TED YEE

Mechanical Engineering Portfolio

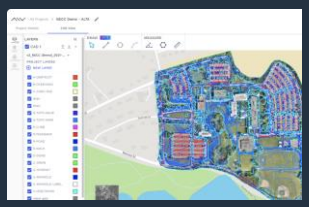
October 2023

See more at:

https://tedyee114.github.io/websites

Airworks Inc.

Jan-June 2023 COOP/Intern
July-Present Part-Time
Boston, MA, USA

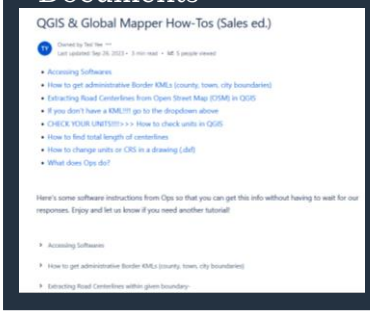


The Airworks Client Portal

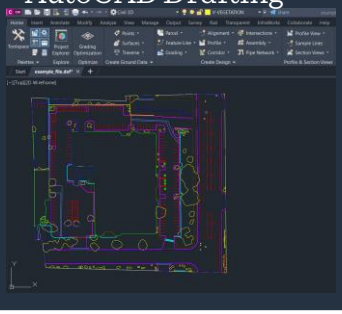
Airworks is a geospatial intelligence company building an AI to extract linework and other AEC, telecom, GIS, statistics, and survey needs by automating aerial imagery drafting (an alternative to walkout surveys). We also work with LIDAR pointclouds, GIS dashboards and calculations, and utilities data to provide comprehensive geospatial deliverables.

Regular Duties

Updating Standards and Internal Documents

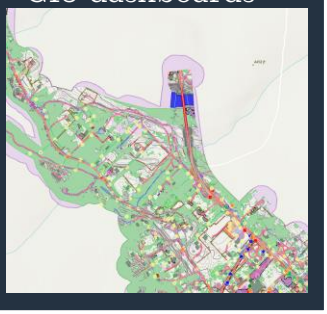


AutoCAD Drafting



Drafted files used for AI computer-vision training via data mask generation

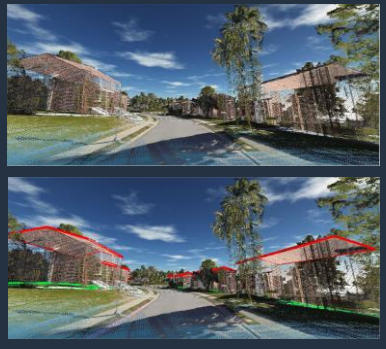
Deliverables as drawing files or GIS dashboards



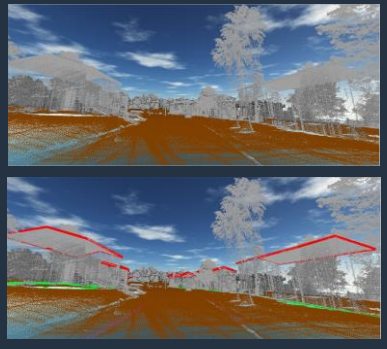
Projects begin with clients providing or requesting aerial (drone, satellite, plane) data for any area they want to work on

Using client-provided data, we extract between a dozen and 50 features

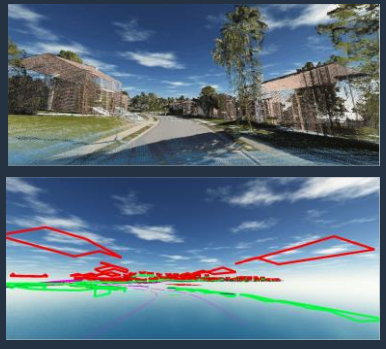
Deliverables used for permitting, planning, as-built reviews, impervious-surface (water runoff) calculations, etc.



Worked in pointclouds (usually lidar) for 3D-vector deliverables



Point classification is a key process, esp. for topography generation



3D-Vector Deliverable

Airworks Inc.

Jan-June 2023 COOP/Intern
July-Present Part-Time
Boston, MA, USA

AIRWORKS

Independent Explorations

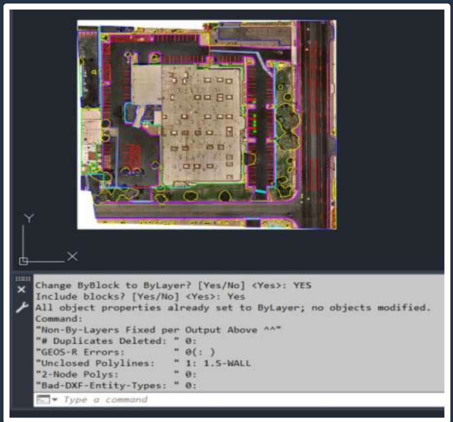
Available at https://github.com/tedyee114

