

# Alexander Ororbia II

Information Sciences & Technology (IST), The Pennsylvania State University  
Intelligent Systems Laboratory, Applied Cognitive Science Laboratory  
332 Info Science & Tech, University Park, PA, U.S.A.

+1 (814) 380 8435 • ago109@ist.psu.edu  
www.personal.psu.edu/ago109/

My research focuses on developing semi-supervised, representation-learning neural architectures. I develop the models and learning algorithms needed for an intelligent agent or system to adapt and improve its performance in real-world environments, applying previously accrued knowledge to new situations and tasks. This is an important and previously only partially-addressed challenge for machine learning in general—lifelong learning. More broadly put, my work contributes to the development of scalable, computational approaches to learning from large-scale text and image data sources.

## Education

---

### Academic Qualifications.....

**Pennsylvania State University, University Park** 2013–present  
*Ph.D., Information Sciences & Technology*  
Ph.D. Candidate (A.B.D. as of April 22, 2016), *Minor in Social Data Analytics*

**Bucknell University, Lewisburg** 2009–2013  
*B.S. Computer Science & Engineering*  
*Minor in Mathematics and a Minor in Philosophy*

## Employment

---

### Research Experience.....

**University of Massachusetts, Amherst** 2015  
*Research Externship*  
Visiting scholar for Dr. Andrew McCallum in the IESL Laboratory, worked on language modeling using deep neural architectures.

**Pennsylvania State University, University Park** 2013–present  
*Graduate Assistantship*  
Doctoral researcher under Dr. C. Lee Giles & Dr. David Reitter.

**Pennsylvania State University, University Park** 2013–2014  
*Summer Research Position*  
Summer research assistant for Dr. C. Lee Giles, worked on intelligent, topical web crawling.

**Bucknell University, Lewisburg** 2013–2014  
*Spring & Summer Research Position*  
Worked with Dr. Joseph V. Tranquillo (Biomedical Engineering) on computational modeling of creative dynamical, systems.

**Bucknell University, Lewisburg** 2013–2014  
*Interpreters: Spring Semester Research Position*  
Worked with Dr. Benoit Razet & Dr. Lea Wittie in developing an educational Lambda Calculus interpreter.

**Bucknell University, Lewisburg**

*Embedded Systems: Summer Research Position* 2012–2013  
Platform Development with Android and Integration of the Kernel-Space Component of the FINS Framework, Advisor Dr. Michael Thompson, Professor Electrical Engineering Department.

**Bucknell University, Lewisburg**

*Graphics: Summer Research Position* 2010–2011  
The Collection and Organization of Facts Pertaining to the History of Computer Graphics Hardware, Advisor Dr. Joshua Steinhurst, Asst. Professor Computer Science Department.

Teaching Experience.....

**The Pennsylvania State University, University Park**

*IST 597 (Foundations of Deep Learning)* 2017  
Co-lecturer, teaching assistant, designed course assignments/syllabus and worked with Dr. C. Lee Giles to design the course.

**The Pennsylvania State University, University Park**

*CSE/IST 597 (Advances & Applications in Deep Learning)* 2017  
Co-lecturer (general machine learning, deep learning), helped design/prepare the course.

**The Pennsylvania State University, University Park**

*CSE 597 (Computational Linguistics)* 2017  
Guest lecturer (neural language modeling/dialogue modeling).

**The Pennsylvania State University, University Park**

*Mentorship* 2017  
Mentoring Shikun Liu, undergraduate student in Electrical Engineering. Project focused on learning latent variables models of voxelized 3D shapes.

**The Pennsylvania State University, University Park**

*Mentorship/Management* 2016-present  
Joint project lead with Dr. Jian Wu for neural compression team (on behalf of Dr. Lee Giles). Mentored one undergraduate student (Scott O’Connell) & two Masters students (Yanbo Sun & Ankur Mali). Project has focused on designing algorithms and neural models for efficient, large-scale image compression.

**The Pennsylvania State University, University Park**

*Mentorship* 2016-2017  
Mentored Yanbo Sun, Masters student in Electrical Engineering (passed defense summer 2016). Project involved building neural-based, video compression systems.

Work Experience.....

