TOBIAS S. MONTILLA

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EDUCATION

Washington University in St. Louis; Saint Louis, MO – B.S. Mechanical Engineering, Expected Graduation: Dec 2028

3.97 GPA | Minor in Aerospace Engineering and Latin American Studies

Activities: WashU Racing, McKelvey Fellowship, Society of Hispanic Professional Engineers, Boeing Mentorship Program

Coursework: Dynamics, Statics, Machine Shop Practicum, CAD, Differential Equations, Material Science, Matrix Algebra

Awards: Annika Rodriguez Scholar, McKelvey Fellow, Hispanic Scholarship Fund Scholar, Dean's List

EXPERIENCE

WashU Racing August 2025 - Present

Ergonomics and Braking Engineer

- Optimized head restraint geometry using CAD and FEA, improving structural strength by 20% under 500-newton loads.
- Iterated head restraint and pedal box designs based on driver feedback, refining fit and performance for vehicle integration.
- Standardized subsystem documentation and improved manufacturing repeatability by authoring SOPs and design cost reports, helping to achieve a first-place competition cost presentation.
- Onboarded new team members through SolidWorks training and knowledge transfer, accelerating their ramp-up on subsystem design and vehicle familiarity.

Society of Hispanic Professional Engineers at Washington University in St. Louis August 2025 - Present

Event Coordinator

- Led a 3-person committee to plan and execute 15 events for SHPE WashU, managing venue reservations and scheduling across general body meetings, social events, professional development workshops, and fundraisers for 70 members.
- Managed a $500 semester budget across all event types, prioritizing catering and supplies to maximize member engagement while staying within funding constraints.

McKelvey Fellowship September 2026 - Present

Undergraduate Fellow

- Selected as one of seven sophomore fellows from a pool of 100 applicants; completing a rigorous new member education process, including an air curtain project as an introduction to hands-on engineering design within the program.

PROJECTS

Pedal Box Rail Redesign – WashU Racing Summer 2026

- Pinpointed recurring fatigue failures at spring-weld attachment points and excessive rail deflection under load, tracing issues to the existing fastening method as root cause.
- Prototyped the revised rail and fastening geometry to verify sizing and strength, validating the design against yield strength through hand calculations to a safety factor of 40.
- Partnered with Carrlane, a local manufacturing sponsor, to source robust hardware that eliminated the spring failure risk identified in the original design.
- Implemented the prototype into the vehicle, eliminating recurring fatigue failures and cutting service time by 25%.

Hose Inlet Design – Personal Project Summer 2026

- Diagnosed water leakage in the existing hose inlet and identified excess, unoptimized material restricting performance.
- Redesigned the part in SolidWorks using parameterized dimensions to eliminate the leak and streamline the internal geometry, then 3D-printed the revised design in resin, reducing part weight by 15%.
- Validated the redesign via FEA flow simulation, confirming a 20% improvement in water flow while resolving leak and maintaining structural integrity.

TECHNICAL SKILLS

- **Software:** SolidWorks (CSWA Certification), FEA (stress analysis, load validation, thermal imaging), Java, Python, and Excel
- **Mechanical:** lathe/end-mill, 3D printing, vertical mill, HVAC, pneumatic, and internal combustion troubleshooting
- **Communication:** Spanish (fluent), English (Native)

INTERESTS

Soccer, Music, Thrifting/Flipping, Hiking, F1, Violin, Trying New Foods