LillyNovak

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EDUCATION

Olin College of Engineering Needham, MA May 2022
Candidate for *Bachelor of Science, Robotics Engineering* GPA: 3.70
Recipient of four year 50% tuition merit scholarship

Babson College Needham, MA May 2022
Cross registered to receive a minor in finance

SKILLS

Programming: Python, R, MATLAB, HTML, CSS, NetLogo, Javascript , Arduino, Jekyll, C++, C, C#,

Software: Git/Github, ROS, Gazebo, OpenCV, SIMULINK, Unity, Unreal Engine, Magic Leap

Design: Rapid Prototyping, Solidworks, Illustrator, Figma, Miro, Photoshop, Blender

Machining: 3D Printer, Drill Press, Band Saw, Belt Sander, Forge, Laser Cutter, Vinyl Cutter, Vacuum Former, Sheet Metal Sheer, Mill, MIG Welder, Heat Bender

Heavy Equipment: Tractor, Loading/Unloading heavy equipment, Driving a Trailer

Collaborative: Remote Teamwork, Leadership, Self-Directed Learning

Languages: English, Chinese

WORK EXPERIENCE

OCAP Mechanical System Design January 2020 - Present
Olin College of Engineering: Lair Robotics Lab
https://pages.olin.edu/jeff-dusek/OCAP
Prototyped the mechanical systems for aquaculture monitoring robot as part of a seven person research lab
- Developed and prototyped a mechanical system for attaching a robot to existing underwater infrastructure for automatic traversal
- Designed a tunnel drive propulsion system
- Worked remotely while collaborating on a seven person team
- Manufactured components for remote team members

Course Assistant September 2020 – December 2020
Olin College of Engineering: Quantitative Engineering and Analysis
Mentored ~80 students remotely as one of six assistants to a four professor teaching team
- Helped students learn MATLAB, differential equations, multivariable calculus, thermodynamics, Fourier transforms, and signal processing through regular check-ins and office hours

CLEW User Interface and User Experience Designer June 2019 – August 2019
Olin College of Engineering: OCCAM Lab
Worked in a team of three to overhaul a navigational app designed for people with visual impairments through user experience design
- Conducted user research, co-design sessions, and user experience interviews with the visually impaired community around Boston MA
- Redesigned the user experience and navigation flow to provide proper signifiers and assistance for users of many different ability levels ranging from low vision to completely blind

PROJECT HIGHLIGHTS

Swarm Robotics Simulation November 2020 - December 2020
Olin College of Engineering: A Computational Introduction to Robotics
https://sandermiller.github.io/CompRobo2020Swarms/
Collaborated remotely with one person to implement a decentralized swarm robotics simulation
- Implemented a decentralized flocking algorithm based on past research
- Expanded upon an implementation for an existing algorithm by adding predator agents which disrupt the normal flocking behavior
- Replicated observed behavior in the natural world using robotics to further understanding of the underlying processes

Computer Vision Robotics Simulation October 2020 - November 2020
Olin College of Engineering: A Computational Introduction to Robotics

Collaborated remotely with one person to design a robotic algorithm capable of playing soccer.
- Used python and OpenCV to process camera feeds for localizing a robot in its environment and to identify the position of the soccer ball, and the goals
- Developed an algorithm to localize a ROS based robot and kick a ball towards the goal

Particle Filter Robot Localization   September 2020 - November 2020
Olin College of Engineering: A Computational Introduction to Robotics
https://github.com/EverardoG/robot_localization
Remotely collaborated with one person to use a particle filter to localize a robot in a known space
- Implemented an algorithm which can localize a robot in its surroundings if provided a map of the environment and the robot's current sensor readings

Color Sensor Development   November 2018 - December 2018
Olin College of Engineering: Introduction to Sensors Instrumentation and Measurement
Worked with two colleagues to design and fabricate a functional color sensor
- Used electrical filtering to design a circuit which returned a voltage output whose strength was dependent on the color of an observed object

Ultrasonic Range Finder Development   November 2018
Olin College of Engineering: Introduction to Sensors Instrumentation and Measurement
Designed and fabricated a functional ultrasonic range finder to perform to specifications
- Used a combination of WaveGen, Matlab, and logic gates to perform signal processing and generate an ultrasonic signal
- Used active and passive electric filtering to process an ultrasonic return signal and return a voltage corresponding to the distance an object is away

