

JUSTIN CHAE

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Professional Experience

LG Electronics

Jan 2025 – Present

Product Development Engineer

Alpharetta, GA

- Identified chassis design flaws in residential heat pump products by observing field installations; proposed 8 corrective actions including 20% larger service panel for tool access and perforated sheet metal flanges to enable field adjustment, with 5 actions incorporated into next production design
- Validated integration of 6 accessory components with commercial HVAC system using Siemens NX; identified mounting misalignments, bracket interferences, and inaccessible fasteners, then specified design revisions from contract manufacturers to ensure proper integration and serviceability
- Conducted competitor teardown and benchmarking during 3-month assignment at Asia R&D HQ; documented component design approaches—including chassis layouts, fastening hardware, and insulation configurations—to inform early-stage design decisions

Architected Materials and Additive Manufacturing Lab

Jun 2023 – Aug 2023

Mechanical Engineering Intern

Princeton, NJ

- Designed a coaxial printer nozzle in Fusion 360 to enable multi-material 3D printing, allowing simultaneous extrusion of core and shell materials to research failure mechanisms of architected samples
- Optimized nozzle for manufacturability (DFM) and assembly (DFA) through off-the-shelf and FDM-printed components, enabling a 5-part modular design with tool-free nozzle swaps in seconds
- Performed hand calculations to specify a load cell for a concrete 3D printer prone to tube cracking, evaluating motor torque, gearbox ratios, and tube failure load to ensure the 1000 lbf sensor provided feedback for extrusion rate control

Pensa Design

Sep 2022 – Dec 2022

Mechanical Engineering Intern

Brooklyn, NY

- Developed 4 powder dispenser prototypes in-house via 3D printing, laser cutting, and wire forming; resolved clumping and inconsistent dispensing in client's original design through an internal agitator wheel coupled with the drum dispensing mechanism, improving dispensing accuracy by 500%
- Conducted performance testing across 30+ trials per prototype with varying powder formulations and storage conditions; analyzed weight consistency and remaining powder to inform design iterations, reducing scrap rate by 50%

Projects

Haptic Feedback Focus Timer | *Fusion 360, Injection Molding, PCB Design, 3D Printing*

Nov 2025 – Present

- Designed a compact focus timer with selectable haptic, audio, and visual feedback modes for quiet environments; integrated LiPo battery and USB-C charging into a 3D-printed enclosure, enabling portable use in libraries and offices
- Developed custom PCB integrating ESP32, OLED display, ERM motor, and LiPo charging circuitry; optimized component selection and layout to minimize unique part count, ensure supply chain availability, and reduce BOM cost
- Designing injection-moldable housing with snap-fit assembly for manufacturability; planning mold flow and draft analyses to optimize gate location and validate production feasibility

Wheeled Bipedal Robot | *Fusion 360, Arduino, 3D Printing, Laser Cutting, Lathe*

Sep 2023 – May 2024

- Designed a modular wheeled biped robot as a solo senior thesis; integrated high-torque quasi-direct drive (QDD) actuators combining planetary gears and BLDC motors into custom drivetrain mounts and leg assemblies
- Implemented a motor control stack using ODrive FOC controllers, Teensy 4.1, and MPU6050 IMU; built a simplified two-wheeled test platform to safely tune PID gains and validate stability before scaling to the full 6-actuator system
- Executed the 9-month development cycle from system architecture through assembly; utilized partial test prints and cardboard mockups to validate spatial requirements and minimize fabrication waste

Skills

CAD: NX, Creo, Fusion 360, Onshape

Manufacturing Processes: CNC Machining, Lathe, 3D Printing, Laser Cutting, Sheet Metal, Injection Molding

Programming Languages: Python, Java, MATLAB, C, Arduino, G-code

Education

Princeton University

May 2024

Bachelor of Science in Mechanical and Aerospace Engineering

Princeton, NJ

Minors in Robotics and Computer Science