

# Ziming Zhang, PhD

Assistant Professor

Department of Electrical & Computer Engineering

Data Science

Robotics Engineering

Worcester Polytechnic Institute

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## Education

- **Oxford Brookes University** Oxford, United Kingdom  
*PhD. Computer Science* Jun 2010 - Jun 2013  
– Advisor: Prof. Philip H. S. Torr (now in **University of Oxford, Fellows of the Royal Society and Royal Academy of Engineering**)
- **Simon Fraser University** Burnaby, Canada  
*M.Sc. Computer Science* Aug 2008 - Apr 2010  
– Advisors: Prof. Ze-Nian Li and Prof. Mark Drew
- **Northeastern University** Shenyang, P.R.China  
*B.Eng. Computer Science and Technology* Sep 2001 - Jul 2005  
– Member of the **computer science specialized** class of the university

## Work Experience

- **Worcester Polytechnic Institute** Worcester, MA, United States  
*Assistant Professor* Oct 2019 - Present
- **Mitsubishi Electric Research Laboratories (MERL)** Cambridge, MA, United States  
*Principal Research Scientist* Apr 2019 - Sep 2019
- **Mitsubishi Electric Research Laboratories (MERL)** Cambridge, MA, United States  
*Research Scientist* Oct 2016 - Mar 2019
- **Boston University** Boston, MA, United States  
*Research Assistant Professor* Jun 2015 - Sep 2016
- **Boston University** Boston, MA, United States  
*Postdoc* Feb 2014 - May 2015  
– Advisor: Prof. Venkatesh Saligrama
- **University of North Carolina** Chapel Hill, NC, United States  
*Postdoc* Jul 2013 - Jan 2014  
– Advisor: Prof. Dinggang Shen

## Teaching Experience

- Courses

- ECE545/CS545: Digital Image Processing, Spring 2020, 2021 (26 graduates)
- ECE596: Graduate Seminars, Fall 2020 (31 graduates)
- 1 Major Qualifying Project (MQP) for Undergraduate, 2019-2020
- 3 Independent Studies for Graduate
- 5 Directed Research for Graduate
- 4 MS Thesis Committee,

## Journal Publications

1. Yecheng Lyu, Xinming Huang, and **Ziming Zhang**. *Revisiting 2D Convolutional Neural Networks for Graph-based Applications*. IEEE Transaction on Pattern Analysis and Machine Intelligence (TPAMI), 2021.
2. Yiming Zhao, Lin Bai, **Ziming Zhang**, and Xinming Huang. *A Surface Geometry Model for LiDAR Depth Completion*. IEEE Robotics and Automation Letters, 2021.
3. Feiyun Cui, Yun Yue, Yi Zhang, **Ziming Zhang**, and H. Susan Zhou. *Advancing Biosensors with Machine Learning*. ACS Sensors, 2020.
4. Yao Sui, **Ziming Zhang**, Guanghui Wang, Yafei Tang, and Li Zhang. *Exploiting the Anisotropy of Correlation Filter Learning for Visual Tracking*. International Journal of Computer Vision (IJCV), 2019.
5. **Ziming Zhang**, Yun Liu, Xi Chen, Yanjun Zhu, Ming-Ming Cheng, Venkatesh Saligrama, and Philip H.S. Torr. *Sequential Optimization for Efficient High-Quality Object Proposal Generation*. IEEE Transaction on Pattern Analysis and Machine Intelligence (TPAMI), 2017.
6. **Ziming Zhang**, and Venkatesh Saligrama. *PRISM: Person Re-Identification via Structured Matching*. IEEE Transaction on Circuits and Systems for Video Technology (TCSVT), June 2016.
7. **Ziming Zhang**, and Philip H.S. Torr. *Object Proposal Generation using Two-Stage Cascade SVMs*. IEEE Transaction on Pattern Analysis and Machine Intelligence (TPAMI), 2016 Jan;38(1):102-15.
8. **Ziming Zhang**, Heng Huang, and Dinggang Shen. *Integrative Analysis of Multi-Dimensional Imaging Genomics Data for Alzheimer's Disease Prediction*. Frontiers in Aging Neuroscience, 2014.

