

# Brandon Amos

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## Current Position

Research Scientist | Facebook AI | New York, NY 2019 – Present

## Education

**Ph.D. in Computer Science** (0.00/0.00) 2014 – 2019

Carnegie Mellon University | Pittsburgh, PA

*Differentiable Optimization-Based Modeling for Machine Learning*

Advisors: [J. Zico Kolter](#) (2016 – 2019), [Mahadev Satyanarayanan](#) (2014 – 2016)

**B.S. in Computer Science** (3.99/4.00) 2011 – 2014

Virginia Tech | Blacksburg, VA

Advisors: [Layne Watson](#), [Jules White](#), [Binoy Ravindran](#)

## Research Internships

**Intel Labs** | Santa Clara, CA | Host: [Vladlen Koltun](#) 2018

**Google DeepMind** | London, UK | Hosts: [Misha Denil](#) and [Nando de Freitas](#) 2017

**Adobe Research** | San Jose, CA | Host: [David Tompkins](#) 2014

## Honors & Awards

NSF Graduate Research Fellowship 2016 – 2019

Nine undergraduate scholarships 2011 – 2014

Roanoke County Public Schools Engineering, Salem–Roanoke County Chamber of Commerce, Papa John's, Scottish Rite of Freemasonry, VT Intelligence Community Center for Academic Excellence, VT Pamplin Leader, VT Benjamin F. Bock, VT Gay B. Shober, VT I. Luck Gravett

## Publications

Google Scholar ID: [d8gdZR4AAAAJ](https://scholar.google.com/citations?user=d8gdZR4AAAAJ)

### 2021

1. *On the model-based stochastic value gradient for continuous reinforcement learning* [code] [slides]  
**Brandon Amos**, [Samuel Stanton](#), [Denis Yarats](#), and [Andrew Gordon Wilson](#)  
L4DC 2021 (Oral)
2. *Riemannian Convex Potential Maps* [code] [slides]  
[Samuel Cohen\\*](#), **Brandon Amos\***, and [Yaron Lipman](#)  
ICML 2021
3. *CombOptNet: Fit the Right NP-Hard Problem by Learning Integer Programming Constraints* [code]  
[Anselm Paulus](#), [Michal Rolínek](#), [Vít Musil](#), **Brandon Amos**, and [Georg Martius](#)  
ICML 2021
4. *Neural Fixed-Point Acceleration for Convex Optimization* [code]  
[Shobha Venkataraman\\*](#) and **Brandon Amos\***  
ICML AutoML 2021
5. *Aligning Time Series on Incomparable Spaces* [code] [slides]  
[Samuel Cohen](#), [Giulia Luise](#), [Alexander Terenin](#), **Brandon Amos**, and [Marc Peter Deisenroth](#)  
AISTATS 2021

6. [Learning Neural Event Functions for Ordinary Differential Equations](#) [code]  
Ricky T. Q. Chen, **Brandon Amos**, and Maximilian Nickel  
ICLR 2021
7. [Neural Spatio-Temporal Point Processes](#) [code]  
Ricky T. Q. Chen, **Brandon Amos**, and Maximilian Nickel  
ICLR 2021
8. [Improving Sample Efficiency in Model-Free Reinforcement Learning from Images](#) [code]  
Denis Yarats, Amy Zhang, Ilya Kostrikov, **Brandon Amos**, Joelle Pineau, and Rob Fergus  
AAAI 2021
9. [MBRL-Lib: A Modular Library for Model-based Reinforcement Learning](#) [code]  
Luis Pineda, **Brandon Amos**, Amy Zhang, Nathan Lambert, and Roberto Calandra  
arXiv 2021

