Michael Shaughnessy

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LinkedIn - GitHub

Skills

- **Data engineering and algorithm design**
- **Software development: databases, distributed systems, web**
- **Modeling, simulation, and optimization**
- **Technical communication**

Languages & Software: Python, Perl, Linux, SQL, Excel, C++, Matlab, Redis, Git, MongoDB, TeX, VASP, LAMMPS, VMD

Experience

2014- Present **RTBiQ, Inc. San Francisco:** *Data Engineer/ Data Scientist*
Designed and implemented real-time bidding control and statistical optimization algorithms for pricing mobile advertising.
• Dynamic control algorithm lowers cost by to 50-100%, compared to the previous method and replies to up to hundreds of thousands of queries per second with latency less than 150 ms.
• Built a Bayesian machine learning that allows customers to automatically avoid fraudulent impressions and systematically improve KPIs.
• Created QA test harness, including remote test ad exchange, communicating over HTTP.
• Built video ad unit capability, allowing customers to upload video advertising creative. Dynamically generated VAST XML bid responses to video auction requests. Integrated the platform with two video advertising exchanges, LiveRail and Vdopia, generating up to tens of thousands of requests per second.

2013-2014 **Synopsys TCAD, Mountain View:** *R&D Engineer*
Defined a methodology for interfacing quantum mechanical calculations with commercial continuum reaction-diffusion simulators.
• Built software tool and API using Python and C++ to ingest large scale simulation data and efficiently compute diffusion parameters.
• Used non-linear regression and Monte Carlo simulations to estimate mole-fraction dependent parameters for semiconductor alloys.
• Calculated ab-initio data sets for ternary III-V alloys and dopants - enabled customers to simulate these materials without experimental data.
• Set up a Linux-based distributed compute environment for rapid, parallelized multi-scale

calculations. Used VASP, LAMMPS, VMD, C++, Bash and Python scripting.

2011-2013 **Sandia National Labs, Livermore:** *Postdoctoral Researcher*
Developed a machine learning tool for molecular dynamics simulations based on *ab-initio* calculations without interatomic potentials or force fields. Predicted contact resistance to carbon nanostructures using multi-scale methods. Simulated transport across grain boundaries in thermoelectric materials and developed a thermoelectric materials aging software package. Initiated and won U.S. Naval Research Lab funding for a multi-year topological insulator device research effort.

2009-2011 **Lawrence Livermore National Lab, Livermore:** *Lawrence Scholar*
Identified new magnetic alloys for permanent magnet and spintronic applications. Utilized tera-scale high-throughput clusters and databases for multi-scale modeling.

2004-2011 **University of California, Davis:** *Research Assistant*
Calculated properties of spintronic using density functional theory. Investigated topological and quantum mechanical properties of black hole and Euclidean solutions in gravity. Lead laboratory courses in physics and wrote solutions for graduate quantum mechanics courses.

2003-2004 **Musculoskeletal Research Lab, Hershey:** *Student Researcher*
Created nanostructured surfaces for bone cell growth using plasma etching and polymer spin-coating. Characterized cell response using FTIR spectroscopy and electron microscopy.

2002 **Cornell University Controlled Environment Agriculture, Ithaca:** *Student Researcher*
Developed a physical model of water diffusion in germinating seeds and built a hydroponic sprouting system.

2000-2004 **Cornell University Physical Sciences Library, Ithaca:** *Library Manager*
Managed day-to-day library operations and customer service.

Education

2004 BS, Biological Engineering, Cornell University, Ithaca
2011 PhD, Physics, University of California, Davis
Thesis: *Electronic and Magnetic Structure in Doped Semiconductors*

Honors/Clearance

2011 DOE EERE Postdoctoral Fellowship Awardee
2009 Lawrence Scholar Fellowship
2011-2013 DOE L Clearance

Patents

Filed 26 September 2014 (Pending)
- Adaptive Parallelization for Multi-Scale Simulation (14/497681)

- First Principles Design Automation Tool (PCT/US14/57803)
- Estimation of Effective Channel Length for FinFETs and Nanowires (PCT/US14/57637)
- Simulation Scaling with DFT and Non-DFT (14/498458)
- Iterative Simulation with DFT and Non-DFT (14/498492)
- Parameter Extraction of DFT (PCT/US14/57840)
- Characterizing Target Material Properties Based on Properties of Similar Materials (14/497695)
- Mapping Intermediate Material Properties to Target Properties to Screen Materials (PCT/US14/57707)

Publications

2008 • J.Y. Lim, M. Shaughnessy, Z. Zhou, H. Noh, E. A. Vogler, and H. J. Donahue. Surface energy effects on osteoblast spatial growth and mineralization. *Biomaterials* **29**: 1776-1784

2009 • M. Shaughnessy, C.Y. Fong, R. Snow, K. Liu, J. Pask, and L.H. Yang. Origin of Large Moments in Mn_xSi_{1-x}. *Appl. Phys. Lett.* **95**: 022515

• C. Y. Fong, M. Shaughnessy, R. Snow, Kai Liu, J. E. Pask, and L. H. Yang. Physical origin of measured magnetic moment in Mn_xSi_{1-x} with x = 0.1%. (invited) *Proceedings of SPIE*, **7398**: 73980J-1

2010 • M. Shaughnessy, C.Y. Fong, L.H. Yang, Ryan Snow, X.S. Chen, and Z.M. Zhiang. Structural and magnetic properties of single dopants of Mn and Fe for Si-based spintronic materials. *Phys. Rev. B* **82**: 035202

• C. Y. Fong, M. Shaughnessy, R, Snow, and L. H. Yang. Theoretical investigations of defects in a Si-based digital ferromagnetic heterostructure - a spintronic material. *Physica Status Solidi C*, **7**: 747

2011 • M. Shaughnessy, Ryan Snow, L. Damewood, and C. Y. Fong. Memory and Spin Injection Devices Involving Half Metals. *Journal of Nanomaterials*, **2011**: 140805

2012 • S. Dag, M. Shaughnessy, C.Y. Fong, X.D. Zhu, L.H. Yang. First principles studies of a Xe atom adsorbed on NB(110) surface. *Physica B*, **407**: 2100

• C. Y. Fong, M. Shaughnessy, L. Damewood, and L. H. Yang. Theory, Experiment and Computation of Half Metals for Spintronics: Recent Progress in Si-based Materials. *Nanoscale Systems: Mathematical Modeling, Theory and Applications*, **1**: 1-22, 2012.

2013 • M. Shaughnessy, C. Y. Fong, L. Damewood, C. Felser and L. H. Yang. Structural variants and the modified Slater-Pauling curve for transition-metal-based half-Heusler alloys. *Journal of Applied Physics*, **113**: 043709 (2013)

• A.C. Ford, M. Shaughnessy, B.M. Wong, A. Kane, O.V. Kuznetsov, K.L. Krafcik, W.E. Billups, R.H. Hauge, F. Leonard. Physical Removal of Metallic Carbon Nanotubes from Nanotube Network Devices Using a Thermal and Fluidic Process. *Nanotechnology.* **24**: 105202.

• L.H. Yang, M. Shaughnessy, L. Damewood, C.Y. Fong. Half-metallic hole-doped Mn/Si trilayers. *Jour. of Phys. D.: Appl. Phys.*,

2014 • M. Shaughnessy, J.D Sugar, N. Bartelt, J. Zimmerman. Energetics and thermodiffusion of Au in Bi_2Te_3. Journal of Applied Physics.

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