Michael Whitson

+1.617.378.8977
mwhitson@alum.mit.edu

SUMMARY

Microfabrication engineer, specializing in MEMS and nanodevice design and process development at pre-production laboratory scale, with over 10 years cleanroom experience. Multidisciplinary generalist background including software, analog circuits, digital and embedded systems, optics, materials, mechanics, and device physics. Member of IEEE.

OBJECTIVE

Seeking full-time position contributing to research in novel micro/nanoscale device development and micro/nanofabrication process techniques. Ideal position is a technical-track team member, making use both of device theory and hands-on laboratory skills. Top locations: Boston/New England, Seattle/Pacific Northwest, Denver/Mountain West, Canada, Northern Europe.

EXPERIENCE

Senior Research Engineer (Optical MEMS) **Feb 2010—Present**
Research Engineer **Apr 2008—Feb 2009**
Optron Systems – Waltham, MA

Principal Investigator for company's MEMS deformable mirror spatial light modulator and infrared/visible video projection system:

- Fabricated optical MEMS devices, including fully functional megapixel spatial light modulators and simplified test structures for short-loop experiments. Processes included contact and maskless UV photolithography, reactive ion etching, polymer pellicle fabrication, and low-temperature metal evaporation.
- Designed and fabricated positive and negative tone photomasks for experimental MEMS structures.
- Optimized MEMS devices and fabrication procedure, including material selection, MEMS device structure and geometry, microfabrication process steps, and custom tooling and fixtures for sample manipulation. Designed and executed experiments, demonstrating improved video performance, device yield, and device uniformity.
- Developed computational Fourier optics analysis of MEMS device and optical system in Mathematica.
- Coordinated and integrated subcontractor efforts including ASIC design and fabrication, digital video interface electronics design and manufacturing, and chip dicing and packaging.
- Developed FPGA/embedded digital video-to-MEMS interface and signal processing firmware, in mixed VHDL/Verilog/C. Developed end-user video testing and demo suite in Python.
- Wrote primary technical components of proposals and reports for DoD and NSF SBIR programs, including successful DoD SBIR Phase I and II selections. Wrote business development, marketing, and technical presentation materials, including white papers, slide shows, and company website.

Graduate Intern (Optical Thin Films) **Jul 2009—Oct 2009**
OSRAM Opto Semiconductors – Regensburg, Germany

- Upgraded metrology procedures for extraction of thin film optical properties, using spectroscopic ellipsometry and reflectometry with optical stack model fitting algorithms.
- Delivered data and models for several optical films representing significant improvements in accuracy of in-house datasets, as well as comprehensive summary report and training manual.

Research Assistant (MEMS) **Sep 2006—Dec 2007**
Precision Compliant Systems Laboratory (MIT) – Cambridge, MA

- Collaborated on device and microfabrication process design of mesoscale/MEMS six-axis flexure-based nanopositioning system. Performed precision error budget analysis, device CAD in SolidWorks, and finite element simulations in COMSOL.
- Designed and prototyped microfabricated kinematic couplings for precision fixturing, using anisotropic orientation-dependent silicon etching for high-quality V-grooves.

EXPERIENCE (CONT'D)

Visiting Researcher (MEMS) **Oct 2005—Aug 2006**
Esashi and Haga Laboratories (Tohoku University) – Sendai, Japan

- Performed device design, analysis, and preliminary fabrication of a piezoelectric MEMS ultrasonic transducer, for use in minimally invasive intravascular surgical imaging.
- Integrated MEMS fabrication process involving precision thinning, lapping, and polishing of bulk piezoelectric ceramics, thermocompression bonding, and deep reactive ion etching.
- Characterized electro-acoustic performance of prototype devices by spectral impedance analysis, using custom GPIB interface in perl.

Nanofabrication Technician **Jun 2004—Sep 2005**
Nantero – Woburn, MA

- Performed nanofabrication of NEMS prototypes for carbon nanotube nonvolatile memory and other products, using UV and electron beam lithography, thermal evaporation, reactive ion etch, and proprietary nanotube-specific process steps.
- Characterized process results using scanning electron and atomic force microscopy. Performed manual and automated electrical tests of process materials, fabricated test structures, and prototype nanodevices, including LabView testbenches.

Intern (MEMS) **Jun 2003—Aug 2003**
Hitachi Central Research Labs – Tokyo, Japan

- Performed design, finite element simulation, and optimization of simple MEMS beam resonators in Coventor.

EDUCATION

Massachusetts Institute of Technology — Cambridge, MA

S.B., Electrical Engineering & Computer Science **Jun 2007**
M.Eng. candidate, Electrical Engineering & Computer Science (pending thesis submission) **Sep 2016**

SKILLS

10+ years laboratory-scale MEMS/NEMS microfabrication experience:

- Processes: Photomask layout and write, vacuum and plasma system operation, spin coating, UV contact and direct-write photolithography, electron beam lithography (EBL), thermal and e-beam evaporation, sputtering, chemical vapor deposition (CVD), atomic layer deposition (ALD), reactive ion etch (RIE, including DRIE), lift-off, wet etch, die saw, precision lap and polish, compression bonding.
- Metrology: Optical, scanning electron (SEM), and atomic force microscopy (AFM). Spectroscopic ellipsometry and reflectometry. Optical and probe-based surface profilometry.

Strong software generalist background including earlier professional experience as Unix administrator and systems programmer.

- Technical software: MATLAB, Mathematica, COMSOL, SolidWorks, Layout Editor, NPGS, AutoCAD, Coventor.
- FPGA/digital and embedded development in Xilinx ISE/EDK.
- Technical writing experience in Word and LaTeX.
- Development: Small/medium project work in Verilog, C, perl, python, and Unix shell scripts.

International work, study, and language experience:

- Conversational Japanese and Norwegian, basic German.