s. shelly jang

PhD candidate

contact

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languages

English & Korean

programming

♥ Mathematica
Matlab, Python

reference 1

Dr. Eric Klavins
klavins@uw.edu
Associate Professor
Dept of EE
University of Washington

reference 2

Dr. Radha Poovendran
rp3@uw.edu
Professor
Dept of EE
University of Washington

reference 3

Dr. Kyle Havens
kyle.havens@pregenen.com
Research Scientist
Pregenen

education

2009–2014 **PhD** in Electrical Engineering — University of Washington
Model Identification of Complex Synthetic Biological Systems
Identifying mathematical models from experimental data of biological systems allows researchers to answer questions motivated by both science (study of existing systems) and engineering (study of novel synthesis). My work is guided by the principle of Occam's razor – achieving the balance between fidelity to the reality and ease of human interpretation.

2007–2009 **MASc** in Chemical and Biological Engineering — University of British Columbia
Nonlinear System Identification with Bayesian Inference

2002–2007 **BS** in Chemical Engineering — University of Washington
Minor in Mathematics and Chemistry

experience

2014–present **Insight Data Science** — Mountain View, CA
Fellow
I developed BeeHealthy, a web app that recommends crowd-verified treatment options for medical conditions. The app is meant to guide health consumers in the midst of information overload as well as expediting their taking the next course of action. I constructed the required database from web-scraped data using Python, and the pilot categorization study was done by deploying the task in Amazon mTurk. Further categorization was automated through models trained in Scikit-learn package. The app was developed in AWS, and further interface with Amazon, Yelp & Doctoralia API was added.

2009–2014 **Professor E. Klavins, University of Washington** — Seattle, WA
PhD Candidate
The bottom up approach of synthetic biology enables a complementary approach to traditional biological investigation and allows the identification of design principles of natural systems. Driven by the need to obtain modularity, characterization and standardization of parts to enable rational engineering, I use experimental data to identify mathematical models that capture the observed dynamics of system entirely. However, over-fitting is a critical issue especially when considering predictive power of the model. Therefore the final model is identified with the aim of keeping the complexity to a minimum for enhanced human interpretation. Though simple, the models are capable of generating new verifiable hypothesis, thus closing the feedback loop in the scientific inquiry.

2007-2009 **Professor B. Gopaluni, University of British Columbia** — Vancouver, BC, Canada
Graduate Research Assistant
Many chemical and biological processes are restricted by physical and logistical factors and do not allow samples to be taken at regular time intervals in large quantity. I developed a Bayesian inference algorithm that allow estimation of parameter probability distribution using a small number of irregularly sampled data from multiple experiments.

experience cont.

2006-2007 **Professor B. Ratner, University of Washington** Seattle, WA
Undergraduate Research Assistant
Characterization and Analysis of polymer surface immobilized with amino acids.

2005 **Professor S. Jiang, University of Washington** Seattle, WA
Undergraduate Research Assistant
Maintenance of overall lab organization, preparing various chemical buffers, electrophoresis gel and bacterial growth media for biochemical experiments for pharmacological research

2003–2007 **Professor N. Zheng, University of Washington** Seattle, WA
Undergraduate Research Assistant
Development of Surface Plasmon Resonance Biosensor

2001-present **Seoul National University** Seoul, Republic of Korea
Freelance Translator
Translation of academic journals and textbooks from Korean to English and from English to Korean, bi-lingual technical writing skills required for academic research

publications

2013 **Mutations in the TIR1 Auxin Receptor That Increase Affinity for Auxin/Indole-3-Acetic Acid Proteins Result in Auxin Hypersensitivity.**
H. Yu, B. Moss, **Seunghee S. Jang**, M. Prigge, E. Klavins, J. Nemhauser, and M. Estelle. *Plant Physiology.*

2012 **Specification and simulation of synthetic multi-celled behaviors.**
Seunghee S. Jang, K. Oishi, R. Egbert and E. Klavins. *Journal of American Chemical Society*

2012 **A synthetic approach reveals extensive tunability of auxin signaling.**
K. A. Havens*, J. M. Guseman*, **S. S. Jang***, E. Pierre-Jerome*, N. Bolten, E. Klavins and J. L. Nemhauser. *Plant Physiology*

2011 **Parameter Estimation in Nonlinear Chemical Biological Processes with Unmeasured Variables.**
S. S. Jang, R. B. Gopaluni. *Canadian Journal of Chemical Engineering*

2011 **Parameter estimation in nonlinear chemical and biological processes with unmeasured variables from small data sets.**
S. S. Jang, H. De La Hoz, A. Ben-Zvi, W. C. McCaffrey, R. B. Gopaluni. *Chemical Engineering Science*

2008 **Parameter Estimation using Scarce and Irregular data from Multiple Experiments.**
S. S. Jang, H. De La Hoz, A. Ben-Zvi, R. B. Gopaluni. *Proceedings of Advanced Control in Industrial Process*

technical skills

Languages: Mathematica, Python, `gro`, MATLAB, Adobe Illustrator, LaTeX, Maple

Tools: Scikit-Learn, NLTK, BeautifulSoup, Pandas, Numpy & Scipy, MySQL, flask

Modeling and analysis: Systems and Control theory, Markov processes, MCMC simulations, Stochastic Simulation Analysis, Chemical master equations, Bayesian inference, parameter identification and model reduction

Biology Laboratory: DNA recombination techniques, plasmid construction, gene modification, cloning, transformations and cell culture. Fluorescence microscopy, microfluidic chambers, flow cytometry

Biomaterials Laboratory: Toxicity screening, ESCA and ToF SIMS, PCA analysis, manufacture and analysis of electrophoresis gel and polymer

awards

2013	**Global Grand Challenges Summit Delegate**	CoE, University of Washington
2012	**Kenney Fellowship**	CoE, University of Washington
2009	**Clairmont L. Egtvedt Fellowship**	University of Washington
2007	**Graduate Entrance Scholarship**	University of British Columbia
2005	**Kimberly-Clark Engineering Scholarship**	Chemical Engineering, University of Washington
2002–2004	**Dean's List**	University of Washington
2003	**Engineering Early Admission Student**	Dept of Chemical Engineering, University of Washington

presentations

2013 **Oral Presentation** — Quantified Self Meetup, 2013, Seattle, WA
Discovering my harshest critic

2012 **Poster** — q-Bio, 2012, Santa Fe, NM
Engineering with auxin: characterization of a synthetic signal processing toolbox

2008 **Oral Presentation** — Advanced Control in Industrial Process, Jasper, AB
Parameter Estimation using Scarce and Irregular data from Multiple Experiments

2008 **Oral Presentation** — Control Systems/Pan Pacific - PAPTAC, Vancouver, BC
Parameter Estimation of Nonlinear Process Model using Multiple Experimental Data

teaching

2011 **Introduction to Synthetic Biology (TA)**
Dept of Electrical Engineering, UW

2008 **Biotechnology Laboratory (TA)**
Dept of Chemical and Biological Engineering, UBC

2008 **Process Synthesis (TA)**
Dept of Chemical and Biological Engineering, UBC

2008 **Chemical & Biological Engineering Thermodynamics (TA)**
Dept of Chemical and Biological Engineering, UBC

courses

Machine Learning (Coursera, Andrew Ng)

Mathematical Foundation Systems Theory

Introduction to Synthetic Blology and Laboratory Course

Introduction to Digital Image Processing

Optimization Methods

Mathematical Operations in Chemical Engineering

courses cont.

Fluid Dynamics

Chemical Engineering Thermodynamics

Foundations in Control Engineering

Self-Tuning Control