

## Computing Skills

---

**Programming / Tools:** Proficient in Python, R, TensorFlow, Keras, SQL, Amazon Web Services (Redshift, S3, EC2, EBS), Tableau, MatLab, IDL, PostgreSQL, UNIX, Bash, LaTeX, Vim, HTML, CSS, Markdown; Limited / Classroom exposure to Fortran, Spark, Hive, Java, C/C++, JavaScript

### **Analytics:**

- **Structured Unstructured Data** (e.g., sensors, instrumentation, images, text, time series, geospatial, simulation, genomics, commerce)
- **Data Pre-Processing** (e.g., remedial outlier detection, imputation, aggregation, feature engineering, feature selection)
- **Probability & Statistics** (e.g., inference, hypothesis testing, resampling, conditioning, error analysis)
- **Machine Learning** (e.g., neural networks, deep learning, CNNs, RNNs, reinforcement learning, statistical models, regression, classification, clustering, prediction, PCA, LDA, feature selection/extraction/engineering, decision trees, random forests)
- **Time Series Analysis** (parametric, nonparametric, spectral analysis, signal processing, forecasting)
- **Numerical Modeling** (e.g., difference equations, numerical derivatives, numerical integration, linear/nonlinear models, dynamical systems, numerical stability, eigenvalue estimation)

## Work and Professional Research Experience

---

### **WWE, Advanced Analytics Team**

**Stamford, CT • October 2016 – Present**

#### *Data Scientist, Manager*

- Design and deployment of deep neural network models in Keras and TensorFlow on cloud GPUs for a handful of projects, including those related customer segmentation, churn, and lifetime value (multilayer perceptrons, autoencoders)
- Development of wrestler image recognition algorithm using transfer learning, convolutional nets
- Lead on numerous business-driven analytics research and predictive modeling projects for WWE Network, including:
- Spectral analyses of customer churn/winback behaviors to enhance customer segmentation efforts, help advise email campaigns, and improve churn/winback forecasting
- Development of multiple revenue attribution models for WWE Network content driven by viewership behaviour at the customer level
- Harmonization of fan panel / survey response data with customer accounts on the WWE Network to better quantify the relationship between subjective responses and objective viewership data
- Sentiment analysis of customer cancellation surveys and social media content to uncover resolvable issues and inform on how to better serve our customer base
- Development of project-agnostic and project-specific R packages to facilitate or fully automate data capture, cleansing, transformation, analysis, and reporting
- Decision tree analyses to help understand and segment customers by WWE content and character preferences
- Design of interactive dashboards in Tableau to help interested parties explore our data assets

### **NJIT Center for Solar-Terrestrial Research**

**Newark, NJ • January 2012 – May 2016**

#### *Research Scientist*

- Led multiple data-driven research projects resulting in a first-author publication, PhD dissertation, and several papers currently in development
- Provided new, empirical insights and interpretation of decades-old problem concerning the geomagnetic field's complex structure in Earth's polar regions
- Developed prediction scheme to forecast the evolution of hydromagnetic energy in the deep polar cap
- Developed remote-sensing technique using ground-based data sets to infer/predict parameters in near-Earth space
- Created innovative visualization and analysis techniques
- Implemented robust, non-parametric methods to characterize empirical distributions
- Conducted the collection, harmonization, and normalization of 100's of time series data streams from instruments/sensors distributed across the Earth and solar system to model and understand the linear/nonlinear drivers of a complex systems
- Developed software packages to enable efficient, streamlined analysis

### **NJIT Department of Mathematical Sciences**

**Newark, NJ • 2008 – 2012**

#### *Research Scientist, Mathematical Modeling*

- Extensively modeled, analyzed, and visualized several representations of granular fluid systems in MatLab and R
- Investigated sources of chaos in a dimensionally-reduced parameter space of a discrete-dynamical system (e.g., via Poincare map simulations in R <sup>[link]</sup>)

- Led effort in understanding and controlling the propagation of numerical errors, which otherwise prevent proper quantitative analysis and visualization of the underlying dynamical system
- Co-authored four peer-reviewed papers numerically modeling, visualizing, and analyzing granular fluid systems
- Led research project on applications of fractional calculus and co-authored peer-reviewed publication
- Explored real-world applications of advanced mathematical disciplines such as dynamical systems, topological analysis, manifold theory, abstract algebra, stochastic calculus

