# Dylan Colli

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## Education

MS in Robotics — Expected Graduation: May '24
University of Michigan
GPA: 3.84

BS in Chemical Engineering, *summa cum laude* — May '18
University of Kentucky

## Relevant Employment/Research History

***Univ. of Michigan ARM Lab | Graduate Research Assistant*** — Aug '22 - Current
*Machine Learning, PyTorch, C++, ROS, Bayesian Filters, Optimization* — Ann Arbor, MI

- Implemented deformable object tracker in PyTorch that utilizes differentiable convex optimization (CVXPYLayers) and simulation (NVIDIA Warp) layers.
- Utilizing this real-time tracker for self-supervised online learning of deformable object dynamics, enabling long-horizon planning compared to neural network approaches.
- Leading team of 3 engineers developing a Spot robot framework for agricultural robotics.

***Qualcomm (Arriver, acquired Apr. 2022) | Algorithm Engineer*** — Jan '21 - Jun '22
*C++, Python, Agile, Sensor Fusion, Target Tracking* — Ann Arbor, MI

- Collaborated in the development of vehicle, static object, and pedestrian tracking module that fused radar and camera data via the Cubature Kalman Filter.
- Decreased module runtime by 7%, restoring the 50 Hz runtime requirement, via proposal and implementation of coordinate transform caching in collision detection routine.
- Architected and implemented KPI exploration/visualization tool used in seven person team.

***Loyola Univ. Chicago | Research Assistant (Remote)*** — Jul '20 - Dec '20
*Python, Technical Writing* — Ann Arbor, MI

- Improved parallelization of in-house genetic algorithm through test-driven development.
- Served as the lab's manuscript editor and consulted on software best practices.

***Univ. of Kentucky | Research Assistant*** — Aug '19 - Jul '20
*C++, Python, Non-Convex Optimization, Blender* — Lexington, KY

- Prototyped and co-authored FiberSim, a numerical model of contraction in heart cells.
- Used GoogleTest for test-driven development of RapidJSON C++ integration for model I/O.
- Developed data visualization/animation tool using Blender's Python API.

***Univ. of Kentucky | Research Assistant, Computer Vision Lead*** — Oct '16 - Jul '19
*Python, OpenCV, Event/Feature Detection, Linux* — Lexington, KY

- Developed/published MatchedMyo package for classification of cardiac cellular remodeling.
- Developed/published algorithm for cellular signaling event detection and quantification.
- Advised 4 teammates on the application of classical CV techniques in physiology research.

## Projects And Selected Publications

**Deformable Object Tracking for Garments** — *Deep Learning, Object Tracking, Simulation*
github.com/dcolli23/garmentnets_tracking

- Extended single-prediction GarmentNets pose estimation model to track garment pose.
- Utilized a differentiable filter approach, incorporating learned dynamics using PointNet++.
- Developed manipulated garment simulation framework leveraging Blender's Python API.

**MatchedMyo** — *Python, Feature Detection, OpenCV*
bitbucket.org/pkh_lab/matchedmyo_git — doi.org/10.1016/j.bpj.2019.03.010

- Developed and published classical computer vision package for detecting and quantifying the various modes of structural cell remodeling elicited by heart failure.

**Quantifying Cardiac Cellular Signaling** — *Python, Event Detection*
github.com/dcolli23/spark_analysis — doi.org/10.1113/JP277360

- Developed/published algorithm to detect and quantify cell signaling in microscopy videos.