

Education

Stanford University (2022-2027) Stanford, CA

- **Position:** First year graduate student - Applied Physics PhD Program

University of St. Thomas (2018 – 2022) Saint Paul, MN • GPA: 3.98

- **Honors:** [Schulze Innovation Scholar](#); [Stanford University Innovation Fellow](#); [Aquinas Honors Scholar](#)
- **Undergraduate Degrees:** Physics (BS), Computer Science (BS), Business Administration (BA)
- **Clubs/Activities:** Applications of Modern Physics lab teaching assistant, Physics Club, Computer Science Club, Business Undergraduate Mentorship Program student mentor, Fowler Business Challenge Semifinalist

Chanhassen High School (2014 – 2018) Chanhassen, MN • GPA: 4.0

- **Honors:** First in class of 2018 (430 students), DECA (President – Senior Year), DECA Diamond Award, Chanhassen Legion Scholarship, Elks National Foundation Scholarship, Rotary Camp Enterprise Scholarship

Work Experience

NSF REU: The Johns Hopkins University - Computational Sensing and Medical Robotics: Jun. 2021 – Aug. 2021.

Our research investigates multiple signal processing stages for deep learning (DL) application to identify B-line features in lung ultrasound images from COVID-19 patients. The long term goal of this research is to increase health care accessibility in remote locations. My contribution as a member of the Photoacoustic and Ultrasonic Systems Engineering (PULSE) Lab, directed by Dr. Muyinatu Bell, involved:

- Training and testing of neural networks on simulated datasets to identify B-line features
- Development of a DL network layer within our architecture to accept images of real COVID-19 patients for testing our simulation-trained networks
- Development of a custom false positive reduction computer vision algorithm to remove common apparent false positives in the predicted segmentation outputs of our trained networks

NSF REU: University of Illinois Urbana-Champaign - Physics Department: Jun. 2020 – Aug. 2020.

Computational methods in the simulation of fiber Bragg grating (FBG) optical sensor devices. The project focus was on the implementation of optical simulation methods to add additional functionality to an existing FBG simulation software package. I utilized COMSOL Multiphysics simulation software to model wave propagation through various optical materials as a means to interpret and analyze the updated software package. Gained new finite element analysis simulation skills and research publication/presentation skills.

Presentations, Proceedings, and Papers

- Frey, B., Snyder, P., Ziock, K., & Passian, A. (2021). Semicomputational calculation of Bragg shift in stratified materials *Phys. Rev. E*, 104(5), 055307.
- Frey, B., Zhao, L., Fong, T. C., & Lediju Bell, M. (2022, April). Multi-stage investigation of deep neural networks for COVID-19 B-line feature detection in simulated and in vivo ultrasound images. In *Proc. of SPIE Vol*(Vol. 12033, pp. 1203308-1).
- Frey, B., Zhao, L., Bell, M. (2022). *Multi-stage investigation of deep neural networks for COVID-19 B-line feature detection in simulated and in vivo lung ultrasound images* [Conference presentation]. SPIE Medical Imaging Conference 2022, San Diego, CA.
- Frey, B. Zhao, L., Bell, M. (2021, 6 August). *Deep Learning for Lung Ultrasound Imaging of COVID-19 Patients*. Presentation delivered at Johns Hopkins University Computational Sensing and Medical Robotics REU program competition mini-conference.
- Frey, B. (2020, 31 July). *Simulation of Optical Fiber Bragg Grating Devices*. Presentation delivered at the University of Illinois at Urbana-Champaign's Physics REU mini-conference.

Other Experience

- Developed data visualization startup Compusim (compusims.com), and app company Cocoa Studios ([@cocoastudios](https://twitter.com/cocoastudios))
- **Lab Experience:** Proficient in MATLAB use for data processing and visual representation. Experience with SpectraSuite for light spectrum analysis, LabView, and National Instruments instrumentation for signal processing techniques
- **Software Experience:** Experience with Python, C, Java, Bash, HTML5, OnShape (CAD), MATLAB, Mathematica, PHP, Obj. C, JavaScript, COMSOL Multiphysics
- **Hardware Experience:** FPGA experience. Built a 3D printer to print custom-designed VR headsets.