

JAMES FONSECA
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PROFILE

Software engineer with strong scientific research background and programming, simulation, and algorithm expertise. Experience working with ambiguous subject matter and many types of code. Ability to handle multiple projects concurrently. Goal-oriented and able to understand all aspects and scales of a problem. Extensive work in team environments and collaborative efforts and eagerness to take on leadership roles.

AREAS OF EXPERTISE

Software Development
Computational Biology
Artificial Intelligence
Parallel Computing

Software Testing and Debugging
Bioinformatics
Web Programming
Algorithm Design

EXPERIENCE

Rush University Medical Center 2008–present
Postdoctoral Researcher, Department of Molecular Biophysics and Physiology

- Developed software using Monte Carlo algorithms to explain physiological properties of protein ion channels using high-performance parallel computing systems.
- Enhanced simulation software to handle easily modifiable complicated 3D protein models.
- Conducted computer simulations of reduced models of the potassium and sodium ion channels, which are vital to human life, to explain ion selectivity and ion permeation experimental results.
- Engineered streamlined approach for calibrating energy variational analysis results.

Ohio University 2005–2008
Research Assistant, Department of Electrical Engineering and Computer Science

- Performed computational molecular dynamics simulations of the sodium pump (Na⁺, K⁺-ATPase) protein using parallel computing systems to determine physiological properties of ion selectivity and permeation.
- Developed a novel, complete, methodology for preparing and running simulations of transmembrane proteins and subsequent analysis of 3D trajectories, pathways, and electrostatic data.
- Expanded nanoMOS software to handle quantum mechanical effects due to manufacturing fluctuations of silicon dioxide in double-gate MOSFETs.

Teaching Assistant, Department of EE & CS 2001–2005

- Received exceptional reviews for teaching weekly electrical engineering instrumentation and principles lab classes of 20-30 students three quarters per year.
- Graded homework and lab reports.
- Revised lab manual with new homework questions, experiments, and exercises.

EDUCATION

Ohio University June, 2008
Ph.D., Electrical Engineering
Dissertation Title: “Temporal and Steric Analysis of Ionic Permeation and Binding in Na⁺,K⁺-ATPase via Molecular Dynamic Simulations”

Ohio University June, 2004
M.S., Electrical Engineering
Thesis Title: “Accurate Treatment of Interface Roughness in Nanoscale Double-Gate Metal Oxide Semiconductor Field Effect Transistors using Non-Equilibrium Green’s Functions”

Virginia Tech June, 2001
B.S., Computer Engineering, Minor in Computer Science

SELECTED PUBLICATIONS

Y. Hyon, **J. E. Fonseca**, C. Liu, B. Eisenberg, A new Poisson-Nernst-Planck equation for charge inversion (submitted)

J. Giri, **J. E. Fonseca**, B. Boda, D. Henderson, B. Eisenberg, Self-organized models of selectivity in calcium channels, *Physical Biology*, **8**, 026004, 2011.

J. E. Fonseca, S. Mishra, S. Kaya, and R. F. Rakowski, Exploration of Na⁺,K⁺-ATPase ion permeation pathways via molecular dynamic simulation and electrostatic analysis, *Journal of Computational Electronics*, **7** (1), 20-3, 2008.

J. E. Fonseca, S. Kaya, S. Guennoun, and R. F. Rakowski, Temporal analysis of valence and electrostatics in ion-motive sodium pump, *Journal of Computational Electronics*, **6** (1-3), 381-5, 2007.

J. E. Fonseca, S. Kaya and R. F. Rakowski, Temporal and steric analysis of ionic permeation and binding in SERCA via molecular dynamic simulations, *Nanotechnology*, **18** (42), 424022-8, 2007.

J. Fonseca and S. Kaya, Accurate treatment of interface roughness in nanoscale DG MOSFETs using non-equilibrium Green's functions, *Solid State Electronics*, **48** (1-2), 1843-7, 2004.

TECHNICAL SKILLS

Programming Languages: C, C++, Fortran, Java, Matlab, Mathematica, Python, Visual FoxPro, Perl, bash scripts, assembler

Modeling and Data Visualization Tools: AVS, OpenDX, GROMACS, NAMD, VMD, SPDBV, MODELLER, and APBS

ORGANIZATIONS & AWARDS

Condensed Matter and Surface Science Studentship, 2007

Research/Teaching Assistantship, Russ College of Engineering and Technology 2001–2008

Ohio Supercomputer Center Major Grant (300,000 processor hours), 2006

Mitchell Scholarship, Russ College of Engineering and Technology, 2003

Eta Kappa Nu Engineering Honor Society