

## Phạm Quang Cường (Quang-Cuong PHAM)

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### PROFESSIONAL EXPERIENCE

- 2018 – *Founder & Director* · **Eureka Robotics Pte. Ltd.** · Singapore
- 2013 – **Nanyang Technological University** · Singapore  
2019 – Deputy Director, Robotics Research Centre  
2019 – Associate Professor, School of Mechanical and Aerospace Engineering  
2013 – 2018 Assistant Professor, School of Mechanical and Aerospace Engineering
- 2013 – 2018 *Scientific Advisor* · **Mujin Inc.** · Japan
- 2011 – 2013 *JSPS Postdoctoral Fellow* · **University of Tokyo** · Japan  
With Prof. Yoshihiko NAKAMURA (Nakamura-Takano Laboratory)
- 2010 *Visiting Researcher* · **University of São Paulo** · Brazil  
With Prof. Marcos DUARTE (Laboratório de Biofísica)
- 2005 *Intern* · **Massachusetts Institute of Technology** · USA  
With Prof. Jean-Jacques SLOTINE (Nonlinear Systems Laboratory)

### EDUCATION

- 2006 – 2009 *PhD* · **Université Paris VI and Collège de France** · France  
PhD in Neuroscience · Highest honors (Mention Très Honorable) · Thesis: *A study of human locomotor trajectories* · Director: Prof. Alain BERTHOZ (Laboratoire de Physiologie de la Perception et de l'Action)
- 2005 – 2006 *MS* · **École Normale Supérieure rue d'Ulm** · France  
MS in Theoretical Computer Science at MPRI (Master Parisien de Recherche en Informatique) · Highest honors (Mention Très Bien)
- 2003 – 2007 *Grande École* · **École Normale Supérieure rue d'Ulm** · France  
Élève at ENS Ulm, Departments of Computer Science and Cognitive Science

## TEACHING EXPERIENCE

- 2014 – Lecture of *Advanced Microprocessor Applications* (Master's Degree in Mechanical Engineering), NTU, Singapore
- 2013 – Lecture and tutorials of *Control Theory* and *Introduction to Electrical Circuits* (Bachelor Degree in Mechanical Engineering, Year 2 and Year 3), NTU, Singapore
- 2007 – 2010 Tutorials of *Introduction to Computer Programming, Internet tools, Programming project* (Bachelor Degree in Computer Science, Year 1 and Year 2), Université Paris VII, France

## RESEARCH GRANTS

- 2018 – 2022 NTU-HP Digital Manufacturing Corporate Lab · *Robotic part manipulation in powder bed* · Project PI · Project funding quantum : SGD 2.7M
- 2017 – 2019 Innovation Grant from Singapore MIT Alliance for Research and Technology (SMART) · *Robotic precision drilling system for unstructured environments* · Single PI · Funding quantum : SGD 250 K
- 2017 – 2018 GAP Fund from NTUitive · *Factory automation with contacts in unstructured environments* · Single PI · Funding quantum : SGD 250 K
- 2015 – 2018 Research Grant from Air Traffic Management Research Institute · *Optimization of air traffic flow via robot motion planning* · Single PI · Funding quantum : SGD 203 K
- 2014 – 2024 Building and Construction Programme from Singapore National Research Foundation · *Sensing, planning and control for additive construction robotics* · Project PI · Project funding quantum : SGD 1.8M
- 2014 – 2018 Industrial Grant from SLM Solutions · *Large-scale metal-based additive manufacturing* · Project PI · Project funding quantum : SGD 796 K
- 2014 – 2016 Tier 1 Grant from Singapore Ministry of Education · *Intelligent perception and dexterous manipulation for fine robotic assembly* · Single PI · Funding quantum : SGD 211 K
- 2013 – 2016 Start-up Grant from NTU · Single PI · Funding quantum : SGD 100 K

