

# 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]

**B. Amos**, S. Stanton, D. Yarats, and A. Wilson  
L4DC 2021 (Oral)

2. *Riemannian Convex Potential Maps* [code] [slides]

S. Cohen\*, **B. Amos\***, and Y. Lipman  
ICML 2021

3. *CombOptNet: Fit the Right NP-Hard Problem by Learning Integer Programming Constraints* [code]

A. Paulus, M. Rolínek, V. Musil, **B. Amos**, and G. Martius  
ICML 2021

4. *Neural Fixed-Point Acceleration for Convex Optimization* [code]

S. Venkataraman\* and **B. Amos\***  
ICML AutoML 2021

5. *Aligning Time Series on Incomparable Spaces* [code] [slides]

S. Cohen, G. Luise, A. Terenin, **B. Amos**, and M. Deisenroth  
AISTATS 2021

6. [Learning Neural Event Functions for Ordinary Differential Equations](#) [code]  
R. Chen, **B. Amos**, and M. Nickel  
ICLR 2021
7. [Neural Spatio-Temporal Point Processes](#) [code]  
R. Chen, **B. Amos**, and M. Nickel  
ICLR 2021
8. [Improving Sample Efficiency in Model-Free Reinforcement Learning from Images](#) [code]  
D. Yarats, A. Zhang, I. Kostrikov, **B. Amos**, J. Pineau, and R. Fergus  
AAAI 2021
9. [MBRL-Lib: A Modular Library for Model-based Reinforcement Learning](#) [code]  
L. Pineda, **B. Amos**, A. Zhang, N. Lambert, and R. Calandra  
arXiv 2021

## 2020

10. [The Differentiable Cross-Entropy Method](#) [code] [slides]  
**B. Amos** and D. Yarats  
ICML 2020
11. [Objective Mismatch in Model-based Reinforcement Learning](#)  
N. Lambert, **B. Amos**, O. Yadan, and R. Calandra  
L4DC 2020
12. [QNSTOP: Quasi-Newton Algorithm for Stochastic Optimization](#) [code]  
**B. Amos**, D. Easterling, L. Watson, W. Thacker, B. Castle, and M. Trosset  
ACM TOMS 2020
13. [Neural Potts Model](#)  
T. Sercu, R. Verkuil, J. Meier, **B. Amos**, Z. Lin, C. Chen, J. Liu, Y. LeCun, and A. Rives  
MLCB 2020
14. [Deep Riemannian Manifold Learning](#)  
A. Lou, M. Nickel, and **B. Amos**  
NeurIPS Geo4dl 2020

## 2019

15. [Differentiable Optimization-Based Modeling for Machine Learning](#) [code]  
**B. Amos**  
Ph.D. Thesis 2019
16. [Differentiable Convex Optimization Layers](#) [code]  
A. Agrawal\*, **B. Amos\***, S. Barratt\*, S. Boyd\*, S. Diamond\*, and J. Z. Kolter\*  
NeurIPS 2019
17. [The Limited Multi-Label Projection Layer](#) [code]  
**B. Amos**, V. Koltun, and J. Z. Kolter  
arXiv 2019
18. [Generalized Inner Loop Meta-Learning](#) [code]  
E. Grefenstette, **B. Amos**, D. Yarats, P. Htut, A. Molchanov, F. Meier, D. Kiela, K. Cho, and S. Chintala  
arXiv 2019

## 2018

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19. *Learning Awareness Models*  
**B. Amos**, L. Dinh, S. Cabi, T. Rothörl, S. Colmenarejo, A. Muldal, T. Erez, Y. Tassa, N. de Freitas, and M. Denil  
ICLR 2018
20. *Differentiable MPC for End-to-end Planning and Control* [code]  
**B. Amos**, I. Rodriguez, J. Sacks, B. Boots, and J. Z. Kolter  
NeurIPS 2018
21. *Depth-Limited Solving for Imperfect-Information Games*  
N. Brown, T. Sandholm, and **B. Amos**  
NeurIPS 2018
22. *Enabling Live Video Analytics with a Scalable and Privacy-Aware Framework*  
J. Wang, **B. Amos**, A. Das, P. Pillai, N. Sadeh, and M. Satyanarayanan  
ACM TOMM 2018

## 2017

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23. *OptNet: Differentiable Optimization as a Layer in Neural Networks* [code] [slides]  
**B. Amos** and J. Z. Kolter  
ICML 2017
24. *Input Convex Neural Networks* [code] [slides]  
**B. Amos**, L. Xu, and J. Z. Kolter  
ICML 2017
25. *Task-based End-to-end Model Learning* [code]  
P. Donti, **B. Amos**, and J. Z. Kolter  
NeurIPS 2017
26. *Quasi-Newton Stochastic Optimization Algorithm for Parameter Estimation of a Stochastic Model of the Budding Yeast Cell Cycle*  
M. Chen, **B. Amos**, L. Watson, J. Tyson, Y. Cao, C. Shaffer, M. Trosset, C. Oguz, and G. Kakoti  
IEEE/ACM TCBB 2017
27. *You can teach elephants to dance: agile VM handoff for edge computing*  
K. Ha, Y. Abe, T. Eiszler, Z. Chen, W. Hu, **B. Amos**, R. Upadhyaya, P. Pillai, and M. Satyanarayanan  
SEC 2017
28. *An Empirical Study of Latency in an Emerging Class of Edge Computing Applications for Wearable Cognitive Assistance*  
Z. Chen, W. Hu, J. Wang, S. Zhao, **B. Amos**, G. Wu, K. Ha, K. Elgazzar, P. Pillai, R. Klatzky, D. Siewiorek, and M. Satyanarayanan  
SEC 2017
29. *A Scalable and Privacy-Aware IoT Service for Live Video Analytics* [code]  
J. Wang, **B. Amos**, A. Das, P. Pillai, N. Sadeh, and M. Satyanarayanan  
ACM MMSys 2017 (Best Paper)

