

Education

2003-2012 Ph.D., Theoretical Physics - The University of Texas at Austin

1996-2001 B.S., Physics - University of California, San Diego (Revelle College)

Experience

Oct 2018 - Pronto.ai

Jun 2019 *Senior Software Engineer*

- AI research and development for Pronto's next-gen autonomous vehicle platform.
- Built highway exit detection algorithm (**Python, scikit-learn, PyTorch**).
- Implemented deep imitative path planning algorithm (**Python, PyTorch**).
- Built, maintained and deployed data collection and pre-processing pipeline, to filter and extract relevant frames from video logs for training of above algorithms (**Python, Bash**).

Nov 2017 - Independent projects and study

Oct 2018 —

- Working on generative music collaboration with Shuttle358, using techniques similar to Google's WaveNet, and variational autoencoders. (In progress.)
- Investigating interpretations of the renormalization group in the framework of deep learning. (In progress. Initial work on GitHub.)
- Completed deeplearning.ai/Coursera Deep Learning Specialization (5 courses).

Sep 2012 - Maxwell Analytics LLC, Austin, TX

Nov 2017 *Research Scientist*

- Principal researcher at a start-up quant fund primarily focused on US cash equities.
- Developed novel theory of markets, based on maximum entropy, statistical mechanical and thermodynamic methods. Theory formed basis of fund's trading strategy, which started with \$6MM AUM at launch, and has demonstrated profitability (details on request).
- Built Bayesian models to estimate passive buy/sell price targets for execution strategies. (**Mathematica**)
- Analyzed time-series data using: autoregressive methods, information theoretic metrics, state space models. (**Python, statsmodels, C++**)
- Built model for real-time estimation and forecasting, using methods from control theory, signal processing, and variational Bayes. (**Mathematica**)
- Worked alongside engineers to build live trading system from ground up. (**C++**)

May 2006 - Weinberg Theory Group, Department of Physics, UT Austin

Aug 2012 *Graduate Researcher*

- Constructed type IIB string theory backgrounds describing non-supersymmetric, finite temperature, and flavored deformations of the resolved deformed conifold. Investigated aspects of the AdS/CFT dual quantum field theories.

Aug 2002 - UT Austin

June 2009 *Assistant Instructor, Teaching Assistant*

- Taught various courses: physical science, plan II honors physics, honors engineering physics, electronics and mechanics labs, solar system astronomy.

Aug 2000 - Institute for Nonlinear Science, UC San Diego

June 2001 *Undergraduate Researcher*

- Developed theoretical description of neuronal synaptic plasticity via a generalized Kuramoto model of coupled phase oscillators.
- Developed theoretical model and circuit prototype for implementing spread-spectrum communication protocols using chaotic frequency modulation.
- Wrote numerical simulations in C to support research.

Technical Skills

Machine Learning: classification, regression, clustering, optimization, neural networks, SVMs, unsupervised methods (PCA, autoencoders, RBMs), Gaussian processes, variational methods, natural language processing.

Statistics: Bayesian methods, MaxEnt modeling, information theory, Monte Carlo methods, time series analysis.

Programming Languages: Python, C++, Mathematica.

Technologies: NumPy, SciPy, Scikit-learn, Matplotlib, Pandas, TensorFlow, PyTorch, OpenCV, \LaTeX , Unix command line, git, emacs, Jupyter notebook, PyCharm, Visual Studio.

Other: calculus, linear algebra, Fourier analysis, analytic and numeric solutions of ODEs/PDEs, differential geometry, nonlinear dynamics.

Certifications

Deep Learning, a 5-course specialization on deeplearning.ai/Coursera. Certificate earned on 10/14/18.

Independent Projects

Dec 2014 - vForms - a Tool for Vision

Present *Designer and Software Developer*

- Designed and built an application for virtual interactive note taking on Windows tablets.
- Designed and built a Zooming User Interface graphics engine from scratch. (**C++**, **DirectX**)

Publications

Journal Publications

- [1] B. S. DiNunno, S. Grozdanov, J. F. Pedraza, and S. Young. Holographic constraints on Bjorken hydrodynamics at finite coupling. *JHEP* 10 110, 2017. arXiv:1707.08812
- [2] E. Cáceres and S. Young. On the stability of non-extremal conifold backgrounds with sources. *Phys. Rev. D* 87, 046006, 2013. arXiv:1205.2397
- [3] S. Bennett, E. Cáceres, C. Nunez, D. Schofield, and S. Young. The non-SUSY baryonic branch: Soft supersymmetry breaking of $\mathcal{N} = 1$ gauge theories. *JHEP* 05 031, 2012. arXiv:1111.1727
- [4] P. Seliger, S. C. Young, and L. S. Tsimring. Plasticity and learning in a network of coupled phase oscillators. *Phys. Rev. E* 65 041906, 2002. arXiv:nlin/0110044

Conference and Book Publications

- [1] O. M. Şulea and S. Young. Unsupervised Inflection Generation Using Neural Language Modeling. In *Rojas I., Jøya G., Catala A. (eds) Advances in Computational Intelligence. IWANN 2019. Lecture Notes in Computer Science, vol 11506. Springer, Cham, 2019.* arXiv:1912.01156
- [2] O. M. Şulea, S. Young, and Liviu P. Dinu. MorphoGen: Full Inflection Generation Using Recurrent Neural Networks. *20th International Conference on Computational Linguistics and Intelligent Text Processing (CICLing 2019)*, La Rochelle, France, April 2019 (to appear).
- [3] A. R. Volkovskii, L. S. Tsimring, N. F. Rulkov, I. Langmore, and S. C. Young. Spread Spectrum Communication with Chaotic Frequency Modulation. In *Larson L.E., Tsimring L.S., Liu J.M. (eds) Digital Communications Using Chaos and Nonlinear Dynamics. Institute for Nonlinear Science. Springer, New York, NY, 2006.*
- [4] A. R. Volkovskii, S. C. Young, L. S. Tsimring, and N. Rulkov. Multi-user communication using chaotic frequency modulation. In *Proc. Int. Symp. Nonlinear Theory and Its Applications (NOLTA'01)*, pp 561–564, 2001.

Ph.D. Thesis

- [1] S. Young. Non-Supersymmetric Holographic Engineering and U-duality. 2012.

Schools

2011	Gauge Theory, Gravity, and String Theory	Nagoya, Japan
2010	Winter School on Superstring Theory and Related Topics	Trieste, Italy
2005	Gravity in the Quantum World and the Cosmos	Stanford, CA

Invited Talks

2016	vForms, a Tool for Vision	Zhengzhou HS #2, Zhengzhou, China
2015	vForms, a Tool for Vision	Tsinghua University, Beijing, China