

Xiaoming LIU

CONTACT INFORMATION

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RESEARCH INTEREST Computer Vision, Machine Learning, Deep Learning, Human Computer Interface, Medical Image Analysis, Pattern Recognition, Image and Video Processing, Multimedia Retrieval.

EDUCATION

Carnegie Mellon University, Pittsburgh, PA. USA

Ph.D., Electrical and Computer Engineering

October, 2004

- Dissertation Title: "Pose Robust Video-Based Face Recognition"
- Advisors: Prof. Tsuhan Chen and Prof. B.V.K. Vijaya Kumar
- Thesis committee: Tsuhan Chen (chair), B.V.K. Vijaya Kumar, Jie Yang, Zhengyou Zhang (Microsoft Research)

Zhejiang University, Hangzhou, Zhejiang, P.R. China

M.S., Computer Science and Engineering

March, 2000

- Dissertation Title: "Study on Video based Human Animation Techniques"
- Advisor: Prof. Yueting Zhuang

Beijing Information Technology Institute, Beijing, P.R.China

B.A., Computer Science and Engineering

July, 1997

EXPERIENCE

Jul 2020- Professor, Department of Computer Science and Engineering, Michigan State University, East Lansing, MI

Jul 2018-Jun 2020 Associate Professor with Tenure, Department of Computer Science and Engineering, Michigan State University, East Lansing, MI

Aug 2012-Jun 2018 Tenure-track Assistant Professor, Department of Computer Science and Engineering, Michigan State University, East Lansing, MI

Nov 2004-Aug 2012 Computer Scientist, Visualization & Computer Vision Lab, GE Global Research, Niskayuna, NY

- Led and performed research in government-sponsored programs on human face recognition related topics, including face capture at a distance, face alignment, head and eye gaze estimation, face super-resolution, face deblurring, face recognition/verification, 3D-to-2D face recognition, face classifier adaption, spontaneous facial action units recognition, unsupervised and semi-supervised face joint alignment, thermal face processing, multi-model biometrics fusion, and biometrics sample quality.
- Led and performed research in government-sponsored video surveillance programs on following topics: multi-camera person detection, person tracking, body alignment, body segmentation via matting, online boosting for person tracking, person counting, pan-tilt-zoom (PTZ) camera control, individual-level behavior and gait analysis, and group-level activity recognition.
- Led and performed research in business-sponsored projects on topics such as affective analysis, user experience modeling, facial expression recognition, facial behavior (pain, stroke, delirium)

analysis for elderly, facial demographics recognition, gaze estimation for football players, interactive advertisement, medical image analysis, activity recognition for hospital rooms, etc.

- Invented and developed a suite of advanced image alignment algorithms, which have been applied to a wide range of applications within GE.
- Developed a classification and testing framework for automatic defect recognition in industrial inspection applications.
- Delivered an array of technologies to GE businesses, including viewers' emotion analysis for NBC Universal, gaze estimation of football players for NBC Universal, biometrics ID kiosk for GE Security, and ultrasound fetal head scan plane identification for GE Healthcare.

Jan 2000-Oct 2004 Research Assistant, Advanced Multimedia Processing Lab, Carnegie Mellon University, Pittsburgh, PA

- Developed video-based face recognition technologies which include: face mosaicing to integrate human face tracking, modeling, and pose-robust recognition from video sequences; adaptive HMMs to model/utilize temporal information in face videos.
- Designed and implemented a camera array system (both hardware & software) for capturing face videos from six cameras simultaneously. This results in the largest publicly available face video database at that time.
- Developed an online subspace learning algorithm where an eigenspace is updated with decaying memory. Applied the updating scheme in various applications, including face recognition, signal change detection, video coding and object tracking.
- Developed expression invariant face recognition algorithm (eigenflow) which uses motion information for recognition. Proposed Individual Principal Component Analysis (IPCA) for face authentication task.

Sep 1998-Dec 1999 Research Assistant, Intelligent CAD Lab, Zhejiang University, P.R. China

- Developed video-based human animation algorithms and system which includes two components: tracking 2D human skeleton from video sequences, and reconstructing 3D skeleton from the 2D skeleton sequence.
- Developed a Web-Oriented image/video information retrieval system where a Semantic Template is proposed to perform multimedia retrieval at the semantic level and a video similarity model is applied to retrieve example clips given a video query.

GRANTS & PROJECTS Total funding during GE employment was **\$2.95M**. Total funding during MSU employment is **\$13.34M**, where my portion is **\$5.94M**.

- **Principal Investigator**, "Intelligent Diagnosis for Machine and Human-Centric Adversaries," DARPA Reverse Engineering of Deceptions (RED) program, Co-PI, Dr. Sijia Liu and Dr. Xue Lin (Northeastern University), \$1M, 11/20-4/22.
- **Principal Investigator**, "Face manipulation detection," Facebook, Co-PI, Dr. Anil Jain, \$387K, 6/20-6/22.
- **Principal Investigator**, "SCH: INT: Collaborative Research: Unobtrusive sensing and motivational feedback for family wellness" National Science Foundation, Co-PI, Dr. Wei Peng, \$365K, 8/19-8/20.
- **Principal Investigator**, "On the Study of Bias in Face Recognition," National Institute of Standards and Technology, \$147K, 9/19-8/20.
- **Principal Investigator**, "Computer vision research," Facebook Reality Lab, Research Gift, \$25K, 5/19-10/19.
- **Principal Investigator**, "Computer vision research," Incode Inc., Research Gift, \$30K, 1/19-12/19.
- **Principal Investigator**, "Group Travel Grant for the Doctoral Consortium of the IEEE Conference on Computer Vision and Pattern Recognition," National Science Foundation, \$26K, 6/18-10/18.
- **Principal Investigator**, "Person Identification at a Distance," Army Research Office, \$500K, 6/18-5/21.

- **Principal Investigator**, “Computer vision research,” Deepcam Inc., Research Gift, \$30K, 9/17-8/18.
- **Principal Investigator**, “Accurate 3D Object Classification in Open World,” Office of Naval Research, \$300K, 6/17-5/20.
- **Principal Investigator**, “Computer vision research,” Adobe Research, Research Gift, \$17K, 9/17-3/18.
- **Principal Investigator**, “Gait-based Rider Authentication for Autonomous Carsharing,” Ford-MSU Innovation Alliance, \$275K, 1/17-3/19.
- **Co-Principal Investigator**, “Presentation Attack Detection: Solutions for Fingerprints, Face and Iris Systems,” IARPA, PI Dr. Arun Ross, \$6.21M, 1/17-12/20.
Develop algorithms and systems to detect various presentation attacks in three biometrics modalities.
- **Principal Investigator**, “Computer vision research,” Bosch Research and Technology Center North America, Research Gift, \$225K, 1/17-10/21.
- **Principal Investigator**, “Computer vision research,” NEC Laboratories America, Inc. Research Gift, \$30K, 12/16-11/17.
- **Co-Principal Investigator**, “Perception software development with 3D Lidar,” Changan US R&D Center Inc., PI Dr. Daniel Morris, \$100K, 09/2016-09/17.
- **Co-Principal Investigator**, “Speaker Recognition from Degraded Audio Samples (SR-DAS),” FBI-BOE, PI Dr. Arun Ross, \$500,000, 05/16-12/17.
Develop algorithms to recognize individuals in surveillance videos using both audio and video signals
- **Co-Principal Investigator**, “Quantitative Molecular and Cellular MRI of Hepatocyte Transplantation,” NIH R01, PI Dr. Erik Shapiro, \$2.10M, 09/15-09/19.
Develop computer vision and machine learning algorithms to quantify cell transplantation in MRI
- **Principal Investigator**, “Intelligent vehicle,” General Motors Company, \$297K, 08/15-08/17.
This project explores one specific scenario of autonomous driving - automatic trailer back up
- **Principal Investigator**, “Sports Video Analysis,” TechSmith Inc. Research Gift, \$52K, 08/15-08/16.
Develop algorithms to analyze the motion in a diverse type of sports videos
- **Principal Investigator**, “Learning to Fuse Information with Missing Modalities”, Department of Defense, \$450K, 05/15-12/19.
- **Principal Investigator**, “A System for Online Exam Proctoring - Development and Evaluation,” MSU Targeted Support Grants for Technology Development (TSGTD) program, \$52K, 03/15-03/16.
Evaluate and further developing a computer vision system to detect cheating behavior while students taking examination for online courses.
- **Principal Investigator**, “Sports Video Analysis,” TechSmith Inc. Research Gift, \$50K, 08/14-08/15.
Develop algorithms to analyze the motion in a diverse type of sports videos
- **Principal Investigator**, “Imaging Technologies for Enhancing Agricultural Productivity, Cercospora Leaf Spot Rating as a Case Study,” Project GREEN, \$30K, 05/14-06/15.
Enhance the automatic rating system for the Cercospora leaf spot disease of sugar beet using the cross-year data.
- **Principal Investigator**, “Object (fish) Segmentation & Counting,” Herrick foundation, \$20K, 04/14-06/14.
Develop a computer vision system to perform automatic fish segmentation and counting from videos.
- **Principal Investigator**, “A System for Online Exam Proctoring,” MSU Targeted Support Grants for Technology Development (TSGTD) program, \$55K, 07/13-08/14.

Develop a computer vision system to detect cheating behavior while students taking examination for online courses.

- **Principal Investigator**, “Sports Video Analysis,” TechSmith Inc. Research Gift, \$47K, 06/13-08/14.
Study algorithms to analyze the motion in a diverse type of sports videos
- **Co-Principal Investigator**, “Image acquisition and processing for enhanced scoring of Cercospora leaf spot nursery,” Michigan Sugar Company Competitive Grant, #MSC-13-08, \$5K, Mitch McGrath (PI), 01/13-12/13.
Develop an automatic rating system for the Cercospora leaf spot disease of sugar beet by using the video captured from a small UAV flying over the field.
- **Co-Principal Investigator**, “Rapid Biometric System for Physical Access Control,” US Army Research Laboratory, Awarded May 2012, \$750K, Daniel Gray (PI), 10/12-09/13.
Develop a smart lens system coupled with advanced image analysis that provides the DoD/ARL with an automated system for rapid verification for physical access.
- **Principal Investigator**, “Advanced Behavior Recognition in Crowded Environments - Continuation,” National Institute of Justice (NIJ) award #2011-IJ-CX-K004, \$250K, 10/11-09/12.
Continue the development of the behavior recognition system and deploy it in a real-world law enforcement site.
- **Principal Investigator**, “Advanced Behavior Recognition in Crowded Environments,” National Institute of Justice (NIJ) award #2009-SQ-B9-K013, \$350K, 03/11-12/11.
Developed a video surveillance system that performs multi-camera multi-person tracking in crowd environments and recognizes individual-level and group-level activity, such as loitering, chasing, franking, contraband hand-off, etc.
- **Project Leader**, “Recognize Facial Action Units (AUs) from Face Video Sequences,” Department of Homeland Security (DHS), \$100K, 01/10-11/10.
Developed a system to automatically recognize a set of spontaneous facial action units that are highly indicative of deception.
- **Principal Investigator**, “Site-Adaptive Face Recognition at a Distance,” National Institute of Justice (NIJ) award #2007-DE-BXK191, \$500K, 10/07-12/09.
Developed a face recognition system that optimizes over the existing subspace-based approaches, and adapts to the site-specific imaging conditions.
- **Project Leader**, “Biometrics ID Kiosk,” Israel-U.S. Binational Industrial Research and Development (BIRD) foundation, \$500K, 6/07-12/08.
Developed a face verification system for an ID kiosk that matches the ID photo scanned from an identity document (e.g., driver’s license, passport) with the face image captured from the camera.
- **Project Leader**, “Active 3D Face Capture,” National Institute of Justice (NIJ) award #2006-IJ-CX-K045, \$500K, 10/06-3/08.
Developed a face capture a distance system including PTZ control, face alignment, and facial super-resolution, which serves as the front-end component of a recognition at a distance system.

HONORS AND AWARDS **Fellow of International Association for Pattern Recognition (IAPR) 2020:** “For contributions to facial image analysis and recognition”.

Best Oral Paper Award for the paper “UGLLI Face Alignment: Estimating Uncertainty with Gaussian Log-Likelihood Loss” at the First Workshop on Statistical Deep Learning in Computer Vision (SDLCV) 2019.

Finalist of the CVPR 2019 Best Paper Award for my students’ work of “Deep Tree Learning for Zero-shot Face Anti-Spoofing”.

2018 Withrow Distinguished Scholar–Junior Award. Established by the Withrow family to recognize faculty of the MSU College of Engineering who have demonstrated excellence in scholarly activities.

Invited participant, Microsoft Research Faculty Summit 2017.

Best Poster Award as a co-author at the 26th British Machine Vision Conference (BMVC) 2015.

One co-authored paper selected as **the top 10% of accepted papers** at the International Conference of Image

Processing (ICIP) 2014.

Best Industry Related Paper Award (BIRPA) runner-up as a co-author at the International Conference on Pattern Recognition (ICPR) 2014.

Best Paper Award Runner-up as a co-author at ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN) 2014.

Best Student Paper Award as a co-author at IEEE Winter Conference on Applications of Computer Vision (WACV) 2014.

Fellow of the Academy for Global Engagement, Michigan State University, 2014.

Best Demo Award as a co-author at IEEE Sixth International Conference on Biometrics: Theory, Applications and Systems (BTAS 2013).

Best Student Paper Award as a co-author at IEEE Workshop on Applications of Computer Vision (WACV) 2012.

Publications Milestone Award, GE Global Research, 2011

Global Winner of Hack Week 2011, GE Healthcare, 2011

Best Paper Honorable Mention Award as a co-author at IEEE Computer Society Workshop on Biometrics, 2009

One of the two finalists of the **Imagination at Work** award in Imaging Organization for “inventions in 2008 that fortify GE’s reputation as a high-tech, innovative company”, GE Global Research, 2009

Inventor Award, GE Global Research, 2008

Publications Award, GE Global Research, 2008

Several Management Awards, GE Global Research

Redington Team Award, GE Global Research, 2006

Inventor Award, GE Global Research, 2005

Rockwell University Fellowship, Zhejiang University, 1998-1999

Several Excellent Student Fellowships, Beijing Information Technology Institute, 1993-1997

Second Prizes, Advanced Mathematics Contest, Beijing Information Technology Institute, 1994

TEACHING

CSE 471: Media Processing and Multimedia, Spring 2014-2018, 2020

CSE 891-006: Computer Vision Seminar, Spring 2013.

