HAEDO CHO

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SUMMARY

PhD candidate in Electrical Engineering at Harvard (Slade Lab, SEAS), specializing in wearable robotics, human-centered AI, and biomechanics. Experienced in machine learning, embedded systems, and cloud data pipelines for health applications, with a focus on scalable assistive technologies and advancing real-world impact.

EDUCATION

Harvard University　　　　　　　　　　　　　　　　　　Sep. 2020 - Aug. 2026 (Anticipated)
Ph.D., in Electrical Engineering
Thesis Advisor: Professor Patrick Slade

Korea Advanced Institute of Science and Technology　　　　　　　　Sep. 2014 - Aug. 2016
M.S., in Mechanical Engineering
Thesis Advisor: Professor Jung Kim
Thesis: *Design of an optical soft sensor for measuring fingertip force and contact recognition*

Inha University, Incheon, Korea　　　　　　　　　　　　　　　　Mar. 2008 - Aug. 2014
B.S with Honors, *Summa Cum Laude*, Mechanical Engineering
Thesis Advisor: Professor Sang-kwon Lee

RESEARCH EXPERIENCE

Harvard University, Slade lab
Graduate researcher with Prof. Patrick Slade　　　　　　　　　　　　Jan. 2023 - current

- **Accurate estimation of real-world Energy expenditure using a smartphone in the pocket**
  - Developed a biomechanically inspired, data-driven model for estimating energy expenditure using smartphones.
  - Built a scalable pipeline for storing and processing smartphone data on an integrated Amazon Web Services (AWS) platform.
  - Designed and conducted Harvard IRB-approved human subjects studies focused on real-world physical activities.

Harvard University, Biodesign lab
Graduate researcher with Prof. Conor Walsh　　　　　　　　　　　　Sep. 2020 - Jun. 2022

- **IMU-based tracking system for strength training**
  - Developed a portable embedded Linux system with real-time wireless capabilities using Beaglebone hardware and related data pipeline code (C++).
  - Designed and executed Harvard IRB approved human subjects research (+25 subjects), with 12 weight training exercises for a classification model
  - Developed a multi-class exercise classification and motion trajectory estimation model using an LSTM network (with classification accuracy above 98%) trained on IMU data.
  - Mentored and trained a Harvard senior undergraduate student in signal processing, human subject research, and Harvard Research Funding Program (HCRP) application

Research Fellow with Prof. Conor. J. Walsh　　　　　　　　　　　　Jan. 2019 - Aug. 2020

- **Soft wearable robot for assisting the shoulder of industrial workers**
  - Developed a textile-based wearable pressure array for torque estimation and related digital capacitance readout circuits.

Korea Advanced Institute of Science and Technology (KAIST), Biorobotics lab
Graduate researcher with Prof. Jung Kim   Sep. 2014 - Aug. 2016

- **Skin-mountable stretch sensing via piezoresistive material based sensor and hysteresis compensation** [link]
  - Developed a skin-mountable soft stretch sensor using 3D printing technique.
  - Designed and conducted human subjects experiments (+3 subjects) to estimate multi-axis joint motion.

- **Cable-driven soft exo glove with optical soft sensor** [link]
  - Develoed a soft sensor for measuring fingertip force that is based on the optical sensing technique of light intensity modulation.
  - Incorporated the sensor into a soft cable-driven glove to augment human performance.

INDUSTRY EXPERIENCE

Wurq Inc.
Signal Processing Engineer (Part-time)   July 2022 – May 2023

- AI-powered fitness technology company
  - Developed and field-tested real-time fitness tracking algorithms for wearable hardware platforms.
  - Engineered and managed biometric data pipelines, leveraging large-scale datasets from wearable devices.
  - Built and deployed AI models for activity recognition and automated health monitoring.
  - Designed and implemented validation metrics for strength training, grounded in biomechanics and signal analysis.

Beflex Inc.
Senior Researcher   Sep. 2016 – Feb. 2018

- Biometric data-driven personal healthcare company
  - Designed and established an experimental test platform using motion capture systems to analyze biomechanical performance for personalized health metrics in runners.
  - Developed and tested a prototype with Raspberry Pi Zero microcontroller, optimizing embedded firmware and data processing algorithms for wearable devices.

PATENTS

WO2024151781A1, "Methods and systems for activity detection and quantification of movement kinematics", 18 July 2024.
Inventors: D. Popov, C.J. Walsh, D. Kim, **H. Cho**, F. Bertacchi.

PUBLICATION

Journal publications

[J6] **Haedo Cho**, Patrick Slade. A smartphone-based system for accurately estimating energy expenditure during real-world physical activity. *Nature Computational Science*, under review (2025).

[J5] Daekyum Kim, Yichu Jin*, **Haedo Cho***, Truman Jones, Yu Meng Zhou, Ameneh Fadaie, Dmitry Popov, Krithika Swaminathan, Conor J. Walsh. Learning-based 3D human kinematics estimation using behavioral constraints from activity classification. *Nature Communications*, 16(1), 2025.
*These authors contributed equally.

[J4] Zhou, Y.M., Hohimer, C.J., Young, H.T., McCann, C.M., Pont-Esteban, D., Civici, U.S., Jin, Y., Murphy, P., Wagner, D., Cole, T., Phipps, N., **Haedo Cho**, et al. A portable inflatable soft wearable robot to assist the shoulder during industrial work. *Science Robotics*, 9(91), 2024.

