STEVEN D. ESSINGER

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CAREER SUMMARY

- Recent **Ph.D.** graduate transitioning to career in **data science**, machine learning and analytics
- 5 years experience developing novel end-to-end computational pipelines (**data wrangling** through presentation)
- Experience in mathematical modeling and **machine learning** including classification, clustering, regression, dimensionality reduction, **data visualization**, and feature selection
- **Team-lead** engineer in multinational product R&D group developing highly scalable wireless electronic paper retail signage system, which inspired **numerous patents** and two successful long-term pilot demonstrations

ENGINEERING AND RESEARCH EXPERIENCE

Drexel University, EESI Laboratory, Philadelphia, PA   September 2008-December 2013

- Graduate Research Fellow

  Algorithm & Method Development
  - Coupled regression and non-parametric hypothesis testing for detecting biological interactions **(R-package: NullSens)**
  - Built **unsupervised machine learning** approach for hierarchical classification of DNA sequences
  - Conceived particle swarm optimization method for ordering biological samples

  End-to-End Data Analysis (Data Munging thru Visualization)
  - Developed Python toolkit to integrate custom databases, alignments and trees for **exploratory analyses**
  - Created **analytical pipeline** for performing meta-analysis of fish gut communities for ecologist collaborator
  - Critiqued dimensionality reduction tools for biological sample visualization
  - Routinely performed **systematic benchmarking** of bioinformatics algorithms; advised best practices

Metrologic Instruments (Honeywell), Blackwood, NJ   September 2004-08

- Research & Development Engineer
  - **Lead Engineer** for Electronic Paper Signage Display System; Integrated with a proprietary 802.15.4 network
  - Team Lead for globally distributed team, **delivered prototype** electronic paper system to U. of Arkansas and Airbus
  - Established **systems design** and **intellectual property** for the display system's product portfolio
  - Developed novel laser illumination denoising circuit (patented) resulting 50% increased bar-code scanner read range
  - Prototyped HF RFID (13.56 MHz) reader for smartcard applications; Novel product design based on prototype

Electronic Warfare Associates, Mt. Laurel, NJ   September 2003-March 2004

- Hardware Engineer
  - Designed variety of robust digital system architectures utilizing Xilinx FPGAs and VHDL code

Federal Aviation Administration, Atlantic City, NJ   September 2002-March 2003

- Engineering Co-op
  - Performed test evaluation/data acquisition of novel aircraft landing system onboard aircraft in flight and in laboratory

TECHNICAL SKILL SET

- Machine Learning, Statistics, Mathematical Modeling, Data Munging, Visualizations
- Python (Generalist), {Numpy, Pandas, Scikit-learn, Matplotlib, iPython}, MATLAB, R, SQL, Condor, LaTeX
- Systems Design, Prototyping, Intellectual Property Spec/Drawing, Project Management

EDUCATION

Drexel University, Philadelphia, PA

- Ph.D., Electrical & Computer Engineering,   December 2013
- M.S., Electrical & Computer Engineering,   June 2011
- B.S., Electrical & Computer Engineering, GPA 3.56, **Cum Laude**   June 2006

HONORS AND AWARDS

- Best Research Poster Award (3rd): IEEE Research Symposium, Drexel University, $100   March 2013
- Best Student Paper Award: IEEE Signal Processing Conference, Sedona, AZ, $500   Jan 2011
- NSF Discovery K-12 Research Fellowship, $24,000 per year + tuition   Sept 2008-2010
- Travel Grant to the IEEE World Congress on Computational Intelligence, $800   July 2010
- Best Research Poster Award (1st): IEEE Graduate Forum, Drexel University, $500   Mar 2010
- Travel Grant to the Pacific Symposium on Biocomputing, $1,200   Jan 2010
- NSF Fellow Biocomplexity Summer School, Istanbul Turkey, $2,200   July 2009

U.S. PATENTS SELECTED, PENDING (23) & GRANTED (22)
PENDING, GRANTED → USPTO Patent Search (in/Essinger and an/Metrologic)

1. Essinger, et al.   8,457,013   June 4, 2013
   Methods of and apparatus for programming and managing diverse network components, including electronic-ink based display devices, in a mesh-type wireless communication network

2. Knowles, et al.   7,793,841   September 14, 2010
   Laser illumination beam generation system employing despeckling of the laser beam using high-frequency modulation of the laser diode current and optical multiplexing of the component laser beams

