# Brandon Amos

bda@fb.com • bamos.github.io • bdamos • brandondamos
bamos • Last updated on October 3, 2021

## Current Position

**Research Scientist**, Facebook AI, New York City 2019 – Present

## Education

**Ph.D. in Computer Science**, Carnegie Mellon University (0.00/0.00) 2014 – 2019
*Differentiable Optimization-Based Modeling for Machine Learning*
Advisors: J. Zico Kolter (2016 – 2019), Mahadev Satyanarayanan (2014 – 2016)

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

## Research Internships

**Intel Labs**, Santa Clara (Host: Vladlen Koltun) 2018
**Google DeepMind**, London (Hosts: Misha Denil and Nando de Freitas) 2017
**Adobe Research**, San Jose (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 Conter for Academic Excellence, VT Pamplin Leader, VT Benjamin F. Bock, VT Gay B. Shober, VT I. Luck Gravett

## Publications

Representative publications where I am a primary author are highlighted.
[Google Scholar] [BibTeX]

### 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. *Scalable Online Planning via Reinforcement Learning Fine-Tuning*
   Arnaud Fickinger, Hengyuan Hu, **Brandon Amos**, Stuart Russell, and Noam Brown
   NeurIPS 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. *Neural Fixed-Point Acceleration for Convex Optimization* [code]
   Shobha Venkataraman* and **Brandon Amos***
   ICML AutoML 2021

10. *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

11. *The Differentiable Cross-Entropy Method* [code] [slides]
    **Brandon Amos** and Denis Yarats
    ICML 2020

12. *Objective Mismatch in Model-based Reinforcement Learning*
    Nathan Lambert, **Brandon Amos**, Omry Yadan, and Roberto Calandra
    L4DC 2020

13. *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

14. *Neural Potts Model*
    Tom Sercu, Robert Verkuil, Joshua Meier, **Brandon Amos**, Zeming Lin, Caroline Chen, Jason Liu, Yann LeCun, and Alexander Rives
    MLCB 2020

15. *Deep Riemannian Manifold Learning*
    Aaron Lou, Maximilian Nickel, and **Brandon Amos**
    NeurIPS Geo4dl 2020

## 2019

16. *Differentiable Optimization-Based Modeling for Machine Learning* [code]
    **Brandon Amos**
    Ph.D. Thesis 2019

17. *Differentiable Convex Optimization Layers* [code]
    Akshay Agrawal*, **Brandon Amos***, Shane Barratt*, Stephen Boyd*, Steven Diamond*, and J. Zico Kolter*
    NeurIPS 2019

18. *The Limited Multi-Label Projection Layer* [code]
    **Brandon Amos**, Vladlen Koltun, and J. Zico Kolter
    arXiv 2019

19. *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

20. *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

21. *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

22. *Depth-Limited Solving for Imperfect-Information Games*
Noam Brown, Tuomas Sandholm, and **Brandon Amos**
NeurIPS 2018

23. *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

24. *OptNet: Differentiable Optimization as a Layer in Neural Networks* [code] [slides]
**Brandon Amos** and J. Zico Kolter
ICML 2017

25. *Input Convex Neural Networks* [code] [slides]
**Brandon Amos**, Lei Xu, and J. Zico Kolter
ICML 2017

26. *Task-based End-to-end Model Learning* [code]
Priya L. Donti, **Brandon Amos**, and J. Zico Kolter
NeurIPS 2017

27. *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

28. *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

29. *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

30. *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

31. *OpenFace: A general-purpose face recognition library with mobile applications* [code]
**Brandon Amos**, Bartosz Ludwiczuk, and Mahadev Satyanarayanan
CMU 2016

32. *Collapsed Variational Inference for Sum-Product Networks*
Han Zhao, Tameem Adel, Geoff Gordon, and **Brandon Amos**
ICML 2016

