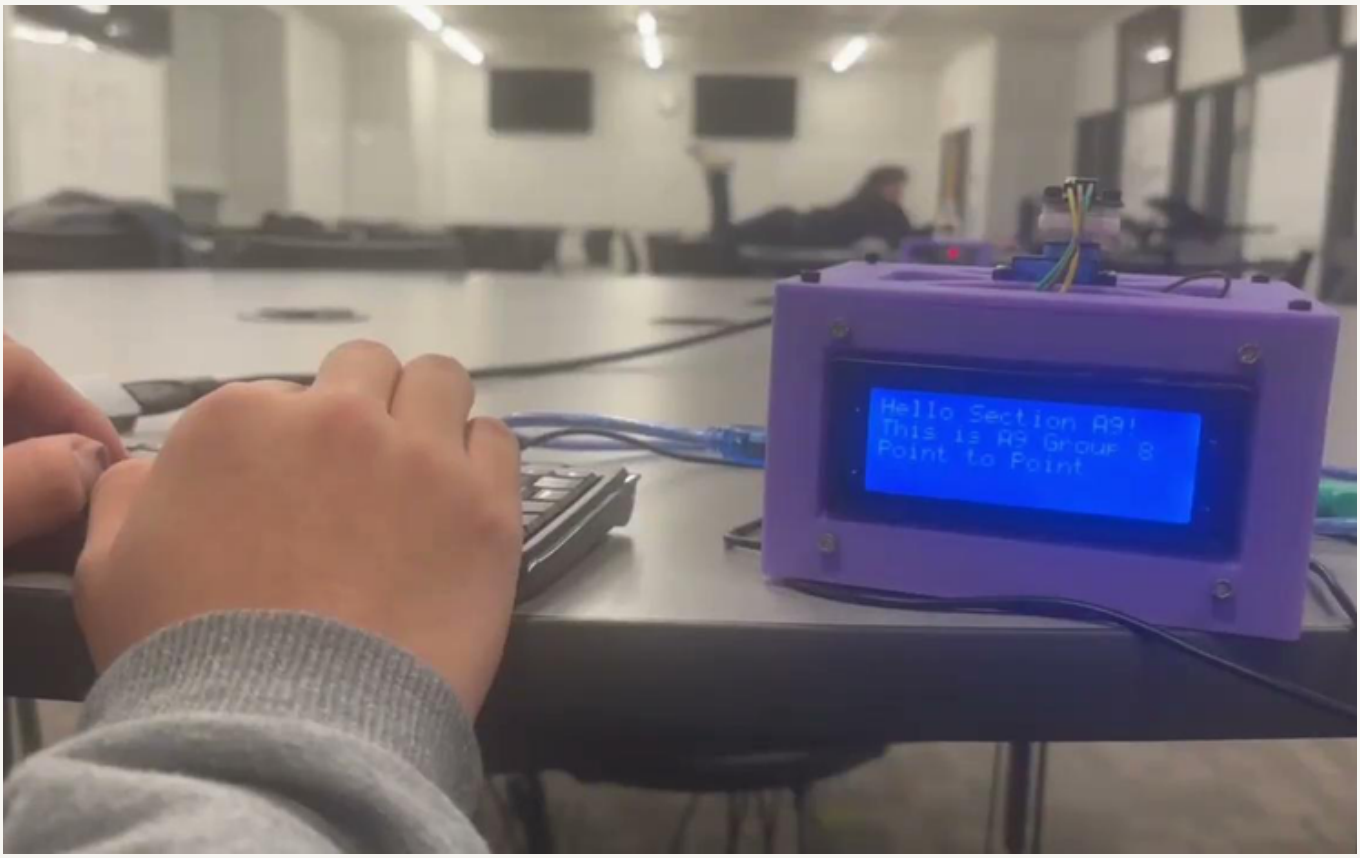
Gabriel Mukherjee

Summer 2027 internship portfolio

Mechanical engineering.
Physical systems. Technical evidence.

Boston University · B.S. Mechanical Engineering
Expected May 2028 · Chemistry minor in progress



01 / Built optical-communication prototype. EK210 team coursework; CAD, integration and testing participation. Full case on page 2.