CSE 803 Computer Vision: Fall 2012-2017, 2019-2020.

Teaching Assistant for Signal and Systems in CMU: Gave recitations, directed labs, prepared homework solutions, **Carnegie Mellon University**, Pittsburgh, PA. Fall 2002 & Fall 2003.

PUBLICATIONS

[Google Scholar](#) lists my **h-index** as **52**, with over 12K citations.

Journal Articles

1. Ziyuan Zhang, Luan Tran, Feng Liu, **Xiaoming Liu**, “On Learning Disentangled Representations for Gait Recognition,” in IEEE Transactions on Pattern Analysis Machine Intelligence (PAMI), doi:10.1109/TPAMI.2020.2998799, May 2020. [arXiv](#).
2. Tian Xie, Guan-Hua Tu, Bangjie Yin, Chi-Yu Li, Chunyi Peng, Mi Zhang, Hui Liu, **Xiaoming Liu**, “The Untold Secrets of WiFi-Calling Services: Vulnerabilities, Attacks, and Countermeasures,” in IEEE Transactions on Mobile Computing, doi:10.1109/TMC.2020.2995509, May 2020. [PDF](#)
3. Luan Tran, **Xiaoming Liu**, “On Learning 3D Face Morphable Model from In-the-wild Images,” in IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), Vol. 43, No. 1, pp. 157-171, January 2021. [arXiv](#) [PDF](#)
4. Feng Liu, Qijun Zhao, **Xiaoming Liu**, Dan Zeng, “Joint Face Alignment and 3D Face Reconstruction with Application to Face Recognition,” in IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), Vol. 42, No. 3, pp. 664-678, March 2020. [arXiv](#)
5. Luan Tran, Xi Yin, **Xiaoming Liu**, “Representation Learning by Rotating Your Faces,” in IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), Vol. 41, No. 12, pp. 3007-3021, Dec 2019. [arXiv](#)
6. Xiangyu Zhu, **Xiaoming Liu**, Zhen Lei, Stan Li, “Face Alignment in Full Pose Range: A 3D Total Solution,” in IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), Vol. 41, No. 1, pp.78-92, January 2019. [PDF](#) [Supplemental](#)
7. Songyang Zhang, Yang Yang, Jun Xiao, **Xiaoming Liu**, Yi Yang, Yueting Zhuang, “Fusing Geometric Features for Skeleton-Based Action Recognition using Multilayer LSTM Networks,” in IEEE Transactions on Multimedia, Volume 20, Issue 9, pp. 2330-2343, September 2018. [PDF](#)

8. Xi Yin, **Xiaoming Liu**, Jin Chen, David Kramer, “Joint Multi-Leaf Segmentation, Alignment, and Tracking from Fluorescence Plant Videos,” IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), Vol. 40, No. 6, pp.1411-1423, June 2018. [arXiv](#)
9. Xi Yin, **Xiaoming Liu**, “Multi-Task Convolutional Neural Network for Pose-Invariant Face Recognition,” in IEEE Transactions on Image Processing, Volume 27, Issue 2, pp.964-975, February 2018. [arXiv](#)
10. Joseph Roth, Yiyong Tong, **Xiaoming Liu**, “Adaptive 3D Face Reconstruction from Unconstrained Photo Collections,” IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), Vol. 39, No. 11, pp.2127-2141, November 2017. [PDF](#)
11. Muhammad Jamal Afridi, Arun Ross, **Xiaoming Liu**, Margaret F. Bennewitz, Dorela Doris Shuboni, Erik Shapiro, “Intelligent and Automatic In Vivo quantification of transplanted cells in MRI”, Magnetic Resonance in Medicine, Volume 78, Issue 5, pp.1991-2002, November 2017. [PDF](#) [Supplementary](#)
12. Alsallakh Bilal, Amin Jourabloo, Mao Ye, **Xiaoming Liu**, Liu Ren, “Do Convolutional Neural Networks Learn Class Hierarchy?” IEEE Transactions on Visualization and Computer Graphics (TVCG), Volume 24, Issue 1, pp. 152-162, January 2018 = Proc. of IEEE Conference on Visual Analytics Science and Technology (VAST), Oct. 1-6, 2017, in Phoenix, Arizona. [PDF](#)
13. Amin Jourabloo, **Xiaoming Liu**, “Pose-Invariant Face Alignment via CNN-based Dense 3D Model Fitting,” International Journal of Computer Vision (IJCV), Volume 124, Issue 2, pp.187-203, September 2017. [PDF](#)
14. Yousef Atoum, Liping Chen, Alex Liu, Stephen Hsu, **Xiaoming Liu**, “Automated Online Exam Proctoring”, IEEE Transaction on Multimedia, Volume 19, Issue 7, pp.1609-1624, July 2017. [PDF](#)
15. Zhong Luan, Yuanyuan Shang, Xiuzhuang Zhou, Hui Ding, Guodong Guo, **Xiaoming Liu**, “Fast Single Image Dehazing Based on A Regression Model,” Neurocomputing, Volume 245, Pages 10-22, July 2017. [PDF](#)
16. Yu Wang, Rui Tan, Guoliang Xing, Jianxun Wang, Xiaobo Tan, and **Xiaoming Liu**, “Energy-Efficient Aquatic Environment Monitoring Using Smartphone-Based Robots,” ACM Transactions on Sensor Networks, Volume 12, Issue 3, August 2016. [PDF](#)
17. Xi Yin*, Jeffrey A. Cruz*, **Xiaoming Liu**, Saif M. Imran, Daniel D. Morris, David M. Kramer, Jin Chen, “Multi-modality Imagery Database for Plant Phenotyping,” Machine Vision and Applications, Volume 27, Issue 5, pp.735 - 749, July 2016. (* denotes equal contribution by the authors) [PDF](#)
18. Yu Wang, Rui Tan, Guoliang Xing, Jianxun Wang, Xiaobo Tan, **Xiaoming Liu**, and Xiangmao Chang, “Monitoring Aquatic Debris Using Smartphone-Based Robots,” IEEE Transactions on Mobile Computing, Vol.15, No.6, pp.1412-1426, June 2016. [PDF](#)
19. Yousef Atoum, Muhammad Jamal Afridi, **Xiaoming Liu**, J. Mitchell McGrath, Linda E. Hanson, “On Developing and Enhancing Plant-Level Disease Rating Systems in Real Fields,” Pattern Recognition, Volume 53, Pages 287-299, May 2016. [PDF](#)
20. Hanno Scharf, Massimo Minervini, Andrew P. French, Christian Klukas, David M. Kramer, **Xiaoming Liu**, Imanol Luengo Muntion, Jean-Michel Pape, Gerrit Polder, Danijela Vukadinovic, Xi Yin, Sotirios A. Tsafaris, “Leaf segmentation in plant phenotyping: A collation study,” Machine Vision and Applications, Volume 27, Issue 4, pp. 585-606, May 2016. [PDF](#)
21. Yousef Atoum, Steven Srivastava, **Xiaoming Liu**, “Automatic Feeding Control for Dense Aquaculture Fish Tanks,” IEEE Signal Processing Letters, Vol. 22, No. 8, pp.1089-1093, August 2015. [PDF](#)
22. Hu Han, Charles Otto, **Xiaoming Liu**, and Anil K. Jain, “Demographic Estimation from Face Images: Human vs. Machine Performance,” IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI), Vol.37, No.6, pp.1148-1161, June 2015. [PDF](#)
23. Joseph Roth, **Xiaoming Liu**, Arun Ross, and Dimitris Metaxas, “Investigating the Discriminative Power of Keystroke Sound,” IEEE Transactions on Information Forensics And Security, Vol.10, No.2, pp.333-345, February 2015. [PDF](#)
24. Joseph Roth, **Xiaoming Liu**, and Dimitris Metaxas, “On Continuous User Authentication via Typing Behavior,” IEEE Transactions on Image Processing, Vol.23, No.10, pp.4611-4624, October 2014. [PDF](#)
25. Jixu Chen, **Xiaoming Liu**, “Transfer Learning with One-Class Data,” Pattern Recognition Letters, Vol. 37, pp.32-40, February 2014. [PDF](#)
26. Jixu Chen, **Xiaoming Liu**, Peter Tu and Amy Aragones, “Learning Person-specific Models for Expression and Action Unit Recognition,” Pattern Recognition Letters, Vol.34, No.15, pp.1964-1970, November 2013. [PDF](#)

27. Yan Tong, **Xiaoming Liu**, Frederick W. Wheeler, and Peter Tu, "Semi-supervised Facial Landmark Annotation," *Computer Vision and Image Understanding*, Vol.116, No.8, pp.922-935, August 2012. [PDF](#)
28. **Xiaoming Liu**, "Video-based Face Model Fitting using Adaptive Active Appearance Model," *Image and Vision Computing*, Volume 28, Issue 7, pp.1162-1172, July 2010. [PDF](#)
29. **Xiaoming Liu**, "Discriminative Face Alignment," *IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI)*, Vol.31, No.11, pp.1941-1954, November 2009. [PDF](#)
30. **Xiaoming Liu**, Tsuhan Chen, and Susan M. Thornton, "Eigenspace Updating for Non-Stationary Process and Its Application to Face Recognition," *Pattern Recognition*, special issue on Kernel and Subspace Methods for Computer Vision, Vol.36, No.9, pp.1945-1959, September 2003. [PDF](#)
31. **Xiaoming Liu**, Tsuhan Chen, and B.V.K. Vijaya Kumar, "Face Authentication for Multiple Subjects Using Eigenflow," *Pattern Recognition*, special issue on Biometrics, Vol.36, No.2, pp.313-328, February 2003. [PDF](#)
32. Yueting Zhuang, **Xiaoming Liu**, and Yunhe Pan, "A Video-based Human Skeleton Extraction Technique For Animation," *Journal of Computer Research & Development*, Vol.37, No.4, pp.498-506, April 2000. (in Chinese)
33. Yueting Zhuang, **Xiaoming Liu**, Yi Wu, and Yunhe Pan, "A New Approach to Retrieve Video by Example Video Clip," *The Chinese Journal of Computers*, Vol.23, No.3, pp.300-305, March 2000. (in Chinese)
34. Yueting Zhuang, **Xiaoming Liu**, Yunhe Pan, and Jun Yang, "3D Human Skeleton Reconstruction from Motion Image Sequence," *Journal of Computer-aided Design & Computer Graphics*, Vol.12, No.4, pp.245-250, April 2000. (in Chinese)
35. Yunhe Pan, Yueting Zhuang, and **Xiaoming Liu**, "Video Motion Capture in VBA-Video-based Animation," *Journal of Zhejiang University, SCIENCE*, Vol.1, No.1, pp.1-7, January 2000.
36. **Xiaoming Liu**, Yueting Zhuang, and Yunhe Pan, "Model-Based Human Motion Tracking," *Journal of Computer Research & Development*, Vol.36, No.10, pp.1268-1273, October 1999. (in Chinese)
37. Yueting Zhuang, **Xiaoming Liu**, Chun Chen, Chenyu Zhang, and Weilin Lu, "GDP: The Design and Implementation of Object Oriented and Software Components Techniques," *Computer Science*, Vol.27, No.1, pp.40-43, January 2000. (in Chinese)

Book Chapters

38. Frederick Wheeler, **Xiaoming Liu**, and Peter Tu, "Face Recognition at a Distance," in *Handbook of Face Recognition, 2nd edition*, Stan Z. Li and Anil K. Jain, Eds, Springer-Verlag, 2011.
39. P.H. Tu, G.W. Brooksby, G. Doretto, D.W. Hamilton, N. Krahnstoeber, J.B. Laflam, **X. Liu**, K.A. Patwardhan, T. Sebastian, Y. Tong, J. Tu, F.W. Wheeler, C. M. Wynnyk, Y. Yao, and T. Yu, "Video Analytics for Force Protection," In *Distributed Video Sensor Networks, 1st edition*, B. Bhanu, C.V. Ravishankar, A.K. Roy-Chowdhury, H. Aghajan, and D. Terzopoulos, Eds, Springer, February 2011.
40. Yaojie Liu, Joel Stehouwer, Amin Jourabloo, Yousef Atoum, and **Xiaoming Liu**, "Presentation Attack Detection for Face in Mobile Phones," in *Selfie Biometrics*, Ajita Rattani, Reza Derakhahani, and Arun Ross, Eds, Springer-Verlag, 2019.
41. Luan Tran and **Xiaoming Liu**, "Learning 3D Face Morphable Model from In-the-wild Images," in *Deep Learning-based Face Analytics*, Vishal Patel, Nalini Ratha, Rama Chellappa, Eds, Cambridge University Press, 2019.

Highly Selective Conference Papers

Papers with acceptance rates similar to major journals are highlighted.

