

RAMIN HASANI

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I design interpretable machine learning and deep learning algorithms, for the modeling of dynamical systems, autonomous vehicles and robotic control. I presented a TEDx talk entitled “Simple Brains to Govern Complex tasks” at the TEDxVienna 2018 event.

Work Experiences

10/2017 – 11/2017

Machine Learning Visiting Research Scholar

DRL, CSAIL, Massachusetts Institute of Technology (MIT), USA

Interpretable machine learning technologies for autonomous driving and robot manipulation.

06/2016 – 10/2016

Machine learning Visiting Research Scholar

VAS Group, Imperial College London, UK

Deep recurrent nets for modeling complex analog integrated circuits

<http://vas.doc.ic.ac.uk/people/>

12/2015 - Present

Machine Learning PhD Research Assistant

CPS Research Division, TU Wien, Austria

Interpretable Machine Learning

Education

12/2015 – Present (expected graduation date: July 2019)

PhD in Computer Science

TU Wien, Austria

Thesis: Interpretable Recurrent Neural Networks for Modeling Dynamic Systems

09/2012 – 12/2015

M.Sc. in Electronic Engineering

Politecnico di Milano, Italy

Thesis: Design of CMOS silicon neurons for noise-assisted computations in spiking neural networks

09/2007 – 01/2012

B.Sc. in Electrical Engineering – Electronics (TOP 5)

Ferdowsi University of Mashhad, Iran

Invited Talks

[**TEDx** talk 20th Oct 2018] "Simple Brains to Govern Complex tasks", TEDxVienna, Austria

[Tutorial 25th Sep 2018] "Recurrent Neural Networks", Infineon AI Workshop, Villach, Austria

[Invited talk 19th Sep 2018] "AI and Neuroscience", The BrainStorms #3 event, Vienna, Austria

[Tutorial 30th-31st Jul 2018] "Recurrent Neural Networks", Infineon AI Workshop, Munich, Germany

[Moderator Dec 2017] "Worm's Neural Information Processing Workshop", Long Beach, USA

[Invited talk Sep 2017] "Learning with a Worm's Brain", Sharif Univ of Tech, Tehran, Iran

Publications

2018

Re-purposing Compact Neuronal Circuit Policies to Govern Reinforcement Learning Tasks

Ramin M. Hasani*, Mathias Lechner*, Alexander Amini, Daniela Rus, Radu Grosu

ArXiv:1809.04423 [cs.LG] *equal contributions

Response Characterization for Auditing Cell Dynamics in Long Short-term Memory Networks

Ramin M. Hasani*, Alexander Amini*, Mathias Lechner, Felix Naser, Radu Grosu, Daniela Rus

ArXiv:1809.03864 [cs.LG] *equal contributions

c302: a multiscale framework for modelling the nervous system of C. elegans

Padraig Gleeson, David Lung, Radu Grosu, Ramin M. Hasani, Stephen Larson
Phil. **Trans. Royal Society** B 373 (1758), 20170379, 2018

OpenWorm: overview and recent advances in integrative biological simulation of C. elegans

Gopal P Sarma, Chee Wai Lee, Tom Portegys, Vahid Ghayoomie, Travis Jacobs, Bradly Alicea, Matteo Cantarelli, Michael Currie, Richard C Gerkin, Shane Gingell, Padraig Gleeson, Richard Gordon, Ramin M Hasani, Giovanni Idili, Sergey Khayrulin, David Lung, Andrey Palyanov, Mark Watts, Stephen D Larson

Phil. **Trans. Royal Society** B 373 (1758), 20170382, 2018

Plug-and-Play Supervisory Control Using Muscle and Brain Signals for Real-Time Gesture and Error Detection

Joseph DelPreto, Andres F. Salazar-Gomez, Stephanie Gil, Ramin M. Hasani, Frank H. Guenther, Daniela Rus

14th Robotics: Science and Systems (**RSS**) Conference, Pittsburg, USA, 2018

Interpretable Neuronal Circuit Policies for Reinforcement Learning Environments

Mathias Lechner*, Ramin M. Hasani*, and Radu Grosu *equal contributions

IJCAI/ECAI Workshop on Explainable Artificial Intelligence (**XAI**), Stockholm, Sweden, 2018

A Machine Learning Suite for Machine Components' Health-Monitoring

Ramin M. Hasani, Guodong Wang, and Radu Grosu

Accepted at The Thirty-First AAAI conference on Innovative Applications of Artificial Intelligence (**IAAI 2019**), Honolulu, Hawaii, USA, 2019

2017

Worm-level Control through Search-based Reinforcement Learning

Mathias Lechner, Radu Grosu, Ramin M. Hasani.

