Carter Tucker

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EDUCATION

Massachusetts Institute of Technology (MIT) – Cambridge, MA **Expected May 2028**
Bachelor of Science in Mechanical Engineering
GPA: 4.8/5.0
Relevant Coursework: Mechanics and Materials I/II, Dynamics and Control I, Design and Manufacturing I, Measurement and Instrumentation

PROJECTS & TECHNICAL EXPERIENCE

Ported Speaker Enclosure – Experimental Study **2025 – 2026**

- Designed and fabricated a ported speaker enclosure and designed an experimental setup to explore resonance-based low-frequency amplification and tuning
- Applied lumped-parameter and Helmholtz resonator theory to model low-frequency response and validate predictions against experimental data
- Processed frequency-response data with FFTs and Bode plots to identify the dependence of resonance modes and evaluate the effect of port diameter and length on low-frequency rolloff behavior
- Presented findings at a formal poster session, summarizing the dependence of response gain and uniformity on port diameter and length

MIT 2.007 Design Competition Robot – F1 Tire Change Robot **2026**

- Designed and fabricated a robot to remove/install a lugnut and disengage a tire from a model F1 car; parts manufactured from sheet metal (bandsaw, laser cut, bent, drilled) and custom 3D printed parts
- Designed a four-bar linkage and cams to counter-rotate flaps within a constrained envelope
- Utilized lug nut torque specifications to inform motor choice and overdrive gear ratio to minimize removal/install time

2007 Kawasaki Ninja – Restoration & Modification **2025 – Present**

- Rebuilding a sport bike with custom aerodynamic bodywork and modernized digital electronics
- Rebuilt and tuned dual carburetors to factory specifications
- Reverse-engineering OEM throttle linkage geometry to develop a direct electronic throttle-by-wire replacement and collect runtime data to inform engine tuning
- Performing CFD analysis in ANSYS Fluent to compare aerodynamic performance of custom fender geometries

Time-Series ML Model – Predictive Sports Analytics **January 2026**

- Built a Python-based machine learning model trained on 25,000+ time-series data points, applying Kalman filtering and time-weighted batch learning
- Implemented adaptive parameter updating across seasons to account for roster turnover and program changes
- Achieved 73%+ win/loss accuracy on tested 2024-25 season games

MITERS Keyholder **2025 – Present**

- Fabricate aluminum, acrylic, and steel components using manual mills, lathe, and band saw
- Assist with tooling setup, machine maintenance, shop clean-up, and prototyping and troubleshooting for member projects

OTHER EXPERIENCE

STEM Instructor & Assistant **July 2024 - Present**

- Tutor 75+ high school students at annual STEM summer camps
- Serve as a TA for Physics I, Physics II, and an Introduction to Making seminar, mentoring students in problem-solving and fabrication

TECHNICAL SKILLS

CAD & Simulation: SolidWorks, SolidWorks Simulation (FEA), ANSYS Fluent (CFD), MATLAB, Fusion360
Fabrication: Manual machining (mill, lathe), laser cutting, welding, 3D printing
Electronics: Circuit design, soldering, sensor integration, motor drivers
Programming: Python (pandas, NumPy, scikit-learn), Java, C++