DO-GON KIM

New York, NY | (646) 315-2260 | Email | Website | LinkedIn

EDUCATION

Columbia University Sep 2023 – May 2025
Master of Science, Mechanical Engineering, **GPA: 4.065**
Relevant Coursework: Intro to Robotics, Computational Aspects of Robotics, Applied Robotics, Robot Learning, Intro to Control Theory, Digital Manufacturing, Mechatronics and Embedded Systems, Data Science, MS Projects in MechE

New York University Sep 2020 – Jan 2023
Bachelor of Science, Mechanical Engineering, **GPA: 3.823**
Relevant Coursework: Robotic Manipulation and Locomotion, Robotic Vision
Honors & Awards: Tau Beta Pi, UGSRP, Founder's Day Award, Dr. Morris Young Outstanding Project Design Award

Research Interests

My past research can be categorized into three areas: **Finger Design integrated with Tactile Sensors**, **Signal Processing for Sensing**, and **Control Algorithm Development**. I have explored the design of systems that mimic the multiple sensory receptors of human touch. Moving forward, I aim to further explore the intersection of Robotics, Control systems, and Learning to create robots that can better understand and interact with their surrounding environment.

PUBLICATIONS

Peer-Reviewed Publications

[**U.1**] E. T. Chang*, P. Ballentine*, Z. He*, **D. Kim**, K. Jiang, H. Liang, J. Palacios, W. Wang, P. Piacenza, I. Kymissis, M. Ciocarlie, "SpikeATac: A Multimodal Tactile Finger with Taxelized Dynamic Sensing for Dexterous Manipulation," *Under Review*

[**C.1**] K. Zhang*, **D. Kim***, E. T. Chang*, H. Liang, Z. He, K. Lampo, P. Wu, I. Kymissis, M. Ciocarlie, "VibeCheck: Using Active Acoustic Tactile Sensing for Contact-Rich Manipulation," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2025*

Workshop Papers, Abstracts, and Posters

[**P.1**] E. T. Chang*, P. Ballentine*, Z. He*, **D. Kim**, K. Jiang, H. Liang, J. Palacios, W. Wang, P. Piacenza, I. Kymissis, M. Ciocarlie, "SpikeATac: A Multimodal Tactile Finger with Taxelized Dynamic Sensing for Dexterous Manipulation," *Northeast Robotics Colloquium (NERC) 2025, Cornell University*

RESEARCH EXPERIENCE

ROAM Lab, Columbia University May 2024 – Sep 2025
Graduate Researcher, advisor: Prof. Matei Ciocarlie

- *SpikeATac: A Multimodal Tactile Finger for Manipulation*
  - Developed a ROS 2 data pipeline integrating PVDF, capacitive, and accelerometer sensors with a linear probe for finger-poking experiments to collect synchronized multimodal data and characterize sensor sensitivity
  - Developed two real-time gripper stopping algorithms based on multimodal tactile sensing: a difference-based method using a 16-channel PVDF array, and a mean-difference threshold method using 7 capacitive sensors
  - Demonstrated stable grasping with a parallel gripper on deformable and fragile objects (egg, nori, raspberry, blueberry, strawberry, flower, origami cube), showcasing SpikeATac's capability for delicate manipulation
- *VibeCheck: Active Acoustic Sensing for Manipulation*
  - Designed and developed fingers with piezoelectric sensor to enable active acoustic sensing for manipulation, enabling material, internal structure, and object state classification, grasp point, and contact type estimation
  - Developed and optimized tactile sensing systems using piezoelectric sensors and signal processing techniques, including FFT analysis for feature extraction, laying the groundwork for object classification using MLP
  - Demonstrated a peg-in-hole insertion task using active acoustic sensing, achieving 90% success rates for in-distribution starting states and 50% for out-of-distribution using only acoustic tactile feedback

Nonlinear Control Group, Columbia University May 2025 – Sep 2025
Graduate Researcher, advisor: Prof. Homayoon Beigi

- Established a PD control framework in C++ within ROS 2 for developing learning-apdaptive controller
- Built a control system to execute simultaneous commands across multiple joints with real-time responsiveness

DitecT Lab, Columbia University Jan 2024 – Sep 2024
Graduate Researcher, advisor: Prof. Sharon Di

- Spearheaded the development of a simulation framework using ROS2 and PyBullet in AWS DeepRacer, enabling ML model testing without physical hardware and fostering a dynamic environment for autonomous vehicle research

- Developed visualization tools for LIDAR to detect obstacles around the autonomous vehicle
- Developed a real-time ArUco marker detection system with OpenCV, allowing for accurate determination of position, orientation, and speed of markers

Control/Robotics Research Lab, New York University Jun 2022 – Dec 2022
Undergraduate Research Assistant, advisor: Prof. Farshad Khorrami

- Researched and utilized ROS with Gmapping and AMCL algorithms to build and localize maps using sensors
- Enabled Turtlebot3 Burger to detect obstacles and navigate autonomously with LIDAR, encoder, and IMU
- Studied SLAM algorithms (RTAB-Map, ORB-SLAM) and analyzed mapping errors to minimize discrepancies

TEACHING EXPERIENCE

MECE E4601 Digital Control Systems, Columbia University Jan 2025 – May 2025
Teaching Assistant

- Assisted Professor Homayoon Beigi in lectures, homeworks, exams, projects, and weekly meetings

MECE E4602 Introduction to Robotics, Columbia University Sep 2024 – Dec 2024
Teaching Assistant

- Assisted Professor Sunil Agrawal in lectures, homeworks, exams, projects, and weekly meetings

EEME E6601 Introduction to Control Theory, Columbia University Sep 2023 – Dec 2023
Note Taker

- Assisted Professor Nicolas Chbat by providing detailed lecture notes through Columbia Disability Services

OUTREACH

Outreach and Engagement with Student Groups

- Guest speaker for the *Jeju Special Self-Governing Province Office of Education's "2025 Global University Exploration for High School Students."* Presented *VibeCheck* and *Spike-A-Tac* and mentored selected high school students from Jeju, Korea on research and study abroad pathways, July 2025
- Guest speaker for *Re'Generation Movement*, a non-profit organization empowering youth leadership. Introduced research projects and discussed the importance of being part of an encouraging community, July 2025

PROJECTS

Introduction to Robotics Project – *Cable Driven Parallel Robot* Sep 2023 – Dec 2023

- Developed an adaptive velocity controller for a 4-cable-driven parallel robot, enabling dynamic speed adjustments based on the different objects to enhance safe handling
- Optimized the cable-driven system design by reducing cables from 7 to 4 to simplify kinematic solutions and to minimize collision issues
- Built 3D simulations in MATLAB to demonstrate motion planning in industrial settings like distribution warehouses

Robotic Vision Project – *Sheet Music Sight-Reader* Feb 2022 – May 2022

- Created a Colab-based CV pipeline that takes in the image of a sheet of music and outputs a playable music file
- Trained a model to detect a position of each note in sheet music using the YOLO algorithm with 90% accuracy
- Utilized Canny Edge Detector to find five lines in sheet music and applied a vertical slice on across the five lines to calculate an accurate position of five lines

SKILLS

Programming Language: Python, C/C++, MATLAB, G-code, LaTex
Software/OS: SOLIDWORKS, Onshape, ROS 2, micro-ROS, Linux, Rviz, Gazebo Simulator, Pybullet, Simulink
Machining/Tools: 3D printing (FDM, SLA), Laser cutting, Soldering, Silicone molding, Vertical bandsaw