Deep Reinforcement Learning Symposium at the 31st Neural Information Processing Systems (**NIPS**) Conference, 2017.

A Simplified Cell Network for the Simulation of C. elegans' Forward Crawling

David Lung, Stephen Larson, Andrey Palyanov, Sergey Khayrulin, Padraig Gleeson, Manuel Zimmer, Radu Grosu and Ramin M. Hasani.

Workshop on Worm's Neural Information Processing at the 31st Neural Information Processing Systems (**NIPS**) Conference, 2017.

Searching for Biophysically Realistic Parameters for Dynamic Neuron Models by Genetic Algorithms from Calcium Imaging Recording

Magdalena Fuchs, Manuel Zimmer, Radu Grosu and Ramin M. Hasani.

Workshop on Worm's Neural Information Processing at the 31st Neural Information Processing Systems (**NIPS**) Conference, 2017.

Compositional Neural-Network Modeling of Complex Analog Circuits

Ramin M. Hasani, Dieter Haerle, Christian F. Baumgartner, Alessio R. Lomuscio and Radu Grosu.

30th International Joint Conference on Neural Networks (**IJCNN 2017**), IEEE, 2017.

SIM-CE: An Advanced Simulation Platform for Studying the brain of C. elegans

Ramin M. Hasani, Victoria Benerer, Magdalena Fuchs, David Lung, and Radu Grosu.

Workshop on Computational Biology, 34th International Conference on Machine Learning (**ICML**), 2017

Modeling a Simple Non-Associative Learning Mechanism in the Brain of C. elegans

Ramin M. Hasani, Magdalena Fuchs, Victoria Benerer, Radu Grosu.

2nd International Workshop on Biomedical Informatics with Optimization and Machine Learning (**BOOM 2017**), In conjunction with 26th International Joint Conference on Artificial Intelligence (**IJCAI**), 2017.

Towards Deterministic and Stochastic Computations with Izhikevich Spiking Neuron Model

Ramin M. Hasani, Guodong Wang, and Radu Grosu.

14th International Work-Conference on Artificial Neural Networks (**IWANN**), Springer, 2017.

Computing with Biophysical and Hardware-efficient Neural Models

Konstantin Selyunin, Ramin M. Hasani, Denise Ratasich, Ezio Bartocci, and Radu Grosu.

14th International Work-Conference on Artificial Neural Networks (**IWANN**), Springer, 2017.

Control of the Correlation of Spontaneous Neuron Activity in Biological and Noise-Activated CMOS Artificial Neural Microcircuits

Ramin M. Hasani, Giorgio Ferrari, Hideaki Yamamoto, Sho Kono, Koji Ishihara, Soya Fujimori, Takashi Tanii, Enrico Prati.

arXiv:1702.07426v1 [cs.NE], 2017.

2016

Efficient Modeling of Complex Analog Integrated Circuits Using Neural Networks

Ramin M. Hasani, Dieter Haerle, and Radu Grosu.

12th Conference on Ph. D. Research in Microelectronics and Electronics (**PRIME**), 2016, pp. 1-4. IEEE, 2016.

Probabilistic Reachability Analysis of the Tap-Withdrawal Circuit in C. elegans

Isla, Md Ariful, Qinsi Wang, Ramin M. Hasani, Ondrej Balun, Edmund M. Clarke, Radu Grosu, and Scott A. Smolka.

18th IEEE International High Level Design Validation and Test Workshop (**HLDVT**), pp. 170-177. IEEE, 2016.

Investigations on the Nervous System of Caenorhabditis elegans

Ramin M. Hasani, Lukas Esterle, and Radu Grosu.