FOCUS

Mechanical design, robotics, mechatronics and manufacturing.
Selected work connects CAD, hardware integration and experimental analysis.

gabemuk@bu.edu

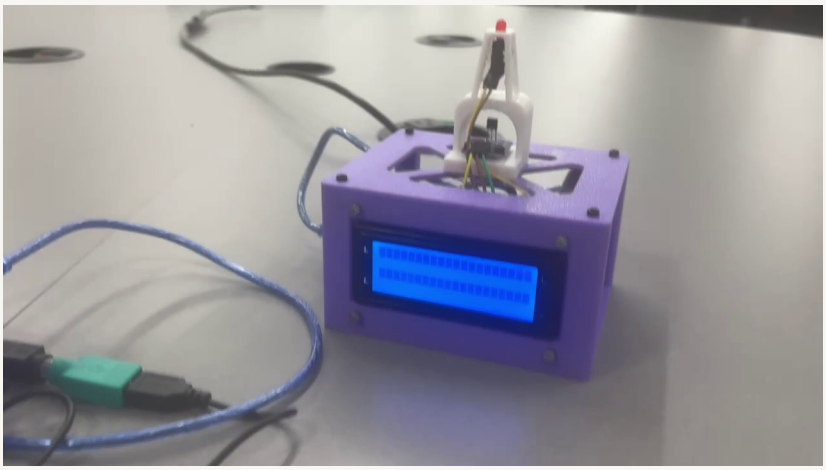
github.com/gabemuk

www.linkedin.com/in/gabriel-mukherjee/

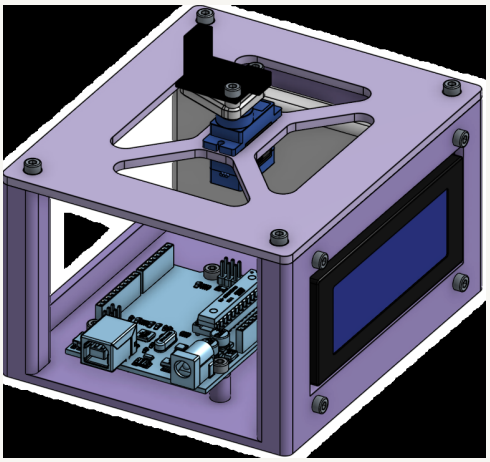
Text across an optical link

Four-person team · Prototype integration, packaging and testing

Transmit keyboard-entered text over a directional optical path. The documented requirement was 5 ft; the team reported successful transmission through 13 ft.



02 / Actual demonstration-video still. Printed housing supports the display and optical mount.



03 / Team transmitter CAD, including vendor components.

DOCUMENTED SIGNAL PATH

PS/2 keyboard → Arduino → 38 kHz IR modulation
Optical receiver → Arduino → LCD

Servo aiming is documented in the team architecture. Modulation frequency is not data throughput.

PACKAGING & CONSTRAINTS

Printed enclosures organize electronics, display access and optical aiming. The CAD shows the mount above the lid and electronics below. Alignment and ambient light are important unresolved test conditions.

MY CONTRIBUTION

Contributed to CAD, integration and testing (owner-reported). Specific subsystem decisions remain unresolved. Team: Ken Yasuda, Gabe Mukherjee, Jake Spaulding and Matthew Watkins; printed parts credited to Jake Spaulding.

