Jacob W. Lee

Hillsborough, NC
Mobile: 443.955.0015
jacob.w.lee@duke.edu

SUMMARY

Duke University undergraduate student (Class of 2026) and applicant for the 2025-2026 National Science Foundation Graduate Research Fellowship Program, applying to PhD programs in Mechanical Engineering and Robotics for Fall 2026. Areas of research include humanoid robotics and bipedal locomotion, with an interest in novel hardware design.

ACHEIVEMENTS/HONORS

- Robotics research paper acceptance: International Conference on Intelligent Robots and Systems (IROS 2025)
- Pratt Research Fellowship Program (Spring 2025 - Present)
- Phi Tau Sigma International Honor Society for Mechanical Engineering (Spring 2025)
- Teaching Assistant - Discrete Math for Computer Science (Spring 2024)
- Duke University General Robotics Laboratory – Student Researcher (September 2023 – Present)
- Duke University Dean's List with Distinction (achieved five of six semesters)
- FOCUS Program: interdisciplinary seminar on Global Energy (Fall 2022)

EDUCATION

BS, Mechanical Engineering & Computer Science (2022 - 2026)
Duke University Pratt School of Engineering, Durham, NC
GPA: 3.989

AA, Mathematics (2020 – 2022; degree conferred in 2024)
Howard Community College, Columbia, MD
Summa Cum Laude, GPA: 4.00
(Degree conferred following completion of a class at Duke)

DUKE UNIVERSITY COURSEWORK

Mechanical Engineering

- Classes completed: Sustainable Energy Engineering Design and Communication, Materials and Technology Energy Future, Engineering Innovation, **Mechanics of Solids**, Structures and Properties of Solids, **Dynamics**, **Electrical Fundamentals of Mechatronics**, **Control Systems**, Thermodynamics, Fluid Mechanics, **Mechanical Engineering Analysis for Design**
- Fall 2025 semester currently enrolled: Heat and Mass Transfer, **Mechanical Design**

Computer Science

- Classes completed: **Data Structures and Algorithms**, **Introduction to Computer Systems**, Introduction to Database Systems, Discrete Math for Computer Science, **Design and Analysis of Algorithms**, Programming Languages, **Computer Vision**
- Fall 2025 semester currently enrolled: Distributed Systems

RESEARCH EXPERIENCE

Duke General Robotics Lab (September 2023 – Present)

Pratt Research Fellow (January 2025 - Present)

- Work Arrangement: 15 – 20 hours weekly during semesters and full time during the summer
- Supervisors: **Dr. Boyuan Chen**, Dickinson Family Assistant Professor, Department of Mechanical Engineering & Material Science, Department of Electrical and Computer Engineering, Department of Computer Science, and Director of the General Robotics Laboratory; Dr. Boxi Xia, Postdoc Researcher
- Research Project: Duke Humanoid V2, planning to submit to *Science Robotics*
- Responsible for robot design, including mechanical, electrical and thermal constraints
  - Perform Finite Element Analysis (FEA) simulations for the robot in various load cases
  - Configure electronics layout
  - Review and iterate the designs of the arm and leg, utilizing Autodesk Fusion 360
- Additional Responsibilities
  - Make Unified Robot Description Format (URDF)
  - Assist with prototyping one leg jumping
  - Inverse Kinematics Code
  - Attend weekly lab meetings, presentations and paper reviews from PhD candidates

Student Researcher (September 2023 - December 2024)

- Work Arrangement: 15 – 20 hours weekly during semesters and full time during the summer
- Supervisors: Dr. Boyuan Chen, Dr. Boxi Xia
- Research Project: Co-Author of **The Duke Humanoid – Design and Control for Energy Efficient Bipedal Locomotion using Passive Dynamics** (Presented at IROS 2025 in Hangzhou, China)
- Responsible for the mechanical design of the robot leg
  - CAD using Autodesk Fusion 360
  - Making URDF
  - Design and manufacturing of parts using 3D Printing and CNC milling
  - Stress-Strain calculations and finite element analysis (FEA) to evaluate material selections
  - Communication of design outcomes during weekly meetings and Slack updates
- Additional Responsibilities
  - Assembly of the robot
  - Robot testing and dynamics matching to reduce sim-to-real gap
  - Writing, editing and reviewing of the research paper
  - Produce professional recording setups for video presentation
  - Attend weekly lab meetings, presentations and paper reviews from PhD candidates

Other Research Experiences

Rhodes Information Initiative at Duke University, Data+ (Summer 2023)

- Work Arrangement: full time summer research internship exploring new data-driven approaches to interdisciplinary challenges
- Supervisors: Dr. Norbert Wilson, Director of World Food Policy Center and Professor of Food, Economics and Community – Duke Divinity School; Dr. Boyla Mainsah, Assistant Research Professor, Electrical and Computer Engineering; Dr. Leslie Collins, Professor of Electrical and Computer Engineering
- Research Project: **A Textual Analysis of Economic Speeches on Agriculture 1919-2022**
- Responsible for Python programming, data preprocessing, topic modeling

- Partnered with a graduate student advisor and two undergraduate students
- Continued project research through the 2023 Fall semester, selected as primary student author

Howard Community College Independent Research (2021-2022)

- Work Arrangement: part time during semesters and summer, intern mentor program
- Supervisor: Dr. Fred Lang, Associate Professor and Chair of Mathematics
- Research Project: A Study of the Variability of LMC X-4 (binary star system)
- Responsible for MATLAB programming, data cleaning and analysis, meta-analysis, reading papers, weekly meetings and updates with Dr. Lang
- Research paper presented at the Howard Community College Honors Symposium and the Maryland Collegiate STEM Conference

NASA High School United to Create Hardware (HUNCH) Intern (2021-2022)

- Work Arrangement: classroom-based, teamed with two other students; year-long national competition
- Supervisor: Dr. Florence Gold, HUNCH Academy Project Manager and Regional Mentor; Raymond Gerstner, Project Lead the Way and Tech Education Instructor
- Research Project: Crystal NanoLab
- Responsible for brainstorming, prototyping, mechanical design, testing, presentations
- Accepted to 11th Annual International Space Station R&D Conference, NASA HUNCH Finalist

TECHNICAL SKILLS

Autodesk Fusion 360; SOLIDWORKS; Finite Element Analysis; Mechanical Design; URDF; Java; Python; MATLAB; SQL

OPERATIONAL SKILLS

Preparation and delivery of presentations to a variety of audiences; problem solving; process improvement; vendor sourcing and procurement; team dynamics; mentoring of students

INDUSTRY INTERNSHIP

- **Allen and Shariff Corporation**, Mechanical Designer Intern, Columbia, MD (Summer 2022)