## 2020

10. [The Differentiable Cross-Entropy Method](#) [code] [slides]  
**Brandon Amos** and Denis Yarats  
ICML 2020
11. [Objective Mismatch in Model-based Reinforcement Learning](#)  
Nathan Lambert, **Brandon Amos**, Omry Yadan, and Roberto Calandra  
L4DC 2020
12. [QNSTOP: Quasi-Newton Algorithm for Stochastic Optimization](#) [code]  
**Brandon Amos**, David Easterling, Layne T. Watson, William Thacker, Brent Castle, and Michael Trosset  
ACM TOMS 2020
13. [Neural Potts Model](#)  
Tom Sercu, Robert Verkuil, Joshua Meier, **Brandon Amos**, Zeming Lin, Caroline Chen, Jason Liu, Yann LeCun, and Alexander Rives  
MLCB 2020
14. [Deep Riemannian Manifold Learning](#)  
Aaron Lou, Maximilian Nickel, and **Brandon Amos**  
NeurIPS Geo4dl 2020

## 2019

15. [Differentiable Optimization-Based Modeling for Machine Learning](#) [code]  
**Brandon Amos**  
Ph.D. Thesis 2019
16. [Differentiable Convex Optimization Layers](#) [code]  
Akshay Agrawal\*, **Brandon Amos\***, Shane Barratt\*, Stephen Boyd\*, Steven Diamond\*, and J. Zico Kolter\*  
NeurIPS 2019
17. [The Limited Multi-Label Projection Layer](#) [code]  
**Brandon Amos**, Vladlen Koltun, and J. Zico Kolter  
arXiv 2019
18. [Generalized Inner Loop Meta-Learning](#) [code]  
Edward Grefenstette, **Brandon Amos**, Denis Yarats, Phu Mon Htut, Artem Molchanov, Franziska Meier, Douwe Kiela, Kyunghyun Cho, and Soumith Chintala  
arXiv 2019

## 2018

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19. *Learning Awareness Models*  
**Brandon Amos**, Laurent Dinh, Serkan Cabi, Thomas Rothörl, Sergio Gómez Colmenarejo, Alistair Muldal, Tom Erez, Yuval Tassa, Nando de Freitas, and Misha Denil  
ICLR 2018
20. *Differentiable MPC for End-to-end Planning and Control* [code]  
**Brandon Amos**, Ivan Dario Jimenez Rodriguez, Jacob Sacks, Byron Boots, and J. Zico Kolter  
NeurIPS 2018
21. *Depth-Limited Solving for Imperfect-Information Games*  
Noam Brown, Tuomas Sandholm, and **Brandon Amos**  
NeurIPS 2018
22. *Enabling Live Video Analytics with a Scalable and Privacy-Aware Framework*  
Junjue Wang, **Brandon Amos**, Anupam Das, Padmanabhan Pillai, Norman Sadeh, and Mahadev Satyanarayanan  
ACM TOMM 2018

## 2017

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23. *OptNet: Differentiable Optimization as a Layer in Neural Networks* [code] [slides]  
**Brandon Amos** and J. Zico Kolter  
ICML 2017
24. *Input Convex Neural Networks* [code] [slides]  
**Brandon Amos**, Lei Xu, and J. Zico Kolter  
ICML 2017
25. *Task-based End-to-end Model Learning* [code]  
Priya L. Donti, **Brandon Amos**, and J. Zico Kolter  
NeurIPS 2017
26. *Quasi-Newton Stochastic Optimization Algorithm for Parameter Estimation of a Stochastic Model of the Budding Yeast Cell Cycle*  
Minghan Chen, **Brandon Amos**, Layne T. Watson, John Tyson, Yang Cao, Cliff Shaffer, Michael Trosset, Cihan Oguz, and Gisella Kakoti  
IEEE/ACM TCBB 2017
27. *You can teach elephants to dance: agile VM handoff for edge computing*  
Kiryong Ha, Yoshihisa Abe, Thomas Eiszler, Zhuo Chen, Wenlu Hu, **Brandon Amos**, Rohit Upadhyaya, Padmanabhan Pillai, and Mahadev Satyanarayanan  
SEC 2017
28. *An Empirical Study of Latency in an Emerging Class of Edge Computing Applications for Wearable Cognitive Assistance*  
Zhuo Chen, Wenlu Hu, Junjue Wang, Siyan Zhao, **Brandon Amos**, Guanhang Wu, Kiryong Ha, Khalid Elgazzar, Padmanabhan Pillai, Roberta Klatzky, Daniel Siewiorek, and Mahadev Satyanarayanan  
SEC 2017
29. *A Scalable and Privacy-Aware IoT Service for Live Video Analytics* [code]  
Junjue Wang, **Brandon Amos**, Anupam Das, Padmanabhan Pillai, Norman Sadeh, and Mahadev Satyanarayanan  
ACM MMSys 2017 (Best Paper)