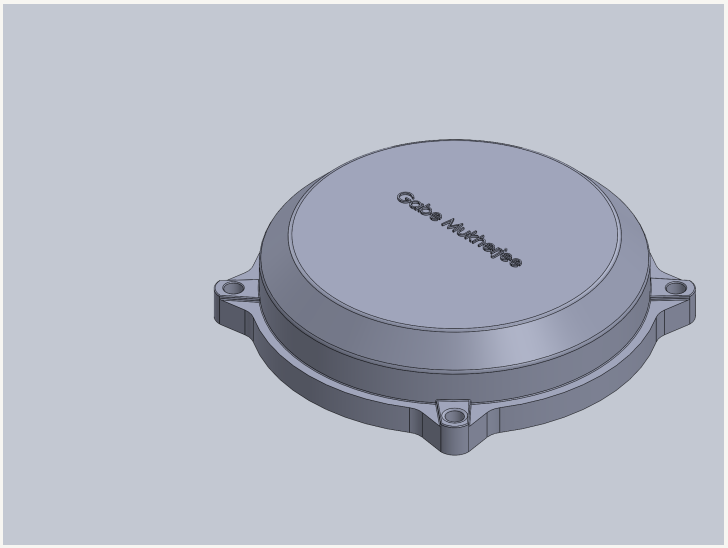
RESULT AGAINST REQUIREMENT

13 ft reported versus a **5 ft requirement**. Raw trials, message lengths and alignment protocol are unavailable; this does not establish a guaranteed range or error rate.

Reported combined BOM: $132.36. Component cost estimate only. Power budgets are estimates; no measured optical power or system draw is claimed.

Cap geometry, made explicit

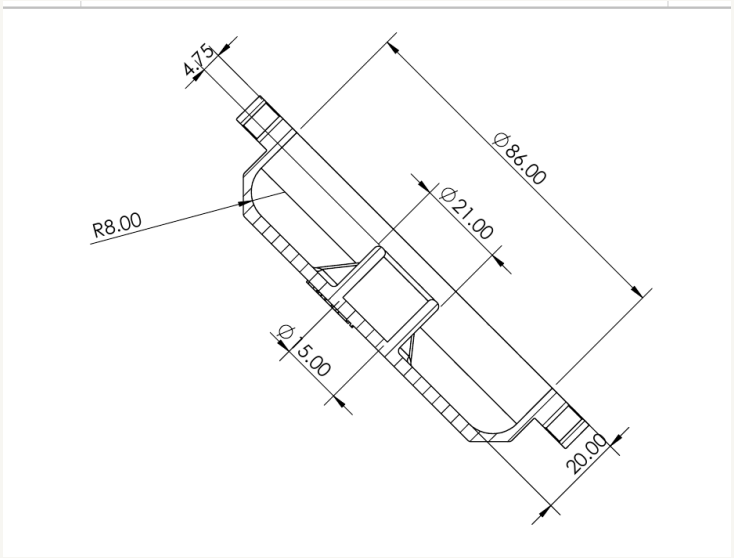
SolidWorks coursework · Native model and original dimensioned drawing



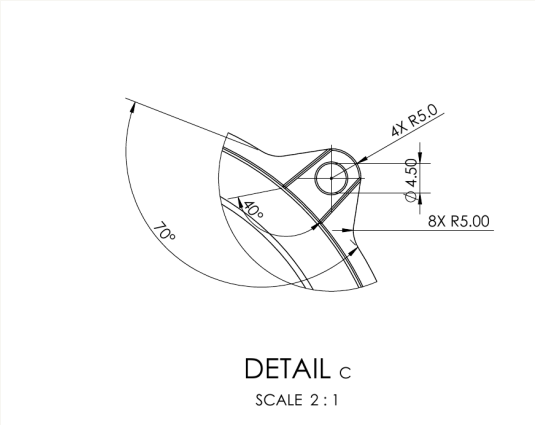
COURSEWORK SCOPE

Genuine cap model and drawing attributed to Gabriel. The native part opened read-only and rebuilt in memory. Supplied versus authored geometry remains unresolved.

04 / Native SolidWorks isometric export. Raised circular top, mounting ears and underside geometry are documented in complementary views.



05 / Section A-A: interior profile and wall geometry.



06 / Detail C: mounting feature.

DRAWING AS AN ENGINEERING INTERFACE

Section and detail views expose geometry hidden in the isometric view. Dimensions are in millimetres; the full original sheet and educational-use notice are retained on page 8. Enlargements above are not to printed scale.

Coursework documentation, not a production release: title-block fields are incomplete. Material, process choice, functional fits and inspection requirements need review before manufacture; no fabrication or tolerance validation is established.

