	224
22	How Good Are Neuron Models?. Science, 2009, 326, 379-380.	6.0	220
23	Optimal Spike-Timing-Dependent Plasticity for Precise Action Potential Firing in Supervised Learning. Neural Computation, 2006, 18, 1318-1348.	1.3	208
24	Microcircuits of excitatory and inhibitory neurons in layer 2/3 of mouse barrel cortex. Journal of Neurophysiology, 2012, 107, 3116-3134.	0.9	207
25	Noise in Integrate-and-Fire Neurons: From Stochastic Input to Escape Rates. Neural Computation, 2000, 12, 367-384.	1.3	183
26	Dynamic<i>I-V</i>Curves Are Reliable Predictors of Naturalistic Pyramidal-Neuron Voltage Traces. Journal of Neurophysiology, 2008, 99, 656-666.	0.9	183
27	Eligibility Traces and Plasticity on Behavioral Time Scales: Experimental Support of NeoHebbian Three-Factor Learning Rules. Frontiers in Neural Circuits, 2018, 12, 53.	1.4	174
28	Temporal whitening by power-law adaptation in neocortical neurons. Nature Neuroscience, 2013, 16, 942-948.	7.1	164
29	Hebbian plasticity requires compensatory processes on multiple timescales. Philosophical Transactions of the Royal Society B: Biological Sciences, 2017, 372, 20160259.	1.8	151
30	Intrinsic Stabilization of Output Rates by Spike-Based Hebbian Learning. Neural Computation, 2001, 13, 2709-2741.	1.3	147
31	Synaptic Plasticity in Neural Networks Needs Homeostasis with a Fast Rate Detector. PLoS Computational Biology, 2013, 9, e1003330.	1.5	144
32	Associative memory in a network of â€˜spikingâ€™ neurons. Network: Computation in Neural Systems, 1992, 3, 139-164.	2.2	143
33	Theory and Simulation in Neuroscience. Science, 2012, 338, 60-65.	6.0	141
34	The temporal paradox of Hebbian learning and homeostatic plasticity. Current Opinion in Neurobiology, 2017, 43, 166-176.	2.0	138
35	A benchmark test for a quantitative assessment of simple neuron models. Journal of Neuroscience Methods, 2008, 169, 417-424.	1.3	121
36	Functional Requirements for Reward-Modulated Spike-Timing-Dependent Plasticity. Journal of Neuroscience, 2010, 30, 13326-13337.	1.7	121

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37	Reinforcement Learning Using a Continuous Time Actor-Critic Framework with Spiking Neurons. PLoS Computational Biology, 2013, 9, e1003024.	1.5	121
38	A biologically motivated and analytically soluble model of collective oscillations in the cortex. Biological Cybernetics, 1993, 68, 363-374.	0.6	116
39	Towards a theory of cortical columns: From spiking neurons to interacting neural populations of finite size. PLoS Computational Biology, 2017, 13, e1005507.	1.5	112
40	Tag-Trigger-Consolidation: A Model of Early and Late Long-Term-Potentiation and Depression. PLoS Computational Biology, 2008, 4, e1000248.	1.5	110
41	Coherence and incoherence in a globally coupled ensemble of pulse-emitting units. Physical Review Letters, 1993, 71, 312-315.	2.9	107
42	The quantitative single-neuron modeling competition. Biological Cybernetics, 2008, 99, 417-426.	0.6	103
43	Associative memory in a network of â€˜spikingâ€™ neurons. , 0, .		102
44	Learning navigational maps through potentiation and modulation of hippocampal place cells. , 1997, 4, 79-94.		100
45	Is there a geometric module for spatial orientation? Insights from a rodent navigation model.. Psychological Review, 2009, 116, 540-566.	2.7	100
46	Generalized Bienenstock-Cooper-Munro rule for spiking neurons that maximizes information transmission. Proceedings of the National Academy of Sciences of the United States of America, 2005, 102, 5239-5244.	3.3	97
47	Synaptic Shot Noise and Conductance Fluctuations Affect the Membrane Voltage with Equal Significance. Neural Computation, 2005, 17, 923-947.	1.3	94
48	Extraction of Network Topology From Multi-Electrode Recordings: Is there a Small-World Effect?. Frontiers in Computational Neuroscience, 2011, 5, 4.	1.2	93
