Ying Liu

Contact Information	Office: 113 Bergin Hall Department of Computer Science & Engineering Santa Clara University Santa Clara, CA 95053 USA	Work Phone: +1 (408) 551-3696 E-mail: yliu15@scu.edu, yingliuub@gmail.com
Webpage	https://www.scu.edu/engineering/faculty/liu-ying/	
Google Scholar Profile	https://scholar.google.com/citations?user=cpX8P_gAAAAJ&hl=en	

Research Interests: Machine Learning, Deep Learning, Video Coding, Image Processing, Computer Vision, Compressed Sensing.

Education

The State University of New York at Buffalo (SUNY Buffalo), Buffalo, NY

Ph.D, Electrical Engineering, Sept. 2012
Thesis: Decoding of Purely Compressed Sensed Video
Advisor: Prof. Dimitris A. Pados

The State University of New York at Buffalo (SUNY Buffalo), Buffalo, NY

M.S., Electrical Engineering, June 2008
Advisor: Prof. Dimitris A. Pados

Beijing University of Posts and Telecommunications (BUPT), Beijing, China

B.S., Communications Engineering, June 2006
Thesis: Dynamic Bandwidth Allocation of Gigabit Passive Optical Networks (GPON), Excellent Undergraduate Thesis Award

Employment

Santa Clara University, Santa Clara, CA

Assistant Professor, Dept. Computer Science & Engineering, Sept. 2018 - Present

The State University of New York at Buffalo (SUNY Buffalo), Buffalo, NY

Lecturer, Dept. Electrical Engineering, Sept. 2016 - May. 2018

The State University of New York at Buffalo (SUNY Buffalo), Buffalo, NY

Postdoc - Research Scientist, Dept. Electrical Engineering, Oct. 2014 - Aug. 2018

Illinois Institute of Technology, Chicago, IL

Senior Research Associate, Dept. Electrical & Computer Engineering, July 2013 - Oct. 2014
Multimedia Communications Laboratory

ARCON Corporation, Waltham, MA

Staff Engineer, Jan. 2013 - Jul. 2013
Air Traffic Management Software Analysis and Testing.

External Grants

- Ying Liu (PI), "Learned Video Compression with Generative Adversarial Networks and Transformers," 1× A100 GPU, NVIDIA Academic Hardware Grant Program, awarded.
- Ying Liu (PI), "ERI: Generative Adversarial Networks for Video Coding," $196,211, National Science Foundation, Feb. 1, 2022 - Jan. 31, 2024, awarded.

- Nam Ling (PI) and Ying Liu (PI), "Low Complexity and High Efficiency Image and Video Coding with Deep Learning on Heterogeneous Platforms," $154,673, Kwai, Inc, June 16, 2021 - June 15, 2022, awarded.
- Nam Ling (PI) and Ying Liu (Co-PI), "Low Complexity and High Efficiency Image and Video Processing with Neural Network on Heterogeneous Platforms," US $150,873.00, Kwai, Inc., June 16, 2020 - June 15, 2021, awarded.

Internal Grants

- Ying Liu (PI), "Video Coding for Semantic Segmentation," $7,680, School of Engineering's Kuehler Undergraduate Research Program, Summer 2023, awarded.
- Ying Liu (PI), "Image Enhancement Through Transformers," $10,500, School of Engineering's Kuehler Undergraduate Research Program, Summer 2022, awarded.
- Ying Liu (PI), School of Engineering Internal Grants, $15,000, June 2020-June 2021, Santa Clara University, awarded.
- Ying Liu (PI), School of Engineering Internal Grants, $15,000, June 2019-June 2020, Santa Clara University, awarded.
- Ying Liu (PI), Summer Research Stipend, $8,000, June 2020-June 2021, Santa Clara University, awarded.
- Start-up Funding, September 2018 - Present, Santa Clara University, awarded.