## 2016

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30. *OpenFace: A general-purpose face recognition library with mobile applications* [code]  
**B. Amos**, B. Ludwiczuk, and M. Satyanarayanan  
CMU 2016

31. *Collapsed Variational Inference for Sum-Product Networks*  
H. Zhao, T. Adel, G. Gordon, and **B. Amos**  
ICML 2016
32. *Quantifying the impact of edge computing on mobile applications*  
W. Hu, Y. Gao, K. Ha, J. Wang, **B. Amos**, Z. Chen, P. Pillai, and M. Satyanarayanan  
ACM SIGOPS 2016
33. *Privacy mediators: helping IoT cross the chasm*  
N. Davies, N. Taft, M. Satyanarayanan, S. Clinch, and **B. Amos**  
HotMobile 2016

## 2015

34. *Edge Analytics in the Internet of Things*  
M. Satyanarayanan, P. Simoens, Y. Xiao, P. Pillai, Z. Chen, K. Ha, W. Hu, and **B. Amos**  
IEEE Pervasive Computing 2015
35. *Bad Parts: Are Our Manufacturing Systems at Risk of Silent Cyberattacks?*  
H. Turner, J. White, J. Camelio, C. Williams, **B. Amos**, and R. Parker  
IEEE Security & Privacy 2015
36. *Early Implementation Experience with Wearable Cognitive Assistance Applications*  
Z. Chen, L. Jiang, W. Hu, K. Ha, **B. Amos**, P. Pillai, A. Hauptmann, and M. Satyanarayanan  
WearSys 2015
37. *The Case for Offload Shaping*  
W. Hu, **B. Amos**, Z. Chen, K. Ha, W. Richter, P. Pillai, B. Gilbert, J. Harkes, and M. Satyanarayanan  
HotMobile 2015
38. *Are Cloudlets Necessary?*  
Y. Gao, W. Hu, K. Ha, **B. Amos**, P. Pillai, and M. Satyanarayanan  
CMU 2015
39. *Adaptive VM handoff across cloudlets*  
K. Ha, Y. Abe, Z. Chen, W. Hu, **B. Amos**, P. Pillai, and M. Satyanarayanan  
CMU 2015

## 2014

40. *Global Parameter Estimation for a Eukaryotic Cell Cycle Model in Systems Biology*  
T. Andrew, **B. Amos**, D. Easterling, C. Oguz, W. Baumann, J. Tyson, and L. Watson  
SummerSim 2014

## 2013

41. *Applying machine learning classifiers to dynamic Android malware detection at scale* [code]  
**B. Amos**, H. Turner, and J. White  
IWCMC 2013

## Repositories

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<a href="#">facebookresearch/mbri-lib</a>	★444   <i>Model-based reinforcement learning library</i>	2021
<a href="#">facebookresearch/dcem</a>	★91   <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>	★256   <i>Ph.D. Thesis LaTeX source code</i>	2019
<a href="#">cvxgrp/cvxpylayers</a>	★1k   <i>Differentiable Convex Optimization Layers</i>	2019
<a href="#">locuslab/mpc.pytorch</a>	★470   <i>Differentiable Model-Predictive Control</i>	2018
<a href="#">locuslab/icnn</a>	★226   <i>Input Convex Neural Networks</i>	2017

<a href="#">locuslab/optnet</a>   ★369   <i>OptNet experiments</i>	2017
<a href="#">locuslab/qpth</a>   ★488   <i>Differentiable PyTorch QP solver</i>	2017
<a href="#">bamos/densenet.pytorch</a>   ★703   <i>PyTorch DenseNet implementation</i>	2017
<a href="#">bamos/block</a>   ★256   <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>   ★320   <i>My YAML/LaTeX/Markdown cv</i>	2013
<a href="#">bamos/dotfiles</a>   ★229   <i>Linux, mutt, xmonad, i3, vim, emacs, zsh</i>	2012

## Invited Talks

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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
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

## Interns and Students

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<a href="#">Samuel Cohen</a> (visiting FAIR from UCL)	2021
<a href="#">Eugene Vinitsky</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)	2020
<a href="#">Ricky Chen</a> (visiting FAIR from Toronto)	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
<a href="#">Lei Xu</a> (visiting CMU from Tsinghua, now: Ph.D. student at MIT)	2016

## Professional Activities

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Reviewing: AAAI, ICML, NeurIPS, ICLR*, ICCV, CVPR, ICRA	*Outstanding reviewer
<a href="#">NeurIPS Learning Meets Combinatorial Optimization Workshop Organizer</a>	2020
<a href="#">CVPR Deep Declarative Workshop Organizer</a>	2020
<a href="#">ECCV Deep Declarative Tutorial Organizer</a>	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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Languages	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