3. Essinger, et al.   US2010/0177707 A1   July 15, 2010
   Method of and apparatus for increasing the SNR at the RF antennas of Wireless end-devices on a wireless communication network, while minimizing the RF power transmitted by the wireless coordinator and routers

PUBLICATIONS

Journal Papers
1. Essinger, S., Blackwood, C., Rosen, G. "**NullSens: Partitioning Abiotic and Biotic Contributions to Community Variation**", Ecology, 2014. (In Review)

2. Essinger, S., Reichenberger, E., Blackwood, C., Rosen, G. "**A Python Toolkit for ARB to Integrate Custom Databases and Externally-built Phylogenies**", PLOS ONE, 2014. (In Review)

3. Sullam, Karen; Essinger, Steven; Lozupone, Catherine; O'Connor, Michael; Rosen, Gail; Knight, Rob; Kilham, Susan; Russell, Jacob. "**Environmental and ecological factors that shape the gut bacterial communities of fish: a meta-analysis***," Molecular Ecology, 2012.

4. Rosen, G., Polikar, R., Diamantino, C., Essinger, S., and Sokhansanj, B. "**Discovering the Unknown: Improving Detection of Novel Species and Genera from Short Reads**," Journal of Biomedicine and Biotechnology, Jan. 2011.

5. G. Rosen and S. Essinger, "**Comparison of Statistical Methods to Classify Environmental Genomic Fragments**," IEEE Transactions on Nanobioscience, Sep. 2010, pp. 1-7.

6. Gail Rosen, Bahrad Sokhansanj, Robi Polikar, Mary Ann Bruns, Jacob Russell, Elaine Garbarine, Steve Essinger, and Non Yok. "**Signal Processing for Metagenomics: Extracting Information from the Soup**," Current Genomics, Nov. 2009.

Conference: Peer-Reviewed Paper with Oral Presentation
1. Steve Essinger and Gail Rosen. "**Ordering Samples Along Environmental Gradients using Particle Swarm Optimization**," IEEE EMBC Conference, Boston MA, August 2011.

2. Steve Essinger and Gail Rosen. "**An Introduction to Machine Learning for Students in Secondary Education**," IEEE Signal Processing in Education Workshop, January 2011. **(Best Student Paper Award)**

3. Steve Essinger, Robi Polikar, and Gail Rosen. "**Neural Network-based Taxonomic Classification for Metagenomics**," IEEE International Joint Conference on Neural Networks, July 2010. **(Student Travel Award)**

4. Steve Essinger and Gail Rosen. "**The Effect of Sequence Error and Partial Training Data on BLAST Accuracy of Short Reads**," IEEE Bioinformatics and Bioengineering Conference (BIBE), June 2010.

5. Steve Essinger, Ryan Coote, Pete Konstantopolous, Jason Silverman, and Gail Rosen. "**Reflections and Measures of STEM Teaching and Learning on K-12 Creative And Performing Arts Students**," ASEE Annual Conference, June 2010.

6. Steve Essinger and Gail Rosen. "**Benchmarking BLAST Accuracy of Genus/Phyla Classification of Metagenomic Reads**," Pacific Symposium on Biocomputing, Jan. 2010. **(Student Travel Award)**

Magazine and Book Chapters
1. Gail Rosen, Jason Silverman, and Steve Essinger. "**Inquiry-Based Learning Through Image Processing**," IEEE Signal Processing Magazine, January 2012.

2. Jean-Luc Bouchot, William Trimble, Gregory Ditzler, Yemin Lan, Steve Essinger, and Gail Rosen, "**Advances in Machine Learning for Processing and Comparison of Metagenomic Data**", *Computational Systems Biology*, Ed. Andres Kriete, Ed. Roland Elis: Academic Press, 2013. (Submission)

TEACHING EXPERIENCE
♦ Teaching Assistant: Dynamic & Linear Systems, Analog Circuits, Transform Methods   September 2012-December 2013
♦ Maximum Likelihood for Phylogeny (Guest lecturer, Drexel undergraduate bioinformatics)   February 2012
♦ Phylogenetic Methods (Guest lecturer, Rowan University)   November 2011
♦ NSF Discovery K-12 Fellow: Develop and Teach STEM labs for H.S. Students   September 2008-09
♦ Johns Hopkins Center for Talented Youth (Bioinformatics Lecturer)   October 2008