Journal Articles

After Joining Santa Clara University

1. M. Schimpf, N. Ling, and **Y. Liu**, "Compressing of medium- to low-rate transform residuals with semi-extreme sparse coding as an alternate transform in video," *IEEE Trans. Consumer Electronics*, Mar. 2023, accepted. Impact Factor (2022): 4.3.
2. F. Akhyar, **Y. Liu**, C.-Y. Hsu, T. K. Shih, C.-Y. Lin, "FDD: a deep learning–based steel defect detectors," *The International Journal of Advanced Manufacturing Technology*, vol. 126, pp. 1093 - 1107, Mar. 2023. Impact Factor (2022): 3.4.
3. B. Hou, **Y. Liu**, N. Ling, Y. Ren, and L. Liu, "A survey of efficient deep learning models for moving object segmentation," *APSIPA Trans. Signal and Information Process.*, vol. 12, no. 1, pp. 1 - 84, Jan. 2023. Impact Score: 4.0.
4. B. Hou, **Y. Liu**, N. Ling, L. Liu, and Y. Ren, "A fast lightweight 3D separable convolutional neural network with multi-input multi-output for moving object detection", *IEEE Access*, vol. 9, pp. 148433 - 148448, Oct. 2021. Impact Factor (2022): 3.9.
5. **Y. Liu**, K. Tountas, D. A. Pados, S. N. Batalama, and M. J. Medley, "L1-subspace tracking for streaming data", *Pattern Recognition*, vol. 97, Aug. 2019. Impact Factor (2022): 8.0.
6. **Y. Liu** and J. Kim, "Variable block-size compressed sensing for depth map coding", *Multimedia Tools and Applications*, vol. 79, pp. 8825 - 8839, Apr. 2019. Impact Factor (2022): 3.6.

Before Joining Santa Clara University

7. **Y. Liu**, D. A. Pados, J. Kim, and C. Zhang, "Reconstruction of compressed-sensed multiview video with disparity and motion compensated total-variation minimization," *IEEE Trans. Circuits and Systems for Video Technology*, vol. 28, pp. 1288-1302, June 2018. Impact Factor (2022): 8.4.
8. **Y. Liu** and D. A. Pados, "Compressed-sensed-domain L1-PCA video surveillance," *IEEE Trans. Multimedia*, vol. 18, pp. 351-363, Mar. 2016. Impact Factor (2022): 7.3.
9. **Y. Liu**, M. Li, and D. A. Pados, "Motion-aware decoding of compressed-sensed video," *IEEE Trans. Circuits and Systems for Video Technology*, vol. 23, pp. 438-444, Mar. 2013. Impact Factor (2022): 8.4.

10. **Y. Liu** and D. A. Pados, "Decoding of framewise compressed-sensed video via interframe total variation minimization," *SPIE Journal of Electronic Imaging, Special Issue on Compressive Sensing for Imaging*, Apr.-June 2013. Impact Factor (2022): 1.1.

