# Joshua H. Brake

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## Education

**California Institute of Technology**, Ph.D. Electrical Engineering 2019

**California Institute of Technology**, M.S. Electrical Engineering 2016

**LeTourneau University**, M.S. Engineering, Electrical Concentration 2014

**LeTourneau University**, B.S. Engineering, Electrical Concentration 2013

## Academic Appointments

**Harvey Mudd College**, Department of Engineering, Assistant Professor of Engineering 2019-Present

## Publications

A list is also available online.

### Journal Papers

M. Jang*, Y. Horie*, A. Shibukawa*, **J. Brake**, Y. Liu, S. M. Kamali, A. Arbabi, H. Ruan, A. Faraon, and C. Yang "Complex wavefront shaping with disorder-engineered metasurfaces." Nature Photonics 12(2), 84-91 (2018). doi:10.1038/s41566-017-0078-z 2018

H. Ruan*, **J. Brake***, J. E. Robinson, Y. Liu, M. Jang, C. Xiao, C. Zhou, V. Gradinaru, and C. Yang. "Deep tissue optical focusing for optogenetic applications with time-reversed ultrasonically encoded light." Science Advances 3(12), eaao5520(2017). doi: 10.1126/sciadv.aao5520 2017

H. Ruan, T. Haber, Y. Liu, **J. Brake***, J. Kim, J. M. Berlin, and C. Yang. "Focusing light inside scattering media withmagnetic-particle-guided wavefront shaping." Optica 4(11), 1337-1343 (2017). doi: 10.1364/OPTICA.4.001337

M.M. Qureshi*, **J. Brake**, H.-J. Jeon, H. Ruan, Y. Liu, A. M. Safi, T. J. Eom, C. Yang, E. Chung. "In vivo study of opticalspeckle decorrelation time across depths in the mouse brain." Biomedical Optics Express 8(11), 4855-4864 (2017). doi:10.1364/BOE.8.004855

E.H. Zhou, A. Shibukawa, **J. Brake**, H. Ruan, C. Yang. "Glare suppression by coherence gated negation." Optica 3(10),1107-1113 (2016). doi: 10.1364/OPTICA.3.001107 2016

**J. Brake***, M. Jang*, and C. Yang. "Analyzing the relationship between decorrelation time and tissue thickness in acute ratbrain slices using multispeckle diffusing wave spectroscopy," Journal of the Optical Society of America A 33(2), 270-75 (2016). doi: 10.1364/JOSAA.33.000270

D. Wang, E.H. Zhou, **J. Brake**, H. Ruan, M. Jang, and C. Yang. "Focusing through dynamic tissue with millisecond digitaloptical phase conjugation," Optica 2(8), 728-735 (2015). doi: 10.1364/OPTICA.2.000728 2015

### Books

**J. Brake**. "The Engineer's Guide to Introductory Circuit Analysis." New York: McGraw-Hill, 2012. 2012

### Patents

Glare suppression through fog by optical phase conjugation assisted active cancellation US10194100B2 2012

## Presentations

**J. Brake** and C. Yang. "Optical Scattering in Biomedicine: Friend and Foe?" Physics of Quantum Electronics. Snowbird, Utah, January 2019. 2019

**J. Brake**, H. Ruan, J. E. Robinson, Y. Liu, V. Gradinaru, and C. Yang. "Deep-Tissue Optical Focusing for Optogenetics Using Wavefront Shaping." Gordon Research Seminar: Image Science. Easton, MA, June 2018. 2018

**J. Brake**, H. Ruan, J. E. Robinson, Y. Liu, V. Gradinaru, and C. Yang. "Time-reversed ultrasonically encoded (TRUE) focusing for deep-tissue optogenetic modulation." SPIE Photonics West, BiOS. San Francisco, CA, January 2018.

**J. Brake**. "Wavefront shaping in living tissue." Engineering Conferences International: Advances in Optics for Biotechnology,Medicine and Surgery XV. Aspen, CO, July 2017. 2017

**J. Brake**, M. Jang, and C. Yang. "The relationship between decorrelation time and sample thickness in acute rat brain tissue slices." SPIE Photonics West, BiOS. San Francisco, CA, February 2016. 2016

S. Cho, **J. Brake**, C. Joy, and S. Kim. "Refractive index measurement using an optical cavity based biosensor with a differential detection." SPIE Photonics West, BiOS. San Francisco, CA, February 2015. 2015

## Awards

Caltech Biotechnology Leadership Program Fellow 2015-2019

SPIE Photonics West Student Travel Grant Recipient 2018

NIH F31 NRSA Fellow 2015-2017

2nd Place Poster Award, Engineering Conferences International: Advances in Optics for Biotechnology, Medicine and Surgery XV 2017

NSF Graduate Research Fellowship Program: Honorable Mention 2015

LeTourneau University R.G. LeTourneau Outstanding Senior Engineering Student 2014

2nd Place, IEEE Region 5 Circuit Design Competition 2013

LeTourneau University Gold Key Society Member 2013

LeTourneau University Outstanding Junior Engineering Student 2013

LeTourneau University Engineering Honor Society Member 2011-2014

## Work Experience

R&D Intern: Advanced Technology Development, Instrumentation Laboratory 2016

## Teaching Experience

Harvey Mudd College

E155 Microprocessor-based Systems: FA19

E85 Digital Design and Computer Architecture: SP20

California Institute of Technology

EE166 Optical Methods for Biomedical Imaging and Diagnosis: SP17

EE151 Electromagnetic Engineering: SP16, SP15

LeTourneau University

Head Supplemental Instructor: FA12

Electric Circuits 1, Lead Supplemental Instructor: SP14, FA13, SP13, FA12, SP12, FA11, SP11

Electric Circuits 1, Lab Assistant: FA13, SP11

## Research Experience

California Institute of Technology

**Research Assistant** 2014-2019

Developed optical methods in wavefront shaping and time-reversal for suppressing the scattering of light in biological tissue.

LeTourneau University

**Research Assistant** 2012-2014

Experimentally new photonic biosensor architecture to sense refractive index changes.

## Professional Service

Reviewer for: Optica, Applied Optics, Optics Express, Optics Letters, and Biomedical Optics Express