**Dylan Colli**

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## Education

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| Bachelor of Science, *summa cum laude*, Chemical Engineering Honors Program, Lewis Honors College University of Kentucky GPA: 3.866 | May ‘18 |

## Relevant Employment History

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| *Post-Baccalaureate Research Assistant*  University of Kentucky College of Medicine | Aug ’19 – July ‘20  Lexington, KY |

* Improved user-friendliness of numerical model by implementing GUI using Tkinter package.
* Developed visualization tool for numerical model of heart contraction via Blender’s Python API.
* Improved readability of simulation input/output by implementing RapidJSON C++ library.

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| *Post-Baccalaureate Research Assistant – Image Analysis Team Lead* University of Kentucky College of Arts and Sciences | May ’18 – July ‘19  Lexington, KY |

* Architected a cardiac calcium spark event detection/quantification tool using Scikit-Image and SciPy Python libraries, leading to a co-authored publication in The Journal of Physiology.
* Developed image analysis software for classification of cardiac subcellular remodeling using OpenCV, NumPy, and Scipy that led to a first author publication in The Biophysical Journal.

## Projects

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| *Numerical Optimization Toolkit* – Python, Tkinter, Test-driven development  [github.com/dcolli23/PyOpt](http://www.github.com/dcolli23/PyOpt) | Jan ’20 – Apr ‘20 |
| Motivation: Design an optimization-method-agnostic toolkit for plotting optimization progress. | |

* Provides classes for reducing optimization boilerplate code.
* Visually condenses multidimensional output from model optimization.

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| *Simplifying JSON Trees for Application I/O*– Python, JSON [github.com/dcolli23/jgrapht](http://www.github.com/dcolli23/jgrapht) | Jan ’20 – Mar ‘20 |
| Motivation: Simplify JSON I/O for numerical models. | |

* Implemented methods for tree equality-testing, data type validation, and tree structure manipulation.

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| *Calcium Spark Analysis* – Python, Scikit-Image, Event detection [bitbucket.org/dcolli23/spark\_analysis](http://www.bitbucket.org/dcolli23/spark_analysis) | Sept ’18 – Oct ‘18  [doi.org/10.1113/JP277360](http://www.doi.org/10.1113/JP277360) |
| Motivation: Employ image analysis techniques for investigating cardiac cell signaling heterogeneity. | |

* Developed and published algorithm for quantification of signaling events in 2D videos.
* Implemented denoising and segmentation routines to detect region of interest (ROI) in images.
* Achieved event detection by thresholding the Sobel filter response.

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| *Biomedical Image Analysis* – Python, OpenCV, Feature detection [bitbucket.org/pkh\_lab/matchedmyo\_git](http://www.bitbucket.org/pkh_lab/matchedmyo_git) | May ’17 – July ‘19  [doi.org/10.1016/j.bpj.2019.03.010](http://www.doi.org/10.1016/j.bpj.2019.03.010) |
| Motivation: To assess the subcellular remodeling elicited by heart failure in preserved tissue. | |

* Designed, tested, and optimized published “MatchedMyo” software that employs image processing/analysis routines from the OpenCV Python module.
* Improved feature detection rate by employing OpenCV’s contrast-limited adaptive histogram equalization (CLAHE) technique.
* Drastically improved speed of analysis by utilizing OpenCV’s Fast-Fourier Transform algorithm.