Moses C. **Nah**

Robotics, Control Theory, and Motor Neuroscience

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Summary

I am a Postdoctoral Research Scientist at Honda Research Institute USA, developing self-improving control algorithms for contact-rich manipulation. I earned my Ph.D. at MIT under Prof. Neville Hogan and worked closely with Prof. Jean-Jacques Slotine [T01] [ArX02], with research recognized by Best Paper Awards at IROS 2024 [C01] [HA01] and BioRob 2020 [C04] [HA04]. I also co-developed Explicit™ [C02], an open-source library leveraging Differential Geometry for rigid-body kinematics and dynamics, with Dr. Johannes Lachner. Prior to MIT, I graduated *Summa Cum Laude* from Seoul National University with a B.S. in Mechanical and Aerospace Engineering. I am also a Korean Physics Olympiad Gold Medalist [HA09] and a selected candidate for the International Physics Olympiad national team.

Selected Professional Experience

Honda Research Institute USA — *San Jose, CA, USA*

Postdoctoral Research Scientist: Robotics and Control Systems — *Aug. 2025 – Present*

- Division: Intelligent Robotics Research (IRR)
- Developing intelligent, self-improving control algorithms for contact-rich manipulation tasks

NAVER LABS Robotics Team — *Gyeonggi-do, S.Korea*

Robotics Research Intern — *Aug. 2016 – Feb. 2017*

- Supervisor: Dr. Sang-ok Seok
- Project 1: Development of a Wheel-Based Stair-Climbing Robot [C07]
- Project 2: Development of a Li-Ion Battery Pack PCB for Universal Use in NAVER LABS Robots [C06]

Selected Publications

Journal

[J01] Johannes Lachner, **Moses C. Nah**, Neville Hogan. *A Physically Consistent Stiffness Formulation for Contact-Rich Manipulation.* The International Journal of Robotics Research (IJRR). 2025

[J02] **Moses C. Nah**, Johannes Lachner, Neville Hogan. *Robot Control Based on Motor Primitives: A Comparison of Two Approaches.* The International Journal of Robotics Research (IJRR). 2024

Conference

[C01] **Moses C. Nah**, Johannes Lachner, Federico Tessari, Neville Hogan. *On the Modularity of Elementary Dynamic Actions.* International Conference on Intelligent Robots and Systems (IROS). 2024. **Best Conference Paper Award** [HA01]

[C02] Johannes Lachner*, **Moses C. Nah***, Stefano Stramigioli, Neville Hogan. *Exp[licit]: An Educational Robot Modeling Software Based on Exponential Maps.* International Conference on Advanced Intelligent Mechatronics (AIM). 2024. ***Equal Contribution**.

[C03] **Moses C. Nah**, Aleksei Krotov, Marta Russo, Dagmar Sternad, Neville Hogan. *Manipulating a Whip in 3D via Dynamic Primitives.* International Conference on Intelligent Robots and Systems (IROS). 2021

[C04] Xiaofeng Xiong, **Moses C. Nah**, Aleksei Krotov, Dagmar Sternad. *Online Impedance Adaptation Facilitates Manipulating a Whip.* International Conference on Intelligent Robots and Systems (IROS). 2021

[C05] **Moses C. Nah**, Aleksei Krotov, Marta Russo, Dagmar Sternad, Neville Hogan. *Dynamic Primitives Facilitate Manipulating a Whip.* International Conference on Biomedical Robotics and Biomechatronics (BIOROB). 2020. **Best Student Paper Award** [HA04]

[C06] Dongil Choi, Minsu Kim, Hyeongkeun Kim, Choe Jonghun, **Moses C. Nah**. *Motion Planning of Autonomous Personal Transporter Using Model Predictive Control for Minimizing Non-Minimum Phase Behavior.* International Conference on Ubiquitous Robots (UR). 2018

[C07] Jonghun Choe*, Ukjin Kwon*, **Moses C. Nah***, Hyeongkeun Kim*. *Design Analysis of Tuskbot: Universal Stair-Climbing 4-Wheel Indoor Robot.* International Conference on Intelligent Robots and Systems (IROS). 2017. ***Equal Contribution**.

