Connor Houle

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EDUCATION

University of California, Los Angeles — B.S. Mechanical Engineering Class of 2029

- GPA 3.95 / 4.00. James N. Harger Scholarship and Muriel K. & Robert B. Allan Fund award recipient.
- Coursework: Linear Algebra, MATLAB Programming, Materials Science 104, Multivariable Calculus, Physics Mechanics.
- In progress (Fall 2026): Statics, Thermodynamics, Differential Equations, Electricity & Magnetism.

EXPERIENCE

Mechanical Engineering Intern — Planewave Inc. May 2026 – Sept 2026

- Supported manufacturing, testing, and R&D for RF space antennas, amplifiers, and test hats.
- Designed custom manufacturing fixtures increasing production speed by 150% and 80% for two in-house products.
- Established new manufacturing processes that increased product pass rate by 10× for in-house products.
- Produced drawings for 10+ new products to ASME Y14.5 GD&T; sourced custom AS9100-rated hardware with vendors.

Undergraduate Researcher — UCLA Mechatronics & Controls Lab, Prof. Tsu-Chin Tsao May 2026 – Present

- Lead mechanical design of a hexarotor AUV with full 6-DOF control that flies, submerges, and morphs radially to cut underwater drag.
- Own the full CAD, the waterproofing scheme, electronics integration, and propulsion sizing.
- Ran an ANSYS Fluent hull-drag study (SST k-omega, 775k polyhedral cells) resolving drag per surface; nose and tail domes carry ~68% of it.

Undergraduate Researcher — UCLA Bionics Lab, Prof. Jacob Rosen Jan 2026 – May 2026

- Designed an animal-trial prototype of a 360° articulating colonoscopy snare, 3.4 mm OD, for removing pre-cancerous polyps.
- Led a five-person team; coordinated physicians, faculty, and medical device suppliers, and set team milestones.

Bruin Formula Racing — UCLA Sept 2025 – Present

- Suspension: building a compliance jig applying 1,000+ lbf laterally, vertically, or longitudinally to measure toe and camber compliance.
- Electrical: developing a KiCad battery-monitoring PCB (TI BQ76942) flagging abnormal draw and estimating state of charge and pack health.

Independent Drone Research — AP Research Aug 2024 – Mar 2025

- Built a relay module extending a drone's control range by up to 82% via PPM signal refactorisation; 5,000-word paper, scored 5.

Co-Founder — Auto Detailing Business, Bay Area Oct 2023 – Aug 2025

- Generated $14,000 net profit across 90+ clients; led customer relations and marketing.

SKILLS

CAD / CAE	SolidWorks (assemblies, weldments, ASME Y14.5 drawings) · ANSYS Fluent · SolidWorks Flow Simulation · Fusion 360 · MATLAB
MANUFACTURING	Haas CNC milling · Fusion 360 CAM · waterjet · TIG welding · SLA and FDM printing · laser cutting
ELECTRONICS	KiCad schematic capture and PCB layout · TI BQ76942 · I²C · Arduino / C++ · nRF24L01+ · oscilloscope bench work

Selected Work

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FULL WRITE-UPS, DRAWINGS, AND PHOTOS

PROJECT INDEX

PROJECT	ROLE	ORGANISATION	STATUS	YEAR
Air–Water Hexarotor AUV	Mechanical design lead	UCLA Mechatronics Lab	In development	2026
Suspension Compliance Test Jig	Design and CAD lead	Bruin Formula Racing	In manufacturing	2025–26
Articulating Colonoscopy Snare	Team lead, 5 people	UCLA Bionics Lab	Complete	2026
Battery Health Monitoring PCB	PCB design	Bruin Formula Racing	In development	2025–26
PPM Drone Relay Module	Sole designer	Independent research	Complete	2024–25
FTC Robotics — Team 13216	Founder, team lead	FIRST Tech Challenge	Complete	2021–25
Combat Robotics — 3 lb class	Founder, mech lead	Beetleweight team	Complete	2022–23

The five pages that follow go deeper. Everything else is on the site.
Each project page covers why the thing exists, how it works, the decisions behind it, and what went wrong along the way.