## Conference Publications

1. Yiming Zhao, Xinming Huang, and **Ziming Zhang**. *Deep Lucas-Kanade Homography for Multimodal Image Alignment*. In Proceeding of Computer Vision and Pattern Recognition (CVPR), 2021. (acceptance rate 27%)
2. **Ziming Zhang**. *An Efficient Empirical Solver for Localized Multiple Kernel Learning via DNNs*. In Proceeding of International Conference on Pattern Recognition (ICPR), 2020. (acceptance rate 40.1%)
3. Yun Yue, Ming Li, Venkatesh Saligrama, and **Ziming Zhang**. *RNN Training along Locally Optimal Trajectories via Frank-Wolfe Algorithm*. In Proceeding of International Conference on Pattern Recognition (ICPR), 2020. (acceptance rate 40.1%)
4. Yecheng Lyu, Ming Li, Xinming Huang, Ulkuhan Guler, Patrick Schaumont, and **Ziming Zhang**. *TreeRNN: Topology-Preserving Deep Graph Embedding and Learning*. In Proceeding of International Conference on Pattern Recognition (ICPR), 2020. (acceptance rate 40.1%)

5. Xin Zhang, Yanhua Li, **Ziming Zhang**, and Zhi-Li Zhang. *f-GAIL: Learning f-Divergence for Generative Adversarial Imitation Learning*. In Proceeding of Advances in Neural Information Processing Systems (NeurIPS), 2020. (acceptance rate 20.1%)
6. Xin Zhang, Yanhua Li, Xun Zhou, **Ziming Zhang**, and Jun Luo. *TrajGAIL: Trajectory Generative Adversarial Imitation Learning for Long-term Decision Analysis*. In Proceeding of International Conference on Data Mining (ICDM), 2020. (acceptance rate 9.8%)
7. Keshav Bimbraw, Xihan Ma, **Ziming Zhang**, and Haichong Zhang. *Augmented Reality-Based Lung Ultrasound Scanning Guidance*. In Proceeding of Workshop on Advances in Simplifying Medical UltraSound (ASMUS), Medical Image Computing and Computer Assisted Intervention (MICCAI) 2020.
8. Ce Zheng, Yecheng Lyu, Ming Li, and **Ziming Zhang**. *LodoNet: A Deep Neural Network with 2D Keypoint Matching for 3D LiDAR Odometry Estimation*. In Proceeding of ACM International Conference on Multimedia (ACM MM), 2020. (acceptance rate 27.8%)
9. Yecheng Lyu, Xinming Huang, and **Ziming Zhang**. *Learning to Segment 3D Point Clouds in 2D Image Space*. In Proceeding of Computer Vision and Pattern Recognition (CVPR), 2020. (**oral**, acceptance rate 5.7%)
10. Anil Kag, **Ziming Zhang**, and Venkatesh Saligrama. *RNNs Incrementally Evolving on an Equilibrium Manifold: A Panacea for Vanishing and Exploding Gradients?* In Proceeding of International Conference on Learning Representations (ICLR), 2020. (acceptance rate 26.5%)
11. **Ziming Zhang**, Wenchi Ma, Yuanwei Wu, and Guanghui Wang. *Self-Orthogonality Module: A Network Architecture Plug-in for Learning Orthogonal Filters*. In Proceeding of Winter Conference on Applications of Computer Vision (WACV), 2020. (acceptance rate 46.1%, second round, algorithm track)
12. Wenju Xu, Guanghui Wang, Alan Sullivan, and **Ziming Zhang**. *Towards Learning Affine-Invariant Representations via Data-Efficient CNNs*. In Proceeding of Winter Conference on Applications of Computer Vision (WACV), 2020. (acceptance rate 30.0%, first round, algorithm track)
13. Mahdi Elhousni, Yecheng Lyu, Xinming Huang, and **Ziming Zhang**. *Automatic Building and Labeling of HD Maps with Deep Learning*. In Proceeding of Thirty-Second Annual Conference on Innovative Applications of Artificial Intelligence (IAAI), 2020
14. Yuanwei Wu, **Ziming Zhang**, and Guanghui Wang. *Unsupervised Deep Feature Transfer for Low Resolution Image Classification*. In Proceeding of Workshop and Challenge on Real-World Recognition from Low-Quality Images and Videos, International Conference on Computer Vision (ICCV), 2019.
15. Jian Zheng, Teng-Yok Lee, Chen Feng, Xiaohua Li, and **Ziming Zhang**. *Robust Attentional Pooling via Feature Selection*. In Proceeding of International Conference on Pattern Recognition (ICPR), 2018.
16. **Ziming Zhang**, Yuanwei Wu, and Guanghui Wang. *BPGrad: Towards Global Optimality in Deep Learning via Branch and Pruning*. In Proceeding of Computer Vision and Pattern Recognition (CVPR), 2018.
17. **Ziming Zhang**, and Matthew Brand. *Convergent Block Coordinate Descent for Training Tikhonov Regularized Deep Neural Networks*. In Proceeding of Advances in Neural Information Processing Systems (NIPS), 2017.
18. Chiori Hori, Takaaki Hori, Teng-Yok Lee, **Ziming Zhang**, Bret Harsham, John R. Hershey, Tim K. Marks, and Kazuhiro Sumi. *Attention-Based Multimodal Fusion for Video Description*. In Proceeding of International Conference on Computer Vision (ICCV), 2017.
19. **Ziming Zhang**, and Venkatesh Saligrama. *Zero-Shot Recognition via Structured Prediction*. In Proceeding of European Conference on Computer Vision (ECCV), 2016.

