JESSICA LOO

PhD Student, Duke University
jessica.loo@duke.edu
https://jessicaloohw.github.io/

EDUCATION

PhD, Biomedical Engineering, Duke University **2017 – Present**
3.94 GPA

MEng, Biomedical Engineering, Imperial College London **2011 – 2015**
1st Class Honours (equivalent to 4.0 GPA)

RESEARCH / WORK EXPERIENCE

Vision and Image Processing Laboratory, Duke University **August 2017 – Present**

- Developing deep learning-based algorithms for clinical applications such as the automatic segmentation and quantification of biomarkers in retinal and corneal diseases on OCT and slit-lamp images.
- Validating algorithms for real-world clinical applications such as demonstrating that an automatic segmentation algorithm can reproduce the outcome of a real-world clinical trial which used an expensive and time-consuming semi-automatic approach.

Duke Reading Center **August 2017 – Present**

- Developing image analysis software for OCT, SLO, and microperimetry images.
- Analyzing OCT, SLO, and microperimetry images for clinical studies and trials.

Neuramatix Sdn. Bhd. **January 2016 – May 2017**

- Developed a deep learning-based algorithm for a property insurance company to automatically classify property age based on Google Street View images.
- Developed image processing algorithms for automatic detection of salient points in images.

Developmental Biomechanics Laboratory, Imperial College London **June 2014 – August 2015**

- Developed a diagnostic test for the classification of fetal health based on leg and head movement parameters modelled and extracted from clinical cine-MRI scans.
- Developed image processing algorithms to semi-automatically track the positions of the hip, knee, ankle, and spine in fetal cine-MRI scans for investigations into how skeletal development is affected by fetal movement in the womb, particularly in hip dysplasia cases.

PUBLICATIONS

J. Loo, C. X. Cai, J. Choong, E. Y. Chew, M. Friedlander, G. J. Jaffe, and S. Farsiu, "Deep learning-based classification and segmentation of retinal cavitations on optical coherence tomography images of macular telangiectasia type 2," *British Journal of Ophthalmology (in press).*

J. Loo, M. F. Kriegel, M. M. Tuohy, K. H. Kim, V. Prajna, M. A. Woodward, and S. Farsiu, "Open-source automatic segmentation of ocular structures and biomarkers of microbial keratitis on slit-lamp photography images using deep learning," *IEEE Journal of Biomedical and Health Informatics* 25(1), 88-99, **2021.**

M. F. Kriegel, **J. Loo**, S. Farsiu, V. Prajna, M. Tuohy, K. H. Kim, A. N. Valicevic, L. M. Niziol, H. Tan, H. A. Ashfaq, D. Ballouz, and M. A. Woodward, "Measurement Reliability for Anterior Segment and Keratitis Morphology," *Cornea* 39(12), 1503-1509, **2020.**

J. Loo, T. E. Clemons, E. Y. Chew, M. Friedlander, G. J. Jaffe, and S. Farsiu, "Beyond Performance Metrics: Automatic Deep Learning Retinal OCT Analysis Reproduces Clinical Trial Outcome," *Ophthalmology* 127(6), 793-801, **2020**.

K. J. McHugh, D. Li, J. C. Wang, L. Kwark, **J. Loo,** V. Macha, S. Farsiu, L. A. Kim, and M. Saint-Geniez, "Computational modeling of retinal hypoxia and photoreceptor degeneration in patients with age-related macular degeneration," *PLOS One* 14(6), e0216215, **2019**.

J. Loo, L. Fang, D. Cunefare, G. J. Jaffe, and S. Farsiu, "Deep longitudinal transfer learning-based automatic segmentation of photoreceptor ellipsoid zone defects on optical coherence tomography images of macular telangiectasia type 2," *Biomedical Optics Express* 9(6), 2681-2698, **2018**.

S. Verbruggen, **J. Loo**, T. Hayat, J. Hajnal, M. Rutherford, A. Phillips, and N. Nowlan, "Modelling the biomechanics of fetal movement," *Biomechanics and Modelling in Mechanobiology* 15(4), 995-1004, **2016**.