Material Properties of Steel Through Heat Treatment   April 2020 – May 2020
Olin College of Engineering: Materials science and Solid State Chemistry
Worked remotely with one person to develop a cheap material hardness testing device and use it to measure the change in hardness of steel at different stages of heat treatment.
- Designed and tested a cheap method of material hardness testing
- Performed experiments to confirm property changes of steel through hardening and tempering processes.
- Learned how the microstructures of steel affect the material properties and the processes required to control steel microstructures

Mechanical Sculpture Project   April 2020 – May 2020
Olin College of Engineering: Introduction to Mechanical Prototyping
Worked remotely to design a Kinetic sculpture depicting the lifestyle of an early space colonist
- Used Solidworks to design linkages for a tripodial walking mechanism and to create a transmission system to power the moving components of the sculpture
- Physically constructed the sculpture from the CAD design

Autonomous Sentry Turret   October 2019 – December 2019
Olin College of Engineering: Principles of Engineering
http://poe.olin.edu/2019/poetal-turret/
Collaborated on a team of five to design and implement an autonomous sentry turret based off of the game Portal 2
- Helped design and implement an autonomous sentry turret capable of following a target and accurately launching nerf projectiles at them when in range.
- Used Solidworks to design the mechanical flywheel system for launching, storing and reloading nerf projectiles
- Designed and fabricated the casing for the robot using a vacuum former
- Collaborated on the design and implementation of the electrical systems to allow for ease of subsystem integration
- Used HTML and CSS to design a website to showcase the project
- Served the role of project manager aiding communication between team members and handling teaming issues when they arose.

Bio-Inspired Play Experience Design Project   Oct 2018 - December 2018
Olin College of Engineering: Design Nature
Collaborated on a team of four to design and fabricate a play experience for fourth graders based on the lifecycle of sea turtles
- Utilized user oriented design to revise the play experience based on user feedback
- Designed the experience to replicate the natural behaviors of Sea turtles to serve as both an educational and enjoyable experience

Blacksmithing Mentor   September 2018 - Present
Olin College of Engineering: Machine Shop

Received funding and educational credit to maintain the Olin College Blacksmithing Equipment and mentor Students in blacksmithing
- Maintained Blacksmithing equipment
- Mentored other students on the proper safety procedures when blacksmithing
- Mentored students on the blacksmithing trade processes of upsetting, drawing out, heat treating, folding Damascus steel, and beveling.

Head Mechanical Director and Head Machinist   January 2014 - May 2018
FIRST Young Robotics Engineers
Mentored a team of 24 in the construction and design of robotic systems, and proper machine shop procedures, while simultaneously organizing fundraising and team management
- Mentored team members on proper machining techniques and safety
- Used Solidworks to design robotic systems
- Organized fundraising and fund management
- Used a wide variety of machine shop tools to fabricate robotic components
- Designed and fabricated a rigid chain actuator for lifting containers
- Designed and fabricated a ratchet mechanism for a winch drive to protect against backdriving mechanical components

Accessible Video Game Development   November 2019 - December 2019
Olin College of Engineering: Software Design
https://sd19fall.github.io/Sound-Labyrinth/
Collaborated on a team of three to design and implement an adventure video game which delivered the same user experience to users with audio or visual impairments
- Utilized design standards, user interviews, and testing/iteration loops to assure that the game was accessible and provided the same experience to people with audio or visual impairments.
- Performed graphical and audio design for game elements
- Used Jekyll and HTML to create an easily editable website where pages could be written in markdown

Analysis of Formula 1 Racing Data   November 2020 - December 2020
Olin College of Engineering: Data Science
Collaborated on a team of three to use the R language to analyze formula 1 racing data and determine if the performance of the car or the skill of the driver is more important in determining race results
- Used the R programming language to process formula racing data, create predictive models modeling final race position based on driver and car constructor normalized for course, and compare models to determine which aspect is more significant.
- Used the R programming language to generate compelling visuals to convey the conclusion that the driver and the constructor are of similar importance in determining race results.