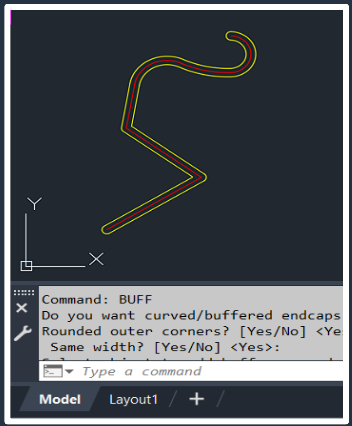
Self-Taught AutoLISP Coding Language

```
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;subfunction of DU, requires no input, passes noth
(defun findit ()
  (if (/= EntityType nil)                                        ;continu
    (progn                                                       ;everyth
     (setq ALPHA 0)                                              ;"ALPHA"

                ;sets ED, checks it with the contained while loop, then changes E
      (while (setq ED (ssname entityType ALPHA))                 ;until E
        (setq EDattributes (cddddr (entget ED)))                 ;"EDattr
        (setq BETA 1)                                            ;"BETA"

                ;compares info of EDattributes and EDNEXTattributes. If so, adds
        (while (setq EDNEXT (ssname entityType (+ ALPHA BETA)))  ;until E
          (setq EDNEXTattributes (cddddr (entget EDNEXT)))       ;"EDNEXT
          (if (member EDattributes (list EDNEXTattributes))      ;if "EDa
            (progn                                               ;everyth
              (ssadd EDNEXT DU)                                  ;then: a
              (ssdel EDNEXT entityType)
            )
            (progn (setq BETA (1+ BETA)))                        ;else: i
          )
        )
        (setq ALPHA (1+ ALPHA))                                  ;once ED
      )
    )
  )
)
```

Automated drafting and review process by inventing new user commands for AutoCAD

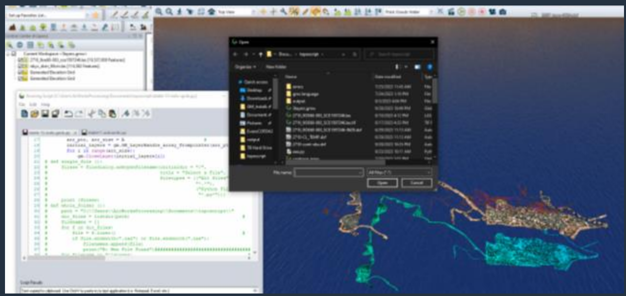
The left command checks file for 7 issues that interfere with data mask generation and AI training; the right generates buffered areas around polylines. Both use the AutoCAD command line as a fast GUI for stats and options





Topography Generation Automation Scripts

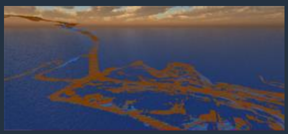
Topography Generation is a very repeatable , but labor-intensive 3D pointcloud process that bottlenecked my team's work. I took initiative and taught myself the necessary Python library and software API to automate it. At right is a dev version of a GUI while generating mid-process 3D surfaces. I started to get learn git version control for this automation to coordinate other members' input.



Initial pointcloud

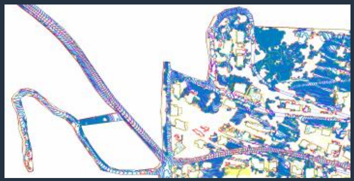
Points classified into ground and nonground

Remove nonground points



Ground points exclude trees, buildings, cars, etc

Generate topography (topo) contours



When viewing ground points only, there are lots of holes

Mark obstructed areas for map liability

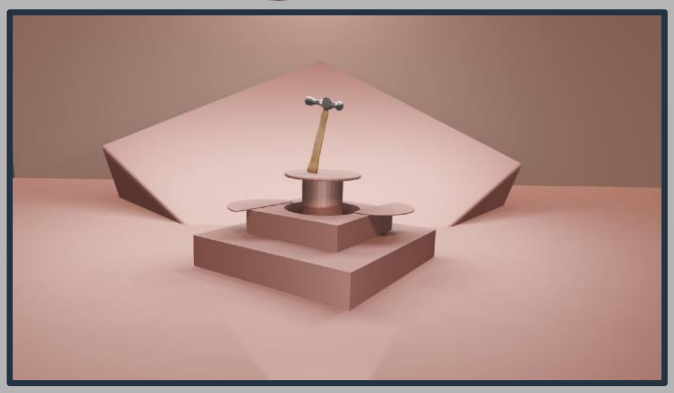
Combine obstruction markings with topo lines

