Wulfram Gerstner

List of Publications by Year in Descending Order

131 papers	13,635 citations	58 h-index	116 g-index
150 ext. papers	16,699 ext. citations	5.6 avg, IF	6.87 L-index

#	Paper	IF	Citations
131	Brain signals of a Surprise-Actor-Critic model: Evidence for multiple learning modules in human decision making. *NeuroImage*, **2021**, 246, 118780	7.9	0
130	Novelty is not surprise: Human exploratory and adaptive behavior in sequential decision-making. *PLoS Computational Biology*, **2021**, 17, e1009070	5	2
129	A functional model of adult dentate gyrus neurogenesis. *ELife*, **2021**, 10,	8.9	1
128	Rapid suppression and sustained activation of distinct cortical regions for a delayed sensory-triggered motor response. *Neuron*, **2021**, 109, 2183-2201.e9	13.9	8
127	Learning in Volatile Environments With the Bayes Factor Surprise. *Neural Computation*, **2021**, 33, 269-340	2.9	3
126	When shared concept cells support associations: Theory of overlapping memory engrams.. *PLoS Computational Biology*, **2021**, 17, e1009691	5	0
125	On the choice of metric in gradient-based theories of brain function. *PLoS Computational Biology*, **2020**, 16, e1007640	5	2
124	Mesoscopic population equations for spiking neural networks with synaptic short-term plasticity. *Journal of Mathematical Neuroscience*, **2020**, 10, 5	2.4	8
123	Dendritic Voltage Recordings Explain Paradoxical Synaptic Plasticity: A Modeling Study. *Frontiers in Synaptic Neuroscience*, **2020**, 12, 585539	3.5	1
122	How single neuron properties shape chaotic dynamics and signal transmission in random neural networks. *PLoS Computational Biology*, **2019**, 15, e1007122	5	14
121	Stability of working memory in continuous attractor networks under the control of short-term plasticity. *PLoS Computational Biology*, **2019**, 15, e1006928	5	27
120	Biologically plausible deep learning - But how far can we go with shallow networks?. *Neural Networks*, **2019**, 118, 90-101	9.1	33
119	One-shot learning and behavioral eligibility traces in sequential decision making. *ELife*, **2019**, 8,	8.9	5
118	Optimal Stimulation Protocol in a Bistable Synaptic Consolidation Model. *Frontiers in Computational Neuroscience*, **2019**, 13, 78	3.5	3
117	Multicontact Co-operativity in Spike-Timing-Dependent Structural Plasticity Stabilizes Networks. *Cerebral Cortex*, **2018**, 28, 1396-1415	5.1	11
116	Balancing New against Old Information: The Role of Puzzlement Surprise in Learning. *Neural Computation*, **2018**, 30, 34-83	2.9	29
115	Excitable neuronal assemblies with adaptation as a building block of brain circuits for velocity-controlled signal propagation. *PLoS Computational Biology*, **2018**, 14, e1006216	5	7

