

# WILLIAM N. HERLANDS

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## EDUCATION

### **Carnegie Mellon University, Pennsylvania (2014-Present)**

- PhD Student in Machine Learning and Public Policy; GPA: 4.02
- Funded in part by NSF Graduate Fellowship and ARCS Fellowship
- Advised by Dr. Daniel Neill and Dr. Andrew Gordon Wilson
- Coursework includes: Advanced statistical machine learning, statistics theory, microeconomics, probabilistic graphical models, convex optimization, computational causation, and political philosophy.

### **Carnegie Mellon University, Pennsylvania (2014-2017)**

- Master of Science in Machine Learning; GPA: 4.02

### **Princeton University, New Jersey (2008-2012)**

- BSE in Electrical Engineering; GPA: 3.79
- Concentration in Machine Learning
- Minors in Computer Science and Near Eastern Studies

## EMPLOYMENT

### **NYU Center for Urban Science and Progress, New York (2017) *Researcher***

- Worked as a post-doc on the Urban Physiology project. Developed novel machine learning techniques for quantifying the normal rhythms and anomalies of complex urban data.

### **Boston Citywide Analytics Team, Massachusetts (2016) *Summer Fellow***

- Worked in Dept. of Innovation and Technology to bring cutting edge analytics technologies to city govt.
- Developed a natural language processing tool to provide actionable insight into tens of thousands of resident permit applications and internally generated documents that until then had been ignored.

### **Baron Public Affairs, Washington DC (2015-2017) *Consultant***

- Consulted on statistical methodology and big data technologies for this elite political consulting firm
- Developed massive network-based machine learning system for influence mapping in heterogeneous data

### **MIT Lincoln Laboratory, Massachusetts (2012-2014) *Assistant Researcher***

- Conducted research on artificial intelligence, robotics, and cybersecurity. See research below.
- Initiated and managed project on robotic swarm cybersystems, collaborating with MIT researchers
- Guided Department of Defense officials on implications of our research for national defense

### **Adaptive Motion Technologies, Maryland (2012) *Engineer***

- Designed and constructed a low-cost, highly adaptable prosthetic leg for amputees in the developing world
- Presented design to Walter Reed Army Institute of Medicine

### **Diana Furchtgott-Roth, New York (2012) *Intern***

- Conducted general macroeconomics research for former chief economist of the Department of Labor and Senior Fellow at the Manhattan Institute
- Wrote reports on the economic implications of 2012 Presidential candidates' energy policies

## AWARDS

- Suresh Konda Award for the best 1st paper in public policy, Carnegie Mellon University (2016)
- National Science Foundation Graduate Research Fellowship (3 year tuition and stipend award, 2014)
- ARCS Foundation Fellowship (3 year stipend award, 2014)
- *Phi Beta Kappa*, liberal arts and sciences honor society (inducted June 2012)
- *Tau Beta Pi*, engineering honor society (inducted December 2010)
- *Sigma Xi*, scientific research honor society (inducted June 2012)
- Calvin Dodd MacCracken Senior Thesis Award, Princeton University (June 2012)
- Charles Ira Young Memorial Tablet and Medal (June 2012)
- Excellence in Engineering Funding (May 2011)

- Kamran Rafieyan '89 Fund for Undergraduate Research (October 2011 and October 2010)

**PUBLICATIONS** • “Change Surfaces for Expressive Multidimensional Changepoints and Counterfactual Prediction”, **Herlands**, Nickisch, Neill, Wilson. *Working paper*.

- “Bivariate Kernel Space-Time Test for Leading Indicator Selection”, **Herlands**, Neill. *Working paper*.

- “Machine Learning for Drug Overdose Surveillance”, Neill, **Herlands**. *Data for Good Exchange*, 2017.

- “Scalable Gaussian Processes for Characterizing Multidimensional Change Surfaces”, **Herlands**, Wilson, Nickisch, Flaxman, Neill, van Panhuis, Xing. *Artificial Intelligence and Statistics (AISTATS)*, 2016.

- “Lass0: Sparse Non-Convex Regression by Local Search”, **Herlands**, De-Arteaga, Neill, Dubrawski. *NIPS Workshop on Optimization*, 2015.

