SAMUEL MILHAVEN

Curriculum Vitae

15 Edgerly Rd, Apt 26, Boston, MA, 02115
samilhaven@gmail.com

ACADEMIC AND RESEARCH INTERESTS

I am broadly interested in autonomous vehicles/mobile robotics, terrain navigation, and control systems. I have conducted research into autonomous motorcycles navigating on uneven terrain, which culminated in physical prototypes that can be used to test safety systems for human riders.

EDUCATION

MS Robotics, Northeastern University 2026
BS Integrative Engineering: Robotics, Lafayette College 2024

RESEARCH EXPERIENCE

Silicon Synapse Lab Research Assistant 2024-2025
Northeastern University

Modeled and 3D printed mounting solutions for critical hardware and electronic systems for the Husky quadruped robot, including batteries, Nvidia Jetson, flight controller, and electronic speed controllers. Used SolidWorks to design and prototype a passive grasping foot for the Husky quadruped robot to traverse narrow paths.

Undergraduate Honors Thesis 2023-2024
Lafayette College

Designed, built, and demonstrated an electric motorcycle that used a biomimetic replication of rider-lean torque to maintain stability on uneven terrain. Conducted a literature review in preparation for a thesis paper, developed a model and LQR controller for the rider-lean pendulum, and conducted linear and Webots simulations to validate the controller and design parameters.

Dynamics, Robotics, & Intelligent Vehicles (DRIVe) Lab Research Assistant 2023-2024
Lafayette College

Designed, built, and demonstrated a driverless, self-stabilizing, electric mini-motorcycle to validate the dynamic accuracy of the Webots simulation software. Designed the steering motor mount for manufacturing, programmed the steering Arduino FSM, designed and soldered the steering interface circuit board, and designed and wired the 24V tractive system and 5V control system on the bike, including multiple safety-critical systems.

CONFERENCE PUBLICATIONS

S. Milhaven, W. Li, R. McClosky, and A. Brown. Simulating the Effects of a Virtual Motorcycle Passenger on Vehicle Motion and Rider Effort, IEEE Intelligent Vehicles Symposium, June 22-25, 2025

AWARDS AND HONORS

Undergraduate Honors in Engineering, Lafayette College 2024
Daniel O'Neil Award, Lafayette College Engineering 2023
Undergraduate honors thesis funding award

COURSE EXPERIENCE

ME 5245: Mechatronic Systems

Covers integration of electronic/electrical engineering, computer technology, and control engineering with mechanical engineering to provide a self-contained, modern treatment of mixed systems along with their computer simulation and applications. Topics include mixed-systems integration; sensors, actuation systems; brief overview of dynamic systems modeling, response characterization, and closed-loop controllers; interfacing; data presentation systems and processes; microprocessors; real-time monitoring and control; and applications of mechatronic systems. The course also offers numerous MATLAB/Simulink examples of select mechatronic systems and devices, along with open-ended design projects and assignments. (Northeastern MIE Courses)

EECE 5550: Mobile Robotics

Investigates the science and engineering of mobile robots. Topics may include kinematics, dynamics, numerical methods, state estimation, control, perception, localization and mapping, and motion planning for mobile robots. Emphasizes practical robot applications ranging from disaster response to healthcare to space exploration. (Northeastern University EECE Courses)

EECE 5554: Robotics Sensing and Navigation

Examines the actual sensors and mathematical techniques for robotic sensing and navigation with a focus on sensors such as cameras, sonars, and laser scanners. These are used in association with techniques and algorithms for dead reckoning and visual inertial odometry in conjunction with GPS and inertial measurement units. Covers Kalman filters and particle filters as applied to the SLAM problem. A large component of the class involves programming in both the ROS and LCM environments with real field robotics sensor data sets. Labs incorporate real field sensors and platforms. Culminates with both an individual design project and a team-based final project of considerable complexity. (Northeastern University EECE Courses)

ME 5250: Robot Mechanics and Control

Covers kinematics and dynamics of robot manipulators, including the development of kinematics equations of manipulators, the inverse kinematics problem, and motion trajectories. Employs Lagrangian mechanics to cover dynamics of manipulators for the purpose of control. Covers control and programming of robots, steady state errors, calculations of servoparameters, robot vision systems and algorithms, as well as imaging techniques and the concept of mobile robots. (Northeastern University ME Courses)

ME 5659: Control Systems Engineering

Covers concepts in design and control of dynamical systems. Topics include review of continuous-time system modeling and dynamic response; principles of feedback, classical and modern control analyses, and design techniques such as root locus, frequency response (e.g., Bode plots and Nyquist Criteria), and state-space feedback; dynamic analysis, design, and control of electromechanical systems; block diagram algebra or signal-flow graphs, effects of poles and zeros on system response characteristics; principles of controllability, observability, observer designs, and pole placement techniques; introduction to adaptive and learning control and digital implementation of control algorithms. (Northeastern University ME Courses)

ME 480: Control Systems and Mechatronics

A study of the basic principles and modes of operation of automatic control systems, including the concepts and design of feedback control systems. The effect of closed-loop classical control on the transient response, error, stability, and frequency response of dynamic systems is introduced, as well as digital control theory. Laboratory work includes the use of programmable logic controllers to implement Boolean logic and the analytical and experimental study of closed-loop control systems implemented using operational amplifiers, as well as DC motors, stepper motors, transistor-based motor drive circuits, and AC circuits. (Lafayette College ME 480)

ES 302: Robotics Systems and Design

A systems-focused treatment of robotics with applications varied in scope and scale from robotic arms to autonomous vehicles, developing analytical tools for the analysis and design of robotic systems. Robotic system design and analysis in the context of physical, ethical, and economic systems comprising its operating environments is also discussed. (Lafayette College ES 302)

PSYC 331: Human Factors and Engineering Psychology

An overview of the role of psychology in the design of the systems with which humans interact. Knowledge of the psychological capabilities, limitations, and preferences of humans can be used in design and practical applications to increase the efficiency, usability, and desirability of systems and decrease human errors, accidents, and annoyance. Hands-on practice with human factors methods. (Lafayette College PSYC 331)

ME 210: Manufacturing and Design

This course introduces techniques in computer-aided design (CAD) and manufacturing as applied to mechanical components and systems. Manufacturing processes, their underlying physical phenomena, and their relevance to mechanical design are studied. Laboratory work includes the drawing and construction of a pre-designed mechanical system using CAD, conventional fabrication techniques, and computer-aided manufacturing (CAM). All course topics are applied to the design, construction, and competition of a major group project. (Lafayette College ME 210)

PROFESSIONAL EXPERIENCE

Robotics R&D Intern 2025
HITT Contracting Inc.

Assisted in the advancement of the Virtual Superintendent project by designing and installing a custom payload for the SPOT robot, which included a 6-DOF arm that held a tablet and moved vertically to assist in telecommunication on-site. Learned about current construction processes and technologies, and ways robotics can be used to assist in and improve the construction industry.

PROFESSIONAL MEMBERSHIP

Member, IEEE Young Professionals	2024-present
Student member, ASME	2022-present
Student member, IEEE	2022-present

REFERENCES

Dr. Alexander Brown
Associate Professor of Mechanical Engineering, Assistant Department Head of Mechanical Engineering, Lafayette College
brownaa@lafayette.edu
(610)-330-5471

Dr. Jenn Stroud Rossmann
Professor of Mechanical Engineering, William Jeffers Dean of Engineering, Lafayette College
rossmanj@lafayette.edu
(610)-330-5406

Kenneth Burns
Assistant Director of Residence Life, Lafayette College
burnsk@lafayette.edu
(610)-330-5335