49	Extracting Oscillations: Neuronal Coincidence Detection with Noisy Periodic Spike Input. Neural Computation, 1998, 10, 1987-2017.	1.3	92
50	Parameter extraction and classification of three cortical neuron types reveals two distinct adaptation mechanisms. Journal of Neurophysiology, 2012, 107, 1756-1775.	0.9	91
51	Rapid Phase Locking in Systems of Pulse-Coupled Oscillators with Delays. Physical Review Letters, 1996, 76, 1755-1758.	2.9	83
52	Spike-Based Reinforcement Learning in Continuous State and Action Space: When Policy Gradient Methods Fail. PLoS Computational Biology, 2009, 5, e1000586.	1.5	82
53	Inference of neuronal network spike dynamics and topology from calcium imaging data. Frontiers in Neural Circuits, 2013, 7, 201.	1.4	82
54	Cognitive Navigation Based on Nonuniform Gabor Space Sampling, Unsupervised Growing Networks, and Reinforcement Learning. IEEE Transactions on Neural Networks, 2004, 15, 639-652.	4.8	78

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55	Voltage and spike timing interact in STDP - a unified model. Frontiers in Synaptic Neuroscience, 2010, 2, 25.	1.3	72
56	Biologically plausible deep learning â€" But how far can we go with shallow networks?. Neural Networks, 2019, 118, 90-101.	3.3	71
57	Stress, genotype and norepinephrine in the prediction of mouse behavior using reinforcement learning. Nature Neuroscience, 2009, 12, 1180-1186.	7.1	68
58	Automated High-Throughput Characterization of Single Neurons by Means of Simplified Spiking Models. PLoS Computational Biology, 2015, 11, e1004275.	1.5	68
59	Robust self-localisation and navigation based on hippocampal place cells. Neural Networks, 2005, 18, 1125-1140.	3.3	66
60	Extracting non-linear integrate-and-fire models from experimental data using dynamic Iâ€"V curves. Biological Cybernetics, 2008, 99, 361-370.	0.6	65
61	Predicting non-linear dynamics by stable local learning in a recurrent spiking neural network. ELife, 2017, 6, .	2.8	58
62	Stability of working memory in continuous attractor networks under the control of short-term plasticity. PLoS Computational Biology, 2019, 15, e1006928.	1.5	57
63	Stable Propagation of Activity Pulses in Populations of Spiking Neurons. Neural Computation, 2002, 14, 987-997.	1.3	56
64	Stochastic variational learning in recurrent spiking networks. Frontiers in Computational Neuroscience, 2014, 8, 38.	1.2	56
65	Balancing New against Old Information: The Role of Puzzlement Surprise in Learning. Neural Computation, 2018, 30, 34-83.	1.3	56
66	Coding and learning of behavioral sequences. Trends in Neurosciences, 2004, 27, 11-14.	4.2	55
67	Limits to high-speed simulations of spiking neural networks using general-purpose computers. Frontiers in Neuroinformatics, 2014, 8, 76.	1.3	55
68	Predicting neuronal activity with simple models of the threshold type: Adaptive Exponential Integrate-and-Fire model with two compartments. Neurocomputing, 2007, 70, 1668-1673.	3.5	53
69	Spontaneous Excitations in the Visual Cortex: Stripes, Spirals, Rings, and Collective Bursts. Neural Computation, 1995, 7, 905-914.	1.3	51
70	Universality in neural networks: the importance of the â€˜mean firing rateâ€™. Biological Cybernetics, 1992, 67, 195-205.	0.6	50
71	Rapid suppression and sustained activation of distinct cortical regions for a delayed sensory-triggered motor response. Neuron, 2021, 109, 2183-2201.e9.	3.8	46
72	Nonlinear Hebbian Learning as a Unifying Principle in Receptive Field Formation. PLoS Computational Biology, 2016, 12, e1005070.	1.5	46

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73	A Computational Model of Parallel Navigation Systems in Rodents. Neuroinformatics, 2005, 3, 223-242.	1.5	44
74	Coding and Decoding with Adapting Neurons: A Population Approach to the Peri-Stimulus Time Histogram. PLoS Computational Biology, 2012, 8, e1002711.	1.5	42