- “A Machine Learning Approach to Musically Meaningful Homogeneous Style Classification”, **Herlands**, Der, Greenberg, Levin. *Association for the Advancement in Artificial Intelligence (AAAI)*, 2014.

- “Effective Entropy: Security-Centric Metric for Memory Randomization Technologies”, **Herlands**, Hobson, and Donovan. *USENIX Workshop on Cybersecurity Security Experimentation*, 2014.

**TALKS**

- “Generalized Difference-in-Difference Models with Gaussian Processes”, *Joint Statistical Meetings*, 2016.

- “Scalable Gaussian Processes for Characterizing Multidimensional Change Surfaces”, **Herlands**, Wilson, Nickisch, Flaxman, Neill, van Panhuis, Xing. *John Heinz III College at Carnegie Mellon University*, 2016.

- “Small Area Spatiotemporal Crime Rate Forecasting”, *The American Society of Criminology*, 2015.

**TEACHING**

**Decision Analytics for Business and Policy 94-867, Carnegie Mellon (2016) Teaching Assistant**

- Taught weekly review sessions, held weekly office hours, and graded assignments for this Masters level course in operations research and management.

**Machine Learning 10-601, Carnegie Mellon (2016) Teaching Assistant**

- Designed problem sets and tests. Taught recitations and held weekly office hours for this Masters level course in machine learning methodology and practice.

**System Design and Analysis ELE301, Princeton (2012) Teaching Assistant**

- Mentored and supervised electrical engineer students as they developed small autonomous vehicles

**PROFESSIONAL**

**SERVICE**

- Co-Organized 2017 NIPS Symposium on Interpretable Machine Learning
- Co-Organized 2017 NIPS Workshop on Machine Learning for the Developing World
- Reviewer for International Society for Disease Surveillance (ISDS) 2018
- Reviewer for Neural Information Processing Systems (NIPS) 2017
- Reviewer for International Conference on Informational Systems (ICIS) 2017
- Co-Organized 2016 NIPS Workshop on Interpretable Machine Learning for Complex Systems

**RESEARCH**

**EXPERIENCE**

**Crime Prediction for Safer Cities, Carnegie Mellon University (2016 - Present)**

- Developing high precision spatiotemporal forecasts of violent crime on a week-by-week basis in Pittsburgh. Predictions through integrating innovative deep learning architectures, Hawkes processes, and Gaussian processes
- Working with Pittsburgh police to integrate predictions into weekly deployment procedures for patrol cars beats

**Event Pattern Detection Laboratory, Carnegie Mellon University (2014 - Present)**

- Investigating novel methods for causal inference at the intersection of machine learning and econometrics
- Evaluating policy interventions without randomized control trials. Developing Bayesian nonparametric algorithms to predict counterfactual measures in highly complex, massive, multidimensional data

**Transportation Experimentation and Prediction, City of Boston (2014-2015)**

- Worked with Department of Transportation to develop randomized experiments and evaluation techniques to reduce traffic through real time predictive analytics and scheduling of public transportation

**Human Trafficking Advertisement Modeling, Carnegie Mellon University (2014)**

- Analyzed 10,000s of ads on solicitation websites to characterize online human trafficking behavior for a FBI project to counter international human traffickers.

**Robotic Swarm Cybersystems, MIT Lincoln Laboratory (2013 - 2014)**

- Explored jamming and Byzantine adversary vulnerabilities in distributed multi-robot systems
- Developed defensive mechanisms for quadcopter ad-hoc communication network

**Goal-Oriented Scenario Modeling Robots, MIT Lincoln Laboratory (2012 –2013)**

- Created incentive-based artificial intelligence system to emulate at scale human reactions to contemporary cybersecurity attacks on large networks; Trained system to real network data using reinforcement learning

**Cyber Measurement Campaign, MIT Lincoln Laboratory (2012 – 2014)**

- Developed a method to quantify the defensive capabilities of memory-based randomization defenses, known as moving target defenses. Supported government deployment and testing of these emerging technologies

**Skills**

- Programming languages: Python, R, Matlab, Stan, Java, C, and MIPS
- Amateur ornithologist, specializing in quail
- Experience with metal mills, lathes, laser cutters, and woodworking