James E. Gentile, Ph.D.

I am an experienced scientist who brings leadership, technical acumen, and creativity to a portfolio of modeling and data science challenges. I currently work with modern machine learning and simulation technology that is used for optimization and forecasting. A diverse series of open source contributions, publications, and patents demonstrates my abilities to deliver, collaborate with others, communicate to diverse audiences, and generate valuable intellectual property.

Experience

2019+;
2015-2018 **Principal Research Engineer**, *Two Six Labs*, VA.
Principal Investigator on DARPA's SD2 program and key personnel on many projects and proposals. Contributions include the development of large-scale models to test research systems and the design of embedded solutions. Capture Lead and contributor to many research successfully funded research proposals.

2018-2019 **Principal Scientific Modeler**, *Improbable*, VA.
Head of the applied data science department at Improbable's team that serves US Government customers. Principal Investigator and capture lead on multiple government contracts. Steering business development, technical focus and resourcing across a diverse portfolio of data science and modeling and simulation projects.

2013-2015 **Lead Computer Scientist**, *MITRE Corporation*, VA.
Research, development, and implementation of very, very large scale individual and agent-based models along with tools and suites for analyzing simulation results. Principal Investigator, Lead Developer, and Technical Lead on multiple projects for distributed model development, data visualization, and complex analytics. Deliverables include client and sponsor facing applications, technical transitions, publications, and open source tools.

2010–2013 **GAANN Fellow & Research Assistant**, *University of Notre Dame*, IN.
Development of an agent-based model for *Anopheles gambiae*, the primary vector for malaria in sub-Saharan Africa. This model was used to investigate the impact of mosquito interventions.
Co-Instructed and co-designed *Unix for Engineers*, a course for the College of Engineering. This class introduced students to a host of Unix paradigms and utilities.

2008–2010 **Graduate Co-Op**, *IBM's T.J. Watson Research Center*, NY.
Research and development of novel computer vision and biometric solutions. Deliverables included multiple research papers and intellectual property. One notable achievement was a system that greatly increased the speed of iris recognition.

Education

2013 **Ph.D. in Computer Science and Engineering**, *University of Notre Dame*, IN.
Thesis Topic: *Design and Implementation of a Genetically-Aware Entomological Model*

2008 **M.S. in Computer Science and Engineering**, *University of Notre Dame*, IN.
Thesis Topic: *Evaluations and Innovations in Face Detection*

2006 **B.S. in Computer Engineering**, *Trine University*, IN.
Capstone Project: *A Firefighting Robot*

2014 **Complex System Summer School Certificate**, *Santa Fe Institute*, NM.
Project: Social Institutions and Economic Inequality, Modeling the onset of the Kuznets Curve

Patents

Iris recognition system and method; J. Connell, J. Gentile & N. Ratha, US Patent 8,452,131, Awarded May 28th, 2013

System and method for generating and employing short length iris codes; J. Connell, J. Gentile & N. Ratha, US Patent 20,120,328,166, Awarded December 27th, 2012

Technical Experience

- Modeling & Simulation: *agent-based, individual-based, and equation-based models; microsimulation, very-large-scale and distributed simulations.*
- Data Reporting, Analysis, & Visualization: *d3.js, Tableau, Matlab, Hypercubes and Tabular Data Models*
- Machine Learning: *Clustering, Decision Trees, Bayesian Classifiers, Boosting, Deep Neural Networks.*
- Distributed Computing: *MPI, Sun Grid Engine, Condor.*
- Web Development: *JavaScript, angular.js, d3.js*
- Parallelization: *OpenMP, MPI.*
- Embedded Systems: *Beaglebone Black, Intel Edision, Arduino, ESP8266*

Publications

Getting the Best of Both Worlds? Developing Complementary Equation-Based and Agent-Based Models. *Computational Economics*, 2017

Daily Rhythms in Mosquitoes and Their Consequences for Malaria Transmission. *Insects*, 2016

Simulation Models for Public Policy. Chapter in *Modeling Complex Systems for Public Policy*, 2015

Modeling Sterile Insect Technique to Control the Population of *Anopheles gambiae*. *Malaria Journal*, 2015

An agent-based model of the population dynamics of *Anopheles gambiae*. *Malaria Journal*, 2014

Social Institutions and Economic Inequality, Modeling the onset of the Kuznets Curve. *World Congress for Social Simulation*, 2014

Massive agent-based modeling of tax compliance in the United States. *11th International Tax Administration Conference*, 2014

Extensive circadian and light regulation of the transcriptome in the malaria mosquito *Anopheles gambiae* and comparisons to rhythmic expression in *Ae. aegypti*. *BMC Genomics*, 2013

Verifying Agent-Based Models with Steady-State Analysis, *CMOT*, 2012

A Framework for Modeling Genetically-Aware Mosquito Vectors for Sterile Insect Technique. *IJATS*, 2011

An Agent-Based Genetically-Aware Entomological Model. *SCSC*, 2011

Divide and conquer: A four-fold docking experience of agent-based models. *SCSC*, 2011

A framework for modeling mosquito vectors. *SCSC*, 2010

An efficient, two-stage iris recognition system. *IEEE BTAS*, 2009

SLIC: Short-length iris codes. *IEEE BTAS*, 2009

Profile Face Detection: A Multi-Biometric Approach. *IEEE BTAS*, 2008

Face Detection Algorithm and Feature Performance on FRGC 2.0 Imagery. *IEEE BTAS*, 2007

Open Source

MABM.py– Python module for large-scale, distributed agent-based models.

IVML.js – A data visualization library that uses angular.js and d3.js to provide charting and visualization directives that bind directly to data and attribute variables.

SD2E and TASBE– open source tools in support of a DARPA program.

BADGEr Tools- Suite of tools for an open hardware e-ink board.

ng-chrome-cast-channels- Angular.js Sender and Receiver Controllers for browsers and Chrome Cast devices.

Awards

- GAANN Fellowship, Department of Education via CSE, 2011
- Mobilize Me 2nd Place Award. Notre Dame, 2011
- CSSS Student Award. CSSS, 2011
- First Patent Application Achievement Award, IBM, 2009
- VOOM Student Research Grant. Marketing Evolution, 2010
- Best Poster. BTAS, 2008

Notable Projects

TrainTimer - Always-on, low-power embedded solution that displays the real-time arrivals of WMATA transportation assets to designated stations.

AnoSim- Agent-based model for *Anopheles gambiae*, primary malaria vector in sub-Saharan Africa. This stochastic model was deployed on an HPC, results were aggregated in a tabular data model and presented via client tools.

BusMiNDer- A mobile application which provided the position of public transit vehicles. This system utilized mobile transponders, cloud messaging and a client application.

Profile Face Detector- Data collection, construction, training and testing for a face detection classifier. This novel approached used feature constellations to detect the presence of a profile face as a driver passed through a simulated security checkpoint.

disMat- A distributed data structure for Condor leveraging memory on multiple machines to facilitate reads and writes.

Shadrach- Autonomous device designed to explore a physical maze, detect and extinguish fire instances. This design placed in an international competition.

Hobbies

Open Source Hardware- Active contributor to a community of developers who design open-source hardware solutions.

American Folk Music- Student of the American Old-Time Music Tradition.

Woodworking- Furniture construction and repair.