75	Synaptic Consolidation: From Synapses to Behavioral Modeling. Journal of Neuroscience, 2015, 35, 1319-1334.	1.7	42
76	Optimality Model of Unsupervised Spike-Timing-Dependent Plasticity: Synaptic Memory and Weight Distribution. Neural Computation, 2007, 19, 639-671.	1.3	41
77	Modeling spatial and temporal aspects of visual backward masking.. Psychological Review, 2008, 115, 83-100.	2.7	38
78	Improved Similarity Measures for Small Sets of Spike Trains. Neural Computation, 2011, 23, 3016-3069.	1.3	37
79	Noise and the PSTH response to current transients: I. General theory and application to the integrate-and-fire neuron. Journal of Computational Neuroscience, 2001, 11, 135-151.	0.6	35
80	Fluctuations and information filtering in coupled populations of spiking neurons with adaptation. Physical Review E, 2014, 90, 062704.	0.8	32
81	Enhanced Sensitivity to Rapid Input Fluctuations by Nonlinear Threshold Dynamics in Neocortical Pyramidal Neurons. PLoS Computational Biology, 2016, 12, e1004761.	1.5	32
82	Spike-timing prediction in cortical neurons with active dendrites. Frontiers in Computational Neuroscience, 2014, 8, 90.	1.2	30
83	How the threshold of a neuron determines its capacity for coincidence detection. BioSystems, 1998, 48, 105-112.	0.9	29
84	How single neuron properties shape chaotic dynamics and signal transmission in random neural networks. PLoS Computational Biology, 2019, 15, e1007122.	1.5	29
85	Perceptual learning, roving and the unsupervised bias. Vision Research, 2012, 61, 95-99.	0.7	28
86	Does computational neuroscience need new synaptic learning paradigms?. Current Opinion in Behavioral Sciences, 2016, 11, 61-66.	2.0	28
87	Coding properties of spiking neurons: reverse and cross-correlations. Neural Networks, 2001, 14, 599-610.	3.3	27
88	Reward-based learning under hardware constraintsâ€"using a RISC processor embedded in a neuromorphic substrate. Frontiers in Neuroscience, 2013, 7, 160.	1.4	27
89	Changing the responses of cortical neurons from sub- to suprathreshold using single spikes in vivo. ELife, 2013, 2, e00012.	2.8	26
90	Short-Term Synaptic Plasticity Orchestrates the Response of Pyramidal Cells and Interneurons to Population Bursts. Journal of Computational Neuroscience, 2005, 18, 323-331.	0.6	25

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91	Gamma Oscillations in a Nonlinear Regime: A Minimal Model Approach Using Heterogeneous Integrate-and-Fire Networks. Neural Computation, 2008, 20, 2973-3002.	1.3	25
92	STDP in Adaptive Neurons Gives Close-To-Optimal Information Transmission. Frontiers in Computational Neuroscience, 2010, 4, 143.	1.2	23
93	Cortical Dynamics in Presence of Assemblies of Densely Connected Weight-Hub Neurons. Frontiers in Computational Neuroscience, 2017, 11, 52.	1.2	22
94	Spatial orientation in navigating agents: Modeling head-direction cells. Neurocomputing, 2001, 38-40, 1059-1065.	3.5	21
95	From spiking neurons to rate models: A cascade model as an approximation to spiking neuron models with refractoriness. Physical Review E, 2006, 73, 051908.	0.8	21
96	Multicontact Co-operativity in Spike-Timingâ€"Dependent Structural Plasticity Stabilizes Networks. Cerebral Cortex, 2018, 28, 1396-1415.	1.6	21
97	Mesoscopic population equations for spiking neural networks with synaptic short-term plasticity. Journal of Mathematical Neuroscience, 2020, 10, 5.	2.4	21
98	Novelty is not surprise: Human exploratory and adaptive behavior in sequential decision-making. PLoS Computational Biology, 2021, 17, e1009070.	1.5	18
99	Paradoxical Evidence Integration in Rapid Decision Processes. PLoS Computational Biology, 2012, 8, e1002382.	1.5	17
100	Learning in Volatile Environments With the Bayes Factor Surprise. Neural Computation, 2021, 33, 269-340.	1.3	17
101	Noise and the PSTH response to current transients: II. Integrate-and-fire model with slow recovery and application to motoneuron data. Journal of Computational Neuroscience, 2002, 12, 83-95.	0.6	16