AVAILABILITY

LOOKING FOR	Summer 2027 mechanical engineering internship — aerospace, robotics, or hardware
AVAILABLE	June through September 2027, full time, on site
BASED IN	Los Angeles · open to relocate
CONTACT	houleconnor06@gmail.com · 408-745-9122

Air–Water Hexarotor AUV

A six-DOF hexarotor that flies, dives, and transitions rapidly between the two. The airframe morphs radially underwater to cut drag, so one vehicle runs efficiently in both mediums.

FIG 01 — AIRFRAME IN THE EXTENDED (AIR) CONFIGURATION

ROLE	Mechanical design lead
STATUS	In development — CAD complete, vehicle in build
DESIGN	SolidWorks · mechanism design · o-ring sealed pressure housing
ANALYSIS	ANSYS Fluent · SolidWorks Flow Simulation

The design problem

Almost every requirement fights another one. Flight wants minimum mass; the pressure housing wants wall thickness. Sealing wants a closed vehicle; serviceability wants me to open it when something fails. Buoyancy trim works against thrust-to-weight. There is no textbook answer for the air–water transition, which is exactly why I asked for that part of the problem.

How the morphing works

The hull is three bays in line: a sealed electronics bay, a flood bay, and a battery bay. A single lead screw in the flood bay drives a profiled plunger that stays in contact through the whole stroke, pushing all six arms down and inboard at once from one motor. The props need no actuator at all — water drag folds the blades inboard, and in air centripetal force throws them back out to full span.

What I own

Full CAD of the airframe and the radial morphing mechanism, the sealing and waterproofing scheme, electronics integration, and propulsion sizing. The CFD characterising hull drag is mine as well — the next page is that study.

On the full page

— CAD of the airframe in both configurations — extended and morphed
— The passive folding-propeller mechanism, and why it needs no actuator
— Sealing and pressure housing decisions, and the tradeoff behind each one

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Hull Drag Characterisation

A CFD study of the AUV hull, run to answer one question before the morphing mechanism is judged on anything: which surfaces are actually paying the drag bill? Splitting the hull into named wall zones before solving turns one drag number into an itemised bill.

