Evan T. Jelly

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PERSONAL STATEMENT

A highly motivated, knowledgeable, and focused optical scientist with over eight years of multi-disciplinary research and engineering experience. Highly capable in advanced biophotonics, image processing, and the design and construction of optical instrumentation. Passionate towards both the advancement of design in science and promoting optics and photonics in public policy. Targeted Ph.D. completion March 2022.

RESEARCH EXPERIENCE

Duke University **2017 - Present**
BIOS Laboratory | Department of Biomedical Engineering | Durham, NC

PhD Advisor: Adam Wax, Ph.D.
Thesis: Development of Optical Coherence Tomography (OCT) Based Technologies for Novel Intraoperative Applications.

Ph.D. Candidate

- Development of optical coherence tomography (OCT) based technologies for intraoperative use.
- Design and fabrication of dual-axis OCT imaging systems for deep tissue imaging.
- Application of OCT towards clinical assessment including evaluation of small bowel graft rejections and grading patello-femoral osteoartitus (OA) in a non-human primate and porcine model, respectively.
- Evaluation of imaging fiber bundles for coherent imaging applications.
- Processing and analysis of spectroscopic-OCT data.
- Experience with precision optical devices, fiber optic components, and optomechanical subsystems.
- Optical design and simulation, including sequential lens design, tolerancing, and scattering analysis.
- Custom NIR-I and NIR-II spectrophotometer design and development including high bandwidth, high resolution, and 2D imaging spectrometers using 3D printed materials.

Lumedica, Inc. **2021 - Present**
Freelance | Durham, NC

Research & Development Consultant

- Provide knowledge, engineering advice, and technical solutions on research projects involving optical coherence tomography.

MicroElastic Ultrasound Systems **2021**
6-month NSF Internship Program | Durham, NC

Research & Development Intern

- Design and fabrication of handheld deep imaging OCT scanners for dental and dermatological application.
- Application of optical coherence elastography (OCE) to measure constructive shearwave interference (CSI) in skin elasticity measurements.
- Delivered on all SBIR research aims under accelerated project timelines.
- Coordinated manufacturing of custom injection-molded parts for ultrasound devices.

Florida State University **2013 – 2014**
Institute for Molecular Biophysics | National High Magnetic Field Laboratory | Tallahassee, FL

Research Assistant

- Characterization of divalent cation-dependent conformational changes in cardiac troponin-C using single-molecule total internal reflection fluorescence (TIRF) microscopy and Förster resonance energy transfer (FRET).
- Construction and maintenance of laboratory optical equipment.
- Microscopy technician at National High Magnetic Field Laboratory optical imaging suite.

General Electric **2011 – 2012**
GE Healthcare Cell Technologies | Cardiff, UK

Graduate Student Researcher | Laboratory Assistant

- hESC cardiomyocyte cell derivation, culturing, and cryopreservation.
- Design and implementation of image-based high-content analysis in drug toxicity studies.

Cardiff University **2011 – 2012**
School of Physics and Astronomy / School of Biosciences | Cardiff, UK

MSc Advisors: Peter Watson, Ph.D. *(Cardiff University) and Rahman Ismail (General Electric)*
MSc Dissertation: Comparing and Contrasting the Relative Performance of Commercial Wide-Field Deconvolution and Line-Scanning Confocal Imaging in Cardiotoxicity Assays.

EDUCATION

Duke University | Durham, NC
Doctor of Philosophy in Biomedical Engineering (in progress; expected: March 2022)
Cardiff University | Cardiff, UK
Master of Science in Biophotonics with distinction
The College of New Jersey | Ewing, NJ
Bachelor of Science in Physics

TEACHING AND MENTORING

Duke University

- Teaching Assistant: Duke University, BME547 - Medical Software Design **2019 - 2021**
- Lecture Series: Fundamentals of Optical Coherence Tomography **Fall 2021**
- Laboratory Instructor: Duke University, Summer Academy - Biomedical Optics **Summer 2017**

PROFESSIONAL SKILLS

- Optical coherence tomography
- Advanced optical microscopy
- Optical/NIR interferometry
- Optical/NIR spectroscopy
- Optical systems design
- Scientific illustration & design
- Mechanical design & fabrication
- GUI/API development
- Digital image processing
- Protein expression & characterization
- Cell culture & sample preparation
- Laboratory record keeping
- **Software and Programming**: Windows, Mac, and Linux; Git; Python; Mathematica; SolidWorks; Matlab; LabView; ImageJ; Zemax; Fortran; TIBCO Spotfire; Altium Designer; Adobe: Ps, Ai, Pr, Ae, Au

