

Hai-Nguyen Nguyen

Ph.D. Candidate, Mechanical Engineering

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Education

- Sep. 2012 – **Ph.D. Student**, *Seoul National University*, Korea.
present Topic: Design, Modeling and Control of Novel Aerial Manipulation Systems using Thrust Propelled Vehicles.
Advisor: Prof. Dongjun Lee, Department of Mechanical & Aerospace Engineering.
- Jun. 2008 & **B.Eng. Mechatronics & M.Sc. Engineering Mechanics**, *Hanoi University of Science and Technology*, Vietnam.
Dec. 2010

Academic Service

- Review IEEE Transactions on Robotics (2015, 2016, 2017), Mechatronics (2017), Nonlinear Dynamics (2017), Robotics and Automation Letters (2017)
IEEE International Conference on Robotics & Automation (2015, 2016, 2017)
IEEE/RSJ International Conference on Intelligent Robots & Systems (2014, 2016)

Skills

- Coding C++/Python, Matlab/Maple/Processing
- Robotics Quadrotors (AscTec, Pixhawk), Haptic devices (Phantom, Force Dimension), Motion capture systems (VICON, OptiTrack), MCUs (Arduino, Odroid), ROS

Publications

- [1] **Hai-Nguyen Nguyen**, Sangyul Park, Junyoung Park and Dongjun Lee, "A novel robotic platform for aerial manipulation using quadrotors as rotating thrust generators," *IEEE Transactions on Robotics (T-RO)*, 2017. (in revision)
- [2] Jeongae Bak, **Hai-Nguyen Nguyen**, Sangyul Park, Dongjun Lee, TaeWon Seo, Sangrok Jin, Jongwon Kim, "Positioning control of an underwater robot with tilting thrusters via decomposition of thrust vector," *International Journal of Control, Automation and Systems (IJCAS)*, 15(x), pp. 1-9, 2017.
- [3] **Hai-Nguyen Nguyen**, Chansu Ha and Dongjun Lee, "Mechanics, control and internal dynamics of quadrotor tool operation," *Automatica*, 61, pp. 289-301, 2015. (regular paper)
- [4] **Hai-Nguyen Nguyen**, Sangyul Park and Dongjun Lee, "Aerial tool operation system using quadrotors as rotating thrust generators," in *IEEE/RSJ International Conference on Intelligent Robots & Systems (IROS)*, Hamburg, Germany, 2015. (featured in IEEE Spectrum)
- [5] **Hai-Nguyen Nguyen** and Dongjun Lee, "Hybrid force/motion control and internal dynamics of quadrotors for tool operation," in *IEEE/RSJ International Conference on Intelligent Robots & Systems (IROS)*, Tokyo, Japan, 2013.

- [6] **Hai-Nguyen Nguyen**, Sangyul Park, Junyoung Park and Dongjun Lee, "Aerial Manipulation using Multiple Quadrotors as Rotating Thrusters: Experiment Results," in *Korea Robotics Society Annual Conference (KRoC)*, Gangwon, Korea, 2017. (Best Video Award, featured in IEEE Spectrum, Interesting Engineering)
- [7] Juhyeok Kim, **Hai-Nguyen Nguyen** and Dongjun Lee, "Preliminary Control Design on Spherically-Connected Multiple-Quadrotor Manipulator System," in *International Conference on Ubiquitous Robots and Ambient Intelligence (URAI)*, Goyang, Korea, 2015.
- [8] Sangyul Park, **Hai-Nguyen Nguyen** and Dongjun Lee, "Modeling and control of a spherically-connected multi-quadrotor tool system," in *ICROS Annual Conference*, Daejeon, Korea, 2015.
- [9] **Hai-Nguyen Nguyen** and Dongjun Lee, "Coordinated rotation control of multiple rigid bodies in $SO(3)$," in *IEEE International Conference on Control, Automation and Systems (ICCAS)*, Gwangju, Korea, 2013.
- [10] Van-Phong Dinh and **Hai-Nguyen Nguyen**, "A new approach of using null space of Jacobian matrix in simulation of multibody dynamics", *Studies in Applied Electromagnetics and Mechanics*, 37, pp. 44–58, 2012.