CONFERENCES

J. Loo, C. X. Cai, E. Y. Chew, M. Friedlander, G. J. Jaffe, and S. Farsiu, "Deep learning-based automatic segmentation of retinal cavitations on OCT images of MacTel2," *ARVO Annual Meeting*, Baltimore, MD, **2020**.*

S. Farsiu, **J. Loo**, J. L. Duncan, D. G. Birch, and G. J. Jaffe, "Deep learning-based automatic segmentation of intact ellipsoid zone area on optical coherence tomography images of USH2A-related retinal degeneration," *ARVO Annual Meeting*, Baltimore, MD, **2020**.*

S. Onal, **J. Loo**, T. Nguyen, M. Cherukury, S. Farsiu, and G. J. Jaffe, "In-vivo quantitative analysis of pterygium volume using anterior segment optical coherence tomography imaging," *ARVO Annual Meeting*, Baltimore, MD, **2020**.*

A. Hasan, Z. Deng, **J. Loo**, D. Mukherjee, J. L. Duncan, D. G Birch, G. J. Jaffe, and S. Farsiu, "Meta-learning approach to automatically register multivendor retinal images," *ARVO Annual Meeting*, Baltimore, MD, **2020**.*

J. Loo, T. E. Clemons, E. Y. Chew, M. Friedlander, G. J. Jaffe, and S. Farsiu, "Automatic Deep Learning OCT Analysis Algorithm Reliably Reproduces Expert-Evaluated Outcome of a Randomized Clinical Trial for Macular Telangiectasia Type 2 Treatment," *ARVO Annual Meeting*, Vancouver, BC, **2019** (Poster).

S. Farsiu, **J. Loo,** M. F. Kriegel, M. Tuohy, V. Prajna, and M. A. Woodward, "Deep learning-based automatic segmentation of stromal infiltrates and associated biomarkers on slit-lamp images of microbial keratitis," *ARVO Annual Meeting*, Vancouver, BC, **2019** (Poster).

M. F. Kriegel, **J. Loo,** V. Prajna, S. Farsiu, M. Tuohy, P. M. Gompa, L. Niziol, and M. A. Woodward, "Reliability of physicians' measurements when manually annotating images of microbial keratitis," *ARVO Annual Meeting*, Vancouver, BC, **2019** (Poster).

J. Loo, T. E. Clemons, E. Y. Chew, M. Friedlander, G. J. Jaffe, and S. Farsiu, "Deep Learning Retinal OCT Analysis Reliably Predicts the Outcome of a Real-World Clinical Trial," *Ophthalmic Technologies XXIX*, San Francisco, CA, **2019** (Talk).

J. Loo, L. Fang, D. Cunefare, G. J. Jaffe, and S. Farsiu, "Deep learning-based automatic segmentation of ellipsoid zone defects in optical coherence tomography images of macular telangiectasia type 2," *ARVO Annual Meeting*, Honolulu, HI, **2018** (Talk).

*Conference was cancelled due to COVID-19

TEACHING EXPERIENCE

BME 544 Digital Image Processing (Teaching Assistant) **Fall 2020**

- Developed and taught lectures on deep learning for inverse problems (denoising, super-resolution, etc.) and motion estimation
- Held weekly office hours and responded to students' questions via email
- Graded weekly homework and prepared solutions

AWARDS

John T. Chambers Fellowship Program (Duke University) **2019 – 2020**
One Year Special Award

John T. Chambers Fellowship Program (Duke University) **2018 – 2019**
One Year Special Award

Medical Imaging Training Program (Duke University) **2018 – 2019**
Affiliated Scholar

Duke Ophthalmology Trainee Day Scientific Symposium (Duke University) **2018**
Best research presentation award

Fitzpatrick Institute for Photonics Symposium (Duke University) **2018**
2nd place poster award

Stephen Richardson Prize (Imperial College London) **2015**
Best MEng project award

Engineering Dean's List (Imperial College London) **2013, 2014, 2015**
Top 10% of the class

AREAS OF INTEREST Deep learning, machine learning, computer vision, image processing, image analysis, medical imaging, ophthalmology

TECHNICAL SKILLS Windows OS, Linux OS, MATLAB, C/C++, Python, TensorFlow, PyTorch, MatConvNet, SolidWorks, PSPICE, LTSPICE

OTHER QUALIFICATIONS Machine Learning by Stanford University (Coursera certification: WBV7QCZLNFZV)
Trinity-Guildhall Music Performance, Grade 8 (Piano); ABRSM, Grade 5 (Music theory)

LANGUAGES English (fluent), Malay (fluent), Spanish (basic), Mandarin (conversational)