

# DO-GON KIM

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## EDUCATION

### Columbia University

Sep 2023 – May 2025

*Master of Science, Mechanical Engineering, GPA: 4.065*

Relevant Coursework: Intro to Robotics, Applied Robotics, Computational Aspects of Robotics, Robot Learning

### 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

## SKILLS

**Programming Language:** Python, MATLAB, C++

**Software/OS:** ANSYS Workbench, SOLIDWORKS, Onshape, Gazebo Simulator, Pybullet, ROS, Linux, Rviz, Simulink

**Machining/Tools:** Laser cutting, 3D printing, Grizzly G7943, Baileigh WBS-22 Bandsaw, Jet JSG-96 Benchtop Sander

## RESEARCH EXPERIENCE

### Graduate Researcher, *Columbia University Prof. Beigi's group*, New York, NY

May 2025 – Present

- *Learning-Adaptive Control for systems performing repetitive tasks*

### Graduate Researcher, *Columbia University ROAM Lab*, New York, NY

May 2024 – Present

- *VibeCheck: Active Acoustic Sensing for Manipulation*
  - Designed and developed fingers 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 a success rate of 70% using only acoustic tactile feedback
- *SpikeATac: Multimodal Tactile Fingers*
  - Developed a ROS2-based data pipeline that integrates PVDF, and capacitive sensors with a linear probe to collect synchronized multimodal data for sensor sensitivity experiments
  - Tuned velocity PI gains on DYNAMIXEL XM430-W210-T to minimize post-contact encoder error, achieving error below 10 counts with optimal settings
  - Implemented a real-time gripper stopping algorithm based on output from a 16-channel PVDF sensor, enhancing grasp stability on deformable and fragile objects through final contact position analysis.

### Graduate Researcher, *Columbia University DitecT Lab*, New York, NY

Jan 2024 – Sep 2024

- 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 effectively 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, which were integrated into dynamic vision-based applications

### Undergraduate Research Assistant, *NYU Control/Robotics Research Lab*, Brooklyn, NY

Jun 2022 – Dec 2022

- 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

### Graduate Teaching Assistant, *Columbia University*, New York, NY

Jan 2025 – May 2025

*MECE E4601 Digital Control Systems*

- Assisted Professor Hodayoon Beigi during lectures and weekly meetings
- Led final project proposal, guiding student teams through control-system design, methodology selection, and implementation strategies
- Held weekly office hours, teaching control theory concepts

### Graduate Teaching Assistant, *Columbia University*, New York, NY

Sep 2024 – Dec 2024

*MECE E4602 Introduction to Robotics*

- Assisted Professor Sunil Agrawal in lectures and weekly meetings
- Created homework and midterm problems on Kinematics, Jacobian, and Singularities
- Held weekly office hours, teaching class materials to help students better understand robotics concepts

## PUBLICATIONS

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

## PROJECTS

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### **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, which enhances precision in handling diverse materials
- Validated performance through MATLAB 3D simulations, demonstrating successful integration of inverse kinematics and adaptive velocity control for smooth, responsive motion
- Optimized the cable-driven system design by reducing cables from 7 to 4, simplifying kinematic solutions and minimizing collision issues, demonstrating the system's applicability 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