Hai-Nguyen (Hann) Nguyen

Ph.D., Mechanical & Aerospace Engineering

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Summary

Demonstrated working history at top research institutions across France, UK, Korea. Strong research professional in robotics and autonomous systems with works published in top-tier journals and conferences, featured in media and demonstrated in public. First-hand experience in developing integrated hardware-software prototypes and industry-grade products within fast-paced Dev-Ops environments in Silicon Valley.

Education

Feb. 2018 **Ph.D. Mechanical & Aerospace Engineering**, *Seoul National University*, Korea
Thesis: Dynamics and Control of Quadrotor-based Aerial Manipulation Systems.
Advisor: Prof. Dongjun Lee, Department of Mechanical & Aerospace Engineering.
Committee: Prof. Frank C. Park (chair), Prof. Kyujin Cho, Prof. Hyosung Ahn, and Prof. Kyungsoo Kim.

Jul. 2008, Jan. 2011 **B.Eng. Mechatronics, M.Sc. Engineering Mechanics**, *Hanoi University of Science and Technology*, Vietnam
Topics: Symbolic models of multibody systems (B.Eng.) and a formalism for multibody systems using null-space of Jacobian matrix (M.Sc.). Advisor: Prof. Van-Phong Dinh.

Academic Experience

Oct. 2024 – now **Lecturer**, *RMIT University Vietnam*, Vietnam
Joined the Robotics and Mechatronics Engineering program in School of Science, Engineering and Technology.

Jan. 2024 – Aug. 2024 **Senior Researcher**, *Seoul National University*, Korea
Joined the Interactive & Networked Robotics Laboratory (INROL). Focus on planning and control for soft and aerial robotics [1, 2].

Jul. 2021 – Oct. 2023 **Contract Research Scientist**, *National Centre for Scientific Research (CNRS)*, France
Joined Robotics and InteractionS (RIS) group in LAAS-CNRS. Focus on the development of the foundations necessary to realize advanced aerial manipulation capability: integrated framework for autonomous sensor placement [4], aerial manipulator with shared compliance [5], aerial skeleton systems with joint locking [2].

Apr. 2018 – Apr. 2020 **Research Associate**, *Imperial College London*, UK
Worked in Aerial Robotics Laboratory (ARL), Department of Aeronautics.

- Developed an autonomous quadrotor system equipped with a winch-tethered magnet [2] that is capable of perching on and sliding along a vertical surface for inspection at close proximity. The first realization of a tethered quadrotor that can hover and perch vertically near infrastructure elements, enabling a variety of surface manipulation and repair tasks. Live demos at EMPA, Switzerland (NEST), at Imperial College, UK (ORCA), at Blyth, UK (ORE Catapult) and to many visitors to ARL during 2019-2020. Featured in media (Reuters TV, BBC, Energy Voice, CNBC, Insider UK).
- Developed planning and control algorithms [8] for an aerial grappling robot to perch on a variety of surfaces including tree branches and pipelines.

Sep. 2012 – Feb. 2018 **Graduate Researcher**, *Seoul National University*, Korea

Worked in Interactive & Networked Robotics Laboratory (INRoL).

- Developed a novel aerial platform (SmQ platform) [9, 12] to overcome the well-known under-actuation issues of multi-rotor drones in aerial operation/manipulation. Provided theoretical framework for its modeling and control, combining high-level Lyapunov control design (to achieve trajectory tracking) with low-level constrained optimization (to comply with physical constraints). Live demo to expert visits in robotics visiting INRoL during 2015-2018. Featured in media (IEEE Spectrum, Interesting Engineering).
- Designed a control framework [11, 13] to enable a quadrotor to operate a tool attached on it. Fully characterized the internal dynamics of the spatial quadrotor tool operation, which arises due to the under-actuation of the quadrotor.

Sep. 2009 – Aug. 2012 **Researcher**, *Vietnam Academy of Science and Technology*, Vietnam

Joined Department of Mechatronics, Institute of Mechanics in Sep. 2009 and became permanent researcher from Mar. 2010. Co-developed software and hardware for a 6-DOF manipulator prototype for welding.