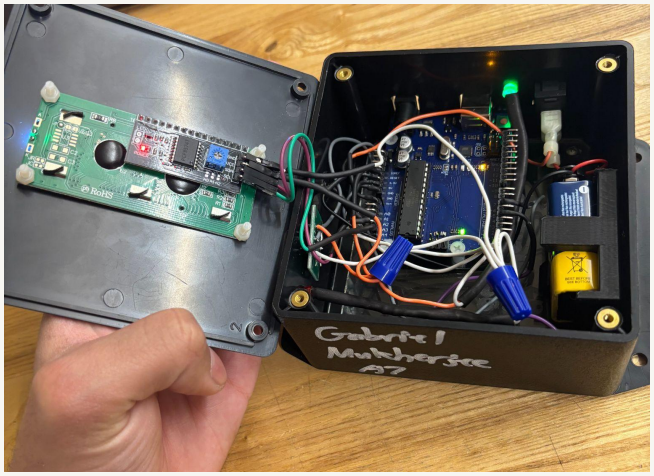
Temperature monitor & alerts

Personal coursework · Sensor, controller, display and enclosure integration

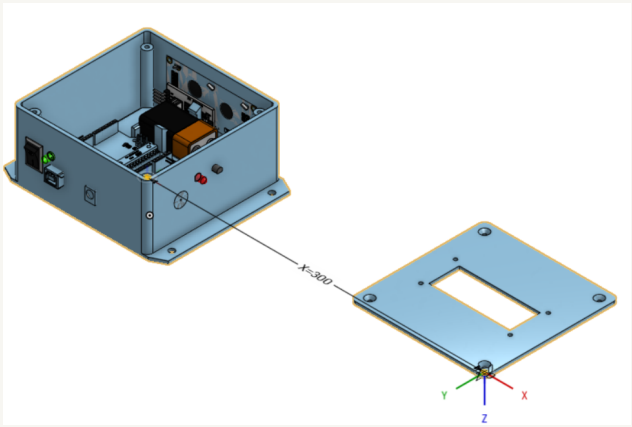
Read temperature, display it locally, and signal excursions outside the documented threshold band with visual and audible alerts.



07 / Closed, powered build. LCD and user-facing indicators are accessible through the enclosure.



08 / Open build. Controller, battery and wiring occupy the base; the LCD is attached to the lid.



09 / Report CAD: enclosure and separated lid. Native CAD and build-to-model correspondence are unverified.

PACKAGING DECISION

A removable lid provides access to the electronics while presenting the display externally. I integrated and assembled the documented build using vendor/course components.