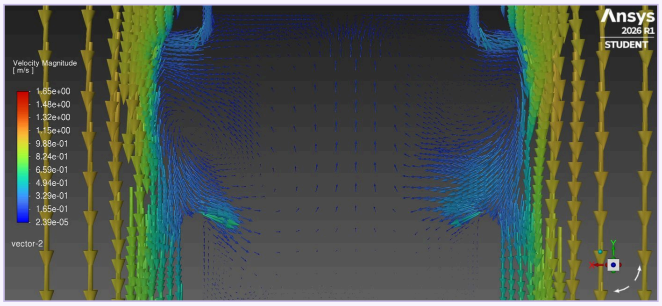

FIG 05 — COUNTER-ROTATING RECIRCULATION TRAPPED IN THE FLOOD BAY

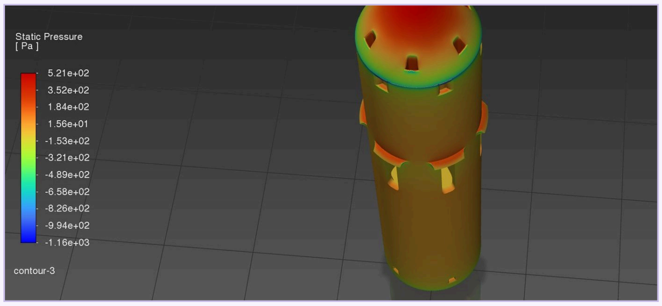

FIG 06 — STATIC PRESSURE ON THE NOSE DOME — THE LARGEST SINGLE CONTRIBUTOR

AXIAL FORCE PER WALL ZONE

SURFACE	PRESSURE (N)	VISCOUS (N)	TOTAL (N)	SHARE
Nose dome	-0.927	-0.048	-0.975	40%
Tail dome	-0.661	-0.025	-0.686	28%
Centre barrel	+0.001	-0.364	-0.363	15%
Water inlets	-0.138	-0.014	-0.151	6%
Flood bay	-0.142	-0.002	-0.144	6%
Screw holes	-0.118	-0.002	-0.120	5%
Arm slots	-0.013	-0.002	-0.015	1%
Resolved across these seven	**-1.998**	**-0.457**	**-2.455**	**100%**

Direction vector (0, 1, 0) — the vehicle axis. Negative is drag. Pressure is form drag; viscous is skin friction.

What the numbers say

The domes are the vehicle. Nose and tail together are about two thirds of the resolved drag and both are overwhelmingly pressure — form drag, not friction. That is a shape problem, and it is the one worth spending time on.

The barrel behaves as a slender body should. Its pressure term is +0.001 N — effectively zero net form drag — and essentially all of its 0.364 N is viscous. Flow stays attached down its length, which says the basic hull proportion is not the problem.

The holes are not free. Flood bay, screw holes, water inlets and arm slots exist for flooding and assembly, not hydrodynamics, and together cost about 0.43 N — roughly 18% of the resolved total. Each one is a feature I chose, so each one is a feature I can fair, countersink, or move.

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FULL STUDY, FIGURES, AND METHOD

Suspension Compliance Test Jig

The team's first compliance jig. It applies over 1,000 lbf to one corner of the car along the lateral, vertical, or longitudinal axis and measures the toe and camber that result.

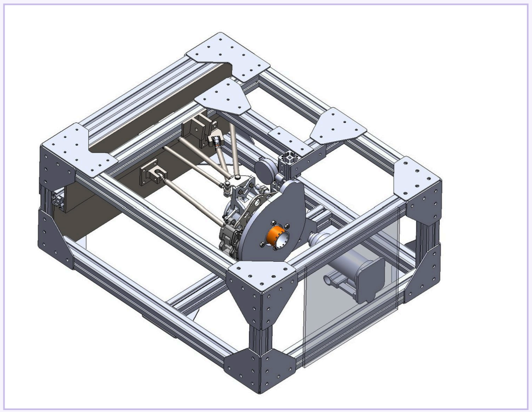

FIG 07 — JIG ASSEMBLY WITH A CORNER FIXTURED FOR TEST

ROLE	Design and CAD lead — two-person team
STATUS	In manufacturing
DESIGN	SolidWorks · GD&T and drawings
MANUFACTURING	Haas CNC milling · Fusion 360 CAM · waterjet

Why it exists

Our suspension model made claims about A-arm and control arm stiffness that nobody on the team had ever measured. The jig produces that number. Correlating the model against real compliance data is what lets the next design iteration start from something other than a guess.

The constraint that drives the design

The structure has to be roughly an order of magnitude stiffer than the thing being measured, or the jig's own deflection contaminates the reading. That single requirement sets the frame section, the load path, and the fixturing — and it is why the first frame concept was scrapped.

What I did

I own the frame and load-path design, the fixturing that ties the jig to a single corner of the car, the instrumentation layout — a pancake load cell in series with dial indicators — and the CAM and machining plan.

On the full page

- Load path and frame CAD, plus the fixturing that ties the jig to the car
- Considered / chose / why on the actuation method and load cell layout
- The what-went-wrong log, including what the first frame concept got wrong

connorhoule.com/suspension-jig →
FULL WRITE-UP, DRAWINGS, AND PHOTOS

Articulating Colonoscopy Snare

A 3.4 mm steerable sheath that gives a polypectomy snare 360° of angular access independent of the scope — small enough to pass down the working channel of an adult colonoscope.