Industry Experience

Mar. 2020 – May 2021 **Senior Robotic Engineer**, *Vimaan Robotics, Inc.*, CA, US (remote)

Joined Autonomous Navigation Team in Santa Clara, CA (joined remotely due to the COVID-19 and visa delay). Focus on developing sensor fusion, control and planning algorithms for indoor autonomous robots, ranging from autopilot to mission generation.

- Developing trajectory generation and motion control for a hybrid ducted-fan/multi-rotor drones.
- Developed a range-aid feature for vision/inertia based state estimation, implemented on ECL/PX4 firmware and verified with existing flight data.
- Designed and implemented a route optimization algorithm for multiple aerial vehicles with limited flight time.

Sep. 2019 – Dec. 2019 **Robotic Consultant**, *Imperial Consultants (ICON)*, UK

Working with Uniper Energy on digitalization. Demonstrate and case study the use of autonomous flying robots for routine inspection and monitoring tasks at the power plants.

Teaching Experience

May 2022 **Guest Lecturer**, *University of Twente*, Netherlands

(1) Control for UAVs (Spring 2022).

Mar. 2020 **Teaching Assistant**, *Business School, Imperial College London*, UK

(1) Imperial Leadership in a Technology Driven World Programme.

Mar. 2019 **Guest Lecturer**, *Imperial College London*, UK

(1) Aircraft Systems Engineering and Unmanned Vehicle Technologies (Spring 2019, Spring 2020).

Mar. 2019– May. 2019 **Coach, UK STEM Ambassador**, *Shepherds Bush Library*, UK

(1) Code club (Python).

Sep. 2013 – Jul. 2017 **Teaching Assistant**, *Seoul National University*, Korea

(1) Control System I (Spring 2015, Spring 2016, Spring 2017).
(2) Control System II (Fall 2013, Fall 2014, Fall 2016).
(3) Robot Mechanics (Spring 2014, Spring 2016).

Technical Experience

Coding C++/Python, Matlab/Maple, ROS/PX4, OpenCV/PCL, Git/Docker/Bash/SQL.

Robots Multi-rotor drones, Manipulators, Underwater robots, Haptic devices, Motion capture systems, ARM-based MCUs.

Sensors	Distance (TFmini, Terabee), Depth camera (Realsense, Terabee), Mono IMU-Camera.
Techniques	Nonlinear Control Theory, Motion planning, Constrained Optimization, State Estimation and Sensor Fusion, VIO/SLAM, RL/Optimal Control.

Media

2021	Imperial College London.
2020	Imperial College London, Telegraph.
2019	Reuters TV, BBC, Energy Voice, CNBC, Insider UK.
2018	Imperial College London, EMPA.
2017	Interesting Engineering, IEEE Spectrum.
2015	IEEE Spectrum.

Honors and Awards

2024	Best Unmanned Aerial Vehicles Paper Award-Finalist, IEEE International Conference on Robotics & Automation (ICRA).
2020	Best Paper Award, IROS Workshop on Perception, Planning and Mobility in Forestry Robotics (WPPMFR).
2018	Outstanding Contribution in Reviewing, Mechatronics Journal, Elsevier.
2017	Best Video Award, Korea Robotics Society Annual Conference.
2015	Travel Award, IEEE/RSJ International Conference on Intelligent Robots & Systems (IROS).
2013 – 2015	Lecture & Research Scholarship, Seoul National University.
2013	Global Scholarship, Seoul National University.
2012 – 2016	BK Scholarship, Brain Korea 21 & 21 Plus Program, Korea Government.
2010, 2011	Exceptional Researcher (Stakhanovite Appellation), Institute of Mechanics.
2003	Merit-based Scholarship, Hanoi University of Science and Technology.
2002	First Prize in Physics, Annual Excellent Student Competition, Haiphong City.
2001	Third Prize in Biology, Annual Excellent Student Competition, Haiphong City.