102	One-shot learning and behavioral eligibility traces in sequential decision making. ELife, 2019, 8, .	2.8	16
103	When shared concept cells support associations: Theory of overlapping memory engrams. PLoS Computational Biology, 2021, 17, e1009691.	1.5	16
104	Dependence of the spike-triggered average voltage on membrane response properties. Neurocomputing, 2006, 69, 1062-1065.	3.5	15
105	Spike-triggered averages for passive and resonant neurons receiving filtered excitatory and inhibitory synaptic drive. Physical Review E, 2008, 78, 011914.	0.8	15
106	Predicting spike times of a detailed conductance-based neuron model driven by stochastic spike arrival. Journal of Physiology (Paris), 2004, 98, 442-451.	2.1	13
107	Emergence of spatiotemporal receptive fields and its application to motion detection. Biological Cybernetics, 1994, 72, 81-92.	0.6	12
108	Special issue on quantitative neuron modeling. Biological Cybernetics, 2008, 99, 237-239.	0.6	12

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109	Connection-type-specific biases make uniform random network models consistent with cortical recordings. Journal of Neurophysiology, 2014, 112, 1801-1814.	0.9	12
110	Excitable neuronal assemblies with adaptation as a building block of brain circuits for velocity-controlled signal propagation. PLoS Computational Biology, 2018, 14, e1006216.	1.5	12
111	Optimal Hebbian Learning: A Probabilistic Point of View. Lecture Notes in Computer Science, 2003, , 92-98.	1.0	11
112	The Silent Period of Evidence Integration in Fast Decision Making. PLoS ONE, 2013, 8, e46525.	1.1	9
113	A Model of Synaptic Reconsolidation. Frontiers in Neuroscience, 2016, 10, 206.	1.4	9
114	From Hebb Rules to Spike-Timing-Dependent Plasticity: A Personal Account. Frontiers in Synaptic Neuroscience, 2010, 2, 151.	1.3	7
115	The Performance (and Limits) of Simple Neuron Models: Generalizations of the Leaky Integrate-and-Fire Model. , 2012, , 163-192.		7
116	On the choice of metric in gradient-based theories of brain function. PLoS Computational Biology, 2020, 16, e1007640.	1.5	7
117	Dendritic Voltage Recordings Explain Paradoxical Synaptic Plasticity: A Modeling Study. Frontiers in Synaptic Neuroscience, 2020, 12, 585539.	1.3	7
118	A functional model of adult dentate gyrus neurogenesis. ELife, 2021, 10, .	2.8	6
119	Competition between cue response and place response: a model of rat navigation behaviour. Connection Science, 2005, 17, 167-183.	1.8	5
120	Optimal Stimulation Protocol in a Bistable Synaptic Consolidation Model. Frontiers in Computational Neuroscience, 2019, 13, 78.	1.2	5
121	Vertical signal flow and oscillations in a three-layer model of the cortex. Journal of Computational Neuroscience, 1996, 3, 125-136.	0.6	4
122	Noise-enhanced computation in a model of a cortical column. NeuroReport, 2005, 16, 1237-1240.	0.6	4
123	Brain signals of a Surprise-Actor-Critic model: Evidence for multiple learning modules in human decision making. NeuroImage, 2022, 246, 118780.	2.1	4
124	A biologically motivated and analytically soluble model of collective oscillations in the cortex. Biological Cybernetics, 1994, 71, 349-358.	0.6	4
125	Exponentially Long Orbits in Hopfield Neural Networks. Neural Computation, 2017, 29, 458-484.	1.3	3
126	Multi-Timescale Memory Dynamics Extend Task Repertoire in a Reinforcement Learning Network With Attention-Gated Memory. Frontiers in Computational Neuroscience, 2018, 12, 50.	1.2	3

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127	Lecturers. Les Houches Summer School Proceedings, 2005, 80, ix.	0.2	0
128	Adaptive sensory processing for efficient place coding. Neurocomputing, 2006, 69, 1211-1214.	3.5	0
129	Synaptic tagging and capture: a bridge from molecular to behaviour. BMC Neuroscience, 2011, 12, .	0.8	0