## OTHER INFORMATION

- Invited lectures* Plenary lecture at CLAWAR 2019, Kuala Lumpur, Malaysia · Plenary lecture at NLA 2018, Irkutsk, Russia
- Editorial activities* Senior Program Committee Member for IROS 2020 · Associate Editor for *IEEE Transactions on Robotics* 2017 – 2020 · Associate Editor for ICRA 2017, IROS 2015, 2016 · PC member for RSS 2017, 2018, WAFR 2016 · Reviewer for *International Journal of Robotics Research, IEEE Transactions on Robotics, IEEE Transactions on Automation Science and Engineering, IEEE Transactions on Automatic Control, IEEE Robotics and Automation Letters, ICRA, IROS, Humanoids, SIMPAR*, etc.
- Awards* IEEE N3XT Star Award (2019) · Second prize at the Airbus Shopfloor Challenge (2016) · Best paper award at the conference Robotics: Science and Systems (2012) · Regional prize at the French national competition for high school students in Physics (2001) · Fifth prize at the French national competition in Latin Prose (2000)
- Scholarships* Post-doctoral fellowship from the Japanese Society for the Promotion of Science (2011 – 2013) · PhD scholarship from the French Ministry of Higher Education and Research (2007 – 2010) · École Normale Supérieure scholarship (2003 – 2007)

Fluent in Vietnamese, French and English · Intermediate level in Japanese · Some knowledge of Portuguese (4 months stay in Brazil), German (7 years of study), Latin (5 years), ancient Greek (5 years) and Chinese (1 year)

## PUBLICATIONS

### Journal articles

- J1 H. Pham, Q.-C. Pham. Convex Controller Synthesis for robot contact. *IEEE Robotics and Automation Letters*, vol. 5, pp. 3330–3337, 2020
- J2 J.-H. Lim, Y. Weng, Q.-C. Pham. 3D printing of curved concrete surfaces using Adaptable Membrane Formwork. *Construction and Building Materials*, vol. 232, 2020
- J3 T. S. Lembono, F. Suárez-Ruiz, Q.-C. Pham. SCALAR: Simultaneous CALibration of 2D LAsER and Robot kinematic parameters using planarity and distance constraints. *IEEE Transactions on Automation Science and Engineering*, vol. 16, pp. 1971–1979, 2019
- J4 X. Zhang, Q.-C. Pham. Planning coordinated motions for tethered planar mobile robots. *Robotics and Autonomous Systems*, vol. 118, pp. 189–203, 2019
- J5 A. Bin Anwar, I. H. Ibrahim, Q.-C. Pham. Spatter transport by inert gas flow in Selective Laser Melting: A simulation study. *Powder Technology*, vol. 352, pp. 103–116, 2019
- J6 H. Nguyen, Q.-C. Pham. On the covariance of  $X$  in  $AX = XB$ . *IEEE Transactions on Robotics*, vol. 34, pp. 1651–1657, 2018