Invited Talks

Dec. 2022	**ICube - Université de Strasbourg**, France Empowering aerial robots with physical interaction capabilities.
Sep. 2022	**Fulbright University**, Vietnam Empowering flying vehicles with physical interaction capabilities: from Control and Design perspectives.
Dec. 2019	**Laboratory for Analysis and Architecture of Systems**, *CNRS*, France Dynamics and Controls of Aerial Robots for Physical Interaction.
Nov. 2018	**2030:A Martian Odyssey**, *Symposium for Extreme Habitats*, UK Aerial Robotics for Infrastructures.
Mar. 2018	**Dept. Applied Mechanics**, *HUST*, Vietnam Introduction of Aerial Manipulation Systems.
Jan. 2018	**Networked Robotic Systems Laboratory**, *NCKU*, Taiwan Aerial Robotic Systems for Physical Interaction.

Academic Services

Edited and reviewed more than **100 articles** since 2014.

Assoc. Editor — Ubiquitous Robots (2020, 2021),
IEEE International Conference on Robotics & Automation (2023, 2024, **2025**).

Section Chair — Robotics: Science and Systems (2019).

Review — IEEE Transactions on Robotics, IEEE/ASME Transactions on Mechatronics, IEEE Robotics and Automation Letters, Mechatronics, Nonlinear Dynamics, IEEE Transactions on Industrial Electronics.

IEEE International Conference on Robotics & Automation (2015-now),
IEEE/RSJ International Conference on Intelligent Robots & Systems (2014-now),
Robotics: Science and Systems (2023, 2024)

Research Funding

Jan. 2020 – Dec. 2020 — **Principal Investigator**, *ORCA Partnership Resource Fund, EPSRC (£164K)*, UK Mixed-Reality Enhanced Telepresence for Remote Inspection and Monitoring with Multiple Aerial Robots. (later tranfered to Co-PI before leaving Imperial)

Patents

[1] D. J. Lee, **H. Nguyen** and H. Lee, "Aerial robot system based on multi-rotor for mechanical tasks," *Korea Patent No. 10-1614620-0000*, 2016.

Publications

Detailed citation at Google Scholar Profile. Mentored-student authors are underlined. Latest rankings available in Sep. 2023.

[1] J. Heo, H. Choi, Yo. Lee, H. Kim, H. Ji, H. Park, Y. Lee, C. Jung, **H. Nguyen**, and D. J. Lee. Hand Tracking: Survey. *International Journal of Control, Automation and Systems (IJCAS)*, 2024. [**Q2, IF 2.964**]

[2] J. Choe, J. Lee, H. Yang, **H. Nguyen**†, and D. J. Lee†. Sequential Trajectory Optimization for Externally-Actuated Modular Manipulators with Joint Locking. *IEEE International Conference on Robotics and Automation (ICRA)*, 2024. († co-corresponding author, **Best UAV Award-Finalist**) [**Rank A***]

[3] F. Hauf, B. B. Kocer, A. Slatter, **H. Nguyen**, O. K. F. Pang, R. Clark, E. Johns, and M. Kovac. Learning Tethered Perching for Aerial Robots. *IEEE International Conference on Robotics and Automation (ICRA)*, 2023. [**Rank A***]

[4] B. Stephens*, **H. Nguyen***, S. Hamaza, and M. Kovac. An integrated framework for autonomous sensor placement with aerial robots. *IEEE/ASME Transactions on Mechatronics (TMech)*, 28(1):38-49, 2023. (* equal contribution) [**Q1, IF 5.867**]

[5] B. Stephens, L. Orr, B. B. Kocer, **H. Nguyen**, M. Kovac. An Aerial Parallel Manipulator with Shared Compliance. *IEEE Robotics and Automation Letters (RAL)*, 7(2):11902-11909, 2022. (with IROS presentation) [**Rank A, Q1, IF 4.321**]

[6] S. Hamaza, A. Farinha, **H. Nguyen**, and M. Kovac. Sensor Delivery in Forests with Aerial Robots: A New Paradigm to Environmental Monitoring. *IROS Workshop on Perception, Planning and Mobility in Forestry Robotics (WPPMFR)*, 2020. (**Best Paper Award**)

[7] D. Robb, M. Imtiaz Ahmad, C. Tiseo, S. Aracri, A. C. McConnell, V. Page, C. Dondrup, H. M. Taylor, P. Ardon, E. Pairet, L. J. Wilson, T. Semwal, **H. Nguyen**, H. Hastie, and K. Lohan. Robots in the danger zone: exploring public perception through engagement. *ACM/IEEE Int'l Conference on Human-Robot Interaction (HRI)*, 2020.