RELEVANT GRADUATE COURSEWORK

- Advanced Optics*
- Advances in Photonics*
- Random Signals and Noise*
- Medical Software Design*
- Machine Learning and Imaging*
- Numerical Analysis*
- Biomedical Optics*
- Science Policy* (non-credit)
- Nanostructures and Optical Manipulation†
- Light Spectroscopy†
- Medical Biophotonics†
- Mathematical Tools in Photonics†
- Advanced Optical Bio-Sensing†
- Modern Light Microscopy†

* Duke University
† Cardiff University

PROFESSIONAL ASSOCIATIONS

- SciPol.org Writers Studio, Data Security & Emerging Tech Policy Contributor **2020**
- Duke OSA/SPIE Student Chapter, Treasurer 2018, Vice President 2019 **2017-**
- Biomedical Engineering Society **2017-**
- FSU Students for the Effective Communication of Science (SECS) **2013-2014**
- Biophysical Society **2013-2017**
- SPIE (Society of Photo-Optical Instrumentation Engineers) **2012-**
- The Optical Society (OSA) **2012-**

HONORS AND AWARDS

- NSF Graduate Research Internship Program (GRIP) Fellowship Awardee **2021**
- SPIE Optics and Photonics Education Scholarship Awardee **2021**
- Duke University Fitzpatrick Institute for Photonics, John Chambers Fellowship Awardee **2018**
- Cardiff University Biophotonics & Quantum Optoelectronics Awardee **2012**
- Phi Eta Sigma National Honor Society **2006-**
- National Society of Collegiate Scholars **2006-**
- University of Rhode Island Honors Society,
  Mechanical and Electrostatic Physics Representative **2005-2006**
- University of Rhode Island Dean's List **2005-2007**

PUBLICATIONS

Peer Reviewed:

Jelly, E.T., Zhao, Y., Chu, K.K., Crose, M., Price, H., Steelman, Z.A., and Wax, A., 2021. Deep imaging with 1.3 μm dual-axis optical coherence tomography and enhanced depth of focus. Biomed. Opt. Express 12, 7689-7702.

Jelly, E.T., Kwun, J., Schmitz, R., Farris, A.B., Steelman, Z.A., Sudan, D. L., Knechtle, S. J., and Wax, A., 2021. Optical coherence tomography of small intestine allograft biopsies using a handheld surgical probe. J. Biomed. Opt. 26(9), 096008.

Chu, K.K., Zhao, Y., **Jelly, E.T.,** Steelman, Z.A., Crose, M., Cox, B., Ofori-Marfoh, Y., Moussa, L., Cirri, H., Shaheen, N.J. and Wax, A. Esophageal OCT imaging using a novel paddle probe externally attached to endoscope. *(In preperation)*.

Zhang, H., Kendall, W.Y., **Jelly, E.T**., Wax, A., 2021, Deep Learning Classification of Cervical Dysplasia using Depth-resolved Angular Light Scattering Profiles. 12(8), 4997-5007.

Jelly, E.T., and Song, G., Chu, K.K., Kendall W.Y., Wax, A., 2021. A review of low-cost and portable optical coherence tomography. †Authors contributed equally. *Progress in Biomedical Engineering.*

Jelly, E.T., Steelman, Z.A., and Wax, A., 2019. Optical coherence tomography through a rigid borescope applied to quantification of articular cartilage thickness in a porcine knee model. Opt. Lett., 44(21), pp.5590-5593.

Song, G., Chu, K.K., Kim, S., Crose, M., Cox, B., **Jelly, E.T.**, Ulrich, J.N. and Wax, A., 2019. First Clinical Application of Low-Cost OCT. Transl. Vis. Sci., 8(3), pp.61-61.

Zhao, Y., Chu, K.K., **Jelly, E.T**. and Wax, A., 2019. Origin of improved depth penetration in dual-axis optical coherence tomography: a Monte Carlo study. J Biophotonics, p.e201800383.

Zhao, Y., Chu, K.K., Eldridge, W.J., **Jelly, E.T.**, Crose, M. and Wax, A., 2018. Real-time speckle reduction in optical coherence tomography using the dual window method. Biomed. Opt. Express, 9(2), pp.616-622.

Steelman, Z.A., Kim, S., **Jelly, E.T.**, Crose, M., Chu, K.K. and Wax, A., 2018. Comparison of imaging fiber bundles for coherence-domain imaging. Appl. Optics, 57(6), pp.1455-1462.

Editorial Reviewed:

Jelly, E.T. 2020. "Automatic Listening Exploitation Act of 2019 (HR 4048, 116th Congress)" Policy brief: emerging tech / data security. SciPol.org.

Conference Proceedings:

Jelly, E.T., Wang, P., Sener, P., Hollender, P., Brown, W., and Wax, A. 2022, January. Handheld Deep-Imaging Instrumentation for Dual-Axis Optical Coherence Tomography. In Photonics in Dermatology and Plastic Surgery. SPIE.