[J3] Hyosang Lee*, **Haedo Cho***, Sangjoon J. Kim, Yeongjin Kim, Jung Kim. Dispenser printing of piezo-resistive nanocomposite on woven elastic fabric and hysteresis compensation for skin-mountable stretch sensing. *Smart Materials and Structures*, 27, 2018.
*These authors contributed equally.

[J2] **Haedo Cho**, Hyosang Lee, Yeongjin Kim, Jung Kim. Design of an optical soft sensor for measuring fingertip force and contact recognition. *International Journal of Control, Automation and Systems*, 15(1), 16-24, 2017.

[J1] Hyosang Lee, Donguk Kwon, **Haedo Cho**, Inkyu Park, Jung Kim. Soft nanocomposite based multi-point, multi-directional strain mapping sensor using anisotropic electrical impedance tomography. *Scientific Reports*, 7:39837, 2017.

Conference & Talks

[C1] Hyosang Lee, **Jiseung Cho***, Jung Kim, Printable skin adhesive stretch sensor for measuring multi-axis human joint angles", *IEEE International Conference on Robotics and Automation (ICRA)*,4975 - 4980, 2016 (***This paper was published before I legally changed my name**)

[C2] Yichu Jin, Christina M. Glover, **Haedo Cho**, Oluwaseun A. Araromi, Moritz A. Graule, Na Li, Robert Wood, Conor J. Walsh, Soft Sensing Shirt for Shoulder Kinematics Estimation", *IEEE International Conference on Robotics and Automation (ICRA)*, 2020

[C3] **Haedo Cho**, Patrick Slade. A smartphone-based system for accurately estimating energy expenditure during real-world physical activity. *Poster presented at the American Society of Biomechanics (ASB 2024)*, Madison, WI, August 5–8, 2024.

TEACHING EXPERIENCE

Biomechanics of Movement and Assistive Robotics (Harvard BE124) Sep. 2024 - Dec. 2023
Teaching Fellow

- Undergraduate/Graduate-level, 4 credits, 30 students
- Lectured in lab sessions on Inverse Dynamics, consulted on students' final projects, and assisted students during office hours.

Data Science 2: Advanced topics in to Data Science (Harvard CS109B/AC209B) Jan. 2023 - May. 2023
Teaching Fellow

- Graduate-level, 4 credits, 180 students
- Lectured in lab sessions on Gap statistics, prepared lecture slides and problem sets, graded assignments and assisted students through office hours

Data Science 1: Introduction to Data Science (Harvard CS109A/AC209A) Sep. 2022 - Dec. 2022
Teaching Fellow

- Graduate-level, 4 credits, 303 students
- Lectured lab session, assisted mid-term final exams led office hours

Introduction to Robotics (Harvard ES159/259) Jul. 2022 - Dec. 2022
Teaching Fellow

- Undergraduate/Graduate-level, 4 credits, 11 students
- Developed course materials (lecture notes and assignments), graded assignments and assisted students through office hours

Technology Venture Immersion (Harvard MS/MBA program) Oct. 2021 - Jan. 2022
Teaching Fellow

- Developed course materials for an introduction to IoT-based embedded systems using Arduino
- Advised Harvard MBA students on human-centered design project development

MENTORING

Truman Jones — Harvard AB in Biomedical Engineering   Feb. 2022 – Aug. 2022

- Supervised an independent capstone project to fulfill engineering degree requirements.
- Guided student through multiple rounds of Harvard Research Funding Program (HCRP) applications.

Filippo Mariani — Visiting MSc student, Politecnico di Milano   Mar. 2025 – Sep. 2025

- Advised on master's thesis, focusing on signal processing and human subject experiments.

Mateo Amigoni — Visiting MSc student, Politecnico di Milano   Mar. 2025 – Sep. 2025

- Advised on master's thesis, focusing on signal processing and human subject experiments.

HONORS AND AWARDS

Dean's Competitive Fund for Promising Scholarship   Sep. 2023 - Aug. 2024
Harvard University

Korean Governmental Scholarship   Sep. 2014 - Aug. 2016
Ministry of Education, Science and Technology, Korea

Hanjin scholarship   Mar. 2013 - Aug. 2014
Inha University, Korea

Undergraduate Scholarship   Mar. 2008 - Aug. 2012
Inha University, Korea

LEADERSHIP & SOCIAL ACTIVITIES

Habitat for Humanity program   Jul. 2013 - Jul. 2013
Team Leader

- Worked on a Habitat construction site and joined the education program for local kids

Republic of Korea Marine Corps   Mar. 2009 - Jan. 2011
Platoon Leader

- Mandatory military service for 2 years

HARVARD/MIT COURSEWORK

Decision Theory
Data Science 1: Introduction to Data Sciences
Special Topics in Engineering and Sciences
Introduction to Probability
Data Science 2: Advanced Topics in Data Science
Analysis and Design of Feedback Control Systems (MIT 2.140)
Laboratory Electronics - Analog Circuits
ENG-SCI 297: Professional Writing for Scientists and Engineers

TECHNICAL SKILLS

Programming	Python, C/C++
Frameworks/Packages	Pytorch, Tensorflow, scikit-learn, Pandas, MATLAB, OpenSim
Motion Capture System	Qualisys, Cortex (Motion Analysis)
3D Modeling Tools	Solidworks, Fusion360
Graphic Tools & Others	Adobe Illustrator, Inkscape, MS Office, LaTeX, CorelDRAW

LANGUAGES

Korean *Native Speaker*
English *Fluent*

REFERENCES

Prof. Patrick Slade
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