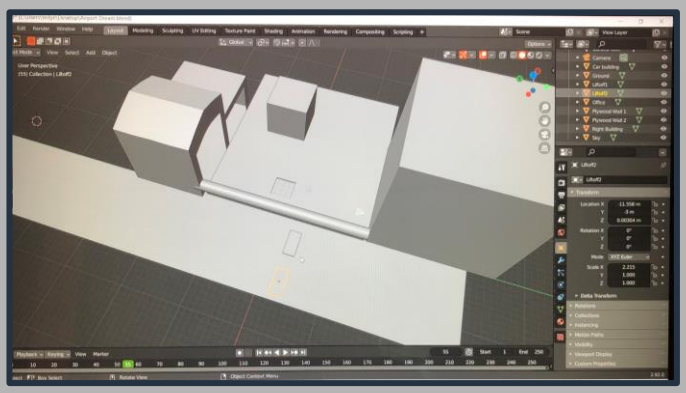
Convert file to client companys drafting standards

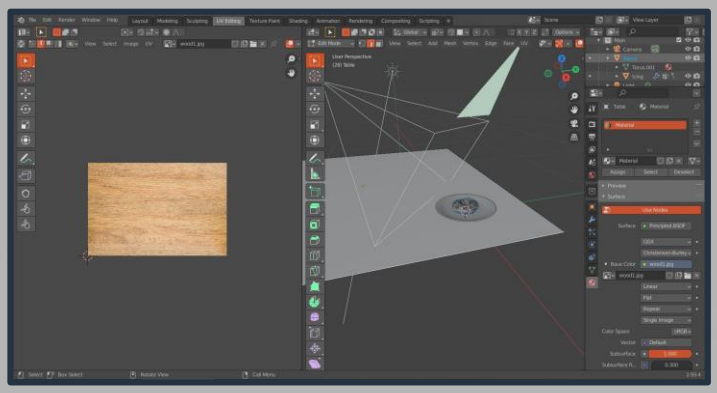
Blender Animation & Rendering

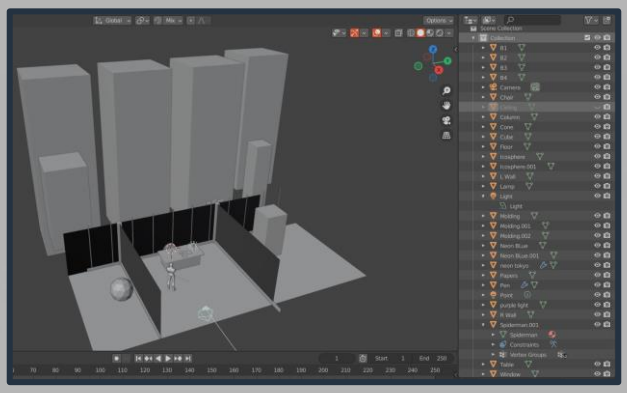
Personal Interest Projects
2021-Present

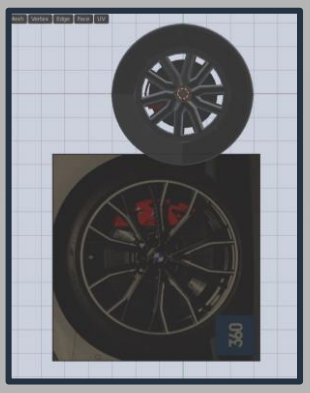
Blender is a mesh modeling, rigging, and rendering animation software that I enjoy working in for its realism and unique modeling type that uses very xyz-oriented operations method of augmenting simple 3D shapes rather than additive drawing. Its very easy to make quick environment and object models and adjust the visual graphics to suit a certain style.





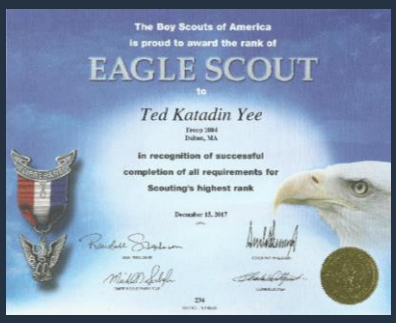






Footbridge Construction

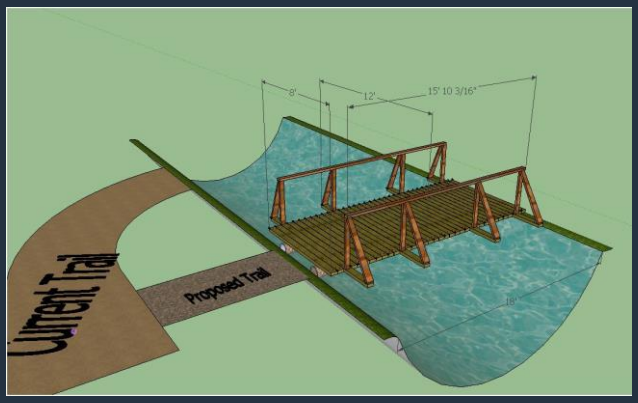
Eagle Scout Project
2017



I achieved the highest rank of American Boy Scouts, Eagle Scout, 3 years younger than majority of the 4% who do. For my final service project, I built a 5.5m bridge at my high school for the running and Nordic skiing teams to use. I organized about 150 volunteer hours, with help from a nearby construction company, my Boy Scout troop, and the high school sports teams to finish the bridge and trail cleanup over the course of a few weeks. The actual design of the bridge was relatively simple but with input on the teams' needs and advice from volunteer construction crews and carpenters, I planned and designed the bridge with railings to support a snowmobile and to be wide enough to accommodate the number of users.