Modeling A Large Mass Driver Propulsion System   November 2018 - December 2018
Olin College of Engineering: Modeling and Simulation of the Physical World
Collaborated on a team of two to create a model of a large mass driver capable of significantly accelerating the earth
- Simulated a model of a large mass driver.
- Simulated the effect of the mass driver on the orbital mechanics of earth5

Modeling the Radiative Cooling of a White Dwarf Star   October 2018
Olin College of Engineering: Modeling and Simulation of the Physical World
Collaborated on a team of two to use python to model the cooling of a white dwarf star via radiation
- Used python to model the thermal properties of a white dwarf star cooling via radiative cooling
- Confirmed scientific estimates for the time length for a white dwarf star to cool

Modeling the propagation of a genetic disease in a population   September 2018
Olin college of engineering: Modeling and Simulation of the Physical World
Collaborated on a team of two to use python to model the genetic transmission of type one diabetes in a population
- Used python to model type 1 diabetes transmission in human populations and compare with data to confirm research that type 1 diabetes is not exclusively propagated through genetics

Facial Recognition Algorithm   February 2019-March 2019
Olin College of Engineering: Quantitative Engineering and Analysis
Designed an implemented a facial recognition algorithm to identify the person in an image and classify whether or not they were smiling.
- Designed and implemented a facial recognition algorithm using principle component analysis and eigenvector decomposition
- Designed a linear classifier to detect whether or not a face was smiling.

Robot Navigation in an unknown environment   February 2019
Olin College of Engineering: Quantitative Engineering and Analysis

Designed an implemented a gradient assent path planning algorithm which would allow a robot to navigate an unknown obstacle course towards a goal based exclusively on sensor readings.

- Designed and implemented a gradient assent path planning algorithm to navigate a robot through an obstacle course towards a goal.
- Designed an algorithm to identify obstacles in the robot's environment by identifying features from a point cloud.

Passive Solar Energy for Heating a Building   September 2019
Olin College of Engineering Quantitative Engineering and Analysis
Collaborated on a team of three to design a model of the thermodynamic heat transfer of the Olin College Miller Academic Center building and propose feasible solutions to decrease the energy consumption of the building by harnessing passive solar energy.

- Used MATLAB to design a model of the thermodynamic system of the building
- Used the model to simulate possible modifications which could be made to make the building more energy efficient by harnessing the energy of the sun to heat and cool the building.
- Tested model predictions with real world experiments testing the proposed changes on sections of the building.

Redesigning the User Experience of Online Shopping   September 2020 – December 2020
Olin College of Engineering: User Experience Design
https://tnovak-olin.github.io/GroceryStoreUXDesignProject/
Collaborated remotely with three colleagues to redesign the user interface and experience for online grocery store shopping.

- Remotely Performed User Oriented Design to determine what aspects of traditional experiences needed to be revised
- Performed remote codesign sessions to revise prototypes to reflect user' desires
- Revised designs using traditional design metrics to refine the user experience
- Used HTML and CSS to design a website to present the project in and display a functional figma prototype

User Group Collaborative Design Project   January 2020 – May 2020
Olin College of Engineering: User Oriented Collaborative Design
Collaborated with three colleagues and the Needham, MA Firefighters, to design a robotic companion which could assist with extremely dangerous environments difficult for fire fighters, i.e. building collapses..

- Performed extensive collaboration with users to target the most significant painpoints/dangers/challenges of their jobs.
- Worked with users to design a solution which serviced multiple user needs

Augmented reality Assembly Visualizer User Interface Design   September 2019 - December 2019
Olin College of Engineering: AR/VR Lab
Designed the user interface for an augmented reality CAD Assembly visualizer for the magic leap platform.

- Used Unity and C# to design user interface components and tool functionality

Volunteer Program director and Robotics Teacher   June 2017-August 2018
Washoe County School District, NV
Taught at-risk populations of elementary school students around Reno NV programming and engineering skills through hands-on project-based learning

- Collaborated with local organizations, TEAM UP and the Boys and Girls Clubs, to provide materials and space for after school robotics programming classes for at-risk students
- Exposed at-risk students to programming, robotics, and STEM at a young age, in a fun way, to increase awareness of STEM as a viable career pathway regardless of socioeconomic status at birth.