42. Feng Liu, **Xiaoming Liu**, "Learning Implicit Functions for Topology-Varying Dense 3D Shape Correspondence," in *Proceeding of Thirty-fourth Conference on Neural Information Processing Systems (NeurIPS) 2020*, virtual, Dec 2020. [PDF](#) (Oral, Acceptance rate 1.1%)
43. Garrick Brazil, Gerard Pons-moll, **Xiaoming Liu**, Bernt Schiele, "Kinematic 3D Object Detection in Monocular Video," in *Proceeding of European Conference on Computer Vision (ECCV) 2020*, Glasgow, UK, August 2020. [PDF](#) (Acceptance rate 27%)

44. Yaojie Liu, Joel Stehouwer, **Xiaoming Liu**, “On Disentangling Spoof Traces for Generic Face Anti-Spoofing,” in *Proceeding of European Conference on Computer Vision (ECCV) 2020*, Glasgow, UK, August 2020. [PDF](#) (Acceptance rate 27%)
45. Sixue Gong, **Xiaoming Liu**, Anil Jain, “Jointly De-biasing Face Recognition and Demographic Attribute Estimation,” in *Proceeding of European Conference on Computer Vision (ECCV) 2020*, Glasgow, UK, August 2020. [PDF](#) (Acceptance rate 27%)
46. Yuge Huang, Pengcheng Shen, Ying Tai, Shaoxin Li, **Xiaoming Liu**, Jilin Li, Feiyue Huang, Rongrong Ji, “Improving Face Recognition from Hard Samples via Distribution Distillation Loss,” in *Proceeding of European Conference on Computer Vision (ECCV) 2020*, Glasgow, UK, August 2020. [PDF](#) (Acceptance rate 27%)
47. Yuge Huang, Yuhan Wang, Ying Tai, **Xiaoming Liu**, Pengcheng Shen, Shaoxin Li, Jilin Li, Feiyue Huang, “CurricularFace: Dynamic Curriculum Learning Loss for Deep Face Recognition,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2020)*, Seattle, WA, June 2020. [PDF](#) (Acceptance rate 22.1%)
48. Joel Stehouwer, Yaojie Liu, Amin Jourabloo, **Xiaoming Liu**, “Noise Modeling, Synthesis and Classification for Generic Object Anti-Spoofing,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2020)*, Seattle, WA, June 2020. [PDF](#) (Acceptance rate 22.1%)
49. Abhinav Kumar, Tim Marks, Wenxuan Mou, Ye Wang, Michael Jones, Anoop Cherian, Toshiaki Koike-Akino, **Xiaoming Liu**, Chen Feng, “LUVLi Face Alignment: Estimating Landmarks’ Location, Uncertainty, and Visibility Likelihood,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2020)*, Seattle, WA, June 2020. [PDF](#) (Acceptance rate 22.1%)
50. Hao Dang*, Feng Liu*, Joel Stehouwer*, **Xiaoming Liu**, Anil Jain, “On the Detection of Digital Face Manipulation,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2020)*, Seattle, WA, June 2020. [PDF](#) [arXiv](#) (Acceptance rate 22.1%)
51. Chang Chen, Zhiwei Xiong, **Xiaoming Liu**, Feng Wu, “Camera Trace Erasing,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2020)*, Seattle, WA, June 2020. [PDF](#) (Acceptance rate 22.1%)
52. Ziqian Bai, Zhaopeng Cui, Jamal Ahmed Rahim, **Xiaoming Liu**, Ping Tan, “Deep Facial Non-Rigid Multi-View Stereo,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2020)*, Seattle, WA, June 2020. [PDF](#) (Acceptance rate 22.1%)
53. Shengjie Zhu, Garrick Brazil, **Xiaoming Liu**, “The Edge of Depth: Explicit Constraints between Segmentation and Depth,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2020)*, Seattle, WA, June 2020. [PDF](#) (Acceptance rate 22.1%)
54. Garrick Brazil, **Xiaoming Liu**, “Monocular 3D Region Proposal Network for 3D Object Detection,” In *Proceeding of International Conference on Computer Vision (ICCV 2019)*, Seoul, South Korean, Oct. 2019. [arXiv](#) (Oral, Acceptance rate 4.3%)
55. Feng Liu, Tran Luan, **Xiaoming Liu**, “3D Face Modeling from Diverse Raw Scan Data,” In *Proceeding of International Conference on Computer Vision (ICCV 2019)*, Seoul, South Korean, Oct. 2019. [arXiv](#) (Oral, Acceptance rate 4.3%)
56. Bangjie Yin*, Luan Tran*, Haoxiang Li, Xiaohui Shen, **Xiaoming Liu**, “Towards Interpretable Face Recognition,” in *Proceeding of International Conference on Computer Vision (ICCV 2019)*, Seoul, South Korean, Oct. 2019. [arXiv](#) (* denotes equal contribution by the authors) (Oral, Acceptance rate 4.3%)
57. Yaojie Liu, Joel Stehouwer, Amin Jourabloo, **Xiaoming Liu**, “Deep Tree Learning for Zero-shot Face Anti-Spoofing,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2019)*, Long beach, CA, June 2019. [PDF](#) (Oral, Acceptance rate 5.6%) **Finalist of the CVPR 2019 Best Paper Award**
58. Ziyuan Zhang, Luan Tran, Xi Yin, Yousef Atoum, **Xiaoming Liu**, Jian Wan, Nanxin Wang, “Gait Recognition via Disentangled Representation Learning,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2019)*, Long beach, CA, June 2019. [PDF](#) (Oral, Acceptance rate 5.6%)
59. Tran Luan, Feng Liu, **Xiaoming Liu**, “Toward High-fidelity Nonlinear 3D Face Morphoable Model,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2019)*, Long beach, CA, June 2019. [PDF](#) (Acceptance rate 25.2%)
60. Saif Imran, Yunfei Long, **Xiaoming Liu**, Daniel Morris, “Depth Coefficients for Depth Completion,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2019)*, Long beach, CA, June 2019. [PDF](#) (Acceptance rate 25.2%)

61. Garrick Brazil, **Xiaoming Liu**, “Pedestrian Detection with Autoregressive Network Phases,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2019)*, Long beach, CA, June 2019. [arXiv PDF](#) (Acceptance rate 25.2%)
62. Luan Tran, Kihyuk Sohn, Xiang Yu, **Xiaoming Liu**, Manmohan Chandraker, “Gotta Adapt ’Em All: Joint Pixel and Feature-Level Domain Adaptation for Recognition in the Wild,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2019)*, Long beach, CA, June 2019. [arXiv PDF](#) (Acceptance rate 25.2%)
63. Xi Yin, Xiang Yu, Kihyuk Sohn, **Xiaoming Liu**, Manmohan Chandraker, “Feature Transfer Learning for Deep Face Recognition with Under-Represented Data,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2019)*, Long beach, CA, June 2019. [arXiv PDF](#) (Acceptance rate 25.2%)
64. Ying Tai*, Yicong Liang*, **Xiaoming Liu**, Lei Duan, Jilin Li, Chengjie Wang, Feiyue Huang, Yu Chen, “Towards Highly Accurate and Stable Face Alignment for High-Resolution Videos,” in *Proceeding of The 33rd AAAI Conference on Artificial Intelligence (AAAI 2019)*, Honolulu, Hawaii, USA, January 2019. [PDF](#) (Acceptance rate 16.2%) (* denotes equal contribution by the authors)
65. Amin Jourabloo*, Yaojie Liu*, **Xiaoming Liu**, “Face De-spoofing: Anti-Spoofing via Noise Modeling,” in *Proceeding of European Conference on Computer Vision (ECCV) 2018*, Munich, Germany, September 2018. (* denotes equal contribution by the authors) [PDF](#) (Acceptance rate 31.8%)
66. Luan Tran, **Xiaoming Liu**, “Nonlinear 3D Face Morphable Model,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2018)*, Salt Lake City, UT, June 2018. [PDF](#) (Spotlight, Acceptance rate 6.8%)
67. Yu Chen*, Ying Tai*, **Xiaoming Liu**, Chunhua Shen, Jian Yang, “FSRNet: End-to-End Learning Face Super-Resolution with Facial Priors,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2018)*, Salt Lake City, UT, June 2018. [arXiv PDF](#) (Spotlight, Acceptance rate 6.8%)
68. Yaojie Liu*, Amin Jourabloo*, **Xiaoming Liu**, “Learning Deep Models for Face Anti-Spoofing: Binary or Auxiliary Supervision,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2018)*, Salt Lake City, UT, June 2018. (* denotes equal contribution by the authors) [PDF](#) (Acceptance rate 30%)
69. Feng Liu, Ronghang Zhu, Dan Zeng, Qijun Zhao, **Xiaoming Liu**, “Disentangling Features in 3D Face Shapes for Joint Face Reconstruction and Recognition,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2018)*, Salt Lake City, UT, June 2018. [PDF](#) (Acceptance rate 30%)
70. Garrick Brazil, Xi Yin, **Xiaoming Liu**, “Illuminating Pedestrians via Simultaneous Detection and Segmentation,” In *Proceeding of International Conference on Computer Vision (ICCV 2017)*, Venice, Italy, Oct. 2017. [PDF](#) (Acceptance rate 29%)
71. Amin Jourabloo, **Xiaoming Liu**, Mao Ye, Liu Ren, “Pose-Invariant Face Alignment with a Single CNN,” In *Proceeding of International Conference on Computer Vision (ICCV 2017)*, Venice, Italy, Oct. 2017. [PDF](#) (Acceptance rate 29%)
72. Ying Tai, Jian Yang, **Xiaoming Liu**, Chunyan Xu, “MemNet: A Persistent Memory Network for Image Restoration,” In *Proceeding of International Conference on Computer Vision (ICCV 2017)*, Venice, Italy, Oct. 2017. (Spotlight, Acceptance rate 2.6%) [PDF](#)
73. Yousef Atoum, Joseph Roth, Michael Bliss, Wende Zhang, **Xiaoming Liu**, “Monocular Video-based Trailer Coupler Detection using Multiplexer Convolutional Neural Network,” In *Proceeding of International Conference on Computer Vision (ICCV 2017)*, Venice, Italy, Oct. 2017. [PDF](#) (Acceptance rate 29%)
74. Xi Yin, Xiang Yu, Kihyuk Sohn, **Xiaoming Liu**, Manmohan Chandraker, “Towards Large-Pose Face Frontalization,” In *Proceeding of International Conference on Computer Vision (ICCV 2017)*, Venice, Italy, Oct. 2017. [PDF](#) (Acceptance rate 29%)
75. Luan Tran, Xi Yin, **Xiaoming Liu**, “Disentangled Representation Learning GAN for Pose-Invariant Face Recognition,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2017)*, Honolulu, Hawaii, July 2017. (Oral, Acceptance rate 2.6%) [PDF](#)
76. Luan Tran, **Xiaoming Liu**, Jiayu Zhou, and Rong Jin, “Learning with Missing Modalities via Cascaded Residual Autoencoder,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2017)*, Honolulu, Hawaii, July 2017. (Acceptance rate 29%) [PDF](#)
77. Ying Tai, Jian Yang, **Xiaoming Liu**, “Image Super-Resolution via Deep Recursive Residual Network,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2017)*, Honolulu, Hawaii, July 2017. (Acceptance rate 29%) [PDF](#)

78. Seyed Morteza Safdarnejad, **Xiaoming Liu**, “Spatio-temporal Alignment of Non-overlapping Sequences from Independently Panning Cameras,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2017)*, Honolulu, Hawaii, July 2017. (Acceptance rate 29%) [PDF](#)
79. Seyed Morteza Safdarnejad, Yousef Atoum, **Xiaoming Liu**, “Temporally Robust Global Motion Compensation by Keypoint-based Congealing,” in *Proceeding of European Conference on Computer Vision (ECCV) 2016*, Amsterdam, The Netherlands, October 2016. (Acceptance rate 26.6%) [PDF](#)
80. Feng Liu, Dan Zeng, Qijun Zhao, **Xiaoming Liu**, “Joint Face Alignment and 3D Face Reconstruction,” in *Proceeding of European Conference on Computer Vision (ECCV) 2016*, Amsterdam, The Netherlands, October 2016. (Spotlight, Acceptance rate 2.9%) [PDF](#)
81. Amin Jourabloo, **Xiaoming Liu**, “Large-pose Face Alignment via CNN-based Dense 3D Model Fitting,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2016)*, Las Vegas NV, June 2016. (Acceptance rate 29.9%) [PDF](#)
82. Joseph Roth, Yiyong Tong, **Xiaoming Liu**, “Adaptive 3D Face Reconstruction from Unconstrained Photo Collections,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2016)*, Las Vegas NV, June 2016. (Acceptance rate 29.9%) [PDF](#)
83. Xiangyu Zhu, Zhen Lei, **Xiaoming Liu**, Hailin Shi, Stan Li, “Face Alignment Across Large Poses: A 3D Solution,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2016)*, Las Vegas NV, June 2016. (Oral, Acceptance rate 3.9%) [PDF](#)
84. Amin Jourabloo, **Xiaoming Liu**, “Pose-Invariant 3D Face Alignment,” in *Proceeding of International Conference on Computer Vision (ICCV 2015)*, Santiago, Chile, December 2015. (Acceptance rate 30.3%) [PDF](#)
85. Muhammad Jamal Afridi, **Xiaoming Liu**, Erik M. Shapiro, Arun Ross, “Automatic in vivo Cell Detection in MRI,” in *Proceeding of the 18th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2015)*, Munich, Germany, October 2015. (Acceptance rate 32.5%) [PDF](#)
86. Joseph Roth, Yiyong Tong, **Xiaoming Liu**, “Unconstrained 3D Face Reconstruction,” in *Proceeding of IEEE Computer Vision and Pattern Recognition (CVPR 2015)*, Boston MA, June 2015. (Acceptance rate 28.4%) [PDF](#)
87. Yu Wang, Rui Tan, Guoliang Xing, Jianxun Wang, Xiaobo Tan, and **Xiaoming Liu**, “Samba: A Smartphone-Based Robot System for Energy-Efficient Aquatic Environment Monitoring,” in *Proceedings of the 14th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN) 2015*, Seattle, WA, April 13-17, 2015. (Acceptance rate 24.3%) [PDF](#)
88. Joseph Roth, **Xiaoming Liu**, “On Hair Recognition in the Wild by Machine,” in *Proceeding of the Twenty-Eighth AAAI Conference on Artificial Intelligence (AAAI) 2014*, Quebec City, Canada, July 27-31, 2014. (Acceptance rate 28%) [PDF](#)
89. Yu Wang, Rui Tan, Guoliang Xing, Jianxun Wang, Xiaobo Tan, **Xiaoming Liu**, and Xiangmao Chang, “Aquatic Debris Monitoring Using Smartphone-Based Robotic Sensors,” in *Proceedings of the 13th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN) 2014*, Berlin, Germany, April 15-17, 2014. (Acceptance rate 20.7%, Best Paper Award Runner-up) [PDF](#)
90. Yimeng Zhang, **Xiaoming Liu**, Ming-Ching Chang, Weina Ge, and Tsuhan Chen, “Spatio-Temporal Phrases for Activity Recognition,” in *Proceeding of European Conference on Computer Vision (ECCV) 2012*, Firenze, Italy, October 7-13, 2012. (Acceptance rate 27%) [PDF](#)
91. **Xiaoming Liu**, Yan Tong, Frederick W. Wheeler, and Peter Tu, “Facial Contour Labeling via Congealing,” in *Proceeding of European Conference on Computer Vision (ECCV) 2010*, Hersonissos, Heraklion, Crete, Greece, September 5-11, 2010. (Acceptance rate 27%) [PDF](#)
92. **Xiaoming Liu**, Yan Tong, and Frederick W. Wheeler, “Simultaneous Alignment and Clustering for an Image Ensemble,” in *Proceeding of International Conference on Computer Vision (ICCV) 2009*, Kyoto, Japan, September 27-October 5, 2009. (Acceptance rate 23%) [PDF](#)
93. Jilin Tu, **Xiaoming Liu**, and Peter Tu, “On Optimizing Subspaces for Face Recognition,” in *Proceeding of International Conference on Computer Vision (ICCV) 2009*, Kyoto, Japan, September 27-October 5, 2009. (Acceptance rate 23%) [PDF](#)
94. Yan Tong, **Xiaoming Liu**, Frederick W. Wheeler, and Peter Tu, “Automatic Facial Landmark Labeling with Minimal Supervision,” in *Proceeding of IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) 2009*, Miami Beach, Florida, June 20-26, 2009. (Acceptance rate 26%) [PDF](#)