Before

After



SketchUp Rendering

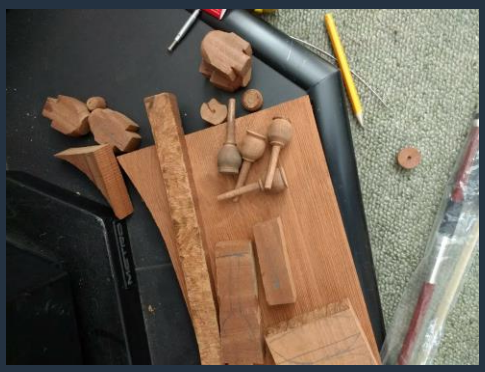
Finished Bridge

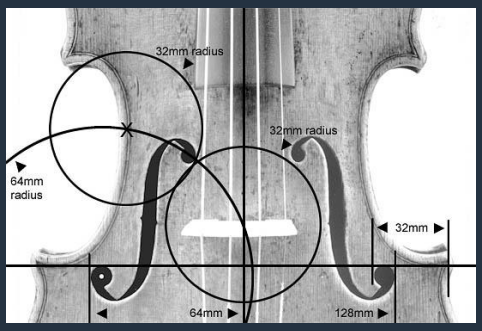
Laying beams and gravel and removing obstructions

Violin Woodworking Project

Personal Interest
2018-2019

Luthiery (stringed-instrument construction and repair) is the pinnacle of fine mechanical woodworking. I used hand planes, chisels, and files to make the 30 pieces, with details smaller than a mm. Then, assembly and finishing was a complex process requiring water-soluble, boiled hide-glue, steam bending, varnishing and tuning. I completed the whole project without instruction or help and very little reference material, and the finished violin is playable, if a bit unique.





University Projects

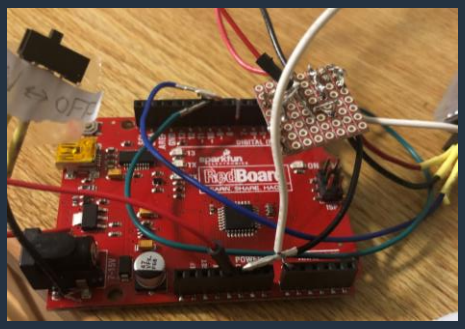
Northeastern Classwork

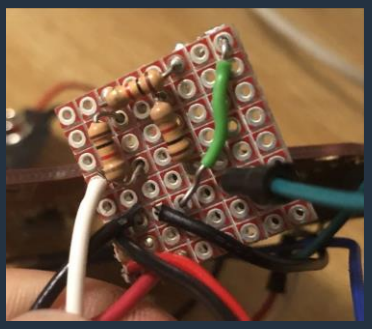
Biomedical Device Design

For Cornerstone of Engineering Class
Fall 2021

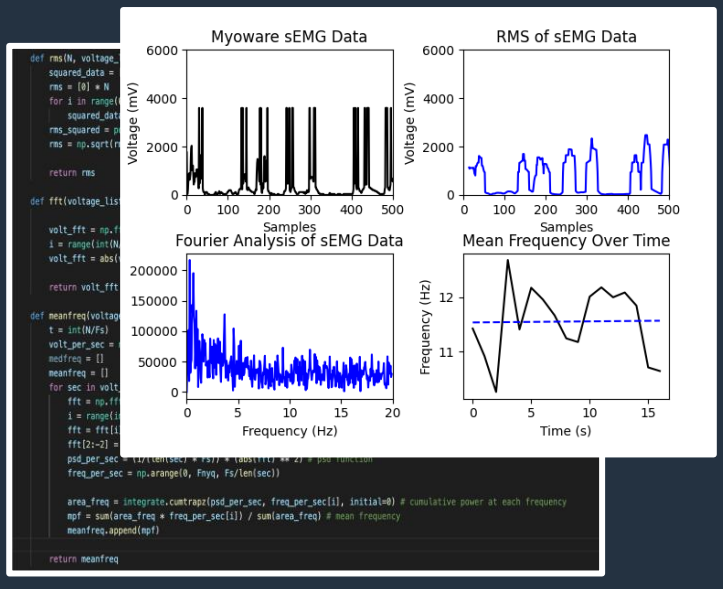
The Myowearable sleeve is a wearable medical tech designed to alert users with injured muscles to before they injure themselves again. An electromyography (EMG) sensor sends data about electrical stimulation in the muscle to a computer via Bluetooth for analysis. A desktop application and GUI provide warning buzzers and notices, as well as four graphs (some real-time) that summarize the user's movement and give insight into their state and trend of fatigue.