ArXiv

[ArX01] **Moses C. Nah**, Johannes Lachner, Neville Hogan. *Modular Robot Control with Motor Primitives.* 2025

[ArX02] **Moses C. Nah**, Johannes Lachner, Neville Hogan, Jean-Jacques Slotine. *Combining Movement Primitives with Contraction Theory.* 2025

[ArX03] Johannes Lachner, Federico Tessari, A. Michael West Jr., **Moses C. Nah**, Neville Hogan. *Divide et Impera: Decoding Impedance Strategies for Robotic Peg-in-Hole Assembly.* 2024

Education

Massachusetts Institute of Technology (MIT) — *Cambridge, MA, USA*

PH.D. IN MECHANICAL ENGINEERING — *May 2020 – Dec. 2024*

- Advisor: Prof. Neville Hogan
- Thesis: *Modular Robot Control with Motor Primitives* (Defense: Oct. 29, 2024)
- Committee: Prof. Jean-Jacques Slotine, Prof. Alberto Rodriguez
- Major: System Dynamics and Control
- Minor: Information Theory and Machine Learning

Massachusetts Institute of Technology (MIT) — *Cambridge, MA, USA*

M.S. IN MECHANICAL ENGINEERING — *Sept. 2018 – May 2020*

- Advisor: Prof. Neville Hogan
- Thesis: *Dynamic Primitives Facilitate Manipulating a Whip*
- Qualifying Exam Subjects: Dynamics, Control, Stochastic Systems

Seoul National University (SNU) — *Seoul, South Korea*

B.S. IN MECHANICAL AND AEROSPACE ENGINEERING — *Mar. 2011 – Sept. 2018*

- Summa Cum Laude
- Leave of Absence for Military Service (2 years)

Selected Honors & Awards

2024 **[HA01] Best Conference Paper Award**, IEEE/RSJ IROS ($2,000)
2024 **[HA02] Sontheimer Travel Award**, Massachusetts Institute of Technology ($1,500)
2023 **[HA03] MathWorks Fellowship**, Massachusetts Institute of Technology
2020 **[HA04] Best Student Paper Award**, IEEE BIOROB
2017 **[HA05] Young Talent Support Fellowship**, NAVER LABS
2017 **[HA06] Gwanak Fellowship**, Hanil Corporation
2013 **[HA07] Grand Prize**, SNU Design, Manufacturing Process, and Laboratory Contest
2011 **[HA08] First Runner-Up**, SNU Creative Engineering and Design Contest
2009 **[HA09] Gold Medalist**, 12th Korea Physics Olympiad (KPhO), High School Division

Teaching Experience

Teaching Assistant (MIT)

Spring 2025 **[T01] 2.152 Nonlinear Control**, Prof. Jean-Jacques Slotine (Rating: 7.0/7.0, Median)
Fall 2024 **[T02] 2.151 Advanced System Dynamics and Control**, Prof. Neville Hogan (Rating: 6.9/7.0)
Fall 2022 **[T03] 2.032 Dynamics**, Prof. Triantaphyllos Akylas (Rating: 6.8/7.0)
Fall 2021 **[T04] 2.151 Advanced System Dynamics and Control**, Prof. Neville Hogan (Rating: 6.8/7.0)

Presentations and Invited Talks

2025 **[P01] Harvard NSF Workshop on Reinforcement Learning**
2025 **[P02] North Carolina State University**, Topic: Modular Robot Control with Motor Primitives
2023 **[P03] IROS**, Workshop on Leveraging Models for Contact-Rich Manipulation (*OpenReview*)
2022 **[P04] KUKA Robotics**, Topic: Robot Control Based on Motor Primitives (Virtual)
2021 **[P05] Robotics: Science and Systems (RSS)**, Workshop on Deformable Object Simulation (DO-Sim)
2020 **[P06] Neural Control of Movement (NCM)**, Blitz Talk (*Program*)
2019 **[P07] MIT Embodied Intelligence Research Mixer**
2017 **[P08] TEDxSNU**, Featured Speaker, Session: *People Who Make Something*

Skills

Robotics & Mechatronics	KUKA LBR iiwa, Franka Emika Panda, Allegro Hand, ROS 1/2, LabVIEW, KiCAD, SolidWorks
Simulation & Modeling	MuJoCo, MATLAB
Programming & Tools	C/C++, Java, Python, Docker, Bash, Git, LaTeX
Mathematics (Selected Topics)	Nonlinear Control Theory, Differential Geometry, Rigid Body Kinematics and Dynamics
Languages	Korean (Native), English (Full Professional Proficiency), Japanese (Elementary)