95. Hao Wu, **Xiaoming Liu**, and Gianfranco Doretto, “Face Alignment via Boosted Ranking Models,” in *Proceeding of IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) 2008*, Anchorage, Alaska, June 24-26, 2008. **(Oral presentation, acceptance rate 4%) PDF**
96. **Xiaoming Liu**, Ting Yu, Thomas Sebastian, and Peter Tu, “Boosted Deformable Model for Human Body Alignment,” in *Proceeding of IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) 2008*, Anchorage, Alaska, June 24-26, 2008. **(Acceptance rate 32%) PDF**
97. **Xiaoming Liu** and Ting Yu, “Gradient Feature Selection for Online Boosting,” in *Proceeding of International Conference on Computer Vision (ICCV) 2007*, Rio de Janeiro, Brazil, October 14-20, 2007. **(Acceptance rate 24%) PDF**
98. **Xiaoming Liu**, “Generic Face Alignment using Boosted Appearance Model,” in *Proceeding of IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) 2007*, Minneapolis, Minnesota, June 18-23, 2007. **(Oral presentation, acceptance rate 5%) PDF**
99. Peter Tu, Rebecca Book, **Xiaoming Liu**, Nils Krahnstoever, Carl Adrian, and Phil Williams, “Automatic Face Recognition from Skeletal Remains,” in *Proceeding of IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) 2007*, Minneapolis, Minnesota, June 18-23, 2007. **(Acceptance rate 28%) PDF**
100. **Xiaoming Liu**, Tsuhan Chen, and Jens Rittscher, “Optimal Pose for Face Recognition,” in *Proceeding of IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) 2006*, Vol.2, pp.1439-1446, New York, NY, June 17-22, 2006. **(Acceptance rate 28%) PDF**
101. **Xiaoming Liu** and Tsuhan Chen, “Pose-Robust Face Recognition Using Geometry Assisted Probabilistic Modeling,” in *Proceeding of the IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) 2005*, Vol.1, pp.502-509, San Diego, CA, June 20-25, 2005. **(Acceptance rate 28%) PDF**
102. **Xiaoming Liu** and Tsuhan Chen, “Video-Based Face Recognition Using Adaptive Hidden Markov Models,” in *Proceeding of the IEEE International Conference on Computer Vision and Pattern Recognition (CVPR) 2003*, Vol.1, pp.340-345, Madison, Wisconsin, June 16-22, 2003. **(Acceptance rate 23%) PDF**
103. **Xiaoming Liu**, Yueting Zhuang, and Yunhe Pan, “Video Based Human Animation Technique,” in *Proceeding of The 7th ACM International Multimedia Conference (Multimedia 1999)*, Orlando, Florida, October 30-November 5, 1999. **(Oral presentation, acceptance rate 18%) PDF**

Other Conference Papers (peer reviewed)

104. Xi Yin, Ying Tai, **Xiaoming Liu**, “Disentangled Feature Driven Face Super-Resolution and Recognition in Surveillance,” in *Proceedings of the 15th Asian Conference on Computer Vision (ACCV) 2020*, virtual, Nov 2020.
105. Yousef Atoum, Mao Ye, Liu Ren, Ying Tai, **Xiaoming Liu**, “Color-wise Attention Network for Low-light Image Enhancement,” in NTIRE: New Trends in Image Restoration and Enhancement workshop and challenges (in conjunction with CVPR 2020), Seattle, WA.
106. Abhinav Kumar, Tim Marks, Wenxuan Mou, Chen Feng, **Xiaoming Liu**, “UGLLI Face Alignment: Estimating Uncertainty with Gaussian Log-Likelihood Loss,” in *Statistical Deep Learning in Computer Vision Workshop* (in conjunction with ICCV 2019), Seoul, South Korea. **(Oral) PDF**
107. Adam Terwilliger, Garrick Brazil, **Xiaoming Liu**, “Recurrent Flow-Guided Segmentation Prediction,” in *Proceedings of the IEEE Winter Conference on Applications of Computer Vision (WACV) 2019*, Hawaii, USA, January 2019. **PDF**
108. Anurag Chowdhury, Yousef Atoum, Luan Tran, **Xiaoming Liu**, Arun Ross, “MSU AVIS dataset: Fusing Face and Voice Biometrics for Person Recognition in Indoor Surveillance Videos,” in *Proceedings of the 24th International Conference on Pattern Recognition (ICPR) 2018*, Beijing, China, August 20-24, 2018. **PDF**
109. Yaojie Liu, Amin Jourabloo, William Ren, **Xiaoming Liu**, “Dense Face Alignment,” in *Proceedings of the 7th IEEE International Workshop on Analysis and Modeling of Faces and Gestures (AMFG) (conjunction with ICCV 2017)*, Venice, Italy, Oct 28, 2017. **PDF**
110. Yousef Atoum*, Amin Jourabloo*, Yaojie Liu*, **Xiaoming Liu**, “Face Anti-Spoofing Using Patch and Depth-Based CNNs,” in *Proceedings of the International Joint Conference on Biometrics (IJCB 2017)*, Denver, Colorado, Oct 1-4, 2017. (* denotes equal contribution by the authors) **PDF**

111. Songyang Zhang, **Xiaoming Liu**, Jun Xiao, “On Geometric Features for Skeleton-Based Action Recognition using Multilayer LSTM Networks,” in *Proceedings of the IEEE Winter Conference on Applications of Computer Vision (WACV) 2017*, Santa Rosa, CA, March 27-29, 2017. [PDF](#)
112. Seyed Morteza Safdarnejad, **Xiaoming Liu**, Lalita Udpa, “Robust Global Motion Compensation in Presence of Predominant Foreground,” in *Proceedings of British Machine Vision Conference (BMVC 2015)*, Swansea, UK, September 2015. (Acceptance rate $\frac{185}{553} = 33\%$, **Best Poster Award**, one out of 145 papers) [PDF](#)
113. Joseph Roth, Andrew Carriveau, **Xiaoming Liu**, Anil Jain, “Learning-based Ballistic Breech Face Impression Image Matching,” in *Proceedings of the IEEE Seventh International Conference on Biometrics: Theory, Applications and Systems (BTAS 2015)*, Arlington, Virginia, September 2015. (**Oral presentation**) [PDF](#)
114. Amin Jourabloo*, Xi Yin*, **Xiaoming Liu**, “Attribute-preserved Face De-identification,” in *Proceedings of the 8th IAPR International Conference on Biometrics (ICB) 2015*, Phuket, Thailand, May 19-22, 2015. (* denotes equal contribution by the authors) [PDF](#)
115. Seyed Morteza Safdarnejad, **Xiaoming Liu**, Lalita Udpa, Brooks Andrus, John Wood, Dean Craven, “Sports Videos in the Wild (SVW): A Video Dataset for Sports Analysis,” in *Proceedings of the 11th IEEE International Conference on Automatic Face and Gesture Recognition (FG) 2015*, Ljubljana, Slovenia, May 4-8, 2015. (Acceptance rate $\frac{84}{221} = 38\%$) [PDF](#)
116. Joseph Roth, **Xiaoming Liu**, “On the Exploration of Joint Attribute Learning for Person Re-identification,” in *Proceedings of the 12th Asian Conference on Computer Vision (ACCV) 2014*, Singapore, Nov 1-5, 2014. (Acceptance rate 27%) [PDF](#)
117. Xi Yin, **Xiaoming Liu**, Jin Chen, David Kramer, “Multi-leaf Tracking from Fluorescence Plant Videos,” in *Proceedings of the IEEE International Conference on Image Processing (ICIP) 2014*, Paris, France, Oct 27-30, 2014. (**The top 10% of accepted papers**) [PDF](#)
118. Seyed Morteza Safdarnejad, **Xiaoming Liu**, Lalita Udpa, “Genre Categorization of Amateur Sports Videos in the Wild,” in *Proceedings of the IEEE International Conference on Image Processing (ICIP) 2014*, Paris, France, Oct 27-30, 2014. [PDF](#)
119. Muhammad Jamal Afridi, **Xiaoming Liu**, J. Mitchell McGrath, “An Automated System for Plant-level Disease Rating in Real Fields,” in *Proceedings of the 22nd International Conference on Pattern Recognition (ICPR) 2014*, Stockholm, Sweden, August 24-28, 2014. (**Oral presentation, acceptance rate** $\frac{198}{1409} = 14\%$, **Best Industry Related Paper Award (BIRPA) runner-up**, 4 out of 792 papers) [PDF](#)
120. Xi Yin, **Xiaoming Liu**, Jin Chen, David Kramer, “Multi-leaf Alignment from Fluorescence Plant Images,” in *Proceedings of the IEEE Winter Conference on Applications of Computer Vision (WACV) 2014*, Steamboat Springs, CO, March 24-26, 2014. (**Best Student Paper Award**, 3 out of 152 papers) [PDF](#)
121. Muhammad Jamal Afridi, Chun Liu, Christina Chan, Seungik Baek, **Xiaoming Liu**, “Image Segmentation of Mesenchymal Stem Cells in Diverse Culturing Conditions,” in *Proceedings of the IEEE Winter Conference on Applications of Computer Vision (WACV) 2014*, Steamboat Springs, CO, March 24-26, 2014. [PDF](#)
122. Joseph Roth, **Xiaoming Liu**, Arun Ross, and Dimitris Metaxas, “Biometric Authentication via Keystroke Sound,” in *Proceedings of the 6th IAPR International Conference on Biometrics (ICB) 2013*, Madrid, Spain, June 4-7, 2013. (**Oral presentation, Acceptance rate** $\frac{24}{212} = 11\%$) [PDF](#)
123. Albert Montillo, Qi Song, **Xiaoming Liu**, and James Miller, “Parsing Radiographs by Integrating Landmark Set Detection and Multi-object Active Appearance Models,” in *Proceedings of the SPIE Medical Imaging on Image Processing*, Orlando, Florida, February 10-12, 2013. (**Oral presentation**) [PDF](#)
124. Jixu Chen, **Xiaoming Liu**, and Siwei Lyu, “Boosting with Side Information,” in *Proceeding of 11th Asian Conference on Computer Vision (ACCV) 2012*, Daejeon, Korea, November 5-9, 2012. [PDF](#) (Acceptance rate $\frac{231}{869} = 26.6\%$)
125. Yinfu Feng, Jun Xiao, Yueting Zhuang, and **Xiaoming Liu**, “Adaptive Unsupervised Multi-View Feature Selection for Visual Concept Recognition,” in *Proceeding of 11th Asian Conference on Computer Vision (ACCV) 2012*, Daejeon, Korea, November 5-9, 2012. [PDF](#) (Acceptance rate $\frac{231}{869} = 26.6\%$)
126. Jixu Chen, **Xiaoming Liu**, Peter Tu, and Amy Aragones, “Person-specific Expression Recognition with Transfer Learning,” in *Proceeding of the IEEE International Conference on Image Processing (ICIP) 2012*, Orlando, Florida, September 30-October 3, 2012. [PDF](#)
127. **Xiaoming Liu**, Pavan Annangi, Mithun Gupta, Bing Yu, Dirk Padfield, Jyotirmoy Banerjee, and Kajoli Krishnan, “Learning-based Scan Plane Identification From Fetal Head Ultrasound Images,” in *Proceedings of the SPIE Medical Imaging on Ultrasonic Imaging, Tomography, and Therapy*, San Diego, California, February 5-6, 2012. (**Oral presentation**) [PDF](#)

