

# MICHAEL POLI

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deep learning | generative models | numerical optimization | optimal control

## OVERVIEW

I am a CS Ph.D. student at Stanford University. My research interests lie at the intersection of deep learning, generative modeling, numerical optimization, dynamical systems and optimal control. Through a dynamical system perspective of learning, my goal is to develop novel neural network architectures, improve training efficiency and constrain the model to a set of desiderata. I have recently focused on wrapping numerical methods in neural architectures: neural differential equations and implicit models.

## EDUCATION

<b>PhD</b> , Computer Science, Stanford University (2021 – TBD)	Palo Alto, USA
<b>M.S.</b> , Industrial and Systems Engineering, KAIST (2018 – 2020)	Daejeon, South Korea
<b>B.Eng.</b> , Control Theory, Tongji University (2015 – 2017)	Shanghai, China
<b>B.Eng.</b> , Automation Engineering, University of Bologna (2014–2017)	Bologna, Italy

## INDUSTRY EXPERIENCE

<b>NAVER AI</b> , Research Scientist Intern (Feb 2021 – Sep 2021)	Seoul, South Korea
<ul style="list-style-type: none"><li>Developed a <a href="#">new method</a> for system identification of multi-mode stochastic hybrid systems (NeurIPS 2021)</li><li>Worked <a href="#">on analyses of biases</a> towards shortcut learning cues in computer vision models.</li></ul>	
KAIST, Research Fellow (Sep 2020 – Sep 2021)	Daejeon, South Korea
<ul style="list-style-type: none"><li>Development on the core simulation architecture for greenhouse dynamics.</li><li>Mentoring research engineers and software developers.</li></ul>	
<b>Koidra.ai</b> , Research Scientist, Part-Time (Sep 2020 – Feb 2021)	Seattle, USA (remote)
<ul style="list-style-type: none"><li>Development on the core simulation architecture for greenhouse dynamics.</li><li>Mentoring research engineers and software developers.</li></ul>	
<b>Neuri.ai</b> , Research Engineer Intern, (Jun 2019 – Oct 2019)	Singapore
<ul style="list-style-type: none"><li>Developed <a href="#">deep learning</a> and reinforcement learning models for end-to-end FX trading systems.</li></ul>	

## CONFERENCE AND JOURNAL PUBLICATIONS

- [1] **Michael Poli\***, Stefano Massaroli\*, Luca Scimeca, Seong Joon Oh, Sanghyuk Chun, Atsushi Yamashita, Hajime Asama, Jinkyoo Park, Animesh Garg  
Neural Hybrid Automata: Learning Dynamics with Multiple Modes and Stochastic Transitions  
*Advances in Neural Information Processing Systems 34 (NeurIPS 2021)*
- [2] Stefano Massaroli\*, **Michael Poli\***, Sho Sonoda, Taiji Suzuki, Jinkyoo Park, Atsushi Yamashita, Hajime Asama  
Differentiable Multiple Shooting Layers  
*Advances in Neural Information Processing Systems 34 (NeurIPS 2021)*
- [3] Stefano Massaroli\*, **Michael Poli\***, Stefano Peluchetti\*, Jinkyoo Park, Atsushi Yamashita, Hajime Asama  
Learning Stochastic Optimal Policies via Gradient Descent  
*59th IEEE Conference on Decision and Control (CDC 2020)*  
*IEEE Control Systems Letters (L-CSS)*
- [4] Stefano Massaroli\*, **Michael Poli\***, Jinkyoo Park, Atsushi Yamashita, Hajime Asama  
Dissecting Neural ODEs  
*Advances in Neural Information Processing Systems 33 (NeurIPS 2020) – Oral (1% of submissions)*
- [5] **Michael Poli\***, Stefano Massaroli\*, Atsushi Yamashita, Hajime Asama, Jinkyoo Park  
Hypersolvers: Towards Fast Continuous-Depth Models  
*Advances in Neural Information Processing Systems 33 (NeurIPS 2020)*
- [6] **Michael Poli**, Jinkyoo Park, Ilija Ilievski  
WATTNet: Learning to Trade FX via Hierarchical Spatio-Temporal Representation of Highly Multivariate Time Series  
*International Joint Conference on Artificial Intelligence (IJCAI 2020)*
- [7] Stefano Massaroli\*, **Michael Poli\***, Federico Califano, Angela Faragasso, Jinkyoo Park, Atsushi Yamashita, Hajime Asama  
Port-Hamiltonian Approach to Neural Network Training  
*58th IEEE Conference on Decision and Control (CDC 2019)*

