

# NHAN H. PHAM

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## RESEARCH INTERESTS

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Stochastic optimization methods for machine learning, deep learning, and reinforcement learning.

## EDUCATION

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### Ph.D. in Operations Research

Aug. 2017–2022 (Expected)

Department of Statistics and Operations Research  
University of North Carolina at Chapel Hill · Chapel Hill, NC, USA

### Graduate Study in Computer Engineering

Aug. 2015–May 2017

Department of Computer Science and Engineering  
University of Nevada, Reno · Reno, NV, USA

### Bachelor of Engineering (Honor Program) in Computer Engineering

Aug. 2008–May 2013

Department of Computer Science and Engineering  
Ho Chi Minh City University of Technology · Ho Chi Minh City, Vietnam

## RESEARCH EXPERIENCES

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### Regularization Techniques on Deep Learning

Sept. 2019–Dec. 2019

SAMSI Research Fellow, Supervisor: Dr. Quoc Tran-Dinh.

- ◇ Work under Regularization Techniques subgroup studying the principle of different regularization techniques on training Deep Neural Networks (DNNs).
- ◇ Conduct numerical experiments on different DNN models consisting two or more regularizers on both model parameters (e.g.  $\ell_2$ -norm, max-norm constraint, etc.) and training process (dropout, batch normalization, etc.).

### Hybrid Stochastic Policy Gradient Algorithm for Reinforcement Learning

Jul. 2019–Dec. 2019

Graduate Research Assistant, Supervisors: Dr. Quoc Tran-Dinh, Dr. Lam M. Nguyen.

Accepted for the 23rd International Conference on Artificial Intelligence and Statistics (AISTATS 2020).

- ◇ Propose a new biased policy gradient estimator from REINFORCE/GPOMDP and adopted SARAH estimators.
- ◇ Develop a new algorithm utilizing the new estimator which is the first algorithm that has convergence guarantee to solve a composite policy optimization problem in reinforcement learning.
- ◇ Prove that the proposed algorithm achieves the best-known convergence rate over existing methods and conduct experiments to verify the advantage using OpenAI gym environments.

### Hybrid Optimization Framework for Composite Nonconvex Optimization

Feb. 2019–Aug. 2019

Graduate Research Assistant, Supervisors: Dr. Quoc Tran-Dinh, Dr. Lam M. Nguyen.

Under review for *Mathematical Programming*, [preprint](#).

- ◇ Introduce a new stochastic gradient estimator that combines SGD and SARAH estimators and use it to develop a new algorithm for composite nonconvex optimization problems which achieves best-known convergence rate.
- ◇ Verify the effectiveness of the proposed algorithm via numerical experiments using Python and Tensorflow.

### ProxSARAH: A Framework for Stochastic Composite Nonconvex Optimization

Aug. 2018–Feb. 2019

Graduate Research Assistant, Supervisors: Dr. Quoc Tran-Dinh, Dr. Lam M. Nguyen.

Accepted with minor revision for *Journal of Machine Learning Research (JMLR)*, [preprint](#).

- ◇ Develop a new stochastic algorithm that solves composite nonconvex optimization problems which utilizes existing SARAH estimator and achieve the best-known convergence rate.
- ◇ Conduct numerical experiments to illustrate the advantage of the proposed algorithms on three examples: Non-negative PCA, classification with 3 nonconvex losses, and neural network training using Python and Tensorflow.

### Autonomous Robots for Bridge Inspection

Aug. 2015–Feb. 2017

Graduate Research Assistant, Supervisor: Dr. Hung M. La.

In *Proceedings of the 54th Annual Allerton Conference on Communication, Control, and Computing*, [preprint](#).

In *Proceedings of the 2017 IEEE International Conference on Robotics and Automation (ICRA)*, [preprint](#).

The 33rd International Symposium on Automation and Robotics in Construction and Mining (ISARC), [preprint](#).

- ◇ Propose a four-wheeled robot for steel bridge inspection with permanent magnets embedded inside each wheel equipped with different type of sensors: visual camera, 3D sensor, IMU for localization and mapping purposes.
- ◇ Build a controller unit with minicomputer (Intel NUC) running Robot Operating System communicating with a low-level controller (Arduino-based) for sensory data collection, implement sensor fusion and mapping algorithms.

