Jesse Lu – Curriculum Vitae

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Education

Stanford University, PhD, Electrical Engineering, June 2013 (in progress)
Stanford University, Masters of Science, Electrical Engineering, May 2012
University of California Los Angeles, Bachelor of Science, Electrical Engineering, June 2006

Honors

Stanford Graduate Fellowship, Stanford University, 2007
Dean's Honors List, University of California Los Angeles, five quarters

PhD Research: Computational design of nanophotonic components

Specifically, the development of software which can design arbitrary linear nanophotonic devices which are fully three-dimensional and multi-modal, exhibit novel functionality, have very compact footprints, exhibit high efficiency, are strongly robust to fluctuations in wavelength, temperature and fabrication error, and are manufacturable. Critically, the developed software does not require the user to be a nanophotonic expert or to perform any manual tuning. Instead, devices are designed solely based on the user's desired performance specification for the device.

Publications

"Objective-first design of high-efficiency, small-footprint couplers between arbitrary nanophotonic waveguide modes" Jesse Lu, Jelena Vuckovic (Optics Express, 2012).
"Inverse design of a three-dimensional nanophotonic resonator" Jesse Lu, Stephen Boyd, Jelena Vuckovic (Optics Express, 2011).
"Inverse design of nanophotonic structures using complementary convex optimization" Jesse Lu, Jelena Vuckovic (Optics Express, 2010).
"Numerical optimization of a grating coupler for the efficient excitation of surface plasmons at an Ag-SiO2 interface" Jesse Lu, Csaba Petre, Josh Conway, Eli Yablonovitch (JOSA B, 2007).

Programming

Fluent in Python, CUDA, and Matlab.
Implemented cloud-based simulation service on Amazon EC2.
Developed hardware-accelerated time- and frequency-domain electromagnetic solvers.
Matlab library for the design of arbitrary linear nanophotonic components.

Research Experience

Graduate Researcher — Jelena Vuckovic Group, Stanford University — 2007-Present

Existing nanophotonic design process consisted of trial-and-error where each simulation about 24 hours to complete. Implemented FDTD and FDFD simulation software on Nvidia GPUs to bring simulation times down to 10 minutes. Also developed a novel "objective-first" nanophotonic design algorithm and demonstrated automated design of arbitrary linear nanophotonic devices.

Undergraduate Researcher — Eli Yablonovitch Group, University of California, Los Angeles — 2005-2006

Surface plasmon focusing device required a grating coupler to inject energy into the surface plasmon mode. Wrote a Matlab program interfacing with a FEM package (COMSOL), developed a hierarchal optimization routine as well as an extended transfer matrix model to produce first-ever thoroughly optimized grating coupler design.