- [1] Federico Berto, Stefano Massaroli, **Michael Poli**, Jinkyoo Park  
Port-Hamiltonian Approach to Neural Network Training  
*NeurIPS Workshop on The Symbiosis of Deep Learning and Differential Equations (2021)* – **Spotlight (21%)**
- [2] **Michael Poli**<sup>\*</sup>, Stefano Massaroli<sup>\*</sup>, Atsushi Yamashita, Hajime Asama, Jinkyoo Park, Stefano Ermon  
TorchDyn: Implicit Models and Neural Numerical Methods in PyTorch  
*Preprint (2021)*
- [3] Stefano Massaroli<sup>\*</sup>, **Michael Poli**<sup>\*</sup>, Michelangelo Bin, Jinkyoo Park, Atsushi Yamashita, Hajime Asama  
Optimal Energy Shaping via Neural Approximators  
*Preprint (2021)*
- [4] Daehoon Gwak, Gyuhyeon Sim, **Michael Poli**, Stefano Massaroli, Jaegul Choo, Edward Choi  
Neural Ordinary Differential Equations for Intervention Modeling  
*Preprint (2021)*
- [5] **Michael Poli**<sup>\*</sup>, Stefano Massaroli<sup>\*</sup>, Atsushi Yamashita, Hajime Asama, Jinkyoo Park  
Port-Hamiltonian Gradient Flows  
*ICLR Workshop on the Integration of Deep Neural Models and Differential Equations (2020)*
- [6] Stefano Massaroli<sup>\*</sup>, **Michael Poli**<sup>\*</sup>, Jinkyoo Park, Atsushi Yamashita, Hajime Asama  
Neural Ordinary Differential Equation Value Networks for Parametrized Action Spaces  
*ICLR Workshop on the Integration of Deep Neural Models and Differential Equations (2020)*
- [7] **Michael Poli**<sup>\*</sup>, Stefano Massaroli<sup>\*</sup>, Atsushi Yamashita, Hajime Asama, Jinkyoo Park  
Graph Neural Ordinary Differential Equations  
*AAAI International Workshop on Deep Learning on Graphs, DLGMA (2020)* – **Contributed Talk (10%)**
- [8] **Michael Poli**, Jinkyoo Park, Ilija Ilievski  
WATTNet: Learning to Trade FX via Hierarchical Spatio-Temporal Representation of Highly Multivariate Time Series  
*AAAI Workshop on Knowledge Discovery from Unstructured Data in Finance (2020)*
- [9] Stefano Massaroli<sup>\*</sup>, **Michael Poli**<sup>\*</sup>, Michelangelo Bin, Jinkyoo Park, Atsushi Yamashita, Hajime Asama  
Stable Neural Flows  
*Preprint (2020)*

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PROFESSIONAL ACTIVITIES:

**Reviewer:** NeurIPS (2021), ICLR (2022), AISTATS (2022), ICML (2021)  
**Mentoring:** Federico Berto (KAIST IE, 2020-22)  
Jiyoung Lee (KAIST AI, 2020-22)  
Chuanbo Hua (KAIST IE, 2020-22)  
**Invited Speaker:** Continuous-Depth Learning: A System-Theoretic Perspective (2020, HKML S3E4)  
Learning with Differential Equations (2021, Harvard Computational Science)

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REFERENCES:

prof. Edward Choi: mp2893 at gmail.com	KAIST, Google
prof. Jinkyoo Park: jinkyoo.park at kaist.ac.kr	KAIST, Stanford
prof. Claudio Melchiorri: claudio.melchiorri at unibo.it	University of Bologna