114	Multi-Timescale Memory Dynamics Extend Task Repertoire in a Reinforcement Learning Network With Attention-Gated Memory. *Frontiers in Computational Neuroscience*, **2018**, 12, 50	3.5	2
113	Eligibility Traces and Plasticity on Behavioral Time Scales: Experimental Support of NeoHebbian Three-Factor Learning Rules. *Frontiers in Neural Circuits*, **2018**, 12, 53	3.5	75
112	Hebbian plasticity requires compensatory processes on multiple timescales. *Philosophical Transactions of the Royal Society B: Biological Sciences*, **2017**, 372,	5.8	79
111	The temporal paradox of Hebbian learning and homeostatic plasticity. *Current Opinion in Neurobiology*, **2017**, 43, 166-176	7.6	80
110	Exponentially Long Orbits in Hopfield Neural Networks. *Neural Computation*, **2017**, 29, 458-484	2.9	1
109	Cortical Dynamics in Presence of Assemblies of Densely Connected Weight-Hub Neurons. *Frontiers in Computational Neuroscience*, **2017**, 11, 52	3.5	15
108	Towards a theory of cortical columns: From spiking neurons to interacting neural populations of finite size. *PLoS Computational Biology*, **2017**, 13, e1005507	5	73
107	Predicting non-linear dynamics by stable local learning in a recurrent spiking neural network. *ELife*, **2017**, 6,	8.9	38
106	Author response: Predicting non-linear dynamics by stable local learning in a recurrent spiking neural network **2017**,		3
105	Does computational neuroscience need new synaptic learning paradigms?. *Current Opinion in Behavioral Sciences*, **2016**, 11, 61-66	4	15
104	Nonlinear Hebbian Learning as a Unifying Principle in Receptive Field Formation. *PLoS Computational Biology*, **2016**, 12, e1005070	5	32
103	A Model of Synaptic Reconsolidation. *Frontiers in Neuroscience*, **2016**, 10, 206	5.1	6
102	Enhanced Sensitivity to Rapid Input Fluctuations by Nonlinear Threshold Dynamics in Neocortical Pyramidal Neurons. *PLoS Computational Biology*, **2016**, 12, e1004761	5	25
101	Synaptic consolidation: from synapses to behavioral modeling. *Journal of Neuroscience*, **2015**, 35, 1319-34	6.6	26
100	Diverse synaptic plasticity mechanisms orchestrated to form and retrieve memories in spiking neural networks. *Nature Communications*, **2015**, 6, 6922	17.4	176
99	Automated High-Throughput Characterization of Single Neurons by Means of Simplified Spiking Models. *PLoS Computational Biology*, **2015**, 11, e1004275	5	47
98	Neuromodulated Spike-Timing-Dependent Plasticity, and Theory of Three-Factor Learning Rules. *Frontiers in Neural Circuits*, **2015**, 9, 85	3.5	134
97	Connection-type-specific biases make uniform random network models consistent with cortical recordings. *Journal of Neurophysiology*, **2014**, 112, 1801-14	3.2	9

96	Optimal control of transient dynamics in balanced networks supports generation of complex movements. *Neuron*, **2014**, 82, 1394-406	13.9	176
95	Stochastic variational learning in recurrent spiking networks. *Frontiers in Computational Neuroscience*, **2014**, 8, 38	3.5	37
94	Spike-timing prediction in cortical neurons with active dendrites. *Frontiers in Computational Neuroscience*, **2014**, 8, 90	3.5	21
93	Limits to high-speed simulations of spiking neural networks using general-purpose computers. *Frontiers in Neuroinformatics*, **2014**, 8, 76	3.9	37
92	Fluctuations and information filtering in coupled populations of spiking neurons with adaptation. *Physical Review E*, **2014**, 90, 062704	2.4	21
91	Neuronal Dynamics: From Single Neurons to Networks and Models of Cognition **2014**,		495
90	Temporal whitening by power-law adaptation in neocortical neurons. *Nature Neuroscience*, **2013**, 16, 942-8	25.5	121
89	Synaptic plasticity in neural networks needs homeostasis with a fast rate detector. *PLoS Computational Biology*, **2013**, 9, e1003330	5	98
88	Reinforcement learning using a continuous time actor-critic framework with spiking neurons. *PLoS Computational Biology*, **2013**, 9, e1003024	5	79
87	Inference of neuronal network spike dynamics and topology from calcium imaging data. *Frontiers in Neural Circuits*, **2013**, 7, 201	3.5	57
86	The silent period of evidence integration in fast decision making. *PLoS ONE*, **2013**, 8, e46525	3.7	3
85	Reward-based learning under hardware constraints-using a RISC processor embedded in a neuromorphic substrate. *Frontiers in Neuroscience*, **2013**, 7, 160	5.1	24
84	Changing the responses of cortical neurons from sub- to suprathreshold using single spikes in vivo. *ELife*, **2013**, 2, e00012	8.9	18
83	Perceptual learning, roving and the unsupervised bias. *Vision Research*, **2012**, 61, 95-9	2.1	21
82	The Performance (and Limits) of Simple Neuron Models: Generalizations of the Leaky Integrate-and-Fire Model **2012**, 163-192		6
81	Microcircuits of excitatory and inhibitory neurons in layer 2/3 of mouse barrel cortex. *Journal of Neurophysiology*, **2012**, 107, 3116-34	3.2	141
80	Parameter extraction and classification of three cortical neuron types reveals two distinct adaptation mechanisms. *Journal of Neurophysiology*, **2012**, 107, 1756-75	3.2	58
79	Theory and simulation in neuroscience. *Science*, **2012**, 338, 60-5	33.3	103