39th German Conference on Artificial Intelligence (**KI 2016**) – Current AI Research in Austria Workshop (**CAIRA**), 2016.

Organizations

Main Chair @ NIPS 2017 1st workshop on the Worm's Neural Information processing (WNIP), Long Beach, CA, USA

Meeting Attendances

NIPS 2018, Montreal, Canada

IJCAI 2018, Stockholm, Sweden

ICML 2018, Stockholm, Sweden

COLT 2018, Stockholm, Sweden

NIPS 2017, Long Beach, California, USA

Deep-Learning-Indaba 2017, Johannesburg, South Africa

IJCAI 2017, Melbourne, Australia

ICML 2017, Sydney, Australia

IWANN 2017, Cadiz, Spain

NIPS 2016, Barcelona, Spain

PRIME 2016, Lisbon, Portugal

CPS Week 2016, Vienna, Austria

Graduated Student

Mathias Lechner - M.Sc. in Computer Engineering, TU Wien. Thesis Title: "Brain-inspired Neural Control", Oct 2016 – Oct 2017 (**Won the Best Thesis Award of 2017 at the Faculty of Informatics, TU Wien**)

Marc Javin - M.Sc. in Computer Engineering, TU Wien. Thesis Title: " A Hybrid Optimization suite for Neuronal Circuits ", Feb 2018 – Nov 2018

Magdalena Fuchs - M.Sc. in Biomedical Engineering. Thesis Title: Principles of Learning and Memory in the Nervous System of *C. elegans*, TU Wien, Jan 2017 – June 2018

Zahra Babaei – B.Sc. in Computer Engineering, Sharif University of Technology. Research title: Deep learning for brain data, July 2018 – Oct 2018.

Benjamin Kulnik - B.Sc. in Electrical Engineering, TU Wien. Thesis Title: "A Grid-Search Algorithm for Selecting the Optimal Structure in Deep Neural Network Models" Oct 2017 – Feb 2018

Ondrej Balún - M.Sc. in Computer Engineering, TU Wien. Thesis Title: "Towards Distributed Controllers Based on *C. elegans* Locomotory Neural Network ", Dec 2015 - Jan 2017.

Honors & Awards

- Google Cloud Platform (GCP) Research Credit Program (\$13,085), Oct 2018 [\[link\]](#)
- Two Awards at the Annual TU Wien i2c Networking Friday event, Feb 2018 [\[link\]](#)
- Microsoft Azure for Research Award Winner (\$13,000), Jan 2018 [\[link\]](#)

- Microsoft Azure for Research Award Winner (\$10,000), Nov 2017 [\[link\]](#)
- NIPS Award, Sponsor Scholar at the 31st Neural Information Processing Systems (NIPS) Conference, Dec 2017
- IJCAI 2017 BOOM Workshop **best poster award**, Aug 2017 [\[link\]](#)
- ICML Award, Sponsor Scholar at the 34th International Conference on Machine Learning (ICML) 2017, Aug 2017 [\[link\]](#)
- Microsoft Azure for Research Award Winner (\$20,000), Jan 2017, [\[link\]](#)
- Full-time research assistant PhD position at TU Wien. (2015- present) [\[link\]](#)
- Member of IEEE-IES Subcommittee on Computer Vision and Human-Machine Interaction in Industrial and Factory Automation, Nov 2016 – Present, [\[link\]](#)
- Full M.Sc. Scholarship from Politecnico di Milano, Italy (2013 – 2015)

Languages

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|------------------|---------------|--------------------------|------------|
| English | Persian | Italian | German |
| Full Proficiency | Mother tongue | Intermediate proficiency | Elementary |

Skills

1 = Elementary | 2 = Intermediate | 3=advanced | 4=Expert

Brain Modeling 4 | Machine learning 3 | Deep Learning 3 | Recurrent neural nets 3 | Interpretability of neural networks 4 | Neuromorphic Systems Design 3 | Nonlinear System Identification 3 | Reinforcement Learning 3

MATLAB 4 | Python 3 | TensorFlow 2 | Keras 3 | C/C++ 2 | IC Design Toolkits 2

Interests

Startups | Brain-inspired technologies | Computational neuroscience | Physics | Neural Networks | Swimming | Traveling | Trading