Dongho Kang

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RESEARCH INTERESTS

My research aims to create legged robots that exhibit natural and animal-like behaviors. Thus, my research interests are broad ranging to legged locomotion control, character animation, and design optimization for robotics applications.

EDUCATION

ETH Zürich, Zurich, Switzerland

- Doctoral Student in Computer Science — Apr 2020 – Present
  - Main advisor: Prof. Dr. Stelian Coros
  - Second advisor: Prof. Dr. Marco Hutter
- M.Sc. ETH in Mechanical Engineering — Sep 2016 – Aug 2019
  - Advisor: Prof. Dr. Marco Hutter
  - Graduated with distiction

Seoul National University, Seoul, South Korea

- B.Sc. in Mechanical Engineering and B.Sc. in Computer Science — Mar 2009 – Aug 2016
  - Advisor: Prof. Dr. Dongjun Lee
  - Graduated with honor (Cum Laude)

RESEARCH EXPERIENCE

Computational Robotics Lab, ETH Zürich

- Scientific Assistant — Dec 2019 – Present
  - Supervisor: Prof. Dr. Stelian Coros
  - Control methods for animal-like motions of bio-inspired quadrupedal robots.

Robotic Systems Lab, ETH Zürich

- Master's Student — Sep 2017 – Nov 2019
  - Supervisors: David Höller, Dr. Jemin Hwangbo and Prof. Dr. Marco Hutter
  - Learning-based collision avoidance for legged robot.
  - Participated in the development of RaiSim: a physics engine for robotics and AI research.

Interactive & Networked Robotics Lab, Seoul National University

- Undergraduate Research Assistant — Sep 2014 – Jan 2016
  - Supervisors: Prof. Dr. Dongjun Lee
  - State estimation and control strategies for multi-robot cooperative systems

PROFESSIONAL AFFILIATIONS & ACTIVITIES

NVIDIA, Zurich, Switzerland

- Deep Learning Intern — Jun 2018 – Dec 2018
  - Projects: Deep learning-based super-resolution and anti-aliasing.

LeisureQ Inc., Seoul, South Korea

- Software Engineer Intern — Jan 2016 – Sep 2016
  - Projects: Backend web application for E-commerce website Gajago.

CNP Technology Inc., Seoul, South Korea

- Hardware and CAD Engineer — Dec 2011 – Mar 2014

PUBLICATIONS

JOURNALS

[1] Dongho Kang, Jin Cheng, Miguel Zamora, Fatemeh Zargarbashi, and Stelian Coros, "RL + Model-based Control: Using On-demand Optimal Control to Learn Versatile Legged Locomotion," in *IEEE Robotics and Automation Letters (RA-L)*, Oct 2023.

[2] Taerim Yoon, Dongho Kang, Seungmin Kim, Minsung Ahn, Stelian Coros, and Sungjoon Choi, "Spatio-Temporal Motion Retargeting," in *IEEE Transactions on Robotics (T-RO)*, 2024 (under review.)

CONFERENCES

[1] Dongho Kang, Flavio De Vincenti, Naomi C. Adam, and Stelian Coros, "Animal Motions on Legged Robots Using Nonlinear Model Predictive Control," in *International Conference on Intelligent Robots and Systems (IROS)*, Oct 2022.

[2] Dongho Kang, Simon Zimmermann, and Stelian Coros, "Animal Gaits on Quadrupedal Robots using Motion Matching and Model-Based Control," in *International Conference on Intelligent Robots and Systems (IROS)*, Sep 2021.

[3] Fatemeh Zargarbashi, Jin Cheng, Dongho Kang, Robert Sumner, and Stelian Coros, "RobotKeyframing: Learning Locomotion with High-Level Objectives via Mixture of Dense and Sparse Rewards," in *Conference on Robot Learning (CoRL)*, Nov 2024.

[4] Adrian Hartmann, Dongho Kang, Fatemeh Zargarbashi, Miguel Angel Zamora Mora, and Stelian Coros, "Deep Compliant Control for Legged Robots," in *International Conference on Robotics and Automation (ICRA)*, May 2024.

[5] Daniel Widmer, Dongho Kang (equal contribution), Bhavya Sukhija, Jonas Hübotter, Andreas Krause, and Stelian Coros, "Tuning Legged Locomotion Controllers via Safe Bayesian Optimization," in *Conference on Robot Learning (CoRL)*, Nov 2023.

[6] Flavio De Vincenti, Dongho Kang, and Stelian Coros, "Control-Aware Design Optimization for Bio-Inspired Quadruped Robots," in *International Conference on Intelligent Robots and Systems (IROS)*, Sep 2021.