78	Paradoxical evidence integration in rapid decision processes. *PLoS Computational Biology*, **2012**, 8, e1002382	5	12
77	Coding and decoding with adapting neurons: a population approach to the peri-stimulus time histogram. *PLoS Computational Biology*, **2012**, 8, e1002711	5	32
76	A history of spike-timing-dependent plasticity. *Frontiers in Synaptic Neuroscience*, **2011**, 3, 4	3.5	227
75	Extraction of Network Topology From Multi-Electrode Recordings: Is there a Small-World Effect?. *Frontiers in Computational Neuroscience*, **2011**, 5, 4	3.5	78
74	Synaptic tagging and capture: a bridge from molecular to behaviour. *BMC Neuroscience*, **2011**, 12,	3.2	78
73	Improved similarity measures for small sets of spike trains. *Neural Computation*, **2011**, 23, 3016-69	2.9	31
72	Connectivity reflects coding: a model of voltage-based STDP with homeostasis. *Nature Neuroscience*, **2010**, 13, 344-52	25.5	387
71	STDP in Adaptive Neurons Gives Close-To-Optimal Information Transmission. *Frontiers in Computational Neuroscience*, **2010**, 4, 143	3.5	22
70	Voltage and Spike Timing Interact in STDP - A Unified Model. *Frontiers in Synaptic Neuroscience*, **2010**, 2, 25	3.5	59
69	From hebb rules to spike-timing-dependent plasticity: a personal account. *Frontiers in Synaptic Neuroscience*, **2010**, 2, 151	3.5	7
68	Functional requirements for reward-modulated spike-timing-dependent plasticity. *Journal of Neuroscience*, **2010**, 30, 13326-37	6.6	93
67	Spike-based reinforcement learning in continuous state and action space: when policy gradient methods fail. *PLoS Computational Biology*, **2009**, 5, e1000586	5	62
66	Neuroscience. How good are neuron models?. *Science*, **2009**, 326, 379-80	33.3	168
65	Stress, genotype and norepinephrine in the prediction of mouse behavior using reinforcement learning. *Nature Neuroscience*, **2009**, 12, 1180-6	25.5	57
64	Is there a geometric module for spatial orientation? Insights from a rodent navigation model. *Psychological Review*, **2009**, 116, 540-66	6.3	87
63	Dynamic I-V curves are reliable predictors of naturalistic pyramidal-neuron voltage traces. *Journal of Neurophysiology*, **2008**, 99, 656-66	3.2	151
62	Tag-trigger-consolidation: a model of early and late long-term-potentiation and depression. *PLoS Computational Biology*, **2008**, 4, e1000248	5	88
61	Gamma oscillations in a nonlinear regime: a minimal model approach using heterogeneous integrate-and-fire networks. *Neural Computation*, **2008**, 20, 2973-3002	2.9	21

