

# JESSICA LOO

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<https://jessicalooHW.github.io/>

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## EDUCATION

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**PhD, Biomedical Engineering, Duke University**  
3.94 GPA

2017 – Present

**MEng, Biomedical Engineering, Imperial College London**  
1<sup>st</sup> Class Honours (equivalent to 4.0 GPA)

2011 – 2015

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## RESEARCH / WORK EXPERIENCE

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**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.

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## PUBLICATIONS

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**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**.

**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), **2020**.

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**.

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## CONFERENCES

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**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. Gomp, 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	
<b>BME 544 Digital Image Processing (Teaching Assistant)</b>	<b>Fall 2020</b>
<ul style="list-style-type: none"> <li>Developed and taught lectures on deep learning for inverse problems (denoising, super-resolution, etc.) and motion estimation</li> <li>Held weekly office hours and responded to students’ questions via email</li> <li>Graded weekly homework and prepared solutions</li> </ul>	
AWARDS	
<b>John T. Chambers Fellowship Program (Duke University)</b> One Year Special Award	<b>2019 – 2020</b>
<b>John T. Chambers Fellowship Program (Duke University)</b> One Year Special Award	<b>2018 – 2019</b>
<b>Medical Imaging Training Program (Duke University)</b> Affiliated Scholar	<b>2018 – 2019</b>
<b>Duke Ophthalmology Trainee Day Scientific Symposium (Duke University)</b> Best research presentation award	<b>2018</b>
<b>Fitzpatrick Institute for Photonics Symposium (Duke University)</b> 2 <sup>nd</sup> place poster award	<b>2018</b>
<b>Stephen Richardson Prize (Imperial College London)</b> Best MEng project award	<b>2015</b>
<b>Engineering Dean’s List (Imperial College London)</b> Top 10% of the class	<b>2013, 2014, 2015</b>
<b>AREAS OF INTEREST</b>	Deep learning, machine learning, computer vision, image processing, image analysis, medical imaging, ophthalmology
<b>TECHNICAL SKILLS</b>	Windows OS, Linux OS, MATLAB, C/C++, Python, TensorFlow, PyTorch, MatConvNet, SolidWorks, PSPICE, LTSPICE
<b>OTHER QUALIFICATIONS</b>	Machine Learning by Stanford University (Coursera certification: WBV7QCZLNfZV) Trinity-Guildhall Music Performance, Grade 8 (Piano); ABRSM, Grade 5 (Music theory)
<b>LANGUAGES</b>	English (fluent), Malay (fluent), Spanish (basic), Mandarin (conversational)