

# ALEC HUDSON

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## EDUCATION

**Auburn University, Samuel Ginn College of Engineering, Auburn, AL**

**Bachelor of Science Mechanical Engineering (BSME), Expected Graduation:**

**May 2027**

- GPA: 3.99 | Honors College | Dean's List
- Member: Tau Beta Pi National Engineering Honor Society
- Member: Pi Tau Sigma Mechanical Engineering National Honor Society
- Relevant Coursework – Kinematics and Dynamics, Thermodynamics I & II, System Dynamics and Controls, System Modeling & Vibration Analysis, Mechanics of Materials, Basic Composites, Mechanical Engineering Design, Computer Aided Engineering, Fluid Mechanics

**TECHNICAL SKILLS:** 3D Printing, CNC, Laser Cutter expertise, Arduino Microcontroller and IDE electronic programming and prototyping, Finite Element Analysis, Mechanical aptitude: design, manufacture & assembly, Strong analysis & calculation skills, Vibration Analysis and Stability Optimization, Financial Analysis

**SOFTWARE PROFICIENCY:** Advanced MATLAB/Simulink skills, SolidWorks/Fusion modeling/drawing Proficient, Python Basic, Excel & MS Project, Tableau Data Visualization, JIRA & Confluence proficient, Unreal Engine, Blender Modeling Expertise, G-code, Adobe Photoshop, Premiere, After Effects

**ADDITIONAL SKILLS:** ASTM-F24 2291 Familiarity, Project Management/Entrepreneur in high pressure environments, Conversant Chinese, Hands-on experience building, prototyping & testing mechanisms, machines & assemblies

## ENGINEERING WORK EXPERIENCE

**Walt Disney World Mechanical Engineering Intern: Textiles**

**January 2026 – June 2026**

- Secured competitive 6-month engineering internship supporting durability validation for high volume automated systems across all Walt Disney World
- Will ensure operational readiness of 3 million pounds of inventory per week with sub 24 hour turn around

**Auburn University, Tutor – System Dynamics and Controls**

**August 2025 – December 2025**

- Delivered group tutoring sessions for 30+ students in System Dynamics and Controls, enhancing understanding of dynamic system modeling, controllers, vibration and applied engineering applications
- Performed mechanical analysis and calculations in statics, dynamics, kinematics, and energy, providing clear and practical examples to help students master complex concepts
- Collaborated with professors to align tutoring sessions with weekly course topics, delivering targeted lessons to meet curriculum deadlines

**Auburn University, Design & Innovation Center**

**September 2023 – Present**

- Volunteering as a *Makerspace* Assistant 4 to 6 hours per week; demonstrate engineering equipment mastery to train and supervise students for project completion
- Facilitated interdisciplinary mechanical and electrical prototyping, 3D printing, and writing G-code for CNC Manufacturing enabling students to successfully fabricate high quality components for engineering projects

## WORK EXPERIENCE

**The Seal Team | Service Guys, Brentwood, TN, Founder**

**April 2015 – Present**

- Founded and led power washing, driveway repair, and sealing business; applied hands-on mechanical expertise to assemble, maintain, and troubleshoot equipment, building skills in mechanisms and machines
- Developed custom methodologies for product volume, pricing, same-day estimating to enhance operational efficiency
- Managed payroll, scheduling, and team for lawn care/maintenance of 24 residential properties; fostered project management, problem-solving applicable to engineering projects and multi-disciplinary teams
- Oversaw real-world applications of mechanical systems, including equipment testing and maintenance

## PROJECTS

### Autonomous Steering Controller for IndyCar Simulation

- Modeled vehicle steering dynamics using bicycle model in **MATLAB** simulating realistic behavior & predict lateral forces.
- Designed and implemented P, PI, and PID controllers, leveraging waypoints for precise trajectory tracking and reduced tracking error.
- Applied vibration analysis to optimize stability, fine-tuned controller parameters to minimize lateral deviations, enhancing overall vehicle stability and simulation accuracy by factor of 10.

### IV Bag with position control and Audible Alerts

- Designed and prototyped an automated lifting mechanism using an electric linear actuator to elevate IV bags, incorporating stability features, real-time height/position feedback, fluid level monitoring down to 0.1% accuracy, user-alert systems for enhanced safety and achieved 100% reliability
- Engineered an integrated control system with **Arduino Microcontroller** and **Arduino Motor Shield** in **Arduino IDE**, managing position control, audible alerts, motor actuation, and load cell-based mass measurement
- Established design specifications, operational theory, and project scope documentation to align with performance goals, budget limits, and end-user requirements
- Sourced and assembled off-the-shelf and **3D-printed** components to build a fully functional prototype, demonstrating skills in mechanical assembly, rapid prototyping, and system integration relevant to innovative engineering applications

### Precision-Machined Aluminum Flag Holder

- Conducted strength of materials analysis to ensure structural integrity under load including stress, strain and bending moment analysis.
- Optimized manufacturing process by altering machine speed and tooling based on material selection and design requirement specifications.
- Machined 6061 aluminum component via **CNC** milling and manual lathe, interpreting technical drawings to achieve exact specifications.
- Performed quality assurance using calipers and micrometers to confirm dimensional accuracy, surface finish, and compliance with standards.
- Applied meticulous attention to detail to maintain 0.1 mm tolerances under strict time constraints, ensuring a durable and high-quality product.

### Autonomous Stair-Climbing Robot

- Led a multidisciplinary team in designing and prototyping a self-navigating mechanical system for stairs and flat surfaces, incorporating mechanical assemblies, motor system, and power management.
- Created optimized **3D CAD Models** in **SolidWorks** to facilitate **CNC** and **Water-Jet** fabrication, ensuring efficient assembly and structural integrity to meet technical specifications.
- Directed manufacturing, assembly, and iterative testing, resulting in performance improvements and enhanced reliability through three design revisions that exceeded required performance by 900%.

## AWARDS AND ASSOCIATIONS

- Earned 2<sup>nd</sup> Place in Intro to Mechanical Engineering Design for Pneumatic Powered Vehicle (2023)
- Awarded Rookie of the Year for Auburn Marching Band Percussion (2023)
- Awarded Citizenship Leader Award JROTC Battalion, Ravenwood High School (2023)