- J7 A. Singh, Q.-C. Pham. Reactive path coordination based on time-scaled collision cones. *Journal of Guidance, Control, and Dynamics*, vol. 41, pp. 2031–2038, 2018
- J8 X. Zhang, M. Li, J.-H. Lim, Y. Weng, D. Tay, H. Pham, Q.-C. Pham. Large-scale 3D printing by a team of mobile robots. *Automation in Construction*, vol. 95, pp. 98–106, 2018
- J9 P. Lertkultanon, Q.-C. Pham. A certified-complete bimanual manipulation planner. *IEEE Transactions on Automation Science and Engineering*, vol. 15, pp. 1355–1368, 2018
- J10 Q.-C. Pham, R. Madhavan, L. Righetti, W. Smart, and R. Chatila. The impact of robotics and automation on working conditions and employment. *IEEE Robotics and Automation Magazine*, vol. 25, pp. 126–128, 2018
- J11 H. Pham Q.-C. Pham. A new approach to Time-Optimal Path Parameterization based on Reachability Analysis. *IEEE Transactions on Robotics*, vol. 34, pp. 645–659, 2018
- J12 J.-H. Lim, P. Narayan, Q.-C. Pham. Improving flexural characteristics of 3D printed geopolymer composites with in-process steel cable reinforcement. *Construction & Building Materials*, vol. 178, pp. 32–41, 2018
- J13 A. Bin Anwar, Q.-C. Pham. Study of the spatter distribution on the powder bed during Selective Laser Melting. *Additive Manufacturing*, vol. 22, pp. 86–97, 2018
- J14 F. Suárez-Ruiz, X. Zhou, Q.-C. Pham. Can robots assemble an IKEA chair? *Science Robotics*, vol. 3, eaat6385, 2018
- J15 L. Righetti, Q.-C. Pham, R. Madhavan, R. Chatila. Lethal Autonomous Weapon Systems. *IEEE Robotics and Automation Magazine*, vol. 25, pp. 123–126, 2018
- J16 H. Pham, Q.-C. Pham. Robotic manipulation of a rotating chain. *IEEE Transactions on Robotics*, vol. 34, pp. 139–150, 2018
- J17 X. Zhou, P. Lertkultanon, Q.-C. Pham. Closed-chain manipulation of large objects by multi-arm robotic systems. *IEEE Robotics and Automation Letters*, vol. 2, pp. 1832–1839, 2017
- J18 C. Veras, Q.-C. Pham, G. Maus. The Silhouette Zoetrope: a new blend of motion, mirroring, depth, and size illusions. *i-Perception*, vol. 8, pp. 1–8, 2017
- J19 S. Caron, Q.-C. Pham, Y. Nakamura. ZMP support areas for multi-contact mobility under frictional constraints. *IEEE Transactions on Robotics*, vol. 33, pp. 67–80, 2017
- J20 Q.-C. Pham, S. Caron, P. Lertkultanon, Y. Nakamura. Admissible velocity propagation: beyond quasi-static path planning for high-dimensional robots. *International Journal of Robotics Research*, vol. 36, pp. 44–67, 2017
- J21 S. Caron, Q.-C. Pham, Y. Nakamura. Completeness of randomized kinodynamic planners with state-based steering. *Robotics and Autonomous Systems*, vol. 89, pp. 85–94, 2017