Presentations

- [1] **Hai-Nguyen Nguyen**, Sangyul Park, Junyoung Park and Dongjun Lee, "Spherically-connected 3-quadrotor (S3Q) platform for aerial manipulation: experimental validation," in *IEEE International Conference on Control, Automation and Systems (ICCAS)*, Gyeongju, Korea, 2016. (poster section)
- [2] **Hai-Nguyen Nguyen**, Sangyul Park and Dongjun Lee, "Aerial manipulation using spherically-connected multiple-quadrotor tool system," in *IEEE International Conference on Robotics & Automation (ICRA)*, Seattle, WA, 2015. (poster section)
- [3] **Hai-Nguyen Nguyen**, Juhyeok Kim and Dongjun Lee, "Preliminary result on aerial tool operation using quadrotors as rotating thrust generators," in *International Symposium on Distributed Autonomous Robotic Systems (DARS)*, Daejeon, Korea, 2014. (poster section)

Patents

- [1] Dongjun Lee, **Hai-Nguyen Nguyen** and Hoyong Lee, "Aerial robot system based on multi-rotor for mechanical tasks," *Korea Patent No. 10-1614620-0000*, April 15, 2016.
- [2] Dongjun Lee, **Hai-Nguyen Nguyen** and Sangyul Park, "Multi-link type working apparatus moved by thrust generating device," *US Patent Application No. 14/923,442*, October 27, 2015.
- [3] Dongjun Lee, **Hai-Nguyen Nguyen** and Sangyul Park, "Multi-link type working apparatus moved by thrust generating device," *Korea Patent Application No. 10-2015-0024404*, February 17, 2015.

Honors and Awards

- 2017 Best Video Award, Korea Robotics Society Annual Conference
- 2015 Travel Award, IEEE/RSJ International Conference on Intelligent Robots & Systems
- 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 Award for Exceptional Researchers (Stakhanovite Appellation), Institute of Mechanics
- 2003 Merit-based Scholarship, Hanoi University of Science and Technology
- 2002 First Prize in Physics, Annual Excellent Student Contest, Haiphong City
- 2001 Third Prize in Biology, Annual Excellent Student Contest, Haiphong City

Media

- 2017 Interesting Engineering, IEEE Spectrum
- 2015 IEEE Spectrum

Research Experience

- Sep. 2012 – **Graduate Researcher**, *Seoul National University*, Korea.
 - present Working in Interactive & Networked Robotics Laboratory (INRoL).
 - Designed a coordinated control law for multiple bodies in SE(3) using passive decomposition (*ICCAS 2013*).
 - Developed a control framework for aerial tool operation using a simple rigid tool attached on a quadrotor (*IROS 2013, Automatica 2015*).
 - Developed a new aerial platform for aerial manipulation using multiple quadrotors as rotating thrust generators (*DARS 2014, ICRA 2015, IROS 2015, TRO 2017*).
 - Collaborated with Rodel Lab at SNU and developed a new control decode scheme for underwater robot with tilting thrusters (IJCAS 2017).
- Sep. 2009 – **Permanent Researcher**, *Vietnam Academy of Science and Technology*, Vietnam.
 - present Joined Department of Mechatronics, Institute of Mechanics in Sep. 2009 and became permanent researcher from Mar. 2010. Co-developed software for a prototype of welding robot. Developed a control law for the robot in the presence of singular configurations.
- Dec. 2007 – **Graduate Researcher**, *Hanoi University of Science and Technology*, Vietnam.
 - Aug. 2009 Studied at Department of Applied Mechanics. Studied multibody system formalisms. Developed an algorithm for generating symbolic models of tree-topology multibody systems. Developed a formalism for multibody systems using null-space of Jacobian matrix.

Teaching Experience

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