33. *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

34. *Privacy mediators: helping IoT cross the chasm*
Nigel Davies, Nina Taft, Mahadev Satyanarayanan, Sarah Clinch, and **Brandon Amos**
HotMobile 2016

## 2015 and earlier

35. *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

36. *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

37. *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

38. *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

39. *Are Cloudlets Necessary?*
Ying Gao, Wenlu Hu, Kiryong Ha, **Brandon Amos**, Padmanabhan Pillai, and Mahadev Satyanarayanan
CMU 2015

40. *Adaptive VM handoff across cloudlets*
Kiryong Ha, Yoshihisa Abe, Zhuo Chen, Wenlu Hu, **Brandon Amos**, Padmanabhan Pillai, and Mahadev Satyanarayanan
CMU 2015

41. *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

42. *Applying machine learning classifiers to dynamic Android malware detection at scale* [code]
**Brandon Amos**, Hamilton Turner, and Jules White
IWCMC 2013

## Repositories

| | |
|---|---|
| facebookresearch/mbrl-lib \| ★478 \| *Model-based reinforcement learning library* | 2021 |
| facebookresearch/dcem \| ★92 \| *The Differentiable Cross-Entropy Method* | 2020 |
| facebookresearch/higher \| ★1.2k \| *PyTorch higher-order gradient and optimization library* | 2019 |
| bamos/thesis \| ★257 \| *Ph.D. Thesis LaTeX source code* | 2019 |
| cvxgrp/cvxpylayers \| ★1.1k \| *Differentiable Convex Optimization Layers* | 2019 |
| locuslab/mpc.pytorch \| ★483 \| *Differentiable Model-Predictive Control* | 2018 |
| locuslab/icnn \| ★229 \| *Input Convex Neural Networks* | 2017 |
| locuslab/optnet \| ★371 \| *OptNet experiments* | 2017 |
| locuslab/qpth \| ★493 \| *Differentiable PyTorch QP solver* | 2017 |
| bamos/densenet.pytorch \| ★713 \| *PyTorch DenseNet implementation* | 2017 |
| bamos/block \| ★258 \| *Intelligent block matrix constructions* | 2017 |
| bamos/setGPU \| ★97 \| *Automatically use the least-loaded GPU* | 2017 |
| bamos/dcgan-completion.tensorflow \| ★1.3k \| *Image completion with GANs* | 2016 |
| cmusatyalab/openface \| ★14.2k \| *Face recognition with deep neural networks* | 2015 |
| bamos/zsh-history-analysis \| ★162 \| *Analyze and plot your zsh history* | 2014 |
| bamos/cv \| ★324 \| *Source for this CV: Creates LaTeX/Markdown from YAML/BibTeX* | 2013 |
| bamos/dotfiles \| ★229 \| *Linux, mutt, xmonad, i3, vim, emacs, zsh* | 2012 |

## Invited Talks

| | |
|---|---|
| Columbia University | 2021 |
| IBM Research | 2021 |
| Max Planck Institute for Intelligent Systems (Tübingen) Seminar | 2020 |
| Montreal Institute for Learning Algorithms Seminar | 2020 |
| ECCV Deep Declarative Networks Tutorial | 2020 |
| CVPR Deep Declarative Networks Workshop | 2020 |
| Caltech CS 159, Guest Lecture | 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

| | |
|---|---|
| Samuel Cohen (visiting FAIR from UCL) | 2021 |
| Eugene Vinitsky (visiting FAIR from Berkeley) | 2021 |
| Arnaud Fickinger (visiting FAIR from Berkeley) | 2021 |
| Aaron Lou (visiting FAIR from Cornell, now: Ph.D. student at Stanford) | 2020 |
| Ricky Chen (visiting FAIR from Toronto, now: scientist at FAIR) | 2020 |
| Paul Liang (visiting FAIR from CMU) | 2020 |
| Phillip Wang (at CMU, now: CEO at Gather) | 2018 |

## Professional Activities

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

| | |
|---|---|
| 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

| | |
|---|---|
| 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 |