- J22 A. Bin Anwar, Q.-C. Pham. Selective Laser Melting of AlSi10Mg: Effects of scan direction, part placement and inert gas flow velocity on tensile strength. *Journal of Materials Processing Technology*, vol. 240, pp. 388–396, 2017
- J23 P. Lertkultanon, Q.-C. Pham. Time-optimal parabolic interpolation with velocity, acceleration, and minimum-switch-time constraints. *Advanced Robotics*, vol. 30, pp. 1095–1110, 2016
- J24 X. Yan, C.-C. Cheah, Q.-M. Ta, Q.-C. Pham. Stochastic dynamic trapping in robotic manipulation of micro-objects using optical tweezers. *IEEE Transactions on Robotics*, vol. 32, pp. 499–512, 2016
- J25 H. Nguyen, Q.-C. Pham. Time-optimal path parameterization of rigid-body motions: applications to spacecraft reorientation. *Journal of Guidance, Control, and Dynamics*, vol. 39, pp. 1665–1669, 2016
- J26 P. Lertkultanon, Q.-C. Pham. A single-query manipulation planner. *IEEE Robotics and Automation Letters*, vol. 1, pp. 198–205, 2016
- J27 H. Hicheur, C. Boujon, C. Wong, Q.-C. Pham, J.-M. Annoni, T. Bihl. Planning of spatially-oriented locomotion after focal brain damage in humans: a pilot study. *Behavioural Brain Research*, vol. 301, pp. 33–42, 2016
- J28 Q.-C. Pham, O. Stasse. Time-optimal path parameterization for redundantly-actuated robots: a numerical integration approach. *IEEE/ASME Transactions on Mechatronics*, vol. 20, pp. 3257–3263, 2015
- J29 Q.-C. Pham, Y. Nakamura. A new trajectory deformation algorithm based on affine transformations. *IEEE Transactions on Robotics*, vol. 31, pp. 1054–1063, 2015
- J30 Q.-C. Pham, M. T. de Mello, C. Teixeira, F. Narciso, L. Antonietti, M. Neto, R. Koyama, S. Garbuio, S. Fernandes Jr, M. Duarte, S. Tufik. Robust evaluation of time-since-awakening using force platform posturography. *Revista Brasileira de Engenharia Biomédica*, vol. 30, no. 4, pp. 1–9, 2014
- J31 Q.-C. Pham. A general, fast, and robust implementation of the time-optimal path parameterization algorithm. *IEEE Transactions on Robotics*, vol. 30, pp. 1533–1540, 2014
- J32 Q.-C. Pham, A. Berthoz, H. Hicheur. Invariance of locomotor trajectories across visual and gait direction conditions. *Experimental Brain Research*, vol. 210, pp. 207–215, 2011
- J33 N. Tabareau, J.-J. Slotine, Q.-C. Pham. How synchronization protects from noise. *PLoS Computational Biology*, vol. 6, e1000637, 2010
- J34 Q.-C. Pham, H. Hicheur. On the open-loop and feedback processes that underlie the formation of trajectories during visual and nonvisual locomotion in humans. *Journal of Neurophysiology*, vol. 102, pp. 2800–2815, 2009
- J35 Q.-C. Pham, N. Tabareau, J.-J. Slotine. A contraction theory approach to stochastic incremental stability. *IEEE Transactions on Automatic Control*, vol. 54, pp. 816–820, 2009
- J36 B. Girard, N. Tabareau, Q.-C. Pham, A. Berthoz, J.-J. Slotine. Where neuroscience and dynamic system theory meet autonomous robotics: a contracting basal ganglia model for action selection. *Neural Networks*, vol. 21, pp. 628–641, 2008
- J37 Q.-C. Pham, H. Hicheur, G. Arechavaleta, J.-P. Laumond, A. Berthoz. The formation of trajectories during goal-oriented locomotion in humans. II. A maximum smoothness model. *European Journal of Neuroscience*, vol. 26, pp. 2391–2403, 2007
- J38 H. Hicheur, Q.-C. Pham, G. Arechavaleta, J.-P. Laumond, A. Berthoz. The formation of trajectories during goal-oriented locomotion in humans. I. A stereotyped behavior. *European Journal Neuroscience*, vol. 26, pp. 2376–2390, 2007
- J39 Q.-C. Pham, J.-J. Slotine. Stable concurrent synchronization in dynamic system networks. *Neural Networks*, vol. 20, pp. 62–77, 2007