## PREPRINTS

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1. Q. Tran-Dinh, **N. H. Pham**, D. T. Phan, and L. M. Nguyen. *A Hybrid Stochastic Optimization Framework for Composite Nonconvex Optimization*. arXiv:1907.03793, 2019. (Under review for Mathematical Programming)
2. **N. H. Pham**, L. M. Nguyen, D. T. Phan, and Q. Tran-Dinh. *ProxSARAH: An efficient algorithmic framework for stochastic composite nonconvex optimization*. arXiv:1902.05679, 2019. (Accepted with minor revision for Journal of Machine Learning Research)

## PUBLICATIONS

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1. **N. H. Pham**, L. M. Nguyen, P. H. Nguyen, M. van Dijk, and Q. Tran-Dinh. *A Hybrid Stochastic Policy Gradient Algorithm for Reinforcement Learning*. The 23rd International Conference on Artificial Intelligence and Statistics (AISTATS), 2020, Palermo, Italy.
2. H. M. La, T. H. Dinh, **N. H. Pham**, Q. P. Ha, and A. Q. Pham. *Automated robotic monitoring and inspection of steel structures and bridges*. Robotica, Cambridge University Press, 1-21, 2018.
3. T. D. Le, S. Gibb, **N. H. Pham**, H. M. La, L. Falk, and T. Berendsen. *Autonomous Robotic System using Non-Destructive Evaluation methods for Bridge Deck Inspection*. In Proceedings of the 2017 IEEE International Conference on Robotics and Automation (ICRA), May 29-June 3, 2017, Singapore.
4. **N. H. Pham** and H. M. La. *Design and Implementation of an Autonomous Robot for Steel Bridge Inspection*. In Proceedings of the 54th Annual Allerton Conference on Communication, Control, and Computing, pages 1-8, Sept. 27-30, 2016, Urbana-Champaign, Illinois, USA.
5. **N. H. Pham**, H. M. La, Q. P. Ha, S. N. Dang, A. H. Vo, and Q. H. Dinh. *Visual and 3D Mapping for Steel Bridge Inspection Using a Climbing Robot*. The 33rd International Symposium on Automation and Robotics in Construction and Mining (ISARC), pages 1-8, July 18-21, 2016, Auburn, Alabama, USA.
6. T.-D. D. Phan, **N. H. Pham**, K.-N. Le-Huu, and A.-V. D. Dinh. *Quadrotor Helicopter: A Practical Design Approach*. IEICE International Conference on Integrated Circuits, Design and Verification, pp.156-163, 2013, Ho Chi Minh, Vietnam.

## SKILLS & QUALIFICATIONS

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<b>Technical</b>	Python, Tensorflow, Keras, Scikit-learn, C/C++, Matlab, Data Structures & Algorithms
<b>Other skills</b>	Linux Development Environment, Robotics, Embedded Systems

## OTHER EXPERIENCES

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<b>Graduate Teaching Assistant</b> STOR 155: Introduction to Data Models and Inference Department of Statistics and Operations Research · University of North Carolina at Chapel Hill	Spring 2020
<b>Graduate Teaching Fellow</b> STOR 113: Decision Models for Business and Economics Department of Statistics and Operations Research · University of North Carolina at Chapel Hill	Spring 2019–Summer 2019
<b>Graduate Teaching Assistant</b> STOR 113: Decision Models for Business and Economics STOR 155: Introduction to Data Models and Inference Department of Statistics and Operations Research · University of North Carolina at Chapel Hill	Fall 2017–Fall 2018
<b>Graduate Teaching Assistant</b> CPE 301: Embedded Systems Design CS 302: Data Structures Department of Computer Science and Engineering · University of Nevada, Reno	Fall 2015–Spring 2017
<b>Lab Assistant</b> Renesas SuperH Lab Department of Computer Science and Engineering · Ho Chi Minh City University of Technology	Jun. 2013–Apr. 2015
<b>Organizing Assistant</b> BKIT Car Rally Department of Computer Science and Engineering · Ho Chi Minh City University of Technology	2014

<b>Robot Control Software Developer</b> <i>BK4 aka BKIT Number One Team · Vietnam National Robot Contest</i> <i>Department of Computer Science and Engineering · Ho Chi Minh City University of Technology</i>	2013
<b>Embedded Software Developer</b> <i>ChipFC Team · Texas Instruments National MCU Design Contest—1st Place Winner</i>	2012

## HONORS & AWARDS

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<b>Graduate Access Grant</b>	Spring 2016–Spring 2017
<b>Regents’ Higher Education Opportunity Award</b> <i>University of Nevada, Reno · Reno, NV</i>	
<b>International Graduate Student Award</b>	Spring 2016–Spring 2017
<b>Regents’ Higher Education Opportunity Award</b> <i>University of Nevada, Reno · Reno, NV</i>	
<b>Poster Exhibition—1st Place Winner</b> <i>CSE Graduate Club—Department of Computer Science and Engineering</i> <i>University of Nevada, Reno · Reno, NV</i>	2016
<b>Outstanding Academic Student Scholarship</b> <i>Department of Computer Science and Engineering</i> <i>Ho Chi Minh City University of Technology · Ho Chi Minh City, Vietnam</i>	2008–2013