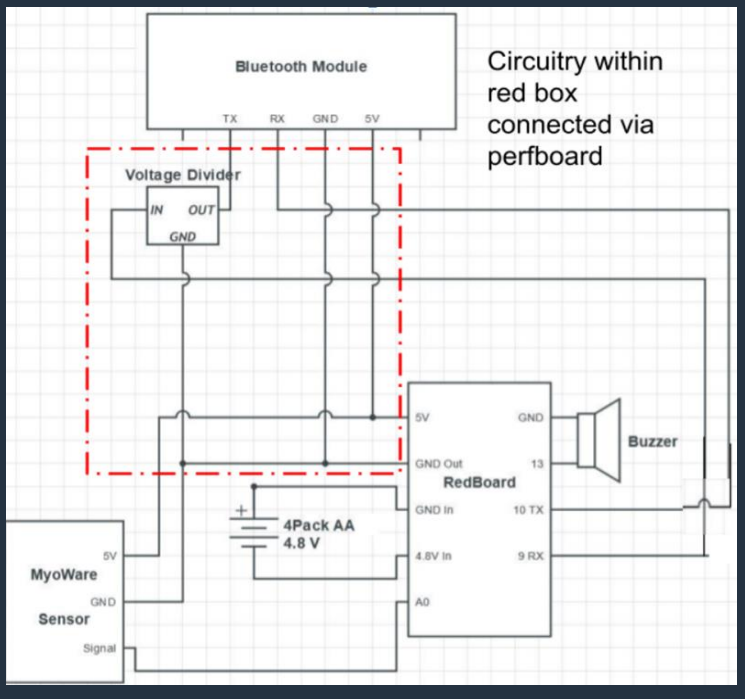
Our project was published in the American society of engineering Education conference paper in 2022 https://peer.asee.org/the-myowearable-sleeve-a-surface-electromyography-injury-prevention-device





Over the semester, I led the electronics design and construction, Bluetooth controls (Arduino using the Hayes AT Command Set, typically for telephone modems) and decrypting raw Bluetooth signal (MATLAB, switched to Python) and made the animated demonstration.

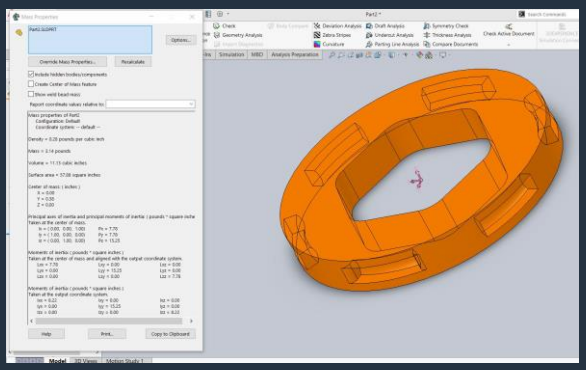




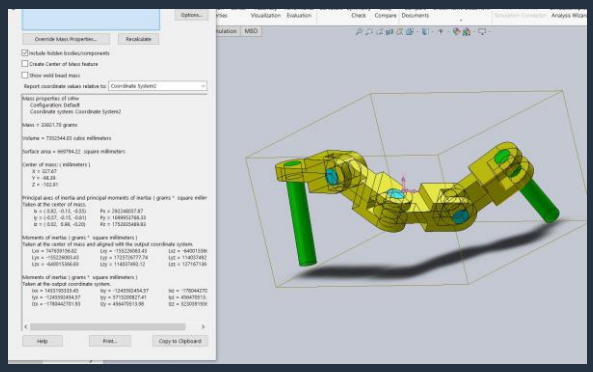
SolidWorks

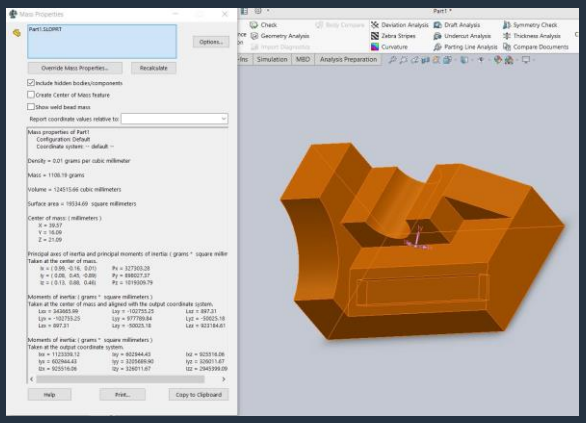
Classwork and for
Certified SolidWorks Associate Exam (CSWA)