128. Yimeng Zhang, Weina Ge, Ming-Ching Chang, and **Xiaoming Liu**, "Group Context Learning for Event Recognition," in *Proceedings of the IEEE Workshop on Applications of Computer Vision 2012 (WACV 2012)*, Breckenridge, Colorado, Jan 9-11, 2012. (**Oral presentation, acceptance rate** $\frac{12}{142} = 8\%$, **Best Student Paper Award**, 2 out of 63 papers) [PDF](#)
129. Ya Xue and **Xiaoming Liu**, "Image Congealing Via Efficient Feature Selection," in *Proceedings of the IEEE Workshop on Applications of Computer Vision 2012 (WACV 2012)*, Breckenridge, Colorado, Jan 9-11, 2012. [PDF](#)
130. Ting Yu, **Xiaoming Liu**, Ser-Nam Lim, Nils Krahnstoever, and Peter Tu, "Automatic Surveillance Video Matting Using a Shape Prior," in *Proceedings of the 11th IEEE Workshop on Visual Surveillance (conjunction with ICCV 2011)*, Barcelona, Spain, November 6-13, 2011. [PDF](#)
131. **Xiaoming Liu**, "Optimal Gradient Pursuit for Face Alignment," in *Proceedings of the International Conference on Automatic Face and Gesture Recognition 2011*, Santa Barbara, California, March 21-25, 2011. [PDF](#)
132. Jilin Tu, Brandon Laflen, **Xiaoming Liu**, Musodiq O Bello, Jens Rittscher, Peter Tu, "LPSM: Fitting Shape Model by Linear Programming," in *Proceedings of the International Conference on Automatic Face and Gesture Recognition 2011*, Santa Barbara, California, March 21-25, 2011. [PDF](#)
133. Jilin Tu, **Xiaoming Liu**, and Peter Tu, "Site-adaptive Face Recognition," in *IEEE Fourth International Conference on Biometrics: Theory, Applications and Systems (BTAS 10)*, Arlington, Virginia, September 27-29, 2010. [PDF](#)
134. Yan Tong, Frederick W. Wheeler, and **Xiaoming Liu**, "Improving Biometric Identification Through Quality-based Face and Fingerprint Biometric Fusion," in *Proceeding of IEEE Computer Society Workshop on Biometrics (conjunction with CVPR 2010)*, San Francisco, California, June 18, 2010. [PDF](#)
135. Necmiye Ozay, Yan Tong, Frederick W. Wheeler, and **Xiaoming Liu**, "Improving Face Recognition with a Quality-based Probabilistic Framework," in *Proceeding of IEEE Computer Society Workshop on Biometrics (conjunction with CVPR 2009)*, Miami Beach, Florida, June 26, 2009. **Best Paper Honorable Mention Award.** [PDF](#)
136. **Xiaoming Liu** and Tsuhan Chen, "Face Mosaicing for Pose Robust Video-Based Recognition," in *Proceeding of 8th Asian Conference on Computer Vision (ACCV) 2007*, Tokyo, Japan, November 18-22, 2007. (**Acceptance rate 32%**) [PDF](#)
137. Frederick Wheeler, **Xiaoming Liu**, and Peter Tu, "Multi-Frame Super-Resolution for Face Recognition," in *Proceeding of IEEE Conference on Biometrics: Theory, Applications and Systems (BTAS) 2007*, Washington D.C., September 27-29, 2007. [PDF](#)
138. **Xiaoming Liu**, Frederick Wheeler, and Peter Tu, "Improved Face Model Fitting on Video Sequences," in *Proceeding of British Machine Vision Conference (BMVC) 2007*, Warwick, UK, September 10-13, 2007. (**Acceptance rate 39%**) [PDF](#)
139. **Xiaoming Liu**, Nils Krahnstoever, Ting Yu, and Peter Tu, "What are Customers Looking at?" in *Proceeding of IEEE International Conference on Advanced Video and Signal-Based Surveillance (AVSS) 2007*, London, UK, September 5-7, 2007. (**Oral presentation**) [PDF](#)
140. Frederick Wheeler, **Xiaoming Liu**, Peter Tu, and Ralph Hocht, "Multi-Frame Image Restoration for Face Recognition," in *Proceeding of IEEE Signal Processing Society Workshop on Signal Processing Applications for Public Security and Forensics (SAFE) 2007*, Washington, D.C., 2007. [PDF](#)
141. **Xiaoming Liu**, Peter Tu, and Frederick Wheeler, "Face Model Fitting on Low Resolution Images," in *Proceeding of British Machine Vision Conference (BMVC) 2006*, Vol.3, pp.1079-1088, Edinburgh, UK, September 4-7, 2006. (**Acceptance rate 25%**) [PDF](#)
142. Rodney Goh, Lihao Liu, **Xiaoming Liu**, and Tsuhan Chen, "The CMU Face In Action (FIA) Database," in *Proceeding of IEEE International Workshop on Analysis and Modeling of Faces and Gestures, held in conjunction with ICCV 2005*, pp.255-263, Beijing, China, October 16, 2005. [PDF](#)
143. **Xiaoming Liu**, Peter Tu, Jens Rittscher, Amitha Perera, and Nils Krahnstoever, "Detecting And Counting People In Surveillance Applications," in *Proceeding of IEEE International Conference on Advanced Video and Signal-Based Surveillance (AVSS) 2005*, Teatro Sociale, Como, Italy, September 15-16, 2005. [PDF](#)
144. **Xiaoming Liu** and Tsuhan Chen, "Geometry-assisted Statistical Modeling for Face Mosaicing," in *Proceeding of the IEEE International Conference on Image Processing (ICIP) 2003*, Vol.2, pp.883-886, Barcelona, Spain, 2003. [PDF](#)

145. **Xiaoming Liu** and Tsuhan Chen, "Shot Boundary Detection Using Temporal Statistics Modeling," in *Proceeding of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2002*, Vol.4, pp.3389-3392, Orlando, Florida, May 13-17, 2002. **(Oral presentation) PDF**
146. **Xiaoming Liu**, Tsuhan Chen, and B.V.K. Vijaya Kumar, "On Modeling Variations For Face Authentication," in *Proceedings of the International Conference on Automatic Face and Gesture Recognition 2002*, pp.384-389, Washington D.C., May 20-21, 2002. **PDF**
147. Tsuhan Chen, Yu-Feng Hsu, **Xiaoming Liu**, and Wende Zhang, "Principle Component Analysis and its Variants for Biometrics," in *Proceedings of the IEEE International Conference on Image Processing (ICIP) 2002*, Vol.1, pp.61-64, Rochester, NY, September 2002. **PDF**
148. Yueting Zhuang, **Xiaoming Liu**, and Yunhe Pan, "Apply Semantic Template to Support Content-based Image Retrieval," in *Proceedings of SPIE Vol.3972, Storage and Retrieval for Media Databases 2000*, San Jose, California, January 26-28, 2000.
149. **Xiaoming Liu**, Yueting Zhuang, and Yunhe Pan, "Webscope-CBVR: A Customized Content-based Search Engine for Video on WWW," in *Proceedings of SPIE Vol.3974, Image and Video Communications and Processing 2000*, San Jose, California, January 23-28, 2000.
150. **Xiaoming Liu**, Yueting Zhuang, and Yunhe Pan, "Semantic Template: A Robust Approach to Support Content-based Image Retrieval," in *Proceeding of The 6th International Conference on Computer-Aided Design and Computer Graphics (CAD/Graphics) 1999*, Shanghai, China, December 1-5, 1999.
151. Yueting Zhuang, **Xiaoming Liu**, and Yunhe Pan, "Query By Video Clip," in *Proceeding of The 6th International Conference on Computer-Aided Design and Computer Graphics (CAD/Graphics) 1999*, Shanghai, China, December 1-5, 1999.
152. **Xiaoming Liu**, Yueting Zhuang, and Yunhe Pan, "A New Approach to Retrieve Video by Example Video Clip," in *Proceeding of The 7th ACM International Multimedia Conference (Multimedia 1999)*, Orlando, Florida, October 30-November 5, 1999. **PDF**
153. Yueting Zhuang, **Xiaoming Liu**, and Yunhe Pan, "Video Motion Capture Using Feature Tracking and Skeleton Reconstruction," in *Proceeding of IEEE International Conference on Image Processing (ICIP) 1999*, Vol.4, pp.232-236, Kobe, Japan, October 25-28, 1999. **PDF**
154. **Xiaoming Liu**, Yueting Zhuang, Yi Wu, and Yunhe Pan, "Video Based Human Motion Capture," in *Proceeding of IEEE Workshop on Multimedia Signal Processing*, Copenhagen, Denmark, September 13-15, 1999.
155. **Xiaoming Liu**, Yueting Zhuang, and Yunhe Pan, "Content-based Video Retrieval by Example Clip on WWW," in *Proceeding of 5th Eurographics International Workshop on Multimedia (EG MULTIMEDIA 1999)*, Milan, Italy, September 7-8, 1999.

Invited Papers

156. Ke Ning, **Xiaoming Liu**, Fei Wu, "Multi-stream CNNs for video action recognition," in the ActivityNet Large Scale Activity Recognition Challenge Workshop (in conjunction with CVPR 2016), Las Vegas, Nevada, July 1, 2016.
157. Peter Tu, Fred Wheeler, Nils Krahnstoeber, Thomas Sebastian, Jens Rittscher, **Xiaoming Liu**, Amitha Perera, and Gianfranco Doretto, "Surveillance Video Analytics for Large Camera Networks," in *SPIE Newsroom*, June 2007.
158. Peter Tu, Gianfranco Doretto, Nils Krahnstoeber, Amitha Perera, Frederick Wheeler, **Xiaoming Liu**, Jens Rittscher, Thomas Sebastian, Ting Yu, and Kevin Harding, "An Intelligent Video Framework for Homeland Protection," in *Proceedings of SPIE Defence and Security Symposium - Unattended Ground, Sea, and Air Sensor Technologies and Applications IX*, Orlando, Florida, April 9-13, 2007.
159. Yueting Zhuang, **Xiaoming Liu**, and Yunhe Pan, "Construct Semantic Net For Video Database," in *Proceeding of First International Workshop on Intelligent Multimedia Computing and Networking*, Taj Mahal, Atlantic City, New Jersey, February 27-March 3, 2000.

Papers Under Review

160. Yaojie Liu, **Xiaoming Liu**, “On Learning Deep Tree Network for Zero-shot Face Anti-Spoofing,” under review in IEEE Transactions on Pattern Analysis Machine Intelligence (PAMI), Oct 2019.
161. Luan Tran, Kihyuk Sohn, Xiang Yu, **Xiaoming Liu**, Manmohan Chandraker, “Gotta Adapt ’Em All: Joint Pixel and Feature-Level Domain Adaptation for Recognition in the Wild,” under review in International Journal of Computer Vision (IJCV), May 2019.
162. Mehdi Bahri, Eimear O’ Sullivan, Shunwang Gong, Feng Liu, **Xiaoming Liu**, Michael Bronstein, Stefanos Zafeiriou, “Shape My Face: Registering 3D Face Scans by Surface-to-Surface Translation,” under review in International Journal of Computer Vision (IJCV), Sep 2020.
163. Pengyu Chu, Zhaojian Li, Kyle Lammers, Renfu Lu, **Xiaoming Liu**, “DeepApple: Deep Learning-based Apple Detection using a Suppression Mask R-CNN,” under review in Pattern Recognition Letters, Sep 2020.
164. Yunfei Long, Daniel Morris, **Xiaoming Liu**, Marcos Paul Gerardo Castro, Punarjay Chakravarty, Praveen Narayanan, “Radar Camera Pixel Association and Fusion,” under reviewed in CVPR 2021.
165. Debayan Deb, **Xiaoming Liu**, Anil Jain, “FaceGuard: A Self-Supervised Defense Against Adversarial Face Images,” under reviewed in CVPR 2021.
166. Masa Hu, Garrick Brazil, Nanxiang Li, Liu Ren, **Xiaoming Liu**, “Camera Calibration Using Human Faces,” under reviewed in CVPR 2021.
167. Andrew Hou, Ze Zhang, Michel Sarkis, Ning Bi, Yiyong Tong, **Xiaoming Liu**, “Towards High Fidelity Face Relighting with Realistic Shadows,” under reviewed in CVPR 2021.
168. Yaojie Liu, Xinyu Huang, Liu Ren, **Xiaoming Liu**, “Facial Foreign Shadow Detection and Removal via Spatio-Temporal Consistency,” under reviewed in CVPR 2021.
169. Abhinav Kumar, Garrick Brazil, **Xiaoming Liu**, “GrooMeD-NMS: Grouped Mathematical Differentiable NMS for Monocular 3D Object Detection,” under reviewed in CVPR 2021.
170. Feng Liu, Luan Tran, **Xiaoming Liu**, “Fully Understanding Generic Objects: Modeling, Segmentation, and Reconstruction,” under reviewed in CVPR 2021.
171. Vishal Asnani, Xi Yin, Tal Hassner, **Xiaoming Liu**, “Reverse Engineering of Generative Models: Inferring Model Hyperparameters from Generated Images,” under reviewed in CVPR 2021.
172. Ziqian Bai, Zhaopeng Cui, **Xiaoming Liu**, Ping Tan, “Learning to Optimize Riggable 3D Face Reconstruction,” under reviewed in CVPR 2021.
173. Xiaohong Liu, Yaojie Liu, Jun Chen, **Xiaoming Liu**, “PSSC-Net: Progressive Spatio-Channel Correlation Network for Image Manipulation Detection and Localization,” under reviewed in CVPR 2021.
174. Saif Imran, **Xiaoming Liu**, Daniel Morris, “Depth Completion with Twin-Surface Extrapolation at Occlusion Boundaries,” under reviewed in CVPR 2021.
175. Sixue Gong, **Xiaoming Liu**, Anil Jain, “Mitigating Face Recognition Bias via Group Adaptive Classifier,” under reviewed in CVPR 2021.
176. Lanqing Hu, **Xiaoming Liu**, Meina Kan, Shiguang Shan, “Structure-Preserved Transferring for Unsupervised Domain Adaptation,” under reviewed in CVPR 2021.

Patents

1. Ziyuan Zhang, **Xiaoming Liu**, “Disentangled Representations for Gait Recognition,” U.S. Serial No. 63/074,082, filed on Sep 3, 2020.
2. Yaojie Liu, Amin Jourabloo, and **Xiaoming Liu**, “Learning Deep Models for Face Anti-Spoofing via Auxiliary Supervision,” U.S. Serial No. 62/626,486, filed on Feb 5, 2018.
3. Luan Tran, Xi Yin, and **Xiaoming Liu**, “Disentangled Representation Learning GAN for Pose-Invariant Face Recognition,” U.S. Serial No. 62/560001, filed on Sep 18, 2017.
4. Alsallakh Bilal, Amin Jourabloo, Mao Ye, **Xiaoming Liu**, Liu Ren, “Visual Analytics System For Convolutional Neural Network Based Classifiers,” U.S. Serial No. 62/537,613, filed on Jul 27, 2017.
5. Michael Bliss, Yunfei Zhang, **Xiaoming Liu**, Yousef Atoum, and Joseph Roth, “Method and Apparatus for Providing Trailer Information,” U.S. patent No. 10,332,002, issued on Jun 25, 2019.

