David Hutchison

Ph.D. Applied Physics, Cornell

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RELEVANT EXPERIENCE

Lidar physicist, *Waymo* — Feb 2016 – Present

Developing Waymo's next-gen LIDAR system:

- Co-invented and working on our next-gen lidar. I am responsible and leading the prototyping effort for one large piece of it.
- A prolific inventor: Seven lidar patents either filed or in process, in about 12 months.

Research Scientist, *Intel Labs, Intel Corporation* — Jun 2012 – Feb 2016

Silicon photonics for LIDAR:

- **Design, fabrication, assembly, optical/electrical testing** of on-chip lasers, integrated and free-space optical components. Extremely proficient in:
  - **3D/2D design** (Solidworks, KLayout). 10+ years SolidWorks experience. Led the design and did a most of the layout for one 30-mask tapeout, plus other smaller tapeouts.
  - **Multiphysics (Thermal-Optical-Mechanical-Electrical) finite-element analysis** (COMSOL), including a deep understanding of the underlying physics.
  - **Optical systems simulation** (Lumerical, COMSOL), having designed optical antennas, phased arrays, small form-factor infrared imaging optics, and other integrated optics components.
  - **Lab test setup, testing & automation, data analysis, and reporting** (MATLAB/LabVIEW, JMP), with broad experience in precision motor-/piezo-driven optics, mechanics, and control systems. Experience with shaker table and environmental testing. Lab manager for two optics labs.

Co-founder and CTO, *Smartphone-Powered LAser Tag (SPLAT, Inc.)* — Jan 2012 – Jun 2012

- Built all the hardware and some of the software for microcontroller-based laser tag guns that interface with Android phones. The attached phone augments the game by displaying map, hitcount, etc.

Graduate Research Assistant, *Cornell University* — Aug 2008 – Apr 2014

- Invented a new kind of on-chip optical MEMS inertial sensor; patented.
- Cleanroom tool testing and reports while employed by Cornell Nanofabrication Facility

Research Assistant, *BYU* — Aug 2005 – Aug 2008

- Invented a new class of nanocomposites (ceramic-impregnated carbon nanotubes); patented.
- Lab Manager for two labs including cleanroom tool maintenance and repairs.

EDUCATION & RELEVANT COURSEWORK

M.S. & Ph.D. in Applied Physics (Optics), *Cornell University, Ithaca, NY* — Apr 2014

- Thesis: "Optomechanics for Inertial Sensing"; GPA: 3.79/4; Business & Entrepreneurship minor
- **Engineering courses** include: Precision Machining, Advanced Experimental Physics, Electrodynamics, Nanocharacterization, Quantum Mechanics, Microsystems
- **Business courses** include: Technology Entrepreneurship, Management, Accounting & Financial Decision Making, Leadership Assessment for Managers, Entrepreneurship and Private Equity

B.S. Physics, Magna Cum Laude, *Brigham Young University, Provo, UT* — Aug 2008

- Thesis: "Carbon Nanotubes as a Framework for HAR MEMS"; GPA: 3.96/4, Japanese and Math minors

AWARDS

Intel

- **Intel Labs Edison Award** (for the Top Patent Filer in Intel Labs), 2014
- **"High 5" Award** (five fully-filed utility patents in 12 months), 2014
- **Gordon E. Moore Award for Outstanding Research**, Q3 2013 and Q1 2014

Cornell/BYU

- **Singularity University Scholarship** 2010
- **Cornell Nanofabrication Facility Fellow** 2009
- **Cornell University Lester B. Knight Fellow** 2008
- **Society of Physics Students Leadership Award** 2007

FILED PATENTS

- **12 more utility patents with Intel or Waymo in inertial sensing & LIDAR, in addition to those below.**
- **"Accelerometer Based on Coupling Between Two Optical Cavities,"** 2012, Hutchison & Bhave
- **"X-ray Radiation Window with Carbon Nanotube Frame,"** 2009, Davis, Vanfleet, Hutchison
- **"Carbon Nanotube Assembly,"** 2009, Davis, Vanfleet, Hutchison
- **"Carbon Nanotube MEMS Assembly,"** 2008, Davis, Vanfleet, Hutchison

SELECTED PUBLICATIONS

- **"High-resolution aliasing-free optical beam steering,"** Hutchison *et al.*, Optica, vol. 3, no. 8, Aug. 2016.
- ***"Professional Android Sensor Programming,"*** I wrote chapters 5-6 and partially wrote 7-10, Milette and Stroud, Indianapolis, IN: Wiley, 2012.
- **"Z-Axis Optomechanical Accelerometer,"** Hutchison and Bhave, Proc. 25th Int'l Conf on MEMS, 2012.
- **"Carbon-Nanotube-Templated Microfabrication of Porous Silicon-Carbon Materials with Application to Chemical Separations,"** Song, Jensen, Hutchison *et al.*, Adv. Func. Mater., XX, pp. 1-8, 2011.
- **"Carbon nanotubes as a framework for high aspect ratio MEMS fabrication,"** Hutchison *et al.*, J. MEMS vol. 19, no. 1, pp. 75-82, Feb. 2010.

SKILLS & ATTRIBUTES

- **Exceptional written and oral communications**
  - While a student, performed with an improv comedy troupe for two years
  - Perfect score on GRE Analytical Writing section
- **Dynamic and Adaptable:**
  - Quickly adapt to new projects or tasks.
  - e.g. Coded an extensive layout toolset in Ruby in 3 months, despite no previous Ruby experience.
  - Built a wide range of projects, see davidnhutch.com. Nothing is too far afield.
- **Exemplary work ethic and teamwork ability:** Strong team player that pushes tasks through obstacles to completion.
- **Cleanroom fabrication: >**10 years' experience with all standard cleanroom techniques, including RIE, DRIE, e-beam lithography, photolithography, thin-film processing and characterization.
- **Highly skilled in device testing/characterization:** optical and electrical probing, free-space and integrated optics, inertial sensor characterization, materials characterization.
- **Language experience:** Python, Ruby, MATLAB
- **Additional software proficiency:** SolidWorks, COMSOL, KLayout, LabVIEW
- **Languages:** English (native), Japanese (working proficiency)
- **Work eligibility:** U.S. Green Card (New Zealand citizen)