

## Profile

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Highly-motivated, innovative individual with extensive experience in empirical research, data product development, and transparent visualization of varied, high-dimensional data sets. Creative, analytic problem solver equipped with an intuition for trends and patterns in complex data sets, and insight into the underlying mathematical structure. Strategic and focused, interested in rapid research-to-product development. Self-motivated, collaborative personality with the understanding that a cross-functional, open-minded work environment and combined skill sets result in efficient delivery of high-value, dependable data products. Effective written and verbal communicator.

## Computing Skills

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

### **Analytics:**

- **Structured Data** (e.g., sensors, instrumentation, time series, geospatial, simulation, genomics, commerce)
- **Unstructured Data** (e.g., image analysis, logs, text mining, web scraping, natural language processing)
- **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., statistical models, neural networks, deep learning, regression, classification, clustering, prediction, dimensionality reduction, pattern recognition, decision trees)
- **Time Series Analysis** (parametric, nonparametric, spectral analysis, signal processing, forecasting)
- **Pattern Recognition** (e.g., kernel density methods, event/anomaly detection)
- **Numerical Modeling** (e.g., difference equations, numerical derivatives, numerical integration, linear/nonlinear models, dynamical systems, numerical stability, eigenvalue estimation)

## Work and Professional Research Experience

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

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

#### *Data Scientist, Manager*

- Currently leading deep neural network efforts to fully take advantage of our content and data assets, developing collaborative and item-based recommendation systems, and exploring various customer churn models in Python / TensorFlow
- Have lead numerous business-driven analytics research and predictive modeling projects for WWE Network
- Used spectral analyses of customer churn/winback behaviors to enhance customer segmentation efforts, help advise email campaigns, and improve churn/winback forecasting
- Developed multiple revenue attribution models for WWE Network content driven by viewership behaviour at the customer level
- Tied fan panel survey response data to customer accounts on the WWE Network, allowing us to better quantify the relationship between subjective responses and objective viewership data
- Conducted sentiment analysis of customer cancellation surveys and social media content, uncovering resolvable issues and informing how to better serve our customer base
- Designed both project-agnostic and project-specific R packages to help streamline and/or automate data capture, cleansing, transformation, analysis, and reporting.
- Utilized decision tree analysis to help understand and segment customers by WWE content and character preferences
- Designed interactive dashboards in Tableau

### **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

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### **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