6. Erik Shapiro, Muhammad Jamal Afridi, Arun Ross, and **Xiaoming Liu**, "System and Method for Quantifying Cell Numbers in Magnetic Resonance Imaging (MRI)," U.S. Serial No. 15/620,545, filed on Feb 25, 2016.
7. Stephen Hsu, **Xiaoming Liu**, and Alex Liu, "Online Exam Proctoring System," U.S. Patent No. 9,154,748, issued on Oct 6, 2015.
8. Kirk Lars Bruns, **Xiaoming Liu**, et al., "System and Methods for Emotive Software Usability," U.S. Serial No. 13/452,329, filed on Apr 20, 2012.
9. **Xiaoming Liu**, Ya Xue, Peter Tu, "Image Congealing Via Efficient Feature Selection," U.S. Serial No. 13/346,479, filed on Jan 9, 2012.
10. Peter Tu, **Xiaoming Liu**, et al., "Usage Measurement Methods for Interactive Advertising," U.S. Serial No. 13/308,386, filed on Nov 30, 2011.
11. Peter Tu, **Xiaoming Liu**, et al., "Episodic Approaches to Interactive Advertising," U.S. Serial No. 13/308,394, filed on Nov 30, 2011.
12. Peter Tu, **Xiaoming Liu**, et al., "An analytics-to-content interface for interactive advertising applications," U.S. Serial No. 13/308,376, filed on Nov 30, 2011.
13. Ting Yu, **Xiaoming Liu**, et al., "Automatic Surveillance Video Matting Using a Shape Prior," U.S. Serial No. 13/290928, filed on Nov 7, 2011.
14. **Xiaoming Liu**, et al., "Optimal Gradient Pursuit for Image Alignment," U.S. Patent No. 8478077, issued on Jul 2, 2013.
15. Jilin Tu, **Xiaoming Liu**, et al., "Optimal Subspaces for Face Recognition," U.S. Patent No. 8498454, issued on Jul 30, 2013.
16. **Xiaoming Liu**, et al., "System and Method for Automatic Landmark Labeling with Minimal Supervision," U.S. Patent No. 8442330, issued on May 14, 2013.
17. Fred Wheeler, **Xiaoming Liu**, et al., "Assessing biometric sample quality using wavelets and a boosted classifier," U.S. Patent No. 8442279, issued on May 14, 2013.
18. **Xiaoming Liu**, et al., "Improved Face Model Fitting on Video Sequences," U.S. Serial No. 12/100620, filed on Apr 10, 2008.
19. Robert Kaucic, **Xiaoming Liu**, et al., "A Screening Automated Defect Recognition System For Inspecting Turbine Blades," U.S. Serial No. 11/851422, filed on Sep 7, 2007.
20. Amitha Perera, **Xiaoming Liu**, et al., "Automatic Pose and Trajectory Tracking in Sports Video," U.S. Serial No. 11/774958, filed on Jul 9, 2007.
21. **Xiaoming Liu**, et al., "Generic Face Alignment via Boosting," U.S. Serial No. 60/943316, filed on Jun 12, 2007.
22. **Xiaoming Liu**, et al., "Automatic Gaze Estimation for Football Players," U.S. Serial No. 11/752030, filed on May 22, 2007.
23. Ting Yu, **Xiaoming Liu**, et al., "Distributed Data Association and Filtering for Multiple Target Tracking," U.S. Serial No. 60/912945, filed on Apr 20, 2007.
24. Peter Tu, **Xiaoming Liu**, et al., "Adaptive Advertisement," U.S. Serial No. 60/908991, filed on Mar 30, 2007.
25. Gianfranco Doretto, Peter Tu, **Xiaoming Liu**, et al., "Person Reidentification", U.S. Serial No. 07/05919, filed on Mar 8, 2007.
26. Fred Wheeler, **Xiaoming Liu**, et al., "A Method to Reconstruct High-quality Facial Images From Surveillance Video Using an Active Appearance Model," U.S. Serial No. 60/886433, filed on Jan 24, 2007.
27. **Xiaoming Liu**, et al., "Method of Combining Images of Multiple Resolutions to Produce an Enhanced Active Appearance Model," U.S. Patent No. 7885455, issued on Feb 8, 2011.
28. **Xiaoming Liu**, Jens Rittscher, et al., "System and Method For Automatic Person Counting And Detection Of Specific Events," U.S. Patent No. 7596241, issued on Sep 29, 2009.

INVITED TALKS

1. Nov 17, 2020, Monocular Video-based 3D Perception for Autonomous Driving, 7th Tech.AD USA conference 2020, Detroit MI. (virtual)
2. Nov 13, 2020, 3D Perception for Autonomous Driving: Research and education, Southern University of Science & Technology, Shenzhen, China. (virtual)
3. Oct 27, 2020, Autonomous Sensing: from 3D Object Detection to Biometric Recognition, Army Research Laboratory, Adelphi, MD (virtual)
4. Aug 4, 2020, Monocular Vision-based 3D Perception for Autonomous Driving, General Motor Research and Development Center, Warren MI. (virtual)
5. Jul 29, 2020, Recent Trend in Computer Vision, Bosch Research and Technology Center, Palo Alto, CA. (virtual)
6. Jun 19, 2020, Monocular 3D Object Detection, UG2+ workshop and challenge (in conjunction with CVPR 2020), Seattle WA (Keynote). (virtual)
7. Jun 15, 2020, Monocular Vision-based 3D Perception for Autonomous Driving, Workshop on Long-Term Visual Localization, Visual Odometry and Geometric and Learning-based SLAM (in conjunction with CVPR 2020), Seattle WA (Keynote). (virtual)
8. May 14, 2020, Monocular Vision-based 3D Perception for Autonomous Driving, Canadian Robot Vision Conference, Ottawa Canada (Invited symposium speaker). (virtual)
9. Nov 21, 2019, Monocular Image-based 3D Perception for Autonomous Driving, 6th Tech.AD USA conference 2019, Detroit MI.
10. Nov 21, 2019, Computer Vision for Autonomous Driving, FORD Research and Innovation Center, Dearborn, MI.
11. Oct 28, 2019, On the Interpretability, Vulnerability, and Decomposability of Faces, Lightweight Face Recognition challenge & workshop (in conjunction with ICCV 2019), Seoul, South Korean (Keynote).
12. Oct 27, 2019, Tackling Person Identification at a Distance: Pose, Resolution and Gait, Workshop on face recognition in low-quality video (in conjunction with ICCV 2019), Seoul, South Korean (Keynote).
13. Sep 10, 2019, Biometrics Research at Michigan State University, Office of Biometric Identity Management (OBIM), U.S. Department of Homeland Security (DHS), Washington, DC.
14. Sep 10, 2019, Learning to Fuse Information with Missing Modalities (Year 5), National Academy of Sciences (IC Academic Research Symposium), Washington, DC.
15. Jul 15, 2019, Monocular Image-based 3D Detection and Reconstruction of Objects, Argo AI, Pittsburgh, PA.
16. Jul 9, 2019, Inverse Graphics for 3D Modeling and Reconstruction: from Face to Generic Objects, School of Computer Science, Simon Fraser University, Vancouver, Canada.
17. Jul 2, 2019, Inverse Graphics for 3D Modeling and Reconstruction: from Face to Generic Objects, Amazon Go, Seattle, WA.
18. Jun 17, 2019, Monocular Image-based 3D Detection and Reconstruction of Objects, CVPR Workshop on autonomous driving (WAD), Long beach, CA (Keynote).
19. Jun 16, 2019, Learning Deep Models for Face anti-Spoofing, CVPR Chalearn Looking at People Workshop on Face Spoofing Attack, Long beach, CA (Keynote).
20. Jun 5, 2019, Inverse Graphics for 3D Object Modeling and Reconstruction: from Face to Generic Objects, School of informatics, University of Edinburgh, UK
21. Jun 6, 2019, Inverse Graphics for 3D Object Modeling and Reconstruction: from Face to Generic Objects, Department of Computing, Imperial College London, UK
22. Jun 7, 2019, Inverse Graphics for 3D Object Modeling and Reconstruction: from Face to Generic Objects, Centre for Vision, Speech and Signal Processing (CVSSP), University of Surrey, UK
23. May 14, 2019, Inverse Graphics for 3D Object Modeling and Reconstruction: from Face to Generic Objects, Kitware Inc., Clifton Park, NY.
24. May 13, 2019, Inverse Graphics for 3D Object Modeling and Reconstruction: from Face to Generic Objects, Computer Science Department, State University of New York at Albany, Albany, New York.

25. Apr 10, 2019, 3D Object Modeling and Reconstruction: from Face to Generic Objects, Tencent Youtu Lab, Shanghai, China.
26. Apr 9, 2019, 3D Faces: Reconstruction, Recognition, and Modeling, Zhejiang University CAD&CG National Key Lab, Hangzhou, China.
27. Apr 4, 2019, 3D Faces: Reconstruction, Recognition, and Modeling, Tencent Youtu X-lab, Shenzhen, P.R. China.
28. Apr 3, 2019, 3D Faces: Reconstruction, Recognition, and Modeling, The Chinese University of Hong Kong, Hong Kong.
29. Mar 27, 2019, 3D Face Modeling, Reconstruction and its Role in Face Recognition, VALSE Webinar, East Lansing, MI.
30. Mar 25, 2019, Deep learning: the Past, Present and Future, Michigan Actuarial Society Spring 2019 Meeting, East Lansing, MI.
31. Mar 1, 2019, Computer Vision for Autonomous Driving, MetroCAD 2019 conference, Detroit, MI.
32. Feb 25, 2019: Learning 3D Morphable Model from 2D Images, CVPR 2019 Area Chair Workshop, UCSD, CA.
33. Feb 22, 2019: 3D Faces: Reconstruction, Recognition, and Modeling, 12 Sigma Technologies, San Diego, CA.
34. Feb 15, 2019: Learning 3D Faces Models, Institute of Computing Technology, Chinese Academy of Sciences, Beijing, P. R. China.
35. Jan 16, 2019: 3D Faces: Reconstruction, Recognition, and Modeling, Department of Computer Science, Wayne State University, Detroit, MI.
36. Jan 8, 2019: 3D Faces: Reconstruction, Recognition, and Modeling, Facebook Reality Lab, Pittsburgh, PA.
37. Oct 23, 2018: 3D Faces: Reconstruction, Recognition, and Modeling, Snap Research, Los Angeles, CA.
38. Oct 22, 2018: 3D Faces: Reconstruction, Recognition, and Modeling, Department of electrical and computer engineering, UC Riverside, Riverside, CA.
39. Sep 25, 2018: Learning to Fuse Information with Missing Modalities (Year 4), National Academy of Sciences (IC Academic Research Symposium), Washington, DC.
40. Sep 6, 2018, Computer Vision for Autonomous Driving, High Performance Computing (HPC) Forum, Dearborn, MI.
41. Mar 19, 2018, Encoder and Decoder in Semi-supervised and Supervised Learning, Midwest Vision Workshop, Ann Arbor MI.
42. Jan 29, 2018: Visual Understanding of Human Faces, Michigan State University Machine Learning Seminar, East Lansing, MI.
43. Dec 16, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, Ant Financial, Beijing, P.R. China.
44. Dec 15, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, JD.Com Inc., Beijing, P.R. China.
45. Dec 14, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, Capital Normal University, Beijing, P. R. China.
46. Dec 11, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, Department of EECS, University of Michigan at Ann Arbor, Ann Arbor, MI.
47. Dec 5, 2017: Deep Learning for Computer Vision, MSU Mathematics department machine learning course, East Lansing, MI.
48. Dec 3, 2017: Deep Learning: the Past, Present and Future, MSU Chinese School, East Lansing, MI.
49. Nov 26, 2017: Computer Vision for Autonomous Driving, Tech.AD Detroit conference, Detroit, MI.
50. Nov 3, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, Department of EECS, Signals, Inference, and Networks (SINE) seminar, University of Illinois at Urbana-Champaign, Champaign, IL.

