Shaun **Fedrick**
Robotics Engineer

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Professional Experience

current – Jan 2022 — **Mechatronics Engineer | Motion Planning and Controls , ASML, Wilton,Ct**

Currently I work to implement robotic (Controls, Machine learning, Kinematics, and Computer vision) software and hardware changes onto a 6 dof, precision, robotic reticle stage. This involves writing software in matlab, python and C++ for a 6 dof robotic reticle stage to simulate the new feature. I then implement the function onto a fleet of stages within a cross sectoral team.

- Designed, developed, and tested a software algorithm in matlab to optimize pretension values for pull only actuators and to optimize controller parameters using a MIL (machine in the loop) approach. The algorithm was then implemented in C++ to function on a 6 dof robotic reticle stage.
- Refactored a code base designed to simulate the dynamics of a 6 dof robotic reticle stage. Transfered this code base into a modern version control system (git) to aid software collaboration along with adding a new feature to said code base.
- Created a motion planning application in python that utilized multithreading to position the 6 dof reticle stage into several desired positions .
- Lead the development of two new mechatronic tools that will enable automatic testing of electronics,hardware, and control methodologies of a 6 dof robotic reticle stage.
- Designed, developed, and tested a software algorithm in python to keep motor coils warm while preventing movement of the robot in order to minimize thermal stresses due to bonding layers undergoing a phase transition as the motor coils cooled under no load. The algorithm was then implemented in C++ to function on a 6 dof robotic reticle stage.

robotics | controls | Data Analysis | Simulation | Matlab | Python | C++ | Linear Algebra | Statistics | Agile

Dec 2021 – May 2021 — **GRASP Lab | Graduate Student Researcher (Robotics) , University of Pennsylvania, Pennsylvania**

I used a phase change material coupled with a heated insert to create a latching mechanism to add directionality to an origami robot. I then designed and implemented a controller in C++ that ran on a micro controller in real time to control the mechanism .

- Designed and optimized a nonlinear controller using Matlab and Python
- Created a simulation and optimization of a mechanical Design of the latch insert using Python.
- Wrote a controller in C++ to control the latching mechanism.
- See DOI:10.1109/ICRA40945.2020.9196534 for more information on the robot.

C++ | Python | Controls | Rapid Prototyping | Git | Docker | Data Analysis | Robotics

May 2020 – December 2018 — **Fluid dynamic research | Student Researcher, Haverford College and University of Pennsylvania, Pennsylvania**

I worked in collaboration with University of Pennsylvania and Haverford College to investigate the way Non-Newtonian effects impacted lubrication forces within a fluid.

- Analyzed and tracked mechanics of a sphere moving through a fluid using OpenCV

Matlab | OpenCV | Python | Solid Works | Java | Computational Physics | Computer Vision | Rapid Prototyping

May 2019 – December 2016 — **Digital Scholarship | Website designer, Haverford College, Pennsylvania**

I worked on https://archivogam.haverford.edu/en/, a website designed to connect persons illegally detained and forcibly disappeared in Guatemala during the Civil War with friends and relatives.

- Wrote the front and back end of Home and Images Section of Archivo Gam
- Implemented a panning zoom feature and a person search feature

Python | Linux | Django | git | command line

Education

December 2021 – January 2020 — **University of Pennsylvania | Mechatronics and Robotic Systems , (Masters of Science in Engineering), Philly,PA**

- Mechatronic and Robotics engineering master's student.

Robotics | Mechatronics | Controls | Machine Learning | Computer vision | Electrical design | Sensors

December 2020 – August 2016 — **Haverford College| Physics , B.S, Haverford,PA**

- Fluid dynamic research; Thesis : Touch Down of a Sphere in Viscoelastic Media

Physics | Math | Dynamics | Mechanics | Computational Physics | Coding | Problem Solving | Expiremetation