Jelly, E.T., Hollender, P., Sener, P., Wang, P., Brown, W., and Wax, A. 2021, October. Dual-Axis OCT for Diagnosis: Imaging Deeper into Highly Scattering Tissue. Biophotonics Conference. Photonics Media.

Chen, C.X., **Jelly, E.T.***, Chu, K.K., and Wax, A., 2021, April. Indocyine Green (ICG) Enhanced Shortwave Infrared Fluorescence Imaging at Video Rate. Biophotonics Congress. OSA. **presenting author.*

Song, G., **Jelly, E.T**., Crose, M., Cox, B., Chu, K.K., and Wax, A., 2021, April. Upgraded Low-Cost OCT System for Retinal Imaging at the Point-of-Care. Biophotonics Congress. OSA.

Kendall, W.Y., Bordas, J., **Jelly, E.T.***, Mirminachi, B., Roper, J., and Wax, A., 2021, April. Spectroscopic optical coherence tomography for early detection of colorectal cancer in a mouse model. Biophotonics Congress. OSA.

Jelly, E.T., Price. H., Chur, K.K., Wax, A. 2021, March. Clinical readiness of dual-axis OCT for dermatology. In Biomedical Applications of Light Scattering XI (Vol. 11657, p. 11657-10) SPIE.

Zhang, H., Kendall, W.Y., **Jelly, E.T.**, Wax, A. 2021, March. Detection of Cervical Dysplasia from Depth-resolved Light Scattering Profiles Using Deep Learning. In Biomedical Applications of Light Scattering XI (Vol. 11657, p. 11657-25) SPIE.

Schmitz, R., Yoon, J., Song, M., **Jelly, E.T.**, Wax, A., Knechtle, S.J., Sudan, D.L. and Kwun, J., 2020, April. A Nonhuman Primate Model of Intestinal Transplantation-Technical Aspects and Early Outcomes. In American Journal of Transplantation (Vol. 20, pp. 400-400).

Jelly, E.T., Kendall, W., Schmitz, R., Knechtle, S. J., Sudan, D. L., Joseph, A., Roper, J., Kwun, J. and Wax, A. Novel Implementations of Optical Coherence Tomography for Clinical Applications in the Lower Gastrointestinal Tract. Endoscopic OCT (pp. OTu4E). OSA.

Chu, K.K., Steelman, Z.A., Crose, M., **Jelly, E.T.**, Cox, B., Ofori-Marfoh, Y., Moussa, L., Cirri, H., Watts, A.E., Shaheen, N.J. and Wax, A., 2020, Combined OCT and angle-resolved low-coherence interferometry using endoscope-coupled paddle probe. In Endoscopic Microscopy XV (Vol. 11214, p. 11214-3) SPIE.

Steelman, Z.A., Ho, D., Zhao, Y., Zhang, H., **Jelly, E.T.**, Song, G., Kendall, W.Y., Crose, M., Cox, B., Chu, K.K. and Wax, A., 2020, Progress in angle-resolved low-coherence interferometry for real-time detection of epithelial dysplasia. Biomedical Applications of Light Scattering X (Vol. 11253, p. 11253-2) SPIE.

Jelly, E.T., Zhao, Y., Chu, K.K., Crose, M. and Wax, A., 2019, September. Expanded Imaging Volume for Dual-Axis Optical Coherence Tomography. In Frontiers in Optics (pp. FM3C-3). OSA.

Jelly, E.T. and Wax, A., 2019, April. Arthroscopic Delivery of OCT Using Low-Cost OCT System for Assessment of Porcine Articular Cartilage Thickness. In Bio-Optics: Design and Application (pp. DT2B-4). OSA.

Song, G., Kim, S., Crose, M., Cox, B., **Jelly, E.T.**., Ulrich, J.N. and Wax, A., 2019, March. First clinical application of low cost portable OCT system (Conference Presentation). In Ophthalmic Technologies XXIX (Vol. 10858, p. 108580E). SPIE.

Zhao, Y., Chu, K.K., Eldridge, W.J., **Jelly, E.T.**, Crose, M. and Wax, A., 2018, April. Speckle Reduction in Optical Coherence Tomography at Video Rate. In Optical Tomography and Spectroscopy (pp. OF3D-3). OSA.

Jelly, E.T., Zhao, Y., Crose, M., Kim, S., Cox, B., Song, G. and Wax, A., 2018, April. Adaptability and Performance of Low-Cost OCT System for use in Benchtop Optical Coherence Microscopy. In Optical Tomography and Spectroscopy (pp. JW3A-32). OSA.