

Engineering with a human purpose.

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B.S. Mechanical Engineering · Class of 2028

Minor: Engineering Business



MY WHY

Amani Medical Foundation began when I was a child. Since then, I have joined multiple medical mission trips to Ghana and taken part in the work of establishing a hospital for women and children. That experience gave my interest in engineering a purpose: I want to build things that help people receive better care.

Today, I support the foundation through medical-equipment research and website updates. As a mechanical engineering student at the University of Virginia, I am developing the design, prototyping, and testing skills I hope to bring to medical devices and healthcare technology.

SELECTED ENGINEERING WORK

01 Compound gear-train teaching apparatus

SolidWorks / 3D printing / MATLAB

02 Pickleball paddle pressure gauge

CAD / Arduino / C++ / Prototyping

03 Prosthetic finger mechanism workshop

Mechanism design / CAD / 3D printing

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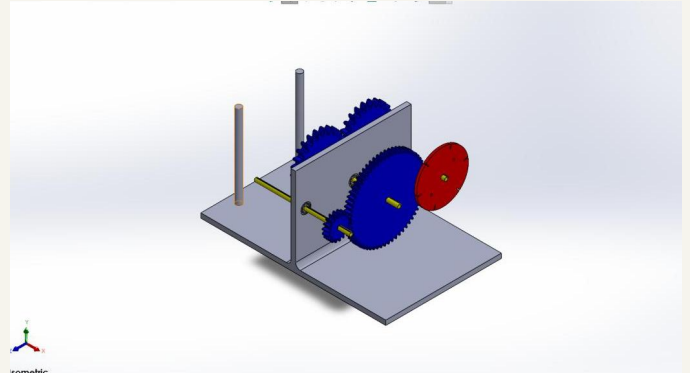
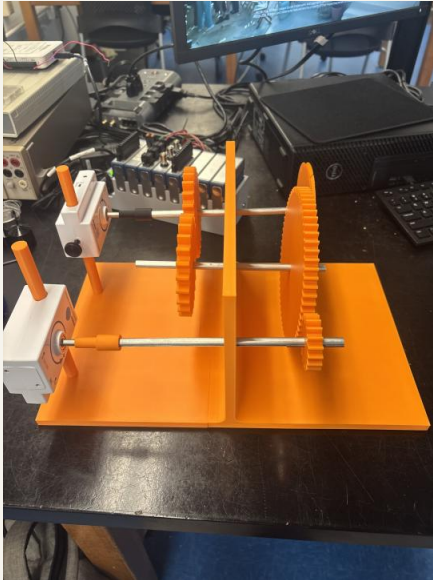
[Resume](#)

SolidWorks · MATLAB · Prototyping · Testing · Technical documentation

01 / COMPOUND GEAR-TRAIN TEACHING APPARATUS

From static lab to dynamic system.

SolidWorks / 3D printing / MATLAB / PASCO



Physical prototype and SolidWorks assembly, extracted from my research journal.

I developed a tabletop compound gear-train apparatus to extend a static teaching lab into a dynamic experiment. The system uses a falling mass, three shafts, four gears, and a flywheel to connect gear ratios with angular acceleration, torque, and power.

MY CONTRIBUTION

This was an individual project: I independently completed the research, CAD design, fabrication, prototyping, assembly, testing, MATLAB analysis, and technical documentation. I also authored the student lab manual for planned use by more than 100 students.

DESIGN DECISION

I used MATLAB to explore inertia and hanging-mass choices, then PASCO rotary sensors to compare input and output motion. I replaced a circular torque calculation with an isolated flywheel test to estimate output inertia.

RESULT & NEXT STEP

Three 100 g trials produced a mean measured ratio of about 3.545 versus 3.556 theoretical (approximately 0.3% difference). A later test series yielded an estimated 84.9% efficiency using the revised inertia-based method.

These are bench-test results, not a full uncertainty study. Flywheel inertia assumptions and measured-versus-predicted acceleration remained areas for refinement.

Research journal

Student lab manual

02 / PICKLEBALL PADDLE PRESSURE GAUGE

Making paddle wear measurable.

CAD / Arduino / C++ / Prototyping / Client collaboration



Team prototype: modified clamp, printed housings, sensing electronics, and display.

Our five-person team developed a portable clamp-based device to investigate pickleball paddle condition. By measuring resistance at the paddle's sweet spot, we explored a repeatable way to compare new, used, and worn paddles.

MY CONTRIBUTION

I designed CAD casing and clamp components, contributed to sensor-reading and display code, and helped test the device. I also worked with the team and client on design decisions, documentation, and the final presentation.

DESIGN DECISION

We combined a pressure sensor, Arduino, display, and modified clamp. Printed housings organized the electronics; revised geometry reduced material use.

RESULT & NEXT STEP

The project placed in the top 7 of 157 engineering design projects at UVA. Our central technical finding was that a useful replacement threshold must account for paddle construction and model.

The prototype demonstrated comparative measurements; it did not establish a universal or independently validated end-of-life threshold. Broader calibration and controlled clamp loading are next steps.

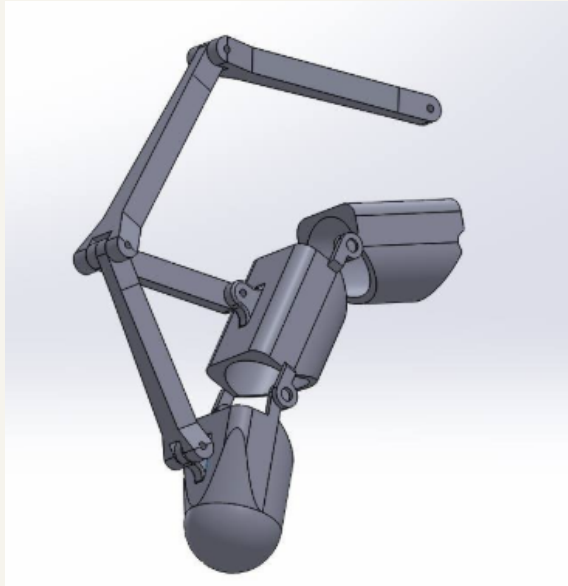
Project poster

Final technical report

03 / PROSTHETIC FINGER MECHANISM WORKSHOP

Exploring how a finger can grasp.

Mechanism design / CAD / 3D printing / Team prototyping



Prosthetic finger mechanism concept and CavaLIMBS engineering club logo.

As a member of CavaLIMBS, an engineering club at UVA, I apply my mechanical engineering skills to biomechanics by contributing to the development of prosthetic finger mechanisms. Mechanical teams are exploring different approaches before comparing which direction offers the most useful and practical grasping motion.

MY CONTRIBUTION

My work focuses on mechanical design and printed prototyping, including component fit and tolerances. The current workshop is moving from individual phalanges toward joints and complete finger mechanisms.

DESIGN DECISION

Current guidelines emphasize documented finger dimensions, metric fasteners, print orientation, and tendon attachment. Two- and three-phalange concepts remain open for comparison.

CURRENT STATUS

Work is in progress. The workshop has established design guidelines and divided the concept work among teams; a final mechanism and validated performance results have not yet been selected.

Current work remains at the concept and prototype stage; performance testing will inform the next design iteration.