60	Spike-triggered averages for passive and resonant neurons receiving filtered excitatory and inhibitory synaptic drive. *Physical Review E*, **2008**, 78, 011914	2.4	14
59	Modeling spatial and temporal aspects of visual backward masking. *Psychological Review*, **2008**, 115, 83-100	6.3	36
58	Phenomenological models of synaptic plasticity based on spike timing. *Biological Cybernetics*, **2008**, 98, 459-78	2.8	346
57	Extracting non-linear integrate-and-fire models from experimental data using dynamic I-V curves. *Biological Cybernetics*, **2008**, 99, 361-70	2.8	56
56	The quantitative single-neuron modeling competition. *Biological Cybernetics*, **2008**, 99, 417-26	2.8	77
55	Firing patterns in the adaptive exponential integrate-and-fire model. *Biological Cybernetics*, **2008**, 99, 335-47	2.8	191
54	A benchmark test for a quantitative assessment of simple neuron models. *Journal of Neuroscience Methods*, **2008**, 169, 417-24	3	99
53	Predicting neuronal activity with simple models of the threshold type: Adaptive Exponential Integrate-and-Fire model with two compartments. *Neurocomputing*, **2007**, 70, 1668-1673	5.4	44
52	Optimality model of unsupervised spike-timing-dependent plasticity: synaptic memory and weight distribution. *Neural Computation*, **2007**, 19, 639-71	2.9	35
51	Dependence of the spike-triggered average voltage on membrane response properties. *Neurocomputing*, **2006**, 69, 1062-1065	5.4	14
50	Adaptive sensory processing for efficient place coding. *Neurocomputing*, **2006**, 69, 1211-1214	5.4	
49	From spiking neurons to rate models: a cascade model as an approximation to spiking neuron models with refractoriness. *Physical Review E*, **2006**, 73, 051908	2.4	18
48	Triplets of spikes in a model of spike timing-dependent plasticity. *Journal of Neuroscience*, **2006**, 26, 9673-82	6.8	383
47	Optimal spike-timing-dependent plasticity for precise action potential firing in supervised learning. *Neural Computation*, **2006**, 18, 1318-48	2.9	163
46	Predicting spike timing of neocortical pyramidal neurons by simple threshold models. *Journal of Computational Neuroscience*, **2006**, 21, 35-49	1.4	181
45	Competition between cue response and place response: a model of rat navigation behaviour. *Connection Science*, **2005**, 17, 167-183	2.8	4
44	Adaptive exponential integrate-and-fire model as an effective description of neuronal activity. *Journal of Neurophysiology*, **2005**, 94, 3637-42	3.2	664
43	Synaptic shot noise and conductance fluctuations affect the membrane voltage with equal significance. *Neural Computation*, **2005**, 17, 923-47	2.9	77

42	Noise-enhanced computation in a model of a cortical column. *NeuroReport*, **2005**, 16, 1237-40	1.7	4
41	Robust self-localisation and navigation based on hippocampal place cells. *Neural Networks*, **2005**, 18, 1125-40	9.1	55
40	A computational model of parallel navigation systems in rodents. *Neuroinformatics*, **2005**, 3, 223-41	3.2	34
39	Short-term synaptic plasticity orchestrates the response of pyramidal cells and interneurons to population bursts. *Journal of Computational Neuroscience*, **2005**, 18, 323-31	1.4	25
38	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, 5239-44	11.5	74
37	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, 959-76	3.2	189
36	Predicting spike times of a detailed conductance-based neuron model driven by stochastic spike arrival. *Journal of Physiology (Paris)*, **2004**, 98, 442-51		11
35	Noninvasive brain-actuated control of a mobile robot by human EEG. *IEEE Transactions on Biomedical Engineering*, **2004**, 51, 1026-33	5	444
34	Cognitive navigation based on nonuniform Gabor space sampling, unsupervised growing networks, and reinforcement learning. *IEEE Transactions on Neural Networks*, **2004**, 15, 639-52		66
33	Coding and learning of behavioral sequences. *Trends in Neurosciences*, **2004**, 27, 11-4; discussion 14-5	13.3	41
32	Optimal Hebbian Learning: A Probabilistic Point of View. *Lecture Notes in Computer Science*, **2003**, 92-98	0.9	10
31	Mathematical formulations of Hebbian learning. *Biological Cybernetics*, **2002**, 87, 404-15	2.8	227
30	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	1.4	14
29	Stable propagation of activity pulses in populations of spiking neurons. *Neural Computation*, **2002**, 14, 987-97	2.9	49
28	Spiking Neuron Models: Single Neurons, Populations, Plasticity **2002**,		2037
27	Coding properties of spiking neurons: reverse and cross-correlations. *Neural Networks*, **2001**, 14, 599-610	9.1	24
26	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, 135-51	1.4	33
25	Spatial orientation in navigating agents: Modeling head-direction cells. *Neurocomputing*, **2001**, 38-40, 1059-1065	5.4	18