**New Providence, New Jersey**

*Interactions, LLC* 2016–2017  
Summer intern for Dr. Ryan Price and Patrick Haffner, conducted an exploratory study on neural language models.

**The Pennsylvania State University, University Park**

*Part-time Summer Research Consultant* 2014  
Worked with Darla Lindberg of the architecture department on initial design of resource management and recommendation software system for charitable food distribution facilities.

**Bucknell University, Lewisburg**

*Classroom and Events Support L&IT* 2009–2012  
Office of Diversity & Equity, and later for Bertrand Library.

**Publications**

2017.....

**Alexander G. Ororbia II**, Patrick Haffner, David Reitter, and C. Lee Giles. “Learning to Adapt by Minimizing Discrepancy”. *arXiv:1711.11542 [cs.LG]*.

**Alexander G. Ororbia II**, Tomas Mikolov, and David Reitter. "Learning Simpler Language Models with the Differential State Framework". In: *Neural Computation* (Volume 29, Issue 12, pp. 3327-3352).

Iulian Serban\*, **Alexander G. Ororbia II**\*, Joelle Pineau, and Aaron Courville. "Piecewise Latent Variables for Neural Variational Text Processing". In: *Proceedings of Empirical Methods in Natural Language Processing*, Copenhagen, Denmark (pp. 422-432). (\* First two authors contributed equally.)

Dafang He, Xiao Yang, Chen Liang, Zihan Zhou, **Alexander G. Ororbia II**, Daniel Kifer, C Lee Giles. "Multi-scale FCN with Cascaded Instance Aware Segmentation for Arbitrary Oriented Word Spotting In The Wild". In: *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, Honolulu, Hawaii (pp. 3519-3528).

**Alexander G. Ororbia II**, C. Lee Giles, and Daniel Kifer. "Unifying Adversarial Training Algorithms with Data Gradient Regularization". In: *Neural Computation* (Volume 29, Issue 4, pp. 867-887).

**Alexander G. Ororbia II**, David Reitter, and C. Lee Giles. "The Temporal Neural Coding Network: Towards Lifelong Language Learning". 11th Annual Machine Learning Symposium. <https://www.nyas.org/events/2017/11th-annual-machine-learning-symposium/>. (Peer-reviewed and accepted poster and spotlight talk).

Qinglong Wang, Wenbo Guo, Kaixuan Zhang, **Alexander G. Ororbia II**, Xinyu Xing, Xue Liu, and C. Lee Giles. "Adversary Resistant Deep Neural Networks with an Application to Malware Detection". In: *Proceedings of the 23rd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, Halifax, Nova Scotia, Canada (pp. 1145-1153).

Qinglong Wang, Kaixuan Zhang, **Alexander G. Ororbia II**, Xinyu Xing, Xue Liu, C. Lee Giles. "An Empirical Evaluation of Rule Extraction from Recurrent Neural Networks". *arXiv:1709.10380 [cs.LG]*.

Bill McDowell, Nathanel Chambers, **Alexander G. Ororbia II**, and David Reitter. "Event Ordering with a Generalized Model for Sieve Prediction Ranking". In: *Proceedings of the 8th International Joint Conference on Natural Language Processing (IJCNLP)*, Taipei, Taiwan.

Shikun Liu, C. Lee Giles, and **Alexander G. Ororbia II**\*. "Learning a Hierarchical Latent-Variable Model of Voxelized 3D Shapes". *arXiv:1705.05994 [cs.LG]*. (\* Senior author.)

Xiao Yang, Dafang He, Wenyi Huang, **Alexander G. Ororbia II**, Zihan Zhou, Daniel Kifer, C Lee Giles. "Smart Library: Identifying Books on Library Shelves Using Supervised Deep Learning for Scene Text Reading". In: *Proceedings of ACM/IEEE Joint Conference on Digital Libraries (JCDL)*, Toronto, Ontario, Canada (pp. 245-248).

## 2016.....

C. Lee Giles and **Alexander G. Ororbia II**. "Recurrent Neural Networks: State Machines and Pushdown Automata". The 33rd International Conference on Machine Learning (ICML): Neural Nets Back To the Future Workshop, Crowne Plaza in New York City, NY, USA.. <https://sites.google.com/site/nnb2tf/>. (Invited talk).

