

Gilbert Chang

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Education

Purdue University – West Lafayette, IN

May 2027

BS in Mechanical Engineering, Computer Science, Mathematics

GPA: 3.80/4.00

Relevant Coursework: Statics, Dynamics, Thermodynamics, Mechanics of Materials, Measurement and Control Systems II, Electrical Engineering Fundamentals II, Signals and Systems, Fluid Mechanics, Machine Design

Experience

Undergraduate Researcher — *Cai Group, Herrick Laboratories*

January 2025 – Present

- Conducting system identification on a dual psychrometric chamber system using MATLAB Control Systems Toolbox, convex optimization, and neural networks, analyzing lumped-element model error.
- Designing system identification and pole placement workflow to develop energy efficient heat pump controllers.

Undergraduate Researcher — *Computational Motion, Manipulation, and Autonomy Lab*

November 2024 – Present

- Engineered a soft robotic gripper using FinRay geometries for the Franka Research 3, integrating FEA to predict deformation under varied loads, focusing on adaptability and precision for manipulation tasks.
- Designing air-pressurized variants of soft end-effectors to enable tactile sensing, enhancing object interaction capabilities.

Undergraduate Researcher — *Purdue University Mechanical Engineering*

January 2024 – May 2024

- Leveraged DFM principles and composites expertise to redesign racing bicycle freehub components for forged carbon fiber manufacturing, achieving a 40% local weight reduction.
- Employed Fusion 360 generative design and Ansys Mechanical FEA to streamline bicycle frame weight while maintaining factors of safety satisfying ISO load standards.
- Investigated Kammtail virtual foils, additively manufacturing test cross sections and conducting wind tunnel tests, applying experimental results to refine aerodynamic performance of topologically optimized frames.

Projects

High Altitude Solid Rocket Motor

December 2024 – January 2025

- Designed a solid rocket motor of 44kNs and 210 Isp in Onshape, establishing streamlined parametric workflows, optimizing the nozzle in OpenMotor, and achieving 98% of the ideal thrust coefficient.
- Conducted FEA and hand-based calculated stress analyses on components, enforcing 3.5 FoS relative to expected loads.
- Led ignition electronics development in KiCAD, focusing on system integration and noise-resistant sensor calibration.
- Applied DFM principles to refine nozzle, bulkhead, and test stands, ensuring manufacturability on 5-axis CNC mills.

Baja SAE Composites Components

August 2023 – Present

- Engineered forged carbon fiber components using VARTM, optimizing mold designs on 3-axis CNC mills, and validating material properties through FEA and destructive testing.
- Authored literature reviews on fuzzy pressure control systems for composite layups, improving manufacturing consistency and strength-to-weight ratios while overseeing resin transfusion processes.
- Modeled aerodynamic features like nosecones and undertrays in SolidWorks, achieving a 10% drag reduction validated via Ansys Fluent CFD simulations.

Adaptive Robotic Gripper with Cable Actuation

May 2024 – August 2024

- Developed a kinematics-based analytical model to determine servo torque and force requirements for a robotic end effector, ensured optimal grasping performance and authoring a comprehensive report.
- Engineered a biologically inspired artificial muscle system using a cable-and-pulley mechanism, enabling 2 active degrees of freedom per joint across all fingers for dexterous manipulation.
- Integrated cable-driven actuation system with soft palm structure and ball-socket spines, added 10 DoF to the end effector and enhanced adaptability in grasping tasks.

Skills

Design & Analysis: Onshape, Siemens NX, SolidWorks, Autodesk Inventor, Ansys Mechanical, Ansys Fluent, KiCAD

Materials & Manufacturing: Composites (VARTM, forged), GD&T, DFM/DFA, Tolerance Stack-ups

Simulation & Control: FEA, CFD, MATLAB, Simulink, ROS2, Python, C, C++, Java, NumPy, Pandas, Matplotlib

Prototyping & Testing: 3D Printing, Laser Cutting, Vacuum Forming Manual & CNC Mills/Lathes, Bandsaws