

# JESSICA LOO

PhD Student, Duke University  
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<https://jessicalooHW.github.io/>

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## EDUCATION

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

August 2017 – May 2022 (Expected)

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

October 2011 – August 2015

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## RESEARCH / WORK EXPERIENCE

### Verily Life Sciences (Internship)

May 2021 – August 2021

- Developed deep learning-based algorithms for quality control of autofluorescence images for pathology applications.

### 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.

### Neuramatrix 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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## SELECTED JOURNAL PUBLICATIONS

**J. Loo**, M. A. Woodward, V. Prajna, M. F. Kriegel, M. Pawar, M. Khan, L. M. Niziol, and S. Farsiu, "Open-Source Automatic Biomarker Measurement on Slit-Lamp Photography to Estimate Visual Acuity in Microbial Keratitis," *Translational Vision Science & Technology* 10(12), 2, **2021**.

**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**.

D. Y. Kim, **J. Loo**, S. Farsiu, and G. J. Jaffe, "Comparison of single drusen size on color fundus photography and spectral-domain optical coherence tomography," *Retina* 41(8), 1715-1722, **2021**.

L. K. Mukkamala, J. Avaylon, R. J. Welch, A. Yazdanyar, P. Emami-Naeini, S. Wong, J. Storkersen, **J. Loo**, D. Cunefare, S. Farsiu, A. Moshiri, S. S. Park, and G. Yiu, "Intraoperative retinal changes may predict surgical outcomes after epiretinal membrane peeling," *Translational Vision Science & Technology* 10(2), 36-36, **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**.

**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**.

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**.

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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## SELECTED CONFERENCE PRESENTATIONS

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E. M. Lad, W. Liang, G. J. Jaffe, Z. Deng, **J. Loo**, D. Mukherjee, and S. Farsiu, "The RUSH2A study: Baseline microperimetry and SD-OCT measures," *ARVO Annual Meeting*, **2021** (Virtual).

**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*, **2020** (Virtual).

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*, **2020** (Virtual).

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*, **2020** (Virtual).

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*, **2020** (Virtual).

**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).

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## TEACHING EXPERIENCE

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### 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, communicated with students via email, graded assignments, and prepared solutions.

### BME 671L Signal Processing & Applied Mathematics (Teaching Assistant)

Spring 2021

- Conducted weekly lab sessions on signal processing using MATLAB.
- Held weekly office hours, communicated with students via email, graded assignments, and prepared solutions.

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## AWARDS

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### Outstanding Teaching Assistant Award (Duke University)

2021

Honorable Mention

### John T. Chambers Fellowship Program (Duke University)

2019, 2020

One Year Special Award

### Medical Imaging Training Program (Duke University)

2019

Affiliated Scholar

### Duke Ophthalmology Trainee Day Scientific Symposium (Duke University)

2018

Best Research Presentation Award

### Fitzpatrick Institute for Photonics Symposium (Duke University)

2018

2<sup>nd</sup> 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

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## AREAS OF INTEREST

Deep Learning, Machine Learning, Computer Vision, Image Analysis, Medical Imaging, Ophthalmology

## TECHNICAL SKILLS

Python, MATLAB, C/C++, TensorFlow, PyTorch, MatConvNet

## OTHER QUALIFICATIONS

Machine Learning by Stanford University (Coursera certification: WBV7QCZLNZFV)  
Trinity-Guildhall Music Performance, Grade 8 (Piano); ABRSM, Grade 5 (Music theory)

## LANGUAGES

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