**Alexander G. Ororbia II**. "Deep Learning Applied". *2016 International Conference on Social Computing, Behavioral-Cultural Modeling & Prediction and Behavior Representation in Modeling and Simulation (SBP-BRIMS)*, Washington DC, USA. (Accepted tutorial).

Qinglong Wang, Wenbo Guo, Kaixuan Zhang, **Alexander G. Ororbia II**, Xinyu Xing, C. Lee Giles, and Xue Liu. "Learning Adversary-Resistant Deep Neural Networks". *arXiv:1612.01401 [cs.LG]*.

Shuting Wang, **Alexander G Ororbia II**, Zhaohui Wu, Kyle Williams, Chen Liang, Bart Pursel, and C Lee Giles. "Using Prerequisites to Extract Concept Maps from Textbooks". In: *Proceedings of the 25th ACM International on Conference on Information and Knowledge Management*, Indianapolis, Indiana, USA (pp. 317-326).

Qinglong Wang, Wenbo Guo, **Alexander G. Ororbia II**, Xinyu Xing, Lynn Lin, C. Lee Giles, Xue Liu, Peng Liu, and Gang Xiong. "Using Non-invertible Data Transformations to Build Adversary-Resistant Deep Neural Networks". *arXiv:1610.01934 [cs.LG]*.

**Alexander G Ororbia II**, Fridolin Linder, and Joshua Snoko. "Using Neural Generative Models to Release Synthetic Twitter Corpora with Reduced Stylometric Identifiability of Users". *arXiv:1606.01151 [cs.LG]*.

2015.....

**Alexander G. Ororbia II**, C. Lee Giles, and David Reitter. "Online Semi-Supervised Learning with Deep Hybrid Boltzmann Machines and Denoising Autoencoders". *arXiv:1511.06964 [cs.LG]*.

**Alexander G. Ororbia II**, David Reitter, Jian Wu, and C Lee Giles. "Online learning of deep hybrid architectures for semi-supervised categorization". In: *Proceedings of Joint European Conference on Machine Learning and Knowledge Discovery in Databases*, Porto, Portugal (pp. 516-532).

**Alexander G Ororbia II**, C Lee Giles, and David Reitter. "Learning a Deep Hybrid Model for Semi-Supervised Text Classification". In: *Proceedings of Empirical Methods in Natural Language Processing*, Lisbon, Portugal (pp. 471-481).

**Alexander G Ororbia II**, Yang Xu, Vito D'Orazio, David Reitter. "Error-Correction and Aggregation in Crowd-Sourcing of Geopolitical Incident Information". In: *Proceedings of Social Computing, Behavioral-Cultural Modeling, and Prediction: 8th International Conference*, Washington, DC, United States (pp. 381-387).

**Alexander G Ororbia II**, Jian Wu, Madian Khabsa, Kyle Williams, and C. Lee Giles. "Big Scholarly Data in CiteSeerX: Information Extraction from the Web". In: *Proceedings of the 24th International Conference on World Wide Web*, Florence, Italy (pp. 597-602).

Hung-Hsuan Chen, **Alexander G Ororbia II**, and C Lee Giles. "ExpertSeer: a Keyphrase Based Expert Recommender for Digital Libraries". *arXiv preprint arXiv:1511.02058*.

2014.....

**Alexander G Ororbia II**, Jian Wu, and C Lee Giles. "CiteSeerX: Intelligent Information Extraction and Knowledge Creation from Web-Based Data". *4th Workshop on Automated Knowledge Base Construction (AKBC) (at NIPS 2014)*, Montreal, Canada.

Jian Wu, **Alexander G Ororbia II**, Kyle Williams, Madian Khabsa, Zhaohui Wu, and C Lee Giles. "Utility-based control feedback in a digital library search engine: Cases in CiteSeerX". *9th International Workshop on Feedback Computing (Feedback Computing 14) (USENIX)*, Philadelphia, Pennsylvania, USA.