Conference Papers

After Joining Santa Clara University

1. Y. Pei, **Y. Liu**, N. Ling, Y. Ren, and L. Liu, "An end-to-end deep generative network for low bitrate image coding," *IEEE Int. Symp. Circuits and Systems (ISCAS)*, Monterey, CA, May 2023, accepted.
2. T. Shen and **Y. Liu**, "Learned image compression with transformers," *SPIE Defense + Commercial Sensing, Conference 12522, Big Data V: Learning, Analytics, and Applications*, Orlando, FL, May 2023, accepted.
3. P. Du, **Y. Liu**, N. Ling, Y. Ren, and L. Liu, "Generative video compression with a transformer-based discriminator," *in Proc. Picture Coding Symposium (PCS)*, San Jose, CA, Dec. 2022.
4. Z. Zhang and **Y. Liu**, "Side information driven image coding for machines," *in Proc. Picture Coding Symposium (PCS)*, San Jose, CA, Dec. 2022.
5. M. Mathai, **Y. Liu**, and N. Ling, "A lightweight model with separable CNN and LSTM for video prediction," in *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS)*, Austin, TX, May-June 2022.
6. P. Du, **Y. Liu**, N. Ling, L. Liu, Y. Ren, M. Hsu, "A generative adversarial network for video compression," in *Proc. SPIE Defense + Commercial Sensing, Conference: Big Data IV: Learning, Analytics, and Applications*, Orlando, Florida, Apr. 2022.
7. B. Hou, **Y. Liu**, N. Ling, L. Liu, Y. Ren, and M. Hsu, "F3DsCNN: a fast two-branch 3D separable CNN for moving object detection," in *Proc. IEEE Conf. Visual Commun. and Image Process. (VCIP)*, Munich, Germany, Dec. 2021.
8. Y. Pei, **Y. Liu**, N. Ling, L. Liu, and Y. Ren, "Class-specific neural network for video compressed sensing," *IEEE Int. Symp. Circuits and Systems*, Daegu, Korea, May 2021.
9. **Y. Liu**, P. Du, and Y. Li, "Hierarchical motion-compensated deep network for video compression," *SPIE Symp. Defense + Commercial Sensing*, Orlando, FL, Apr. 2021.
10. M. Schimpf, N. Ling, Y. Shi, and **Y. Liu**, "Sparse coding of intra prediction residuals for screen content coding," *IEEE Int. Conf. Consumer Electronics (ICCE)*, 2021.
11. B. Hou, **Y. Liu**, and N. Ling, "A super-fast deep network for moving object detection," *IEEE Int. Symp. Circuits and Systems*, online, Oct. 2020.
12. Y. Pei, **Y. Liu**, and N. Ling, "Deep learning for block compressed sensing of images in sparse domain," *IEEE Int. Symp. Circuits and Systems*, online, Oct. 2020.
13. R. Khan, **Y. Liu**, "Motion-aware deep video coding network," *Conference SI110: Big Data II: Learning, Analytics, and Applications, SPIE Symp. Defense + Commercial Sensing 2020*, online, Apr. 2020.
14. **Y. Liu**, Z. Bellay, P. Bradsky, G. Chandler, and B. Craig, "Edge-to-fog computing for color-assisted moving object detection," in *Proc. SPIE 10989, Big Data: Learning, Analytics, and Applications*, Baltimore, MD, Apr. 2019.

Before Joining Santa Clara University

15. **Y. Liu** and D. A. Pados, "Conformity evaluation of data samples by L_1-norm principal-component analysis," in *Proc. SPIE 10658, Compressive Sensing VII: From Diverse Modalities to Big Data Analytics*, Orlando, FL, May 2018.
16. **Y. Liu**, D. A. Pados, S. N. Batalama, and M. J. Medley, "Iterative re-weighted L1-norm principal-component analysis," in *Proc. IEEE Asilomar Conference*, Pacific Grove, CA, Oct. - Nov. 2017.