[8] **H. Nguyen***, R. Siddall*, B. Stephens, A. Navarro-Rubio, M. Kovac. A passively adaptive microspine grapple for robust, controllable perching. *IEEE International Conference on Soft Robotics (RoboSoft)*, 2019. (* equal contribution)

[9] **H. Nguyen**, S. Park, J. Park, and D. J. Lee. A novel robotic platform for aerial manipulation using quadrotors as rotating thrust generators. *IEEE Transactions on Robotics (T-RO)*, 34(2):353-369, 2018. **[Q1, IF 6.835]**

[10] J. Bak, **H. Nguyen**, S. Park, D. J. Lee, T. Seo, S. Jin, and J. Kim. Positioning control of an underwater robot with tilting thrusters via decomposition of thrust vector. *International Journal of Control, Automation and Systems (IJCAS)*, 15(5):2283-2291, 2017. **[Q2, IF 2.964]**

[11] **H. Nguyen**, C. Ha, and D. J. Lee. Mechanics, control and internal dynamics of quadrotor tool operation. *Automatica*, 61:289-301, 2015. **[Q1, IF 6.15]**

[12] **H. Nguyen**, S. Park, and D. J. Lee. Aerial tool operation system using quadrotors as rotating thrust generators. In *Proc. IEEE/RSJ Int'l Conference on Intelligent Robots & Systems (IROS)*, pp. 1285-1291, 2015. **[Rank A]**

[13] **H. Nguyen** and D. J. Lee. Hybrid force/motion control and internal dynamics of quadrotors for tool operation. In *Proc. IEEE/RSJ Int'l Conference on Intelligent Robots & Systems (IROS)*, pp. 3458-3464, 2013. **[Rank A]**

[14] V-P. Dinh and **H. Nguyen**. A new approach using null space of Jacobian matrix in simulation of multibody dynamics. *Studies in Applied Electromagnetics and Mechanics*, 37:44-58, 2012.

Presentations

[1] **H. Nguyen**. Gathering spatially and temporally spreading data with aerial robots. *Journée des Jeunes Chercheurs et Jeunes Chercheuses en Robotique (JJCR), and Journée GT2 UAV*, 2022.

[2] **H. Nguyen**, B. Stephens, P. Zheng, and M. Kovac. Vertical-surface Inspection with Flying Robots. *RSS Workshop on Aerial Interaction and Manipulation: Unsolved Challenges and Perspectives*, 2019. (poster)

[3] **H. Nguyen**, S. Park, J. Park, and D. J. Lee. Aerial manipulation using multiple quadrotors as rotating thrusters: experiment results. *Korea Robotics Society Annual Conference (KRoC)*, 2017. (**Best Video Award**)

[4] **H. Nguyen**, S. Park, J. Park, and D. J. Lee. Spherically-connected 3-quadrotor (S3Q) platform for aerial manipulation: experimental validation. *IEEE Int'l Conference on Control, Automation and Systems (ICCAS)*, 2016.

[5] J. Kim, **H. Nguyen**, and D. J. Lee. Preliminary Control Design on Spherically-Connected Multiple-Quadrotor Manipulator System. In *Proc. Int'l Conference on Ubiquitous Robots and Ambient Intelligence (URAI)*, pp. 206-207, 2015.

[6] **H. Nguyen**, S. Park, and D. J. Lee, Aerial manipulation using spherically-connected multiple-quadrotor tool system, *IEEE Int'l Conference on Robotics & Automation (ICRA)*, 2015. (Late Breaking Results Session)

[7] **H. Nguyen**, J. Kim, and D. J. Lee. Preliminary result on aerial tool operation using quadrotors as rotating thrust generators. *Int'l Symposium on Distributed Autonomous Robotic Systems (DARS)*, 2014. (poster)

[8] **H. Nguyen** and D. J. Lee. Coordinated rotation control of multiple rigid bodies in SO(3). In *Proc. IEEE Int'l Conference on Control, Automation and Systems (ICCAS)*, pp. 1671-1673, 2013.