20. Yao Sui, **Ziming Zhang**, Guanghui Wang, Yafei Tang, and Li Zhang. *Real-Time Visual Tracking: Promoting the Robustness of Correlation Filter Learning*. In Proceeding of European Conference on Computer Vision (ECCV), 2016.
21. **Ziming Zhang**, Yuting Chen, and Venkatesh Saligrama. *Efficient Training of Very Deep Neural Networks for Supervised Hashing*. In Proceeding of Computer Vision and Pattern Recognition (CVPR), 2016.
22. **Ziming Zhang**, and Venkatesh Saligrama. *Zero-Shot Learning via Joint Latent Similarity Embedding*. In Proceeding of Computer Vision and Pattern Recognition (CVPR), 2016.
23. **Ziming Zhang**, and Venkatesh Saligrama. *Zero-Shot Learning via Semantic Similarity Embedding*. In Proceeding of International Conference on Computer Vision (ICCV), 2015.
24. **Ziming Zhang**, Yuting Chen, and Venkatesh Saligrama. *Group Membership Prediction*. In Proceeding of International Conference on Computer Vision (ICCV), 2015.
25. Gregory D. Castanon, Yuting Chen, **Ziming Zhang**, and Venkatesh Saligrama. *Efficient Activity Retrieval through Semantic Graph Queries*. In Proceeding of ACM International Conference on Multimedia (ACM MM), 2015: 391-400. (oral)
26. **Ziming Zhang**, and Venkatesh Saligrama. *RAPID: Rapidly Accelerated Proximal Gradient Algorithms for Convex Minimization*. In Proceeding of International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2015.
27. **Ziming Zhang**, Yuting Chen, and Venkatesh Saligrama. *A Novel Visual Word Co-occurrence Model for Person Re-identification* In ECCV Workshop on Visual Surveillance and Re-Identification, 2014. (oral)
28. Ming-Ming Cheng, **Ziming Zhang**, Wen-Yan Lin, and Philip H.S. Torr. *BING: Binarized normed gradients for objectness estimation at 300fps*. In Proceeding of Computer Vision and Pattern Recognition (CVPR), 2014. (oral, acceptance rate 5.75%)
29. **Ziming Zhang**, Paul Sturgess, Sunando Sengupta, Nigel Crook, and Philip H.S. Torr. *Efficient Discriminative Learning of Parametric Nearest Neighbor Classifiers*. In Proceeding of Computer Vision and Pattern Recognition (CVPR), 2012. (acceptance rate 21.6%)
30. **Ziming Zhang**, Lubor Ladicky, Philip H.S. Torr, and Amir Saffari. *Learning Anchor Planes for Classification*. In Proceeding of Advances in Neural Information Processing Systems (NIPS), 2011: 1611-1619. (acceptance rate 24%)
31. **Ziming Zhang**, Jonathan Warrell, and Philip H.S. Torr. *Proposal Generation for Object Detection using Cascaded ranking SVMs*. In Proceeding of Computer Vision and Pattern Recognition (CVPR), 2011: 1497-1504. (acceptance rate 22.5%)
32. **Ziming Zhang**, Jiawei Huang, and Ze-Nian Li. *Learning Sparse Features On-Line for Image Classification*. In Proceeding of International Conference on Image Analysis and Recognition (ICIAR), 2011: 122-131. (oral, acceptance rate 29.6%)
33. **Ziming Zhang**, Jiawei Huang, and Ze-Nian Li. *Discovering Motion Patterns for Human Action Recognition*. In Proceeding of Pacific-Rim Conference on Multimedia (PCM), 2010: 716-727.
34. **Ziming Zhang**, Ze-Nian Li, and Mark Drew. *Learning Image Similarities via Probabilistic Feature Matching*. In Proceeding of International Conference on Image Processing (ICIP), 2010: 1857-1860. (oral, acceptance rate 15%)
35. **Ziming Zhang**, Ze-Nian Li, and Mark Drew. *AdaMKL: A Novel Biconvex Multiple Kernel Learning Approach*. In Proceeding of International Conference on Pattern Recognition (ICPR), 2010: 2126-2129. (oral, acceptance rate 18%)

