

# Derek Onken

*Philomath, Polymath, BS in Math*

<https://derekonken.com/>

derek@derekonken.com

## CURRENT RESEARCH INTERESTS

---

I view myself as a data scientist working in the interdisciplinary overlap of mathematics, computer science, and statistics. I value leveraging theory from these fields to develop models for practical applications that mostly fall in the physical and biological realms.

### Machine Learning for Pharmaceutical Applications

- Developing and deploying machine learning tools for use in clinical trials
- Leveraging neural networks to increase pharmaceutical product manufacturing yield
- Applying machine learning for accelerating drug development

## EDUCATION

---

**Ph.D. in Computer Science & Informatics**, Emory University

*Advisor:* Lars Ruthotto

*Dissertation:* Optimal Control Approaches for Designing Neural Ordinary Differential Equations

**M.S. in Computer Science**, Emory University

**B.S. in Mathematics and Computer Science**, Honors College, University of Georgia

*Minors:* Physics and Classical Culture

*Honors:* Graduated High Honors with Capstone

*Advisor:* Juan B. Gutierrez

## COMPUTATIONAL SKILLS

---

Comfortable in PYTHON, PYTORCH, MATLAB, SQL

Familiar with AWS, Julia, TENSORFLOW, C, C++, JAVA, R

Exposed to MPI, x86, OPENCL, CUDA, HTML, MATHEMATICA

## WORK EXPERIENCE

---

<b>Sr. Research Scientist</b> , Eli Lilly, Advanced Analytics and Data Science (AADS)	2023-present
<b>Research Scientist</b> , Eli Lilly, Advanced Analytics and Data Science	2021-2023
<b>Data Scientist Intern</b> , UnitedHealth Group, R&D	2019, 2020
<b>High Performance Computing Intern</b> , Air Force Research Labs, UES Inc.	2018
<b>Teaching Assistant</b> , Emory University	2016-2018
<b>Tutor</b> , University of Georgia Athletic Department	2016
<b>Undergraduate Researcher</b> , University of Georgia Mathematics Department	2014
<b>Piano Teacher</b>	2013-2014
<b>Summer League Swim Coach</b>	2009, 2010

## LEADERSHIP & SERVICE

---

**External Reviewer** for several entities, including:

- [Mathematical Sciences of Machine Learning Conference](#)

- [Cell Patterns](#)
- [Springer International Journal of Dynamics and Control](#)
- [IEEE Transactions on Neural Networks and Learning Systems](#)

<b>Mentor Polygence</b>	2021-present
<b>Member</b> Emory Society for Industrial and Applied Mathematics (SIAM)	2016-2021
<b>Volunteer</b> Atlanta Science Festival	2016-2019
<b>University of Georgia Men’s Swimming &amp; Diving Team</b>	2011-2015
– Captain & NCAA Division I Varsity Athlete	
– Competed at the Southeastern Conference Championships	
– Qualified and competed at the 2016 U.S. Olympic Trials	
– NCAA Academic All-American Honorable Mention	2013, 2014, 2015
– Awarded Dick Bestwick Scholar-Athlete Award, UGA Athletic Dept	2015
– Awarded Ramsey Scholarship for Academic and Athletic Excellence	2014-2015
– Awarded Peter O’Sullivan Hardest Worker Award, UGA Men’s Swimming	2014, 2015
– Awarded Alex Patterson Scholar-Athlete Award , UGA Men’s Swimming	2014
– College Swim Coaches of America Association Scholar All-American Team	2013, 2014, 2015
<b>Student-Athlete Advisory Committee</b> Team Representative	2014-2015

## HONORS & AWARDS

---

Eli Lilly Chief Information & Digital Officer Finalist (Immunology, Rising Star)	2022
Eli Lilly Chief Information & Digital Officer Award (Manufacturing)	2021
Eli Lilly Top 100 Innovator Award (Immunology, x2)	2021,2023
Eli Lilly Innovator Award (x6)	2021-2023
Phi Beta Kappa	2015
University of Georgia Presidential Scholar	2014
University of Georgia Athletic Director’s Honor Roll	2012-2015
Southeastern Conference Academic Honor Roll	2012-2015
University of Georgia Dean’s List	2012-2015

## PUBLICATIONS

---

[Title](#) is a clickable link to access manuscript pdf.

For conferences and posters, presenter is underlined.

\* denotes co-first authors

### *Preprints*

[P.1] **D. Onken**, L. Ruthotto

[Discretize-Optimize vs. Optimize-Discretize for Time-Series Regression and Continuous Normalizing Flows](#)

arXiv:2005.13420, 2020

| [code](#) | [videos](#) |

*Peer-Reviewed Journal Articles*

- [J.3] I. Morales-Ivorra, D. Taverner, O. Codina, S. Castell, P. Fischer, **D. Onken**, P. Martínez-Osuna, C. Battioui, M.A. Marín-López  
[External Validation of the Machine Learning-Based Thermographic Indices for Rheumatoid Arthritis: A Prospective Longitudinal Study](#)  
 Diagnostics 14(13), 1394, Jun 2024  
 | [doi](#) |
- [J.2] **D. Onken**, L. Nurbekyan, X. Li, S. W. Fung, S. Osher, L. Ruthotto  
[A Neural Network Approach for High-Dimensional Optimal Control Applied to Multi-Agent Path Finding](#)  
 IEEE Transactions on Control Systems Technology 31(1), pp. 235-251, Jan 2023  
 | [code](#) | [videos](#) | [doi](#) |
- [J.1] Y. Vigfusson\*, T. Karlsson\*, **D. Onken\***, *et al.*  
[Cell-Phone Traces Reveal Infection-Associated Behavioral Change](#)  
 Proceedings of the National Academy of Sciences (PNAS) 118(6), e2005241118, Feb 2021  
 | [code](#) | [doi](#) |