Modeling for Mass Properties

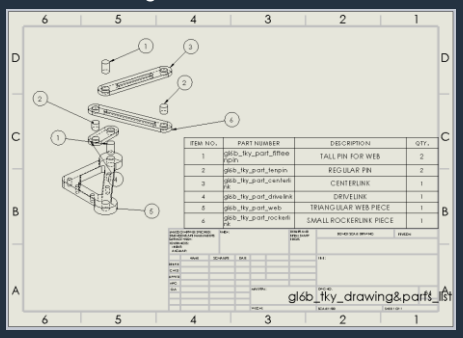


Assembly Center of Mass Evaluation

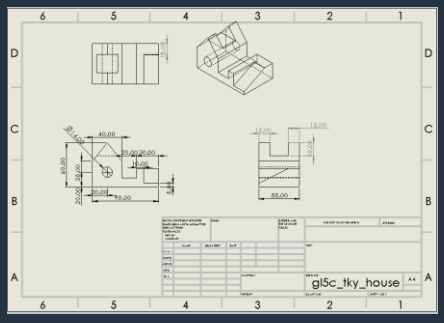


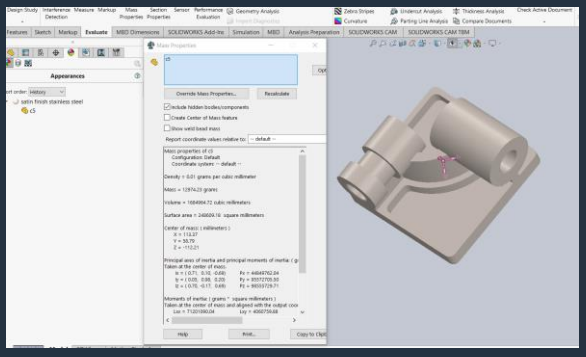


Assembly Instructions

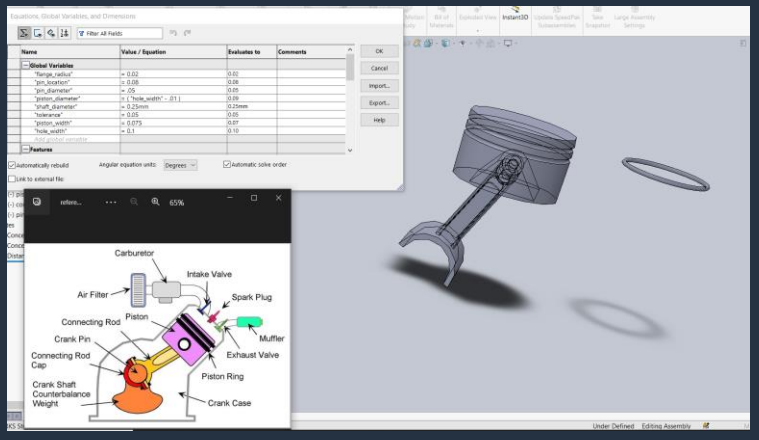


Basic 2D Part Layout

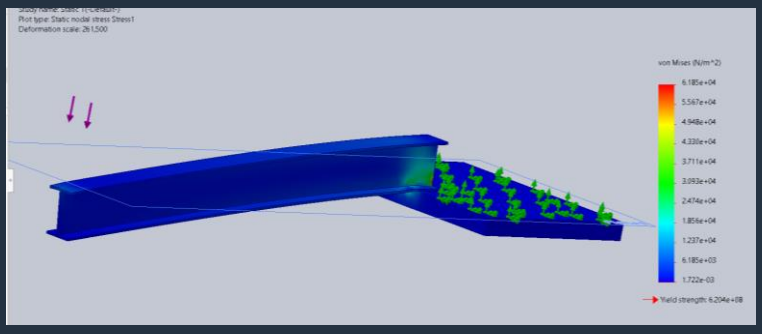




Externally-Referenced Dimensions



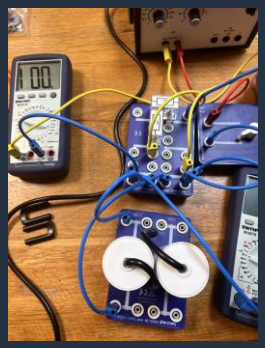
Basic Static Force Simulation



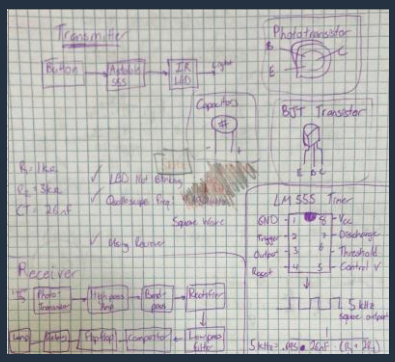
University Projects

Northeastern Classwork

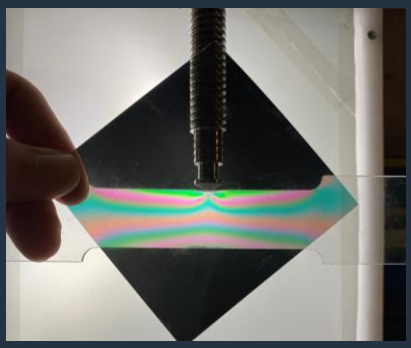
Here are some applicable things I've done in my classwork:

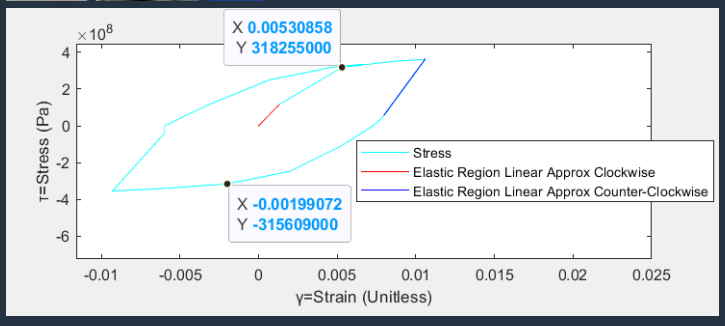


Capacitor/Inductor Analysis



Infrared Signal Transmitter and Receiver with hardware signal processing. Used Oscilloscopes.

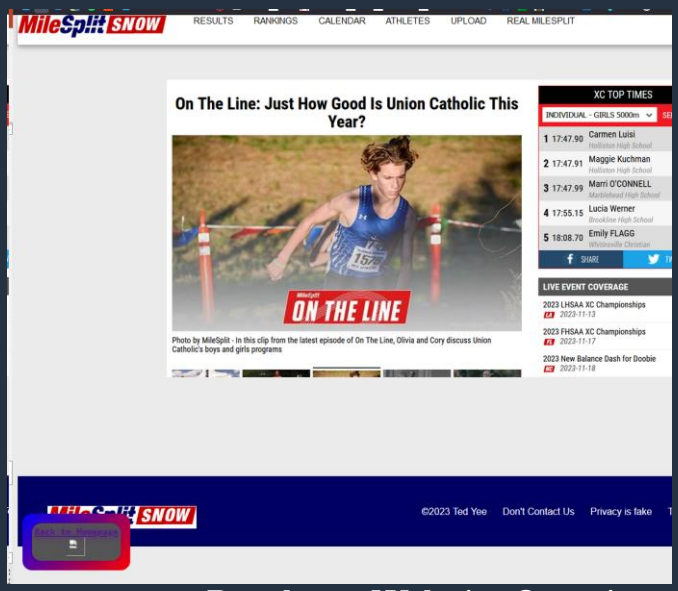




Numerous Material Property Tests. Used Instron tension and torsion, Charpy impact, Rockwell hardness, X-Ray Diffraction, Photoelasticity, Deflection & Strain Gauges

```
sqlite> select employee_first_name, employee_last_name, degree_name from (select employee.employee_first
_name, employee_last_name, degree_name from employee left join employee_degree on employee.employee_id=e
mployee_degree.employee_id left join degree on employee_degree.degree_id=degree.degree_id) where degree_
name in ('Bachelors of Science', 'Masters of Science', 'Doctorate');
```

employee_first_name	employee_last_name	degree_name
Roger	Federer	Bachelors of Science
Steffi	Graf	Masters of Science
Stanley	Hudson	Bachelors of Science
Ryan	Howard	Bachelors of Science
L'Damian	Washington	Bachelors of Science
Claire	Howard	Bachelors of Science
Claire	Howard	Masters of Science
Claire	Howard	Doctorate
Neha	Sharma	Bachelors of Science
Mengqi	Zi	Bachelors of Science
Mahmoud	Diarra	Bachelors of Science
Steve	Shah	Bachelors of Science