36. **Ziming Zhang**, Ze-Nian Li, and Mark Drew. *Feature Correspondence with Constrained Global Structures*. In Proceeding of International Conference on Image Processing (ICIP), 2009: 177-180.
37. **Ziming Zhang**, Yiqun Hu, Syin Chan, and Liang-Tien Chia. *Motion Context: A New Representation for Human Action Recognition*. In Proceeding of European Conference on Computer Vision (ECCV), 2008: 817-829.
38. **Ziming Zhang**, Syin Chan, and Liang-Tien Chia. *Image Classification Using Tensor Representation*. In Proceeding of ACM International Conference on Multimedia (MM), 2007: 281-284.
39. **Ziming Zhang**, Syin Chan, and Liang-Tien Chia. *Discriminative Signatures for Image Classification*. In Proceeding of International Conference on Image Processing (ICIP), 2007: 197-200.
40. **Ziming Zhang**, Syin Chan, and Liang-Tien Chia. *Codebook+: A New Module for Creating Discriminative Codebooks*. In Proceeding of International Conference on Multimedia and Expo (ICME), 2007: 815-818.

## Grants

1. *Knowledge Integrated Data-Efficient Deep Learning*. NSF:CISE:CCF:SHF:SMALL, PI, \$499,950, 10/01/2020 - 09/30/2023
2. *Multi-Source Object Re-Identification: A Probabilistic Framework*. GDMS University Research RFP, PI, \$100,000, 2019-2020
3. *Real-Time Geo-Rectification for UAV Videos Using Deep Learning*. GDMS University Research RFP, Co-PI, \$100,000, 2019-2020

## Invited Talks

- United Imaging Intelligence, Cambridge, MA, Jan 2020
- Wayfair, Boston, MA, Jan 2020
- IBM Research at Boston, MA, Sep 2018
- Deep Learning Summit, Boston, May 2018
- IVC Seminar at Department of Computer Science, Boston University, MA, April 2017
- Microsoft Research at NYC, NY, May 2016
- IBM Research at Watson, NY, May 2016
- Department of Computer Science, City College of New York, NY, May 2016
- BBN Technologies, MA, May 2016
- Department of Electrical and Computer Engineering, Tufts University, MA, Feb 2015
- Department of Computer Science, Boston College, MA, Nov 2014
- IVC Seminar at Department of Computer Science, Boston University, MA, Sep 2014

## Patents

1. **Ziming Zhang** and Matthew Brand. *On the Convergence of Block Coordinate Descent in Training DNNs with Tikhonov Regularization*. 2017.
2. Gregory D. Castanon, Venkatesh Saligrama, **Ziming Zhang**, and Yuting Chen. *Large Scale Video Search Using Queries that Define Relationships Between Objects*. Nov 2014.

## Professional Activities

- Committee member of International Conference on Risk Analysis and Emergency Management, 2021  
<http://icraem.org>
- A member of Topic Editors for Journal of Imaging (2021-)  
[https://www.mdpi.com/journal/jimaging/topic\\_editors](https://www.mdpi.com/journal/jimaging/topic_editors)
- Guest editor for special issue on “Collective Behavior Analysis and Graph Mining in Social Networks 2021” in Complexity, <https://www.hindawi.com/journals/complexity/si/486242/>
- Co-organizer of 2nd Workshop on Vision Applications and Solutions to Biased or Scarce Data (VASBSD 2021) in Winter Conference on Applications of Computer Vision (WACV), 2021
- Co-organizer of 1st Workshop on Vision Applications and Solutions to Biased or Scarce Data (VASBSD 2020) in Winter Conference on Applications of Computer Vision (WACV), 2020
- Section Chair in Workshop on Recent Trends in Computer Vision, 2015
- Member, Institute of Electrical and Electronics Engineers (IEEE)
- Reviewer for
  - Transactions on Information Theory (TIT)
  - Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
  - Transactions on Image Processing (TIP)
  - Transaction on Medical Imaging (TMI)
  - International Journal of Computer Vision (IJCV)
  - Journal of Machine Learning Research (JMLR)
  - International Journal of Pattern Recognition and Artificial Intelligence (IJPRAI)
  - International Journal of Image and Graphics (IJIG)
  - Pattern Recognition (PR), Neurocomputing
  - Transactions on Cybernetics (CYB)
  - Signal Processing, PLOS ONE
- Reviewer/PC Member for
  - Neural Information Processing Systems (NIPS)
  - International Conference on Machine Learning (ICML)
  - International Conference on Learning Representations (ICLR)