*Peer-Reviewed Conference Proceedings*

- [C.2] **D. Onken**, L. Nurbekyan, X. Li, S. W. Fung, S. Osher, L. Ruthotto  
[A Neural Network Approach Applied to Multi-Agent Optimal Control](#)  
 European Control Conference (ECC), 1036–1041, 2021  
 | [code](#) | [videos](#) | [doi](#) | [talk slides](#) | [talk recording](#) |
- [C.1] **D. Onken**, S. W. Fung, X. Li, L. Ruthotto  
[OT-Flow: Fast and Accurate Continuous Normalizing Flows via Optimal Transport.](#)  
 AAAI Conference on Artificial Intelligence, 35(10), 9223-9232, 2021  
 | [code](#) | [doi](#) | [talk slides](#) | [talk recording](#) | [poster](#) |

**INVITED TALKS**

- Digital Strategies for Improving Recruitment and Diversity in Clinical Trials*, presented at  
 [T.6] Understanding Priorities for Use of Digital Health Technologies, FDA and Duke Margolis Center for Health Policy [Virtual Public Meeting](#), Mar 2023  
 | [slides](#) | [recording](#) | presented by [Klaus Gottlieb](#)

- A Neural Network Approach for High-Dimensional Optimal Control*, presented at  
 [T.5] Applied Mathematics and Statistics Colloquium, Colorado School of Mines, Oct 2021  
 | [slides](#) |
- [T.4] Optimal Transport and Mean Field Games Seminar, University of South Carolina, Mar 2021  
 | [slides](#) |
- [T.3] Applied Mathematics Seminar, UCLA, Mar 2021  
 | [slides](#) |
- [T.2] Virtual Informal Systems Seminar (VISS) at Centre for Intelligent Machines (CIM) at McGill and the Groupe d'études et de Recherche en Analyse des Décisions (GERAD), Feb 2021  
 | [slides](#) | [recording](#) |

*Efficient and Accurate Discretize-Optimize Approaches for Training Deep Residual Networks*,  
presented at

- [T.1] SIAM Mathematics of Data Science, Jun 2020  
| [slides](#) |

### PEER-REVIEWED POSTER PRESENTATIONS

- [R.3] P. Shannon, **D. Onken**, K. Gottlieb, *et al.*  
[The Capture of Fingernail and Scalp Psoriasis Pictures Through a Mobile Application in a Real-World Ixekizumab Observation Study](#)  
Maui Derm 2024
- [R.2] **D. Onken**, S. W. Fung, X. Li, L. Ruthotto  
[Normalizing Flows Via Mean Field Games and Hamilton-Jacobi-Bellman Equations](#)  
SIAM/CAIMS AN2020
- [R.1] **D. Onken**, R. Jennings, S. Garth, E. Haber, E. Treister, S. Novikov, L. Ruthotto  
[Using PDE-Based Neural Networks for Classifying 3-D LDCT Images for Lung Cancer Detection](#)  
IPAM Deep Learning for Medical Applications 2020

### SELECTED PRESENTATIONS & POSTERS

- [13] *talk*, Clinical Imaging, *Lilly AADS: Winning with AI Symposium*, Mar 2023
- [12] *demo*, Utilizing Amazon Web Services EC2 Bursting in High-Performance Computing environment, *Lilly AADS Tutorial*, Dec 2022
- [11] *talk*, Deep Learning for Manufacturing, *Game-Changers: Lilly Board of Directors*, Oct 2022
- [10] *talk*, Optimal Transport Primer, *Lilly AADS ML/AI Team Meeting*, Sep 2022
- [9] *demo*, Training Neural Networks in Amazon Web Services, *Lilly Technical Seminar Series*, Jun 2022
- [8] *talk*, Deep Learning Primer: The Truth Behind the Buzzword, *Lilly Technical Seminar Series*, Mar 2022
- [7] *talk*, Image Transformers, *Lilly AADS Image Capability Meeting*, Aug 2021
- [6] *talk*, Image Classification For Lung Cancer Via Neural Networks Based On Partial Differential Equations, *UnitedHealth Group Internship Presentation*, Aug 2019
- [5] *talk*, PDE-based Neural Networks, *UnitedHealth Group Brown Bag Lecture Series*, Jul 2019
- [4] *talk*, [Applying Higher-Order Runge-Kutta Methods To Neural Networks](#), *Emory Scientific Computing Seminar*, Apr 2019
- [3] *poster*, [Applying Higher-Order Runge-Kutta Methods To Neural Networks](#), *Georgia Scientific Computing Symposium*, Feb 2019
- [2] *poster & talk*, Cell Segmentation via Convolutional Neural Networks, *High Performance Computing and Modernization Program*, Aug 2018
- [1] *poster*, [Tracking Behavioral Alterations via Cell Phone Data](#), *Amazon Graduate Research Symposium*, Oct 2017