[7] Changu Kim, Hyunsoo Yang, Dongho Kang and Dongjun Lee, "2-D Cooperative Localization with Omni-Directional Mobile Robots," in *International Conference on Ubiquitous Robots and Ambient Intelligence*, Oct 2015.

WORKSHOP

[1] Dongho Kang, Flavio De Vincenti, and Stelian Coros, "Nonlinear Model Predictive Control for Quadrupedal Locomotion Using Second-Order Sensitivity Analysis," in *ICRA 2022: 6th Full-Day Workshop on Legged Robots*, May 2022.

THESIS

[1] Dongho Kang, "End-to-End Collision Avoidance from Depth Input with Memory-based Deep RL," Master's thesis, the Department of Mechanical and Process Engineering, ETH Zürich, Aug 2019.

INVITED TALK

- **Computational Methods for Animal Motion Imitation** — Aug 2024
  Biomimetic Robotics Lab, Massachusetts Institute of Technology
  Cambridge, United States
- **Computational Robotics for Legged Locomotion Control and Co-design** — May 2024
  Speakers: Dongho Kang and Gabriele Fadini
  Johou Systems Kougaku Laboratory, University of Tokyo
  Tokyo, Japan
- **Computational Robotics for Legged and Construction Robotics** — May 2024
  Speakers: Yijiang Huang, Dongho Kang and Gabriele Fadini
  Suzumori Laboratory, Tokyo Institute of Technology
  Tokyo, Japan
- **Motion Capture-Driven Legged Locomotion Control** — Dec 2022
  Interactive and Networked Robotics Lab, Seoul National University,
  Seoul, South Korea

AWARDS & SCHOLARSHIPS

- Birkigt Scholarship, ETH Zürich — Feb 2018
  Stipendiary scholarship for international master student.
- Eminence Scholarship, Seoul National University — Aug 2014
  Full-tuition scholarship for one academic semester for outstanding academic performance.
- Development Fund Scholarship, Seoul National University — Feb 2010
  Full-tuition scholarship for one academic year for outstanding academic performance.

TEACHING EXPERIENCE

ETH Zürich, Zurich, Switzerland

- Teaching Assistant, Introduction to Machine Learning (F. Perez-Cruz, F. Yang) — Spring 2024
- Teaching Assistant, Computer Science (M. Fischer, F. Friedrich Wicker) — Autumn 2023
- Teaching Assistant, Digital Humans (S. Coros, Siyu Tang) — Spring 2023
- Teaching Assistant, Linear Algebra (Ö. Imamoglu, O. Sorkine-Hornung) — Autumn 2022
- Teaching Assistant, Computational Models of Motion (S. Coros, B. Thomaszewski) — 2021 – 2022
- Teaching Assistant, Visual Computing (S. Coros, M. Pollefeys) — 2020 – 2021

Seoul National University, Seoul, South Korea

- Mentor, SNU Samsung Convergence Software Course Program — 2015
- Teaching Assistant, MAE 446.204A: Dynamics — 2014
- Teaching Assistant, PA 034.013: Basic Physics 2 — Autumn 2011

TECHNICAL SKILLS

Programming and Software

C/C++, C#, Python, Matlab/Octave, Unix/Linux, Tensorflow, Pytorch, ROS, Open Dynamics Engine, Unity

Experience with Robots

UnitreeRobotics Aliengo, A1, Go1, Go2, ANYbotics ANYmal

SERVICES

Reviewer

RA-L, IROS, ICRA, RSS, Humanoids, BioRob, Eurographics

LANGUAGES

- Korean: Native language.
- English: Fluent.

REFERENCES

- **Prof. Dr. Stelian Coros**
  Associate Professor in the Department of Computer Science
  ETH Zürich
  Wasserwerkstrasse 12, 8092, Zurich, Switzerland
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- **Prof. Dr. Marco Hutter**
  Associate Professor in the Department of Mechanical and Process Engineering
  ETH Zürich
  Leonhardstrasse 21, 8092 Zurich, Switzerland
  mahutter@ethz.ch • +41 44 632 74 17
- **Prof. Dr. Jemin Hwangbo**
  Assistant Professor in the Department of Mechanical Engineering
  Korea Advanced Institute of Science and Technology
  291 Daehak-Ro, Yuseong-Gu, Daejeon, 34141, South Korea
  jhwangbo@kaist.ac.kr
- **Prof. Dr. Dongjun Lee**
  Professor in the Department of Mechanical Engineering
  Seoul National University
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