17. F. Maritato, **Y. Liu**, S. Colonnese, and D. A. Pados, "Cloud-assisted individual L1-PCA face recognition using wavelet-domain compressed images," in *Proc. the 6th European Workshop on Visual Information Process. (EUVIP)*, Marseille, France, Oct. 2016.
18. **Y. Liu**, D. A. Pados, and C.H. Yeh, "Two-stage tensor locality-preserving projection face recognition," in *Proc. IEEE Int. Conf. Multimedia Big Data*, Taipei, Taiwan, Apr. 2016.
19. M. Pierantozzi, **Y. Liu**, D. A. Pados, and S. Colonnese, "Video background tracking and foreground extraction via L1-subspace updates," in *Proc. SPIE Commercial + Scientific Sensing and Imaging*, Baltimore, MD, Apr. 2016.
20. F. Maritato, **Y. Liu**, D. A. Pados, and S. Colonnese, "Face recognition with L1-norm subspaces," in *Proc. SPIE Commercial + Scientific Sensing and Imaging*, Baltimore, MD, Apr. 2016.
21. **Y. Liu**, S. Chamadia, and D. A. Pados, "Joint-view Kalman-filter recovery of compressed-sensed multiview videos," in *Proc. IEEE Int. Conf. Acoust. Speech, and Signal Process. (ICASSP)*, Shanghai, China, Mar. 2016.
22. Y. Xu, J. Sun, J. Zeng, Z. Kudyshev, A. Pandey, **Y. Liu**, and N. M. Litchinitser, "Probing metamaterials with structured light," in *Proc. SPIE 9544, Metamaterials, Metadevices, and Metasystems*, Sept. 2015.
23. **Y. Liu**, D. A. Pados, "Compressed-sensed L1-PCA surveillance video," in *Proc. SPIE Defense, Security, and Sensing (DSS)*, Baltimore, MD, Apr. 2015.
24. **Y. Liu**, C. Zhang, and J. Kim, "Disparity-compensated Total-variation Minimization for compressed-sensed multiview image reconstruction," in *Proc. IEEE Int. Conf. Acoust. Speech, and Signal Process. (ICASSP)*, Brisbane, Australia, Apr. 2015.
25. K. R. Vijayanagar, **Y. Liu**, and J. Kim, "Adaptive measurement rate allocation for block-based compressed sensing of depth maps," in *Proc. IEEE Int. Conf. Image Process. (ICIP)*, Paris, France, Oct. 2014.
26. **Y. Liu**, K. R. Vijayanagar, and J. Kim., "Rate-distortion optimization for compressive video sampling," in *Proc. SPIE Defense, Security, and Sensing (DSS)*, Baltimore, MD, May 2014.
27. **Y. Liu**, K. R. Vijayanagar, and J. Kim, "Quad-tree partitioned compressed sensing for depth map coding," in *Proc. IEEE Int. Conf. Acoustics and Speech Signal Process. (ICASSP)*, Florence, Italy, May 2014.
28. **Y. Liu** and D. A. Pados, "Rate-adaptive compressive video acquisition with sliding-window total-variation- minimization reconstruction," in *Proc. SPIE on Defense, Security and Sensing*, Baltimore, MD, Apr. 2013.
29. **Y. Liu**, M. Li, and D. A. Pados, "Decoding of purely compressed-sensed video," in *Proc. SPIE on Defense, Security and Sensing*, Baltimore, MD, Apr. 2012.
30. **Y. Liu**, M. Li, K. Gao, and D. A. Pados, "Motion compensation as sparsity-aware decoding in compressive video streaming," (invited paper) in *Proc. Intern. Conf. on Digital Signal Proc. (ICDSP)*, Corfu, Greece, Jul. 2011.

Patents

1. P. Du, **Y. Liu**, N. Ling, L. Liu, Y. Ren and M. K. Hsu, "Generative Adversarial Network for Video Compression," U.S. Patent granted (publication number US 2023/0105436 A1), Apr. 6, 2023. (U.S. Patent filed (application no. 17/495,797) on Oct. 6, 2021.)
2. P. Du, **Y. Liu**, N. Ling, Y. Ren and L. Liu, "Generative video compression with a transformer-based discriminator," filed on Oct. 21, 2022, U.S. Patent Application No. 17/971,546. (Non-provisional).
3. Y. Pei, **Y. Liu**, N. Ling, Y. Ren, and L. Liu, "End-to-end deep generative network for low bitrate image coding," U.S. Patent filed (application no. 17/969,551) on Oct. 18, 2022. (Non-provisional).

4. B. Hou, **Y. Liu**, N. Ling, L. Liu, Y. Ren, and M. K. Hsu, "3D Separable Deep Convolutional Neural Network for Moving Object Detection," filed on November 22, 2021, U.S. Patent Application No. 17/533,012. (Non-provisional).
5. Y. Pei, **Y. Liu**, N. Ling, L. Liu, Y. Ren, and M. K. Hsu, "Class-Specific Neural Network for Video Compressed Sensing," U.S. Patent filed (application no. 17/695,684) on March 15, 2022. (Non-provisional).

Teaching

1. COEN166/266 Artificial Intelligence, Santa Clara University
2. COEN140/240 Machine Learning, Santa Clara University
3. COEN347 Advanced Techniques in Video Coding, Santa Clara University
4. EE614 Smart Antennas (graduate), Spring 2018, SUNY at Buffalo
5. EE462/562 Principle of Medical and Radar Imaging (graduate), Spring 2018, Spring 2017, SUNY at Buffalo
6. EE631 Detection & Estimation I (graduate), Fall 2017, Fall 2016, SUNY at Buffalo
7. EE484 Communication Systems 2 (Senior), Fall 2017, SUNY at Buffalo
8. EE200 EE Concepts/non-Majors (undergraduate, 200+ students), Fall 2017, Spring 2017, Fall 2016, SUNY at Buffalo
9. EE303 Signal Analysis and Transform Methods (undergraduate), Summer 2011, SUNY at Buffalo