Jian Wu, Kyle Williams, Hung-Hsuan Chen, Madian Khabsa, Cornelia Caragea, **Alexander G Ororbia II**, Douglas Jordan, and C Lee Giles. "CiteSeerX: AI in a Digital Library Search Engine". *Annual Conference on Innovative Applications of Artificial Intelligence (IAAI)*, Quebec City, Quebec, Canada. (Best Application Paper).

Zhaohui Wu, Jian Wu, Madian Khabsa, Kyle Williams, Hung-Hsuan Chen, Wenyi Huang, Suppawong Tuarob, Sagnik Ray Choudhury, **Alexander G Ororbia II**, Prasenjit Mitra, and C Lee Giles. "Towards building a scholarly big data platform: Challenges, lessons and opportunities". In: *Proceedings of the 14th ACM/IEEE-CS Joint Conference on Digital Libraries (JCDL)*, London, United Kingdom.

## Skills

---

### Programming Languages.....

**Experienced::** Java, Scala, LaTeX

**Comfortable::** MatLab, R, O-Caml, JavaScript, C, C++, Python, Haskell, Bash, and MIPS assembly

**Familiar::** LISP, SmallTalk, HTML/CSS mark-up, PHP, & Verilog Hardware Description Language

### Software.....

**Experienced::** Keras, Theano, Weka, Eclipse, IntelliJ, BIDData/BIDMat, GIMP, Audacity, Blender3D

**Comfortable::** MiniTab Statistical Package, LogicWorks (circuit design & simulation), GNU Make & Plot, 3DsMax/Viz, & Rhino

**Familiar::** Spark, Hadoop Distributed File System

## Awards & Honors

---

- CIFAR-CRM Deep Learning Summer School (2016, accepted participant)
- Alfred P. Sloan Scholar (2014-2015 cohort, merit-based)
- NSF IGERT Fellow (2014-2016, merit-based)
- Jordan Rednor Fellow (2013, merit-based)
- Bunton Waller Scholar (2013-2014, 2016-2017, merit-based)

## Affiliations

---

- Alpha Lambda Delta Honor Society
- Omicron Delta Kappa Honor Society
- Bucknell Engineering Alumni Association
- Association of Computing Machinery (Student member)
- Society of Hispanic Engineers (Founder & charter member of local Bucknell chapter)
- The National Society of High School Scholars

## Professional Activities

---

- Bucknell National Society of Hispanic Engineers (2011-2012) Drafted club's constitution - charter member, Vice President
- Bucknell Association of Computing Machinery (2010-2012) - Treasurer
- Bucknell Musician's Forum (2009 - 2010) - Treasurer
- Student Mentor for Bucknell Alumni Weekend (2010)
- Bucknell Engineering Student Research Symposium Presented "The Collection and Analysis of Facts Surrounding the History of Graphics Hardware" research (2011)
- Bucknell Engineering Student Research Symposium Presented "The Collection and Organization of Facts Pertaining to the History of Computer Graphics Hardware" research (2010)
- Bucknell Big Questions/Answers Symposium (2009)
- Bucknell Engineering Student Research Symposium, Presented 3D Modeling/Animation independent research (2009)
- Bucknell Issues of the 21st Century Symposium (student participant) (2008)

## References

---

- **Dr. C. Lee Giles:** David Reese Professor, The Pennsylvania State University, University Park, PA  
*Email:* giles@ist.psu.edu, *Phone:* +1 (814) 865-7884
- **Dr. David Reitter:** Assistant Professor, The Pennsylvania State University, University Park, PA  
*Email:* reitter@psu.edu, *Phone:* +1 (814) 867-3159
- **Patrick Haffner:** Lead Inventive Scientist, Interactions L.L.C., New Providence, NJ  
*Email:* phaffner@interactions.com, *Phone:* +1 (646) 285-1929
- **Tomas Mikolov:** Research Scientist, Facebook, New York, New York  
*Email:* tmikolov@fb.com, *Phone:* +1 (650) 798-7105
- **Dr. Daniel Kifer:** Associate Professor, The Pennsylvania State University, University Park, PA  
*Email:* dkifer@cse.psu.edu, *Phone:* +1 (814) 863-1187
- **Dr. Xinyu Xing:** Assistant Professor, The Pennsylvania State University, University Park, PA  
*Email:* xxing@ist.psu.edu, *Phone:* (814) 863-0017