DOCUMENTED THRESHOLD LOGIC

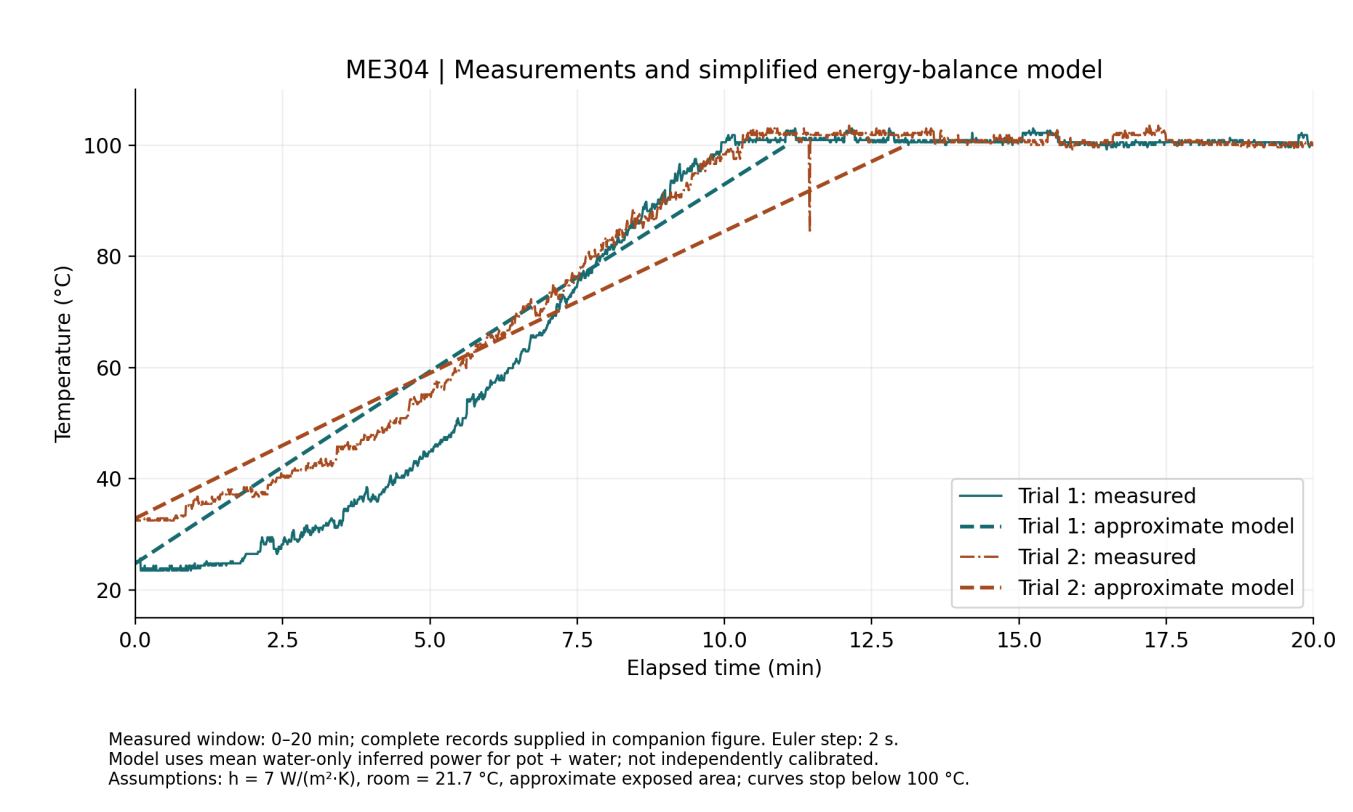
T < 70 °F or T > 75 °F
→ **visual / audible alert**

Monitoring and alerts only; no heater or cooler actuation. Report code supports the threshold behavior, but installed firmware equivalence, calibrated accuracy, response time and battery endurance are unverified.

Where the energy balance fails

Team laboratory study · Measured traces, inferred quantities and model comparison

Compare two water-heating trials with a simplified pot-and-water energy balance. Logger temperatures and measured masses support the analysis; individual measurement and analysis roles remain unresolved.



10 / Original measured traces and reproduced approximate model, 0–20 min. Full records extend beyond 20 min; Trial 2 then drops to 41.9 °C. Model curves stop below 100 °C.

INFERRED RESULTS	Trial 1	Trial 2
Initial water mass (kg)	**0.543**	**0.741**
Water-only heating rate (W)	**284.5 ± 8.9**	**329.9 ± 10.5**
Latent heat (kJ/kg)	**1146 ± 68**	**1373 ± 84**

Reference ≈ 2,257 kJ/kg near 100 °C / 1 atm (lab report). Inferred latent heats are about 49% and 39% low: the model does not agree with the reference.