## NASA/CalTech Jet Propulsion Laboratory

Pasadena, CA • Summer 2011

*Intern, Trajectory Optimization / Design*

- Collaborated with a team of engineers and scientists to develop a full-fledged spacecraft mission to the Trojan asteroids of Jupiter (from establishing and prioritizing science goals, to optimizing the science-engineering-financial parameter space, to the written proposal and presenting our mission design to the NASA review board)
- Gained an appreciation of rapid product development via concurrent engineering, and an understanding of the intricate interplay between the various engineering system designs, science goals, timeline requirements, and budget constraints.
- Published peer-reviewed paper documenting lessons learned

## Independent Research Consultant

Clifton, NJ • August 2010 - August 2011

- Obtained contracts from NJIT and Siena College to continue the development of automated, real-time prediction of geomagnetic parameters
- Published peer-reviewed paper documenting proof-of-concept and lessons learned proof-of-concept <sup>[link]</sup>

## NJIT Department of Physics

Newark, NJ • August 2008 - August 2010

*Research Assistant*

- Led project demonstrating the feasibility of a real-time detection/classification scheme in maintaining surveillance and prediction of local, regional, and global-scale geomagnetic events of interest
- Analyzed multi-channel instrument data from a spatially-distributed network of automated observatories in Antarctica.
- Developed data metrics and associated classification scheme for events of interest in the data sets.
- In-depth experience visualizing and analyzing data in R, MatLab, and IDL
- In-depth experience in various data analysis techniques, such as digital signal processing, time series analysis, spectral analysis, statistical methods, modeling, and regression.
- Hardware-software interfacing of instrumentation for data collection
- Published Master's thesis

## NASA Goddard Space Flight Center

Greenbelt, MD • June – August 2007

*Intern, Observational Cosmology Laboratory*

- Developed software implementing a Stokes parameter analysis to run on simulation data for the proposed Absolute Spectrum Polarimeter [ASP] — an instrument designed to detect B-mode gravitational waves, which would provide evidence for Einstein's theory of general relativity and cosmological inflationary theory
- Worked with multiple programming languages, including MatLab, Bash (shell scripting), and IDL

## NASA Goddard Space Flight Center

Greenbelt, MD • June – August 2006

*Intern, Heliophysics Division*

- Worked extensively in the UNIX programming environment, learning and developing Python, HTML, CSS, JavaScript, and PHP code
- Developed web content

## Selected Peer-Reviewed Publications

- Rethinking the polar cap: Eccentric-dipole structuring of ULF power at the highest corrected geomagnetic latitudes, *Journal of Geophysical Research, Space Physics*, Vol. 121, 2016.
- Analysis, simulation, and visualization of 1D tapping via reduced dynamical models, *Physica D: Nonlinear Phenomena*, Vol. 273, 2014.
- Mission to the Trojan Asteroids: Lessons learned during a JPL Planetary Science Summer School mission design exercise, *Planetary and Space Science*, Vol. 76, 2013.
- Dynamical systems model and discrete element simulations of a tapped granular column, *Powders and Grains 2013: Proceedings of the 7th International Conference on Micromechanics of Granular Media*. Vol. 1542. No. 1. AIP Publishing, 2013.
- Quiet-time observations of the open-closed boundary prior to the CIR-induced storm of August 9, 2008, *Space Weather*, Vol. 9, S11001, 2011.
- Tapping dynamics for a column of particles and beyond, *Journal of Mechanics of Materials and Structures*, Vol. 6, No. 1-4, 2011.
- Integrability analysis of regular and fractional Blackmore-Samulyak-Rosato fields, *Condensed Matter Physics*, Vol. 13, No. 4, 2010.

## Education

---

### **Ph.D., Applied Physics**

New Jersey Institute of Technology & Rutgers University, Newark, NJ

Dissertation: The Hydromagnetic Structure of the Polar Cap and Its Interaction with the Solar Wind

### **M.S., Applied Physics (Minor: Applied Mathematics)**

New Jersey Institute of Technology & Rutgers

University, Newark, NJ

Thesis: Synoptic Variability of a CIR-Driven Open-Closed Boundary During Solar Minimum

### **B.S., Applied Physics (Minor: Applied Mathematics)**

New Jersey Institute of Technology & Rutgers

University, Newark, NJ