51. Oct 28, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, the 7th IEEE International Workshop on Analysis and Modeling of Faces and Gestures (AMFG), Venice, Italy (Keynote).
52. Oct 13, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, Information Sciences Institute, University of Southern California, Los Angeles, CA.
53. Oct 12, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, Department of Computer Science, University of California, Santa Barbara, Santa Barbara, CA.
54. Sep 29, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, Amazon Visual Search, Seattle, WA.
55. Sep 28, 2017: Learning to Fuse Information with Missing Modalities (Year 3), National Academy of Sciences (IC Academic Research Symposium), Washington, DC.
56. Aug 2, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, Clouream Inc., Shenzhen, P. R. China.
57. Jul 7, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, Tencent Youtu Lab, Shanghai, P. R. China.
58. Jun 24, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, National Taiwan University of Science & Technology.
59. Apr 19, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, Department of Computer Science, University of Notre Dame, South bend, IN.
60. Mar 28, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, Adobe Research, San Jose, CA.
61. Feb 24, 2017: Disentangled Representation Learning and Image Synthesis via DR-GAN, National Geospatial-Intelligence Agency, Springfield, Virginia.
62. Feb 27, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, CVPR 2017 Area Chair Workshop, College Park, MD.
63. Feb 22, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, FORD Research and Innovation Center, Dearborn, MI.
64. Feb 16, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, Centre for Vision Research Seminar, York University, Toronto, Canada.
65. Feb 7, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, Media Analytics group, NEC Labs America, Cupertino, CA.
66. Feb 6, 2017: Large-pose Face Analysis: Alignment, Reconstruction, and Recognition, Bosch Research and Technology Center, Palo Alto, CA.
67. Dec 2016: Large-pose Face Recognition, Capital Normal University, Beijing, P. R. China.
68. Dec 2016: Large-pose Face Recognition, Institute of Computing Technology, Chinese Academy of Sciences, Beijing, P. R. China.
69. Dec 2016: 2D/3D Shape Estimation and Recognition for Large-pose Faces, Horizon Robotics, Beijing, P. R. China.
70. Dec 2016: 2D/3D Shape Estimation and Recognition for Large-pose Faces, Department of Automation, Tsinghua University, Beijing, P. R. China.
71. Dec 2016: 2D/3D Shape Estimation and Recognition for Large-pose Faces, College of Computer Science, Beihang university, Beijing, P. R. China.
72. Dec 2016: High, Middle, and Low-level Vision Problems for Faces, Seoul National University, Seoul, South Korea.
73. Nov 2016: 2D/3D Shape Estimation and Recognition for Large-pose Faces, U.S. Army Research Laboratory, Adelphi, MD.
74. Oct 2016: Estimating 2D and 3D Facial Shape from Unconstrained Photos, Nanyang Technological University, Singapore.
75. Oct 2016: Estimating 2D and 3D Facial Shape from Unconstrained Photos, School of Computer Science and Engineering, Nanjing University of Science and Technology, Nanjing, P.R. China

76. Oct 2016: Estimating 2D and 3D Facial Shape from Unconstrained Photos, The 11th Chinese Conference on Biometric Recognition (CCBR2016), Chengdu, P.R. China.
77. Sep 2016: Estimating 2D and 3D Facial Shape from Unconstrained Photos, University of Western Ontario, London, Canada.
78. Sep 2016: Learning to Fuse Information with Missing Modalities (Year 2), National Academy of Sciences (IC Academic Research Symposium), Washington, DC.
79. May 2016: Estimating 2D and 3D Facial Shape from Unconstrained Photos, Microsoft Research Asian, Beijing, P. R. China.
80. May 2016: Estimating 2D and 3D Facial Shape from Unconstrained Photos, Yonsei University, Seoul, South Korea.
81. May 2016: Unconstrained 3D Face Reconstruction, Institute of Automation, Chinese Academy of Sciences, Beijing, P. R. China.
82. May 2016: Estimating 2D and 3D Facial Shape from Unconstrained Photos, Institute of Computing Technology, Chinese Academy of Sciences, Beijing, P. R. China.
83. Jan 2016: Global motion compensation, Capital Normal University, Beijing, P. R. China.
84. Sep 2015: Learning to Fuse Information with Missing Modalities (Year 1), National Academy of Sciences (IC Academic Research Symposium), Washington, DC.
85. Aug 2015: Lectures on facial analysis and face recognition, Wisisoft Inc., Chengdu, P. R. China.
86. Aug 2015: Unconstrained 3D face reconstruction, College of Computer Science, Zhejiang University, Hangzhou, P. R. China.
87. July 2015: Unconstrained 3D face reconstruction, Robotics Institute VASC Seminar, Carnegie Mellon University, Pittsburgh PA.
88. July 2015: Learning-based Ballistic Breech Face Impression Image Matching, Surface & Nanostructure Metrology Group, National Institute of Standards and Technology (NIST), Gaithersburg, MD.
89. May 2015: Unconstrained 3D face reconstruction, Department of Electronic Engineering, The Chinese University of Hong Kong, Hong Kong.
90. Jan 2015: Visual Sensing and Automatic Understanding of Human Behavior, Spring 2015 Cognitive Forum, Michigan State University, East Lansing, Michigan.
91. Dec 2014: Efficient Motion-Saliency Detection and Its Application to Video Analysis, Midwest vision workshop, Chicago IL.
92. Oct 2014: Human Sensing: Efficient Visual Analysis for Faces and Hands, Toyota Technical Center, Ann Arbor, Michigan.
93. Apr 2014: Efficient Time Series Data Matching and its Application to Human Sensing, Signal processing seminar, Department of Mathematics, Michigan State University, East Lansing, Michigan.
94. Nov 2013: Efficient Time Series Data Matching and its Application to Human Sensing, Department of Computer Science, Rutgers University, New Brunswick, NJ.
95. Oct 2013: Human Sensing: Computational Approaches to Human Behavior Understanding from Visual Content, DevCon, TechSmith Inc., Lansing, Michigan.
96. Feb 2013: Human Sensing: Computational Approaches to Human Behavior Understanding from Visual Signals, Electrical and Computer Engineering Seminar Series, Michigan State University, East Lansing, Michigan.
97. Nov 2012: Computer Vision and its Applications, College of Engineering Noon-time Seminar, Michigan State University, East Lansing, Michigan.
98. Jul 2012: Facial Analysis: Theory and Applications, Advanced Multimedia Processing Lab, Cornell University, Ithaca, New York.
99. Jun 2012: Advanced Behavior Recognition in Crowded Environments, NIJ Conference 2012, Washington DC.
100. Apr 2012: Facial Analysis: Theory and Applications, College of Computer Science, Zhejiang University, Hangzhou, P.R.China.

101. Mar 2012: Facial Analysis: Theory and Applications, Computer Science Departmental Colloquium, Georgia State University, Atlanta, Georgia.
102. Feb 2012: Facial Analysis: Biometrics and Beyond, Computer Science and Engineering Department Seminar, Michigan State University, East Lansing, Michigan.
103. Jan 2012: Group Context Learning for Event Recognition, IEEE Workshop on Applications of Computer Vision (WACV) 2012, Breckenridge, Colorado.
104. Oct 2011: Computer Vision-based Student Engagement Inference for Online Education (with Peter Shea), School of Education Seminar, State University of New York at Albany, Albany, New York.
105. Oct 2011: Visual Analysis via Boosted Learning, Computer Science Department Seminar, State University of New York at Albany, Albany, New York.
106. Jun 2011: Supervised and Semi-Supervised Image Alignment, Computer vision seminar, University of South Florida, Tampa, Florida.
107. Oct 2010: Supervised and Semi-Supervised Image Alignment, Computer & Information Sciences Department Colloquium, Temple University, Philadelphia, Pennsylvania.
108. Oct 2010: Supervised and Semi-Supervised Image Alignment, Electrical Engineering Department Colloquium, The City College of New York, New York City, New York.
109. Oct 2010: Intelligent Video (with Peter Tu), School of Electrical and Computer Engineering, Cornell University, Ithaca, New York.
110. Nov 2009: Image Alignment: Theory and Application, Computer Science Department Seminar, State University of New York at Albany, Albany, New York.
111. Nov 2009: Image Alignment: Theory and Application, Naval Research Laboratory, Washington DC.
112. Sep 2009: Image Alignment: Theory and Application, Artificial Intelligence Lab., Zhejiang University, Hangzhou, P. R. China.
113. Jun 2009: Improving Face Recognition with a Quality-based Probabilistic Framework, IEEE Computer Society Workshop on Biometrics (in conjunction with CVPR 2009), Miami Beach, Florida.
114. May 2008: Discriminate Image Alignment, Digital Video and Multimedia (DVMM) Lab, Columbia University, New York City, New York.
115. May 2008: Discriminate Image Alignment, Robotics Institute, Carnegie Mellon University, Pittsburgh, Pennsylvania.
116. Feb 2008: Face Alignment: Algorithms and Applications, National Sensor, Surveillance and Biometric Technologies Center Of Excellence, New York City, New York.
117. Sep 2007: What are Customers Looking at? IEEE International Conference on Advanced Video and Signal-Based Surveillance (AVSS) 2007, London, UK.
118. Aug 2007: Generative and Discriminative Face Alignment, Electrical, Computer, & Systems Engineering (ECSE) Department, Rensselaer Polytechnic Institute, Troy, New York.
119. Jun 2007: Generic Face Alignment using Boosted Appearance Model, IEEE Conference on Computer Vision Pattern Recognition (CVPR) 2007, Minneapolis, Minnesota.
120. Jun 2007: Intelligent Video for Security (with Fred Wheeler), Northeast Technology and Product Assessment Committee (NTPAC) Corrections Conference, Sturbridge, Massachusetts.
121. Apr 2007: Intelligent Video at GE, Artificial Intelligence Lab., Zhejiang University, Hangzhou, P.R.China.
122. Feb 2007: Multi-view Face Enhancement and Forensic Face Recognition (with Fred Wheeler), Identix Inc., Jersey City, New Jersey.
123. Aug 2005: Towards Intelligent Video Solutions (with Nils Krahnstoeber and Jens Rittscher), Robotics Institute, Carnegie Mellon University, Pittsburgh, Pennsylvania.
124. Sep 2004: Pose Robust Video-Based Face Recognition, Siemens Corporate Research, Princeton, New Jersey.
125. Sep 2004: Pose Robust Video-Based Face Recognition, GE Global Research, Niskayuna, New York.
126. Aug 2004: Pose Robust Video-Based Face Recognition, Epsom Palo Alto Lab, Palo Alto, California.
127. May 2002: Shot Boundary Detection Using Temporal Statistics Modeling, IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2002, Orlando, Florida.
128. Feb 2001: Face Authentication with Tolerance to Expression Variations and Registration Errors, Media Site Inc., Pittsburgh, Pennsylvania.

TUTORIALS/LECTURES

1. Yaojie Liu and **Xiaoming Liu**, Face Anti-Spoofing: Past, Present and the Future, half-day tutorial in BTAS 2019 conference, Sep. 2019.
2. Yaojie Liu and **Xiaoming Liu**, Face Anti-Spoofing and Anti-Deepfake: Recent progress, half-day tutorial in IJCB 2020 conference, Sep. 2020.
3. **Xiaoming Liu**, Face Presentation Attacks: Physical and Digital, The 5th IAPR/IEEE Winter School on Biometrics 2021, Shenzhen, China, 24-28 January 2021.

CURRENT PH.D STUDENTS

Yaojie Liu (2016-)
Garrick Brazil (2016-)
Shengjie Zhu (2018-)
Masa Hu (2018-)
Andrew Hou (2019-)
Abhinav Kumar (2020-)
Vishal Asnani (2021-)
Xiao Guo (2021-)

CURRENT POST-DOC

Feng Liu (Oct 2018-)

CURRENT UNDERGRAD STUDENTS

Ziyuan Zhang (Summer 2017-)
Kilosh Mike Kamwana (Fall 2019-)
Ethan Rylko (Fall 2020-)

UNDERGRAD STUDENTS ADVISED

Yevgeny Khessin (Fall 2012)
Jacob Jensen (Fall 2013-Spring 2014)
Marco Botros (Fall 2013-Spring 2014)
Nayana Kodur (Summer 2014-Fall 2014)
Zach Richardson (Fall 2015)
Jack Dean Smith (Fall 2015-Spring 2016)
Zhiming Jiang (Summer 2016)
Xiaohan Zhang (Summer 2017)
Weilin Liang (Summer 2018)

HIGH SCHOOL STUDENTS ADVISED

Kyle Milka (Summer 2013)
William Ren (Summer 2016, 2017)

GRADUATED

Ph.D. students

- Joseph Roth (Aug 2012 - Aug 2016, CSE), “Unconstrained 3D Face Reconstruction from Photo Collections”. Recipient of the **2016 Outstanding Graduate Student Award** in the CSE Department at MSU; recipient of the **First Place of Fitch H. Beach Awards** - the highest honor among all the 2016 graduating PhD students in the College of Engineering at MSU. First job at Google Research in Pittsburgh.
- Muhammad Jamal Afridi (Aug 2012 - Jan 2017, CSE), “Convolutional Neural Networks for Automated Cell Detection in Magnetic Resonance Imaging Data”. Co-advised with Erik Shapiro, Arun Ross. First job at 3M Company, Maplewood MN.
- Morteza Safdarnejad (Aug 2013 - May 2017, ECE), “Robust Global Motion Compensation and its Applications”. Co-advised with Lalita Udpa. First job at Adobe Systems Incorporated, San Jose, CA.
- Yousef Atoum (Aug 2013 - Jan 2018, ECE), “Detecting Objects under Challenging Illumination Conditions”. First job as an Assistant Professor at Department of Computer Engineering, Hijjawi Faculty For Engineering Technology, Yarmouk University, Jordan. Now at General Motors (GM) Company.
- Xi Yin (Aug 2013-Aug 2018, CSE), “Representation Learning and Image Synthesis for Deep Face Recognition”. Recipient of the **2018 Outstanding Graduate Student Award** in the CSE Department at MSU;

recipient of the **First Place of Fitch H. Beach Awards** - the highest honor among all the 2018 graduating PhD students in the College of Engineering at MSU. First job as Research Scientist at Microsoft AI & Research.

- Amin Jourabloo (Aug 2014-Apr 2019, CSE), “Designing Convolutional Neural Networks for Face Alignment and Anti-spoofing”. Recipient of the **First Place of Fitch H. Beach Awards** - the highest honor among all the 2019 graduating PhD students in the College of Engineering at MSU. First job as Postdoctoral Research Scientist at Facebook Reality Lab (Oculus Research).
- Luan Tran (Aug 2015-Dec 2019, CSE) “Learning 3D Model From In-The-Wild 2D Images”. First job as Research Scientist at Facebook Reality Lab (Oculus Research).