Presentations and Talks

1. COEN 100, Undergraduate Seminar.
2. COEN 400, Graduate Seminar.

Students & Projects

PhD Students' Projects:

- Pengli Du - Deep Learning for Video Coding
- Tianma Shen - Deep Learning for Image Compression
- Zhongpeng Zhang - Image Coding for Machines
- Bingxin Hou (co-advisor) - Deep Learning for Moving Object Detection
- Yifei Pei (co-advisor) - Deep Learning for Image Compression
- Mareeta Mathai (co-advisor) - Deep Learning for Video Prediction

MS Students' Projects:

- Rida Khan – Convolutional neural network-based video compression
- Zachary Bellay (graduated) - Deep Learning for Image and Video Processing

Undergraduate Students' Research Projects:

- Yuzhu Li - Deep Learning for Video Coding
- Junhe Cui - Deep Learning-based Object Detection and Image Denoising

Senior Design Projects Advised:

- Junhe Cui, Yihui Qin, Chen Zhang - "Deep learning-based compressed image super-resolution and quality enhancement," 2022/2023.
- Xukun Zhang, Yuzheng Wu, Haochen Zhang - "Crossroad - avoid crowd intelligence," 2020/2021.
- Carter Duncan, Alexander Kennedy, Andrew Wang, Jack Cunningham - "Urban planning optimization via 'Cities: Skylines'," Senior Design Conference Session Winner, 2020/2021.

- Zachary Bellay, Payton Bradsky, Glen Chandler, Brandon Craig - "Edge-to-fog computing for color-assisted moving object detection," Senior Design Conference Session Winner, 2018/2019.
- James Olivas, Haobo Zhang - "Machine learning solution to organ-at-risk segmentation in radiotherapy planning," 2018/2019.

PhD Thesis Committee:
- Mareeta Mathai
- Michael Schimpf
- Bingxin Hou
- Eyor Alemayehu
- Suthee Chaidaroon

Master Thesis Reader:
- Rachael Brooks
- Licheng Xiao
- Yifei Pei
- Yuan Wang
- Glen Chandler

Honors Contract Class Instructor:
- Drew Ligman, COEN 140, Spring 2021

Senior Honor Thesis Reader:
- Nam Tran, Philip Cori, June 2020
- Payton Bradsky, June 2019

Professional Activities

Associate Editor:
- IEEE Transactions on Circuits and Systems for Video Technology, Jan. 2022 - Dec. 2023.

Professional Association Services:
- Secretary/Treasurer, Asia-Pacific Signal and Information Processing Association (APSIPA), US Local Chapter, Jan. 2023 - Present.

Panelist:
- NSF Graduate Research Fellowship Program (GRFP), 2020.

Conference/Workshop Organizing Committee:
- Moderator and one of the organizers, "Visual Coding for Machines", Panel Discussion, The Asia-Pacific Signal and Information Processing Association (APSIPA), Mar. 2023.
- Organizing Committee Member, the First IEEE Workshop on Coding for Machines, in conjunction with IEEE ICME 2023, Jul. 10, 2023, Brisbane, Australia.
- Publicity Chair, Picture Coding Symposium, Dec. San Jose, CA, 2022.
- Workshop Co-Chair, The 1st International Workshop on Edge, Fog, and Cloud Computing for the Internet of Things (EFIOT), in conjunction with the 16th EAI International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services, Houston, TX, Nov. 2019.

Conference/Workshop Session Chair/Co-Chair:

- Session Chair, the 56-th IEEE International Symposium on Circuits and Systems (ISCAS), Monterey, CA, May 21 - May 25, 2023.
- Poster Session Chair, IEEE Int. Symp. Circuits and Systems, Daegu, Korea, May 2021.