Association for the Advancement of Artificial Intelligence (AAAI)  
 Artificial Intelligence and Statistics Conference (AISTATS)  
 International Joint Conferences on Artificial Intelligence (IJCAI)  
 Conference on Computer Vision and Pattern Recognition (CVPR)  
 International Conference on Computer Vision (ICCV)  
 European Conference on Computer Vision (ECCV)  
 Winter Conference on Applications of Computer Vision (WACV)  
 International Conference on Robotics and Automation (ICRA)  
 IEEE Conference on Decision and Control (CDC)

## Honours & Awards

R&D 100 Award (the most prestigious innovation awards program for the past 56 years)	2018
MELCO ITC Award	2018
MERL Research Award	2018
BMVA Travel Bursary Award (£750)	2012
PASCAL2 Travel Grant (£800)	2011
Deskin Sales Graduate Scholarship (C\$700)	2009
Computing Science Graduate Fellowship (C\$6250)	2009
Nanyang Technological University Graduate Scholarship	2006 - 2008
Successful Participation Award in Mathematical Contest in Modeling (MCM)	2004
First-Class Award in Liaoning Province in Chinese Mathematical Contest in Modeling (CMCM)	2003
Northeastern University Academic Scholarship	2001 - 2005
Northeastern University Entrance Fellowship	2001
First-Class Award in Chinese Physics Olympic Competition (23 <sup>rd</sup> place in Liaoning Province)	2000
Second-Class Award in Chinese Chemistry Olympic Competition	2000
Third-Class Award in Chinese Mathematics Olympic Competition	2000
First-Class Award in Chinese Physics Olympic Competition (3 <sup>rd</sup> place in Shenyang City)	1998

## Service to Department & University

- Member of the Graduate Policy and Curriculum Committee (GPCC) & Graduate Admission Committee in ECE, 2019-2020
- Member of the Graduate Program Committee (GPC) in ECE, 2020-2021

## Supervised/Co-supervised Students

- Intern@MERL
  - Yuanwei Wu (University of Kansas)
  - Venkatesh N. Murthy (University of Massachusetts at Amherst)
  - Wenbo Liu (Carnegie Mellon University)
  - Jian Zheng (Binghamton University, State University of New York)

- Rongmei Lin (Emory University)
- Weiyang Liu (Georgia Institute of Technology)
- Wenju Xu (University of Kansas)
- Zudi Lin (Harvard University)
- Yecheng Lyu (Worcester Polytechnic Institute)
- PhD
  - Yuting Chen (2014-2016, co-supervised with Prof. Saligrama in ECE at Boston University)
  - Yecheng Lyu (2019-now, co-supervised with Prof. Xinming Huang in ECE at WPI)
  - Guojun Wu (2020-now, co-supervised with Prof. Yanhua Li in CS at WPI)
  - Biao Yin (2020-now, co-supervised with Prof. Elke A Rundensteiner in Data Science at WPI)
  - Yun Yue (2020-now)
  - Yuping Shao (2021-now)
- Master
  - Amey Kulkarni (2020), now at Bastian Solutions
  - Xiao Zhang (2021)
- Visiting Scholars
  - Ce Zheng (2019-2020), MS from EE @ Tufts University, now pursuing PhD at NC State University (NCSTU)
  - Ming Li (2019-2021), MS from EECS @ Peking University, now pursuing PhD at National University of Singapore (NUS)

## Referees

- Dr. Philip H. S. Torr
  - Professor, Fellow St Catherine's College, Royal Society Wolfson Research Merit Award Holder
  - Department of Engineering Science, University of Oxford
  - Email: philip.torr@eng.ox.ac.uk
  - Phone: +44 1865 283 059
- Dr. Dinggang Shen
  - Professor and Dean, FIEEE, FAIMBE, FIAPR, Co-CEO@United Imaging Intelligence
  - School of BME, ShanghaiTech University
  - Email: dgshen@shanghaitech.edu.cn
- Dr. Venkatesh Saligrama
  - Professor, Fellow of IEEE
  - Department of Electrical & Computer Engineering, Boston University
  - Email: srv@bu.edu
  - Phone: +1 617 353 1040