

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

03/2019 – Present

Machine Learning Visiting Research Scholar

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

Developing Interpretable machine learning algorithms for autonomous systems

12/2015 - Present

Machine Learning PhD Research Assistant

CPS Research Division, TU Wien, Austria

Interpretable Machine Learning

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

Recurrent nets for modeling complex analog integrated circuits

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

Education

12/2015 – Present (expected graduation date: September 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

[Keynote talk 5th Jun 2019] "Interpretable AI Agents", Cognitive Vehicles, Berlin, Germany

[TEDx talk 29th Jun 2019] "AI and Neuroscience", TEDxCluj, Romania

[Invited talk 23rd Jun 2019] "Brain-inspired AI", Brainstorm Festival, Vienna, Austria

[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

2019

Designing Worm-inspired Neural Networks for Interpretable Robotics Control

Mathias Lechner*, Ramin Hasani*, Manuel Zimmer, Thomas Henzinger, Radu Grosu

Accepted to the 2019 IEEE International Conference on Robotics and Automation (**ICRA**), Montreal, Canada, 2019

*equal contributions

A Machine Learning Suite for Machine Components' Health-Monitoring

Ramin Hasani, Guodong Wang, and Radu Grosu

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

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

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

Submitted to the IEEE 32nd International Joint Conference on Neural Networks (**IJCNN**), 2019

*equal contributions

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

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

Submitted to the IEEE 32nd International Joint Conference on Neural Networks (**IJCNN**), 2019

*equal contributions

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

Joseph DelPreto, Andres Salazar-Gomez, Stephanie Gil, Ramin Hasani, Frank Guenther, Daniela Rus

Under revision at the **Journal of Autonomous Robots (AURO)**, 2019

2018

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 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 Hasani*, and Radu Grosu *equal contributions

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

2017

Worm-level Control through Search-based Reinforcement Learning

Mathias Lechner, Radu Grosu, Ramin 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, Pdraig Gleeson, Manuel Zimmer, Radu Grosu and Ramin 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 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 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 Hasani, Victoria Bener, 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 Hasani, Magdalena Fuchs, Victoria Bener, 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 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 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 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 Hasani, Dieter Haerle, and Radu Grosu.

12th IEEE Conference on PhD Research in Microelectronics and Electronics (PRIME), 2016

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

Isla, Md Ariful, Qinsi Wang, Ramin 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 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

Student I Supervise/d

Julian Posch – B.Sc. in Physics, Universität Wien. Internship Project: "What happens inside a Neural network", Mar 2019 – Present

Bernhard Müllner – M.Sc. in Computer Engineering, TU Wien. Thesis title: "Better end-to-end object detection in low SNR environments with Time-of-Flight Cameras", Nov 2018 – Present

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 – Jun 2018

David Lung – M.Sc. in Computer Engineering. Thesis title: OpenWorm: Design and Evaluation of Neural Circuits on the Virtual Worm, *C. elegans*, TU Wien, Jan 2017 – December 2018

Zahra Babaei – B.Sc. in Computer Engineering, Sharif University of Technology. Internship Project: Deep learning for brain data, Jul 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

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