Technical Program Committee Member:

- IEEE-CAS Visual Signal Processing and Communications (VSPC), Jan. 2021 - present.
- IEEE Int. Conf. Visual Commun. Image Process. (VCIP), 2022.
- Area Chair/Meta-reviewer, IEEE Conf. Visual Commun. and Image Process. (VCIP), Munich, Germany, Dec. 2021.
- The 23rd IEEE Int. Symp. Multimedia, Naples, Italy, Dec. 2021.
- The 22nd IEEE Int. Symp. Multimedia, Naples, Italy, Dec. 2020.
- The 5th IEEE Int. Conf. Multimedia Big Data, Singapore, Singapore, Sept. 2019.
- The 21st IEEE Int. Symp. Multimedia, San Diego, CA, Dec. 2019.
- The 20th IEEE Int. Symp. Multimedia, Taichung, Taiwan, Dec. 2018.
- The 19th IEEE Int. Symp. Multimedia, Taichung, Taiwan, Dec. 2017.
- IEEE Int. Conf. Multimedia Big Data, Taipei, Taiwan, Apr. 2016.
- IEEE Int. Conf. Cyber-enabled Distributed Computing and Knowledge Discovery, Chengdu, China, Oct., 2016.
- IEEE Int. Conf. Open Source Systems & Technologies, Lahore, Pakistan, Dec. 2016.
- The 6th Int. Conf. on Ambient Systems, Networks and Tech (ANT2015), June 2015, London, United Kingdom.

Reviewer:

- IEEE Access
- IEEE Sensors Journal
- Neurocomputing
- IEEE Transactions on Multimedia
- IEEE Transactions on Computational Imaging
- IEEE Transactions on Signal Processing
- IEEE Transactions on Circuits and Systems of Video Technology
- IEEE Transactions on Neural Networks and Learning Systems
- IEEE Open Journal of Circuits and Systems
- APSIPA Trans. Signal and Information Process
- Security and Communication Networks
- SPIE Journal of Electronic Imaging
- Springer Journal of Signal, Image and Video Processing
- Elsevier Journal of Visual Communication and Image Representation
- Elsevier International Journal of Electronics and Communications
- Journal of Circuits, Systems, and Computers
- MDPI Sensors
- IEEE International Workshop on Machine Learning for Signal Processing, 2019
- Asia-Pacific Signal and Information Processing Association Annual Summit and Conference, 2019

- IEEE International Conference on Communications, 2016
- IEEE International Conference on Multimedia Big Data, BigMM2016
- IEEE Sensor Array and Multichannel Signal Processing Workshop, 2018
- IEEE International Conference on Cyber-enabled Distributed Computing and Knowledge Discovery, 2016
- The 15th International Conference on Algorithms and Architectures for Parallel Processing, 2015

Member of Societies:

- Member of the Asia-Pacific Signal and Information Processing Association (APSIPA)
- Member of the Institute of Electrical and Electronics Engineers (IEEE)
- Member of the International Society for Optics and Photonics (SPIE)
- Member of the IEEE Circuits and Systems Society
- Member of the IEEE Signal Processing Society
- Member of the IEEE Communications Society
- Member of the IEEE Computer Society

Santa Clara University Services

School of Engineering:

- Lecturer, Spring Engineering Education Days (SEEDs), April 2022
- Lecturer, Summer Engineering Seminar, July 2021
- Graduate Fellowship Committee, Jan. 2021
- Research Showcase Judge, 2020, 2023

Department:

- Senior Project Coordinator, Winter 2021, Winter 2023
- Faculty Search Committee, 2019/2020
- PhD Prelim Exam Proctor, 10/10/2020

Awards and Honors

- Certificate of Recognition (for influential work to support student career development and success at Santa Clara University in the 2018-2019 school year), Career Center, Santa Clara University, 2019.
- Blavatnik Regional Awards for Young Scientists Nominee, 2017.
- First Place of "Three-Minute Presentation", Annual Postdoctoral Research Symposium, The State University of New York at Buffalo, June 2016.
- Best Paper Selection: "Two-stage tensor locality-preserving projection face recognition," in *Proc. IEEE Int. Conf. Multimedia Big Data (IEEE BigMM)*, Taipei, Taiwan, April 2016, by Ying Liu, D. A. Pados, and Chia-Hung Yeh.
- Excellent Undergraduate Dissertation, Beijing University of Posts and Telecommunications (BUPT), June 2006.
- Excellent Summer Intern Paper, Beijing University of Posts and Telecommunications (BUPT), 2005.