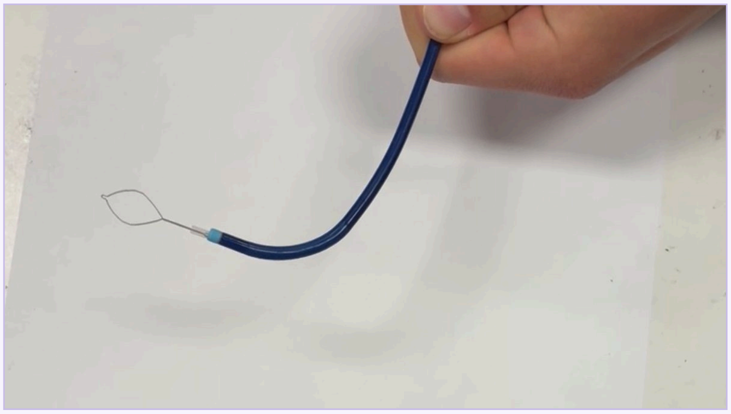

FIG 08 – ARTICULATED SHEATH WITH THE LOOP DEPLOYED

ROLE	Project lead — five-person team
STATUS	Complete — developed toward animal trials
DESIGN	SolidWorks · SLA printing · pull-wire actuation
WORKED WITH	Physicians, faculty, and medical device suppliers

Why it exists

A colonoscope is steerable; the snare that comes out of the end of it is not. To reach a polyp the physician has to aim the entire scope, and the scope is too large to point precisely at a small target. Adding articulation at the tip gives back a degree of freedom the endoscope alone does not provide.

How it works

The sheath passes down the working channel with the snare running through its own lumen. Two pull wires anchored at the tip and wound on spools in a vertical handle deflect the distal section; combined with rotation, that gives 360° of angular access. The hard constraint throughout was scale — every mechanism has to fit and function inside 3.4 mm.

What I did

I grew into the lead role on a five-person team. I ran the research, the prototyping and the actuation design, pulled requirements directly from a practising gastroenterologist, and managed the medical device manufacturers who built the final prototype.

On the full page

- Handle and articulation sketches, section views, and CAD
- Tip deflection testing and how the loop deploys
- The iteration log from the oversized 10 mm proof build to the 3.4 mm device

connorhoule.com/colonoscopy-snare → FULL WRITE-UP, DRAWINGS, AND PHOTOS

PPM Drone Relay Module

A deployable ground relay that extends a commercial drone's control range by up to 82 percent, by pulling the PPM control signal apart, retransmitting it as data, and rebuilding it at the aircraft.

FIG 09 — TEST AIRFRAME WITH RELAY RECEIVER AND AVIONICS

ROLE	Sole designer
STATUS	Complete
BUILD	Arduino / C++ · nRF24L01+ · FDM printed enclosure
VALIDATION	Oscilloscope bench work · measured range

How it works

The relay takes the PPM frame off a standard receiver and decomposes it into arrays of throttle, yaw, roll, and pitch values. Those go out over a 2.4 GHz nRF24L01+ link to a second module at the aircraft, which reconstructs the PPM waveform and feeds it to the flight controller. The aircraft never knows it is not talking to the original transmitter.

The problem that took longest

Getting the flight controller to accept the frame. My scope showed clean PPM reaching the FC and the drone still would not respond. I worked backwards to a known-good baseline: returned the drone to its off-the-shelf configuration, captured the stock signal, and compared the two. Mine was off by a factor of 3.5. Scaling it in firmware fixed it. Mechanical, electrical, and software were all live suspects, and the only way through was eliminating them one at a time.

On the full page

- Oscilloscope captures of the original and reconstructed PPM frames
- Range test method and the measured improvement
- Firmware, the printed enclosure, and the full 5,000-word paper

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FULL WRITE-UP, DRAWINGS, AND PHOTOS