24	Intrinsic stabilization of output rates by spike-based Hebbian learning. *Neural Computation*, **2001**, 13, 2709-41	2.9	122
23	Spatial cognition and neuro-mimetic navigation: a model of hippocampal place cell activity. *Biological Cybernetics*, **2000**, 83, 287-99	2.8	199
22	Noise in integrate-and-fire neurons: from stochastic input to escape rates. *Neural Computation*, **2000**, 12, 367-84	2.9	123
21	Population dynamics of spiking neurons: fast transients, asynchronous states, and locking. *Neural Computation*, **2000**, 12, 43-89	2.9	299
20	Hebbian learning and spiking neurons. *Physical Review E*, **1999**, 59, 4498-4514	2.4	392
19	How the threshold of a neuron determines its capacity for coincidence detection. *BioSystems*, **1998**, 48, 105-12	1.9	26
18	Extracting oscillations. Neuronal coincidence detection with noisy periodic spike input. *Neural Computation*, **1998**, 10, 1987-2017	2.9	83
17	Reduction of the Hodgkin-Huxley Equations to a Single-Variable Threshold Model. *Neural Computation*, **1997**, 9, 1015-1045	2.9	230
16	Learning navigational maps through potentiation and modulation of hippocampal place cells. *Journal of Computational Neuroscience*, **1997**, 4, 79-94	1.4	81
15	What matters in neuronal locking?. *Neural Computation*, **1996**, 8, 1653-76	2.9	192
14	Vertical signal flow and oscillations in a three-layer model of the cortex. *Journal of Computational Neuroscience*, **1996**, 3, 125-36	1.4	4
13	A neuronal learning rule for sub-millisecond temporal coding. *Nature*, **1996**, 383, 76-81	50.4	806
12	Rapid phase locking in systems of pulse-coupled oscillators with delays. *Physical Review Letters*, **1996**, 76, 1755-1758	7.4	74
11	Spontaneous excitations in the visual cortex: stripes, spirals, rings, and collective bursts. *Neural Computation*, **1995**, 7, 905-14	2.9	46
10	Time structure of the activity in neural network models. *Physical Review E*, **1995**, 51, 738-758	2.4	303
9	Emergence of spatiotemporal receptive fields and its application to motion detection. *Biological Cybernetics*, **1994**, 72, 81-92	2.8	9
8	A biologically motivated and analytically soluble model of collective oscillations in the cortex. *Biological Cybernetics*, **1994**, 71, 349-358	2.8	
7	Coherence and incoherence in a globally coupled ensemble of pulse-emitting units. *Physical Review Letters*, **1993**, 71, 312-315	7.4	98

6	Why spikes? Hebbian learning and retrieval of time-resolved excitation patterns. *Biological Cybernetics*, **1993**, 69, 503-515	2.8	171
5	A biologically motivated and analytically soluble model of collective oscillations in the cortex. I. Theory of weak locking. *Biological Cybernetics*, **1993**, 68, 363-74	2.8	80
4	Associative memory in a network of ‘spiking’ neurons. *Network: Computation in Neural Systems*, **1992**, 3, 139-164	0.7	130
3	Universality in neural networks: the importance of the ’mean firing rate’. *Biological Cybernetics*, **1992**, 67, 195-205	2.8	40
2	Associative memory in a network of ‘spiking’ neurons		83
1	Stability of working memory in continuous attractor networks under the control of short-term plasticity		3