*Book chapter*

- B1 Q.-C. Pham. Trajectory planning. In A. Nee, (Ed.) *Handbook of Manufacturing Engineering and Technology: Robotics and Automation*, Springer, 2014

*Refereed conference articles*

- C1 H. Nguyen, N. Adrian, J. X. Y. Lim, J. Salfity, W. Allen, Q.-C. Pham. Development of a robotic system for automated decaking of 3D-printed parts. *IEEE International Conference on Robotics and Automation (ICRA)*, Paris, France, 2020

- C2 C. Yu, Z. Cai, H. Pham, Q.-C. Pham. Siamese CNN for sub-millimeter-accurate Visual Servoing. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Macau, China, 2019
- C3 E. Tiryaki, X. Zhang, Q.-C. Pham. Printing-while-moving: a new paradigm for large-scale robotic 3D Printing. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Macau, China, 2019
- C4 H. Pham, Q.-C. Pham. Critically fast pick-and-place with suction cups. *IEEE International Conference on Robotics and Automation (ICRA)* Montreal, Canada, 2019
- C5 T. S. Lembono, F. Suárez-Ruiz, Q.-C. Pham. SCALAR – Simultaneous Calibration of 2D Laser and Robot’s kinematic parameters using three planar constraints. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Madrid, Spain, 2018
- C6 F. Suárez-Ruiz, T. S. Lembono, Q.-C. Pham. RoboTSP – A fast solution to the Robotic Task Sequencing Problem. *IEEE International Conference on Robotics and Automation (ICRA)*, Brisbane, Australia, 2018
- C7 H. Pham, Q.-C. Pham. Time-optimal path tracking: Online Scaling with guarantees. *IEEE International Conference on Robotics and Automation (ICRA)*, Brisbane, Australia, 2018
- C8 P. Lertkultanon, J. Yang, H. Pham, Q.-C. Pham. Departure and conflict management in multi-robot path coordination. *IEEE International Conference on Robotics and Automation (ICRA)*, Brisbane, Australia, 2018
- C9 S. Caron, Q.-C. Pham. When to make a step? Tackling the timing problem in multi-contact locomotion by TOPP-MPC. *IEEE-RAS International Conference on Humanoid Robots (Humanoids)*, Birmingham, UK, 2017
- C10 H. Pham, Q.-C. Pham. On the structure of the time-optimal path parameterization problem with third-order constraints. *IEEE International Conference on Robotics and Automation (ICRA)*, Singapore, 2017
- C11 F. Suárez, Q.-C. Pham. A framework for fine robotic assembly. *IEEE International Conference on Robotics and Automation (ICRA)*, Stockholm, Sweden, 2016
- C12 S. Caron, Q.-C. Pham, Y. Nakamura. Leveraging cone double description for multi-contact stability of humanoids with applications to statics and dynamics. *Robotics: Science and Systems (RSS)*, Rome, Italy, 2015
- C13 S. Caron, Q.-C. Pham, Y. Nakamura. Stability of surface contacts for humanoid robots: closed-form formulae of the contact wrench cone for rectangular support areas. *IEEE International Conference on Robotics and Automation (ICRA)*, Seattle, USA, 2015
- C14 Y. Xiao, C.-C. Cheah, Q.-C. Pham, J.-J. Slotine. Robotic manipulation of micro/nanoparticles using optical tweezers with velocity constraints and stochastic perturbations. *IEEE International Conference on Robotics and Automation (ICRA)*, Seattle, USA, 2015
- C15 P. Lertkultanon, Q.-C. Pham. Dynamic non-prehensile object transportation. *International Conference on Control, Automation, Robotics and Vision (ICARCV)*, Singapore, 2014
- C16 S. Caron, Q.-C. Pham, Y. Nakamura. Completeness of randomized kinodynamic planners with state-based steering. *IEEE International Conference on Robotics and Automation (ICRA)*, Hong Kong, China, 2014
- C17 Q.-C. Pham. Characterizing and addressing dynamic singularities in the time-optimal path parameterization algorithm. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Tokyo, Japan, 2013
- C18 Q.-C. Pham, S. Caron, Y. Nakamura. Kinodynamic planning in the configuration space via Velocity Interval Propagation. *Robotics: Science and Systems (RSS)*, Berlin, Germany, 2013
- C19 Q.-C. Pham, Y. Nakamura. Time-optimal path parameterization for critically dynamic motions of humanoid robots. *IEEE-RAS International Conference on Humanoid Robots (Humanoids)*, Osaka, Japan, 2012
- C20 Q.-C. Pham. Planning manipulator trajectories under dynamics constraints using minimum-time shortcuts. *IFTOMM Asian Conference on Mechanism and Machine Science (Asian-MMS)*, Tokyo, Japan, 2012

- C21 Q.-C. Pham, K. Ayusawa, K. Kubota, Y. Nakamura. On the structural identifiability of joint parameters from motion capture data. *IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, Seoul, Korea, 2012
- C22 Q.-C. Pham, Y. Nakamura. Affine trajectory deformation for redundant manipulators. *Robotics: Science and Systems (RSS)*, Sydney, Australia, 2012 **[Best paper award]**
- C23 Q.-C. Pham, Y. Nakamura. Regularity properties and deformation of wheeled robots trajectories. *IEEE International Conference on Robotics and Automation (ICRA)*, St. Paul, USA, 2012
- C24 Q.-C. Pham. Fast trajectory correction for nonholonomic mobile robots using affine transformations. *Robotics: Science and Systems (RSS)*, Los Angeles, USA, 2011
- C25 Q.-C. Pham. Analysis of discrete and hybrid stochastic systems by nonlinear contraction theory. *International Conference on Control, Automation, Robotics and Vision (ICARCV)*, Hanoi, Vietnam, 2008
- C26 D. Coudert, S. Pérennes, Q.-C. Pham, J.-S. Sereni. Rerouting requests in WDM networks. *AlgoTel*, Giens, France, 2005

*Updated May 21, 2020*