Michael Shaughnessy

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Machine learning, simulation, and optimization

Data science / data engineering

Python, AWS, Redis, Git, Linux, SQL, Excel, Matlab, TeX, scikit-learn, RTB

Experience

Present **Flourish Data Services:** *Managing Partner*

Reinforcement learning and machine decisioning for ad-tech and IoT.

2014- 2015 **RTBiQ, Inc. San Francisco:** *Data Scientist / Data Engineer*

Designed and implemented algorithms for pricing mobile advertising.

- New dynamic control algorithm lowered cost by to 50-100%, compared to the previous method, and replied to tens of thousands of queries per second with latency less than 150 ms.
- Built a Bayesian machine learning system allowing customers to automatically avoid fraudulent impressions and systematically improve KPIs.
- Created QA test harness for bidder system, including remote test ad exchange, communicating over HTTP.
- Built video ad unit capability, enabling video advertising creative. Dynamically generated VAST XML bid responses. Integrated with LiveRail and Vdopia RTB video ad exchanges.

2013-2014 **Synopsys TCAD, Mountain View:** *R&D Engineer*

Combined quantum models with commercial TCAD software.

- 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 multi-scale simulations. (VASP, LAMMPS, VMD, C++, Bash and Python)
- Monte Carlo simulations to estimate mole-fraction dependent parameters for semi-

conductor alloys.

2011-2013 **Sandia National Labs, Livermore:** *Postdoctoral Researcher*
Developed a machine learning tool for molecular dynamics simulations. Predicted contact resistance to carbon nanostructures and simulated transport across grain boundaries in thermoelectric materials. Initiated and won U.S. Naval Research Lab funding for multi-year topological insulator device research.

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

2004-2011 **University of California, Davis:** *Research Assistant*
2003-2004 **Musculoskeletal Research Lab, Hershey:** *Student Researcher*
2002 **Cornell Controlled Environment Agriculture, Ithaca:** *Student Researcher*
2000-2004 **Cornell Physical Sciences Library, Ithaca:** *Library Manager*

Education

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

Honors/Clearance

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

Patents

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.*

2015 - L. Damewood, B. Busemeyer, M. Shaughnessy, C.Y. Fong, L.H. Yang, C. Felser. Stabilizing and increasing the magnetic moment of half-metals: The role of Li in half-Heusler LiMn Z (Z= N, P, Si). *Physical Review B.*

- M. Shaughnessy and R. E. Jones, Efficient use of an adapting database of ab initio calculations to generate accurate Newtonian dynamics. *Journal of Chemical Theory and Computation.*

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