
Education

2008-2015 **Ph.D. in Computational Physics**, University of Illinois at Chicago.

Research Area: *machine learning algorithms, Anomaly Detection, Deep Learning, Multivariate Statistical Modeling, Advanced Mechanics Modeling, and Machine Learning Applications, Signal Processing.*

2012-2013 **MS in Statistics**, University of Illinois at Chicago.

Master's Exam: High Pass.

2010-2012 **MS in Applied Mathematics**, University of Illinois at Chicago.

Master's Exam: High Pass.

2008-2011 **MS in Physics**, University of Illinois at Chicago.

Qualifying exam: All Pass.

8+ Years of Machine Learning Work Experience

08/2020-Now **Senior Machine Learning Scientist**, Amazon.com, Great Los Angeles Area.

- Lead a team of senior engineers and data scientists to conduct the dealer churn machine learning engine on **AWS**. This supply chain dealer churn machine learning engine generates **\$5,000,000+** revenue annually.
- Design, develop, and deploy supply chain consumable and reusable modeling based on LSTM (**Keras, Pyspark, Redshift SQL, SageMaker, Tensorflow, CUDA GPU Computing**) into **AWS**. This model is accurately and effectively forecasting the supply and the demand of \$100 million level items for 800+ Amazon warehouses.
- Build and serve the dealer retention model, churn prediction model (**NLP, Xgboost, lightgbm, Spacy, NLTK**), and marketing revenue generation model on **Redshift, EC2, S3**. The dealer churn prediction model and dealer retention model is processing **\$5,000,000+** monthly revenue.
- Research and develop objective recognition and detection modelings based on by Yolo (**Computer Vision, Keras, Tensorflow, openCV**).
- Conduct the e-commerce recommendation engine to provide contextual product recommendations to users, it also helps users to discover additional relevant options along with a given input .

05/2018-08/2020 **Lead Data Scientist**, Cars.com, Great Chicago Area.

- Lead research and development on machine learning image processing tool (**Tensorflow, skimage, scipy**) which enables *image recognition, image quality enhancement, and image scoring*. This tool is featured in cars.com technology medium and is able to process million-level listing images. [0]
- Mentor team members on data analysis and modeling tasks including deploy data science models into **AWS (terraform, ecs, ec2, sagemaker, codecommit, cloudwatch)**, data visualization, data-story-telling .

10/2015-05/2018 **Data Science Lead**, Uptake Technologies, Great Chicago Area.

- Hold **4 U.S. machine learning patents** regarding unsupervised learning, **supervised learning**, anomaly detections in multivariate data, and remedy of software anomalies.
- Develop and deploy **machine learning anomaly detection (MLAD)** cloud computing platform, which monitors over 1 billion streaming readings per day. This anomaly detection engine has been productized and detecting anomalous for **500+ wind turbines** all over the world [1] .

06/2015-08/2015 **Data Scientist (Intern)**, Huawei Technologies, Great Chicago Area.

- **Hold 1 U.S. patent [2]** which illustrates a machine learning methodology to improve the anomaly detection rate. 98% TPR and 7.6% FPR were obtained by applying embodiment anomaly detection techniques to the KDD 99 dataset. The testing results outperform other known anomaly detection techniques.

11/2012-06/2015 **Research Scientist**, University of Illinois at Chicago, Great Chicago Area.

- **Hold 3 machine learning and data science publications [3]** which concentrate on machine learning applications on laser physics.

Machine Learning Patents and Patent Applications

- 10/2015 **Methodology to Improve Anomaly Detection Rate.**
Zhibi Wang and Tuo Li, Huawei Technologies, US Patent 62/236,745.
- 09/2016 **Detection of Anomalies in Multivariate Data.**
Tuo Li et al., Uptake Technologies, US Patent 63/382,639.
- 10/2017 **Computer System and Method for Detecting Anomalies in Multivariate Data.**
Tuo Li and James P Herzog, Uptake Technologies, U.S Patent Application Serial No.:15/788,622.
- 11/2017 **Systems and Methods for Detecting and Remediating Software Anomalies.**
Yuan Tang, Tuo Li, and James P Herzog., Uptake Technologies, U.S Patent 10/635,519.
- 04/2018 **Computer System and Method for Creating a Supervised Failure Modell.**
Tuo Li et al., Uptake Technologies, US Patent 10/635,095.

Data Science and Data Analysis Publications

- 08/2019 **Applications of Machine Learning Image Processing in Digital Marketing.**
Tuo Li, <https://tech.cars.com/applications-of-machine-learning-image-processing-in-digital-marketing-982ee296dc8a>
- 07/2015 **Density Functional Theory Analysis of Hexagonal Close-Packed Elemental Metal Photocathodes.**
*Tuo Li, B.L. Rickman, and W.A. Schroeder, *Physical Review ST Accelerators and Beams* 18.073401 (2015): 10.1103.*
- 03/2015 **Emission Properties of Group VIb Elemental Photocathodes.**
*Tuo Li, B.L. Rickman, and W.A. Schroeder, *Journal of Applied Physics* 117.13 (2015): 134901.*
- 02/2016 **Photoelectric Emission Properties of Photocathode Materials.**
Tuo Li, Ph.D. thesis, University of Illinois at Chicago.
- 04/2017 **PbTe(111) Sub-Thermionic Photocathode: A Route to High-Quality Electron Pulses.**
*Tuo Li and W.A. Schroeder, *arXiv preprint arXiv:1704.00194* (2017).*
- 05/2017 **Nonparametric Modeling of Face-Centered Cubic Metal Photocathodes.**
*Tuo Li and W.A. Schroeder, *arXiv preprint arXiv:1704.05371* (2017).*
- 11/2012 **Excited-state Thermionic Emission in III-Antimonides: Low Emittance Ultrafast Photocathodes.**
*J.A.Berger, B.L. Rickman, Tuo Li and W.A. Schroeder, *Applied Physics Letters* 101.19 (2012): 4103.*
- 11/2007 **Four Wave Mixing with Matter Waves.**
*Tuo Li, *China Modern Education with Honor*, 2007.*

Computer Skills

- Programming Python, R, Matlab, C++, Scala.
- Data Tools MySQL, PySpark, Redshift, SageMaker, ECS, ECR, EC2.
- Others AWS, RShiny, Rmarkdown, Bash, Git, Linux, L^AT_EX.