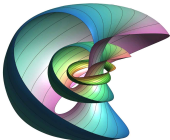
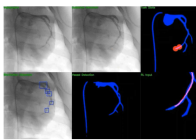
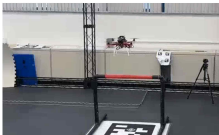
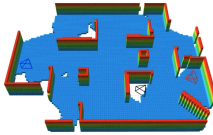

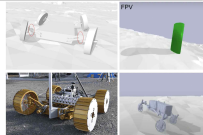


<div><div><div>CT</div><div>RL</div></div><div>KAIST EE</div><div>Ctrl Lab</div></div> <div>Control Laboratory</div>	■ Contact information		
	Professor	Email: <a href="mailto:dechang@kaist.ac.kr">dechang@kaist.ac.kr</a>	Tel: 042-350-7440
	Lab.	Room: 1110, N24	Tel: 042-350-7540
	Website	<a href="https://control.kaist.ac.kr">https://control.kaist.ac.kr</a>	
■ Current state of the Lab. (in 2025 Spring Semester)			
Postdoctoral Fellows : 0      PhD Students: 10      Master's Student: 12			
■ Research Areas			
■ Control theory and its application with AI			
<ul style="list-style-type: none"><li>• We develop novel control theories for efficient and robust control and implement them on real systems.</li><li>• We develop automatic control algorithms that combine image processing AI and reinforcement learning.</li><li>• We develop numerical integration algorithms to faithfully preserve the values of conserved quantities such as energy during numerical integration.</li></ul>			
		Drone control using $S^1$ fiber bundle	Automatic guidewire control using reinforcement learning
■ Autonomous flight drone			
<ul style="list-style-type: none"><li>• We take a new approach to autonomous flight by applying control theory, deep learning and reinforcement learning.</li><li>• We combine AI-based perception and motion planning using reinforcement learning to accomplish missions.</li><li>• We implement developed control algorithm on real drone.</li></ul>			
		Autonomous flight drone for perching	Reinforcement learning-based swarm drone exploration
■ Robotics with AI			
<ul style="list-style-type: none"><li>• We develop artificial intelligence technologies for various robotics fields.</li><li>• We develop a simulator for reinforcement learning as well as reinforcement learning algorithms for robust control.</li></ul>			
		State estimation and control for quadruped robots	Lunar rover simulator for reinforcement learning
■ Recommended courses & Career after graduation			
Research on control and robotics requires a strong background in mathematics, physics and computer science as well as electrical engineering. Recommended undergraduate courses are analysis, linear algebra, differential equations, optimization, signals and systems, feedback control, visions, and deep learning.			
▪ Graduates can work in academia, national labs or companies.			
■ Introduction to other activities besides research			
There are no other activities done laboratory-wide other than research.			
■ Introduction to the Lab.			
Prof. Chang is an expert in control, and robotics. He takes students from various fields including electrical engineering, mechanical engineering, aerospace engineering, brain science, computer science, and mathematics, thus creating a synergistic and multi-disciplinary research environment in the laboratory. Prospective students are not expected to have been exposed to all these areas. Only industriousness is required of them.			
■ Recent research achievements (2023-2025)			
* Huggingface LeRobot Worldwid Hackerton Third prize, 2025.			
[1] S. Shanbhag and D. E. Chang, "Machine learning based state observer for discrete time systems evolving on Lie groups," <i>Engineering Applications of Artificial Intelligence</i> , vol. 139, p. 109576, 2025.			
[2] S. Shanbhag and D. E. Chang, "Globally exponentially convergent observer for systems evolving on matrix Lie groups," <i>Mathematics and Computers in Simulation</i> , 2025.			
[3] H.-D. Jang, J.-H. Park, and D. E. Chang, "Particle Filter with Stable Embedding for State Estimation of the Rigid Body Attitude System on the Set of Unit Quaternions," in <i>2024 IEEE International Conference on Robotics and Automation (ICRA)</i> , 2024.			
[4] J.-H. Park, S. Yoo, and D. E. Chang, "A New Paradigm for Dealing With Manifold Structures in Visual Inertial Odometry by Using Stable Embedding," <i>IEEE Transactions on Control Systems Technology</i> , 2024.			
[5] D. E. Chang, "A New Bundle Picture for the Drone," <i>IEEE Transactions on Automatic Control</i> , 2023.			