M.S. students

- Lingyi Wu (Fall 2012-Summer 2014, CSE), First job at Med-Care Diabetic and Medical Supplies, Inc., Boca Raton, FL.
- Liping Chen (Fall 2013-Spring 2016, CSE), First job at Amazon.com, Inc., Seattle, WA.
- Bangjie Yin (Fall 2017-Spring 2019, CSE), First job at Tencent Youtu Lab, Shanghai, P.R. China.
- Joel Stehouwer (Fall 2017-Spring 2020, CSE)

INTERN RESEARCHER SUPERVISION

Mahesh Ramachandran, University of Maryland at College Park, 2007. (co-supervision with Gianfranco Doretto)
Hao Wu, University of Maryland at College Park, 2007. (co-supervision with Gianfranco Doretto)
Peng Yang, Rutgers university, 2007. (co-supervision with Gianfranco Doretto)
Avinash Ravichandran, Johns Hopkins University, 2007. (co-supervision with Gianfranco Doretto)
Yilei Xu, University of California at Riverside, 2008.
Ryan Connaughton, University of Notre Dame, 2010. (co-supervision with Fred Wheeler)
Yimeng Zhang, Cornell University, 2011. (co-supervision with Ming-Ching Chang, Weina Ge) **Recipient of the prestigious GE Early Identification Award.**

VISITING SCHOLARS

Lekun Zhou, Zhejiang University (Fall 2013)
Ke Ning, Zhejiang University (Fall 2015)
Ying Tai, Nanjing University of Science and Technology (Spring 2016)
Yunfei Wang, Capital Normal University (Fall 2016)
Lanqing Hu, Chinese Academy of Science (Fall 2019-Summer 2020)
Chang Chen, University of Science and Technology of China (Fall 2019-Spring 2020)
Xiaohong Liu, McMaster University (Summer-Fall 2020)

PROFESSIONAL ACTIVITIES

Fellow of IAPR
Senior Member of IEEE
Member of ACM
Member of AAAI
Program Committee

- 7th Asian Conference on Computer Vision (ACCV) 2006, Hyderabad, India, January 13-16, 2006.
- IEEE workshop on Beyond Patches (in conjunction with CVPR 2006), New York, NY, June 17, 2006.
- Workshop on Non-rigid registration and tracking through learning (in conjunction with ICCV 2007), Rio de Janeiro, Brazil, October 14, 2007.
- IEEE Workshop on Motion and Video Computing (WMVC), Copper Mountain, Colorado, January 8-9, 2008.
- International Workshop on Instinctive computing, Carnegie Mellon University, Pittsburgh, PA, June 15-16, 2009.
- 1st ACM International Workshop on Interactive Multimedia for Consumer Electronics (IMCE 2009), Beijing, China, October 23, 2009.
- Video Intelligence (VI-2010), ICCS Workshop, Amsterdam, May 30, 2010.
- IEEE International Workshop on Analysis and Modeling of Faces and Gestures (AMFG 2010, in conjunction with CVPR 2010), June 14, 2010.
- IEEE International Conference on Multimedia and Expo (ICME 2010), July 19-23, 2010.

- The 10th Asian Conference of Computer Vision (ACCV 2010), November 8-12, 2010.
- IEEE Workshop on Motion and Video Computing (WMVC), Kona, Hawaii, January 6, 2011.
- The 9th IEEE Conference on Automatic Face and Gesture Recognition (FG 2011), March 21-23, 2011.
- IEEE International Conference on Multimedia and Expo (ICME 2011) July 11-15, 2011.
- The 13th International Conference on Computer Vision (ICCV 2011), November 6-13, 2011.
- The International Workshop on Interactive Multimedia on Mobile and Portable Devices (IMMPD'11, in conjunction with ACM Multimedia 2011), November 28, 2011.
- The 1st International Conference on Pattern Recognition Applications and Methods (ICPRAM 2012), February 6-8, 2012.
- The 25th IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2012), June 18-20, 2012.
- IEEE International Conference on Multimedia and Expo (ICME 2012), July 9-13, 2012.
- The IEEE Fifth International Conference on Biometrics: Theory, Applications and Systems (BTAS 2012), September 23-27, 2012.
- The 9th IEEE Conference on Advanced Video and Signal-based Surveillance (AVSS 2012), September 18-21, 2012.
- The 2012 International Conference on Advanced Vehicle Technologies and Integration (VTI 2012), July 16-19, 2012.
- The 11th Asian Conference of Computer Vision (ACCV 2012), November 5-9, 2012.
- The IEEE Workshop on Applications of Computer Vision 2013 (WACV 2013), January 16-18, 2013.
- The 2nd International Conference on Pattern Recognition Applications and Methods (ICPRAM 2013), February 15-18, 2013.
- The 5th IEEE International Workshop on Analysis and Modeling of Faces and Gestures (AMFG2013), in conjunction with CVPR 2013, June 28, 2013.
- The IEEE Fifth International Conference on Biometrics: Theory, Applications and Systems (BTAS 2013), September 29 – October 2, 2013.
- The 1st International Workshop on Multimedia Affective Computing, in conjunction with ICME 2014, July 14, 2014.
- The workshop on Face and Facial Expression Recognition (FFER) from Real World Videos, in conjunction with ICPR 2014, Aug 24, 2014.
- The workshop on My Car Has Eyes: Intelligent Vehicle With Vision Technology, in conjunction with ACCV 2014, Nov 1, 2014.
- The 6th IEEE International Workshop on Analysis and Modeling of Faces and Gestures (AMFG2015), in conjunction with CVPR 2015, Jun 12, 2015.
- The IEEE Seventh International Conference on Biometrics: Theory, Applications and Systems (BTAS 2015), Sep 2015.
- The 2nd Computer Vision Problems in Plant Phenotyping workshop (CVPPP), in conjunction with BMVC 2015, Sep 10, 2015.
- The ACCV 2016 Workshop on Large-Scale Soft Biometrics (LSSB), Nov 2016.
- The second workshop on Face and Facial Expression Recognition (FFER 2016), in conjunction with ICPR 2016, Dec 4, 2016.
- The Workshop on Facial Informatics, in conjunction with ACCV 2016, Nov 20, 2016.
- The First International Workshop on the Bright and Dark Sides of Computer Vision: Challenges and Opportunities for Privacy and Security, in conjunction with CVPR 2017, July 21, 2017.
- The CVPR 2017 workshop on DeepVision: Temporal Deep Learning, July 26, 2017.
- SmartAg International Symposium, December 3-6, 2017.
- IEEE FG 2018 Workshop on Dense 3D Reconstruction of 2D Face Images in the Wild, May 2018.
- IEEE FG 2018 Doctoral Consortium, May 2018.
- IEEE International Conference on Visual Communications and Image Processing (VCIP 2018), December 9-12, 2018.
- The CVPR 2019 Workshop on Precognition: Seeing through the Future, June 2019.
- Intelligent Biometrics and Smart Sensors Workshop in conjunction with AVSS 2019, September 18, 2019.

Program Chair

- IEEE Winter Conference on Applications of Computer Vision (WACV 2018), March 12-15, 2018.
- 9th IEEE International Conference on Biometrics: Theory, Applications and Systems (BTAS 2018), October 22-25, 2018.
- IEEE Advanced Video and Signal-based Surveillance (AVSS-2022) conference, 2022.

General Chair

- 17th IEEE Conference on Automatic Face and Gesture Recognition (FG), May 13-17, 2023.

Workshop Chair

- ICCV Workshop on Human Behavior Understanding (HBU), Oct 2019.
- The International Workshop on 3D Human Understanding (3DHU), in conjunction with IEEE ICPR 2020, Sep, 2020.

Area Chair/Co-Chair

- The 21st International Conference on Pattern Recognition (ICPR 2012), November 11-15, 2012.
- The 6th IAPR International Conference on Biometrics (ICB 2013), June 4 - 7, 2013.
- Doctoral Consortium of 10th IEEE Conference on Automatic Face and Gesture Recognition (FG 2013), April 23, 2013.
- IEEE Winter Conference on Applications of Computer Vision (WACV 2014), March 24-26, 2014.
- The 11th IEEE International Conference on Advanced video and Signal-based Surveillance (AVSS 2014), August 26-29, 2014.
- The 11th IEEE Conference on Automatic Face and Gesture Recognition (FG 2015), May 4-8, 2015.
- IEEE Winter Conference on Applications of Computer Vision (WACV 2016), March 7-9, 2016.
- The 23rd International Conference on Pattern Recognition (ICPR 2016), December 4-8, 2016.
- The 12th IEEE Conference on Automatic Face and Gesture Recognition (FG 2017), May 29- June 3, 2017.
- 2017 IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2017), June 24-30, 2017.
- Tutorial Chair, IEEE Winter Conference on Applications of Computer Vision (WACV 2017), March 24-31, 2017.
- Corporate Relations Chair, International Joint Conference on Biometrics (IJCB 2017), October 1-4, 2017.
- The 19th IEEE International Conference on Image Processing (ICIP 2017), September 17-20, 2017.
- Doctoral Consortium Co-Chair, 2018 IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2018), June 18-23, 2018.
- The 13th IEEE Conference on Automatic Face and Gesture Recognition (FG 2018), May 15- 19, 2018.
- 2019 IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2019), June 15-21, 2019.
- 2019 International Conference on Computer Vision (ICCV 2019), Oct 27-Nov 3, 2019.
- Senior Program Committee member of the 28th International Joint Conference on Artificial Intelligence (IJCAI) 2019, August 10-16 2019.
- The 15th IEEE Conference on Automatic Face and Gesture Recognition (FG 2020), May 18-22, 2020.
- The International Conference on Learning Representations (ICLR 2020), Apr 26-30, 2020.
- The 16th European Conference on Computer Vision (ECCV 2020), Aug 23-28, 2020.
- The 28th ACM International Conference on Multimedia (ACM MM) 2020, Oct 12-16, 2020.
- The 25th International Conference on Pattern Recognition (ICPR) 2020, Jan 10-15, 2021.
- The Conference on Neural Information Processing Systems (NeurIPS) 2020, Dec 6-12, 2020.
- The International Conference on Learning Representations (ICLR 2021), May, 2021.
- 2021 IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2021), Jun, 2021.
- 2021 International Conference on Computer Vision (ICCV 2021), October 11, 2021.
- The 38th International Conference on Machine Learning (ICML 2021) July 18-24, 2021.

Panelist

- NSF Panel on IIS-Robust Intelligence (RI) small program, March 2012.
- Technology Innovation panel on NIJ Conference, June 2012.
- NSF Panel on IIS-Robust Intelligence (RI) small program, May 29-30 2014.
- ICPR 2014 Special Panel on Industry Related Research, August 26 2014.
- “Recent Advances in Biometrics” session in the 13th Annual Smart Card Alliance Government Conference, October 30, 2014.
- NSF Panel on IIS-Research Initiation Initiative (CRII) program, Nov 17-18 2016.
- CVPR 2018 Biometrics Workshop Panel on “Impact of deep learning on biometrics and trends”, June 18, 2018.
- CVPR 2018 Disguised Faces in the Wild Workshop Panel on “Attacks on Face Recognition”, June 18, 2018.

- NSF Panel on IIS-Robust Intelligence (RI) small program, March 28-29 2019.
- The 7th Annual U.S. Border Security and Intelligence Summit, Panel on “Developing New Biometric Identification Technologies for National Security, April 11, 2019.
- Discussion Panel in CVPR Workshop on autonomous driving - Beyond Single-Frame Perception (WAD), June 16, 2019

Associate Editor

- Neurocomputing journal (Dec 2016-Dec 2019).
- Pattern Recognition Letters (Feb 2019-).
- Pattern Recognition (Apr 2019-).
- IEEE Transaction on Image Processing (Nov 2019-).

Guest Editor

- International Journal of Computer Vision Special Issue on Deep Learning for Face Analysis (Oct 2017-Nov 2018).
- ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM) Special Issue on Face Analysis for Applications (June 2018-Apr 2019).
- Machine Vision and Applications Special Issue on 2018 IEEE Winter Conference on Applications of Computer Vision (Jan 2018 - Dec 2018).
- Pattern Recognition Letter Special Issue on Biometric Presentation Attacks: handcrafted features versus deep learning approaches (Nov 2019-).
- Corresponding expert of Frontiers of Information Technology & Electronic Engineering (July 2019-December 2022).
- IEEE Transactions on Biometrics, Behavior, and Identity Science (T-BIOM) Special Issue on Trustworthy Biometrics (Dec 2020 - Jan 2022)

Services

- Campus Curriculum Committee, MSU CSE Department, Fall 2020.
- Reappointment, Tenure Promotion Committee, MSU CSE Department, Fall 2020.
- Graduate Studies and Research Committee Chair, MSU CSE Department, Fall 2017, Spring 2018.
- Graduate Studies and Research Committee Member, MSU CSE Department, Fall 2012-Spring 2014, Fall 2015, Spring 2016.
- Faculty advisor, NSF-sponsored Research Experience for Teacher (RET) program at MSU, Summer 2013, 2014, 2015.
- Colloquium Committee Co-Chair, MSU CSE Department, Fall 2013-Spring 2015.
- Instructor, MSU Grandparent University, Summer 2014.
- Faculty Search Committee Member, MSU CSE Department, Fall 2014-Spring 2015.
- Faculty Search Committee Member, MSU CSE Department, Fall 2015-Spring 2016.
- Faculty Search Committee Member, MSU CSE Department, Fall 2019-Spring 2020.
- Mobility Faculty Search Committee Member, MSU College of Engineering, Fall 2017-Spring 2018.
- University Council/Faculty Senate representative, MSU, Fall 2014-Spring 2016.
- Faculty mentor for Autonomous Ground Vehicle Research Club, Michigan State University, Fall 2016-Spring 2018.
- Mentor of the CVPR 2017 Doctoral Consortium (DC), July 24, 2017.
- Mentor of the IJCB 2017 Doctoral Consortium (DC), Oct 3, 2017.
- Mentor of the ICCV 2019 Doctoral Consortium (DC), October 30, 2019.
- VALSE 2019 Best Paper Selection Committee, Apr 2019.
- Steering Committee of IEEE International Conference on Connected and Autonomous Driving (MetroCAD).

Other Activities

- Review book proposal submitted to the engineering technology editorial team at John Wiley and Sons, Ltd
- Judge panel, MEng student projects evaluation, School of Electrical and Computer Engineering, Cornell University, Ithaca, New York, May 2010
- Initiate “Rosenblum Undergraduate Research Opportunity Award (RUROA)” at MSU CSE Department, Fall

2013.

- Member of the advisory committee of the 5-year AI flagship project in South Korea titled “Intelligent interaction based on context awareness and intention understanding”, April 2017-.
- Technical Activities Committee member of IEEE Biometrics Council, June 2017-.
- Co-organizer of the MSU-Notre Dame Workshop on Biometrics/Computer Vision, Sep 2019.