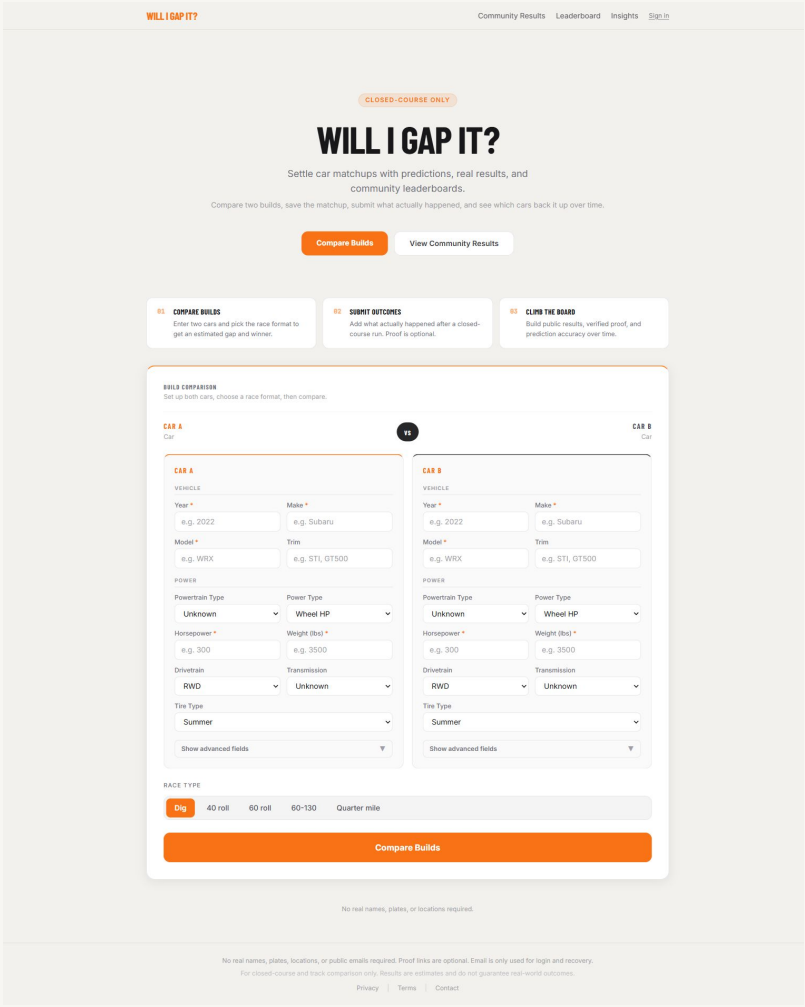
Method: $P = m \cdot c \cdot \Delta T / \Delta t$, with c = 4,180 J/(kg·K); reuse preboiling power during boiling and assign total mass loss to that interval. Pot/plate storage, changing heat transfer and thermal gradients can bias this estimate. Model input power is not independently calibrated.

± values: first-order propagation of assumed 1σ inputs (each mass ±0.001 kg, temperature ±1 °C, onset/end ±0.25 min), retaining shared dependencies. Excludes systematic bias; neither calibrated accuracy nor 95% intervals. Electrical input is unknown.

Will I Gap It?

Vehicle-comparison interface · Deterministic estimates for closed-course use

Translate vehicle inputs into an inspectable comparison using available performance times or power-to-weight, with explicit adjustment rules.



11 / Genuine deployed anonymous interface, captured during evidence review. Empty forms are shown; no results or submissions were fabricated.

SOURCE ARCHITECTURE

Next.js / React
Interface and input flow

TypeScript
Deterministic comparison rules

Supabase
Backend integration in source

MY ROLE

Repository identifies Gabriel as maintainer; its README acknowledges team-account and AI-assisted contributions. Personal implementation decisions remain unresolved.

WHAT THE OUTPUT MEANS

A rule-based comparison, not a validated vehicle-dynamics model. Heuristic confidence labels are not statistical probabilities. The live interface was observed; prediction accuracy, sign-in, persistence and hosted backend parity were not tested.

willigapit.com / github.com/gabemuk/will-i-gap-it

Engineering across interfaces

Mechanical engineering · Summer 2027 internship interests

I am a Boston University mechanical engineering student interested in the interfaces between mechanical parts, electronics and software. My selected coursework spans physical integration, technical documentation and experimental comparison.

SELECTED CAPABILITIES / EVIDENCE

Mechanical CAD & documentation

03 / 08

SolidWorks cap model, sections and dimensioned detail views. Educational design and drafting evidence.

Hardware integration & packaging

02 / 04

Arduino, sensors, LCDs, wiring and enclosure assembly. Personal temperature-monitor build; team optical prototype.

Experimental engineering

05

Heating and boiling records, energy-balance interpretation and explicit separation of measurement from inference. Team laboratory work.

Engineering software

06

Next.js, React, TypeScript and Supabase in the vehicle-comparison source. Maintainer attribution with shared contributions.

EDUCATION

Boston University · B.S. Mechanical Engineering
Expected May 2028 · Chemistry minor in progress

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www.linkedin.com/in/gabriel-mukherjee/

APPENDIX / ORIGINAL COURSEWORK DRAWING

ME357 cap · Dimensions in mm · Reproduced at reduced scale; use stated dimensions, not measurements from this print.