## 2016

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30. *OpenFace: A general-purpose face recognition library with mobile applications* [code]  
**Brandon Amos**, Bartosz Ludwiczuk, and Mahadev Satyanarayanan  
CMU 2016
31. *Collapsed Variational Inference for Sum-Product Networks*  
Han Zhao, Tameem Adel, Geoff Gordon, and **Brandon Amos**  
ICML 2016
32. *Quantifying the impact of edge computing on mobile applications*  
Wenlu Hu, Ying Gao, Kiryong Ha, Junjue Wang, **Brandon Amos**, Zhuo Chen, Padmanabhan Pillai, and Mahadev Satyanarayanan  
ACM SIGOPS 2016
33. *Privacy mediators: helping IoT cross the chasm*  
Nigel Davies, Nina Taft, Mahadev Satyanarayanan, Sarah Clinch, and **Brandon Amos**  
HotMobile 2016

## 2015 and earlier

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34. *Edge Analytics in the Internet of Things*  
Mahadev Satyanarayanan, Pieter Simoens, Yu Xiao, Padmanabhan Pillai, Zhuo Chen, Kiryong Ha, Wenlu Hu, and **Brandon Amos**  
IEEE Pervasive Computing 2015
35. *Bad Parts: Are Our Manufacturing Systems at Risk of Silent Cyberattacks?*  
Hamilton Turner, Jules White, Jaime A. Camelio, Christopher Williams, **Brandon Amos**, and Robert Parker  
IEEE Security & Privacy 2015
36. *Early Implementation Experience with Wearable Cognitive Assistance Applications*  
Zhuo Chen, Lu Jiang, Wenlu Hu, Kiryong Ha, **Brandon Amos**, Padmanabhan Pillai, Alex Hauptmann, and Mahadev Satyanarayanan  
WearSys 2015
37. *The Case for Offload Shaping*  
Wenlu Hu, **Brandon Amos**, Zhuo Chen, Kiryong Ha, Wolfgang Richter, Padmanabhan Pillai, Benjamin Gilbert, Jan Harkes, and Mahadev Satyanarayanan  
HotMobile 2015
38. *Are Cloudlets Necessary?*  
Ying Gao, Wenlu Hu, Kiryong Ha, **Brandon Amos**, Padmanabhan Pillai, and Mahadev Satyanarayanan  
CMU 2015
39. *Adaptive VM handoff across cloudlets*  
Kiryong Ha, Yoshihisa Abe, Zhuo Chen, Wenlu Hu, **Brandon Amos**, Padmanabhan Pillai, and Mahadev Satyanarayanan  
CMU 2015
40. *Global Parameter Estimation for a Eukaryotic Cell Cycle Model in Systems Biology*  
Tricity Andrew, **Brandon Amos**, David Easterling, Cihan Oguz, William Baumann, John Tyson, and Layne T. Watson  
SummerSim 2014
41. *Applying machine learning classifiers to dynamic Android malware detection at scale* [code]  
**Brandon Amos**, Hamilton Turner, and Jules White  
IWCMC 2013

