

STEPHEN BIRCH

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Education

Rutgers University-New Brunswick

Bachelor of Science in Aerospace Engineering

Cumulative GPA: 3.21 | Major GPA: 3.52

Interlochen Arts Academy

Cello Performance

Sept. 2023 - May 2027 (Expected)

New Brunswick, New Jersey

Sept. 2021 - May 2023

Interlochen, Michigan

Projects

Flapping Wing Drone | Onshape, C, 3D Printing, Aerodynamics

Spring 2026 (Ongoing)

- Designing and analyzing a flapping wing drone under the advisement of Professor Mitsunori Denda.
- Developing CAD models of the wing and actuation mechanism in Onshape for fabrication and analysis.
- Investigating biomimetic flight principles and unsteady aerodynamics to inform wing geometry and flapping kinematics.
- Fabricating wing spars, linkages, and airframe components via 3D printing to iterate rapidly on mechanism designs and minimize structural weight.
- Programming the flight control unit in C to drive actuation timing and stabilize the aircraft across a range of flapping frequencies and angles of attack.

Fluid Simulation using ANSYS | ANSYS Fluent, Solidworks

Spring 2026

- Modeled several NACA airfoils in Solidworks and imported the geometries into ANSYS for CFD analysis.
- Generated meshes for each airfoil at multiple angles of attack with mesh independence verification.
- Performed laminar flow simulations to characterize airfoil aerodynamics at varying angles of attack.
- Ran transient unsteady simulations to capture von Kármán vortex shedding and flow separation.

Steel Bear Canister | Solidworks, PrePoMax, CalculiX

Fall 2025

- Designed a bear canister with multiple geometries and incorporating industry standard parts in Solidworks.
- Used PrePoMax to quickly generate accurate simulations under many types of loading.
- Optimized automatic mesh generation in PrePoMax by creating custom meshing parameters and generation techniques.

Light Activated Food Dispenser | Arduino, Arduino IDE, Mechatronic Engineering

Spring 2025

- Created a photo-detection system using photo-resistors and an Arduino computer to determine the light level.
- Built a custom control panel to allow the user to adjust the amount of food being dispensed.
- Integrated an LCD display to allow the user to see how much food is being dispensed and feeding instances.
- Designed a dispensing system using a stepper motor and a gearbox to increase torque and increase dispensing precision.

Technical Skills

Engineering: Mechanical Component Design, CAD, Dynamic System Modeling, Mechatronic Design & Analysis, Aircraft/Airfoil Design & Performance, Finite Element Analysis, Fluid Simulation, Additive Manufacturing

Software: MATLAB Simulink, Onshape, Solidworks, Microsoft 365 Suite, Microsoft Visual Studio, PrePoMax, ANSYS, ANSYS Fluent.

Programming Languages: MATLAB, C, LaTeX, Python.

Work Experience

JEI Learning Center

June 2026 - Present

SAT Tutor

Somerset, New Jersey

- Tutor high school students in SAT Math and Reading & Writing, tailoring instruction to each student's diagnostic results and target score.
- Develop practice problem sets and review sessions targeting recurring weak points such as algebraic modeling, data analysis, and passage-based grammar.
- Teach test-taking strategy including time management, question triage, and process of elimination to improve accuracy under timed conditions.
- Track student progress across practice exams and communicate performance trends and study plans to students and parents.

Extracurricular Leadership

First Light Christian Acapella

Fall 2024 - Present

Treasurer

Rutgers University-New Brunswick

- Managed funds distributed by Rutgers University to organize equipment purchases, group travel, and food catering.
- Worked with the Rutgers University administration to raise and finance \$3,000 to attend a conference at MIT.
- Negotiated with the Rutgers University Student Association to fund a conference trip hosted by Carnegie Mellon.
- Organized fund raising events and sought out performance opportunities to elevate First Light's public presence.