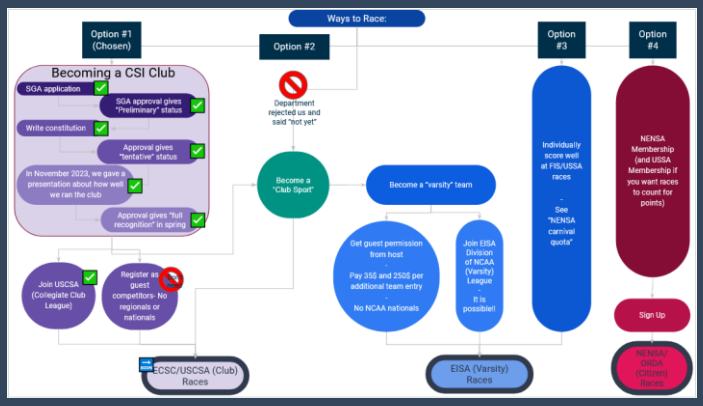


Database-Website Creation, connection and web development. Sites run on Java, HTML and CSS, connect via Python to SQLite to database and display formatted queries. See them all at https://tedyee114.github.io/websites/

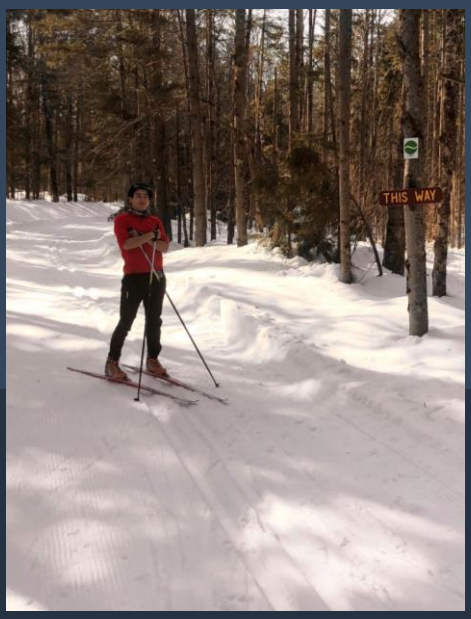
Other Interests

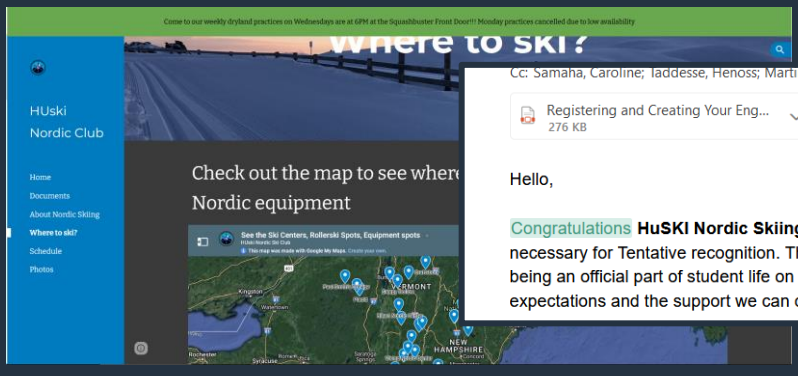
Founder & Current President of Nordic Ski Team at Northeastern University

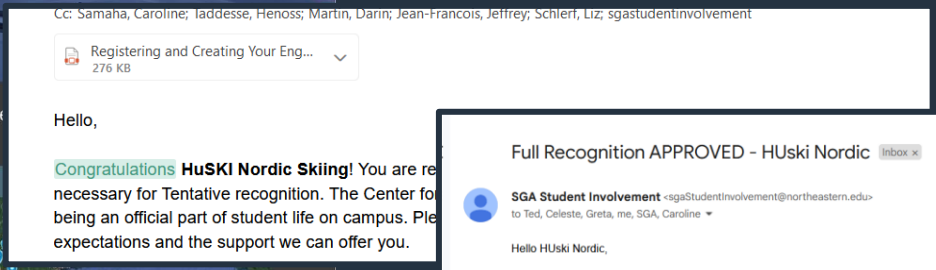
I skied in high school and when I found other skiers, decided to start a collegiate team so that we could race. We went thorough a few options, but after two and a half years, we're a fully recognized Northeastern club registered to race in the US Collegiate Ski Association (USCSA)



I liken the process to starting a business. Recruiting, advertising, permitting, budgeting, networking, sponsors, expertise, and day-to-day functions are a lot of work starting from scratch. With a few other captains, I led the majority of the process, creating the team framework, starting with just a name, and email. Starting a college team is difficult because it's slow and means that it won't really get going until after you graduate, but I saw lots of people who wanted to do something they love and got gave up, so I figured somebody's got to do it.







I like the process and its so rewarding to see something come where there was nothing before. I started by bluffing that there was a team, figured out what I needed to get there, and really had to believe in something I didn't see for a lot more hours than I could've anticipated. I also had fun inventing a brand-the website (https://sites.google.com/view/huskinordic/home), logo, advertising media, and newsletter styles.

Other Interests

I run. Like a lot. I'm on Northeastern's Club Running Team, and compete in cross country, indoor, and outdoor track seasons with them when I'm not skiing.

My claim to fame is a 101mi week in singles.

This year, to shake things up, I qualified for the 2024 Boston Marathon in 2hrs, 48mins.