## Repositories

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<a href="#">facebookresearch/mbrl-lib</a>   ★453   <i>Model-based reinforcement learning library</i>	2021
<a href="#">facebookresearch/dcem</a>   ★92   <i>The Differentiable Cross-Entropy Method</i>	2020
<a href="#">facebookresearch/higher</a>   ★1.2k   <i>PyTorch higher-order gradient and optimization library</i>	2019
<a href="#">bamos/thesis</a>   ★255   <i>Ph.D. Thesis LaTeX source code</i>	2019
<a href="#">cvxgrp/cvxpylayers</a>   ★1.1k   <i>Differentiable Convex Optimization Layers</i>	2019
<a href="#">locuslab/mpc.pytorch</a>   ★475   <i>Differentiable Model-Predictive Control</i>	2018
<a href="#">locuslab/icnn</a>   ★228   <i>Input Convex Neural Networks</i>	2017
<a href="#">locuslab/optnet</a>   ★369   <i>OptNet experiments</i>	2017
<a href="#">locuslab/qpth</a>   ★490   <i>Differentiable PyTorch QP solver</i>	2017
<a href="#">bamos/densenet.pytorch</a>   ★706   <i>PyTorch DenseNet implementation</i>	2017
<a href="#">bamos/block</a>   ★258   <i>Intelligent block matrix constructions</i>	2017
<a href="#">bamos/setGPU</a>   ★97   <i>Automatically use the least-loaded GPU</i>	2017
<a href="#">bamos/dcgan-completion.tensorflow</a>   ★1.3k   <i>Image completion with GANs</i>	2016
<a href="#">cmusatyalab/openface</a>   ★14.1k   <i>Face recognition with deep neural networks</i>	2015
<a href="#">bamos/zsh-history-analysis</a>   ★161   <i>Analyze and plot your zsh history</i>	2014
<a href="#">bamos/cv</a>   ★323   <i>Source for this CV: Creates LaTeX/Markdown from YAML/BibTeX</i>	2013
<a href="#">bamos/dotfiles</a>   ★229   <i>Linux, mutt, xmonad, i3, vim, emacs, zsh</i>	2012

## Invited Talks

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Columbia University	2021
IBM Research	2021
Max Planck Institute for Intelligent Systems (Tübingen) Seminar	2020
Montreal Institute for Learning Algorithms Seminar	2020
<a href="#">ECCV Deep Declarative Networks Tutorial</a>	2020
<a href="#">CVPR Deep Declarative Networks Workshop</a>	2020
<a href="#">Caltech CS 159, Guest Lecture</a>	2020
SIAM MDS Minisymposium on Learning Parameterized Energy Minimization Models	2020
New York University CILVR Seminar	2019
INFORMS Session on Prediction and Optimization	2019
Facebook AI Research	2019
ISMP Session on Machine Learning and Optimization	2018
Google Brain	2018
Bosch Center for AI	2018
Waymo Research	2018
Tesla AI	2018
NVIDIA Robotics	2018
Salesforce Research	2018
OpenAI	2018
NNAISENSE	2018
UC Berkeley	2018

## Interns and Students

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<a href="#">Samuel Cohen</a> (visiting FAIR from UCL)	2021
<a href="#">Eugene Vinitzky</a> (visiting FAIR from Berkeley)	2021
<a href="#">Arnaud Fickinger</a> (visiting FAIR from Berkeley)	2021
<a href="#">Aaron Lou</a> (visiting FAIR from Cornell, now: Ph.D. student at Stanford)	2020
<a href="#">Ricky Chen</a> (visiting FAIR from Toronto, now: scientist at FAIR)	2020
<a href="#">Paul Liang</a> (visiting FAIR from CMU)	2020
<a href="#">Phillip Wang</a> (at CMU, now: CEO at <a href="#">Gather</a> )	2018

## Professional Activities

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Reviewing: AAAI, ICML, NeurIPS, ICLR\*, ICCV, CVPR, ICRA \*Outstanding reviewer

NeurIPS Learning Meets Combinatorial Optimization Workshop Organizer	2020
CVPR Deep Declarative Workshop Organizer	2020
ECCV Deep Declarative Tutorial Organizer	2020
CMU CSD MS Admissions	2014 – 2015

## Teaching

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Graduate AI (CMU 15-780), TA	S2017
Distributed Systems (CMU 15-440/640), TA	S2016
Software Design and Data Structures (VT CS2114), TA	S2013

## Skills

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Programming	C, C++, Fortran, Haskell, Java, Lua, Make, Mathematica, Python, R, Scala
Frameworks	JAX, NumPy, Pandas, PyTorch, SciPy, TensorFlow, Torch7
Tools	Linux, emacs, vim, evil, org, mu4e, xmonad, i3, git, tmux, zsh