

Songyao Jiang

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EDUCATION

- Northeastern University** Boston, MA
Ph.D. in Computer Engineering 06/2016 – 05/2022
• Concentration: Computer Vision and Pattern Recognition, Machine Learning.
- University of Michigan** Ann Arbor, MI
Master of Science in Electrical Engineering: Systems 09/2013 – 05/2015
• Coursework: Linear Algebra, Machine Learning, Image Processing, Embedded System Programming, *etc.*
- Hong Kong Polytechnic University** Hong Kong
Bachelor of Engineering in Electrical Engineering, 09/2009 – 06/2013
• Coursework: Programming, Computer Architecture, Operating Systems, Analog and Digital Circuits, *etc.*
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RESEARCH INTERESTS

Computer Vision: Human Face and Gesture Analysis, Video Classifications, Human Detection and Pose Estimation, Generative Models, Skeleton-base Action Recognition, Sign Language Recognition.

EXPERIENCE

- Amazon.com, Inc.** Cambridge, MA
Applied Scientist at Lab126 06/2022 – present
• Worked on computer vision and machine learning in Amazon Devices AI team.
- Northeastern University** Boston, MA
Graduate Research Assistant in SMILE Lab 06/2016 – 05/2022
• Advisor: Prof. Yun (Raymond) Fu
• Research topics: computer vision: pose estimation, sign language recognition, generative models, *etc.*
- Graduate Research Assistant in Power Electronics Research Group** 09/2015 – 06/2016
• Advisor: Prof. Bradley Lehman
• Research topic: machine learning based photovoltaic power prediction.
- AInnovation Labs, Inc.** Boston, MA
Founding Member and Computer Vision Engineer Intern. 02/2022 – 05/2022
• Developed key machine learning algorithms in the core products, including real-time AI color calibration system, virtual makeup addon, removal and recommendation system, and face detection and alignment system.
- Giaran, Inc. (acquired by Shiseido Americas)** Boston, MA
Founding Member and Computer Vision Engineer Intern. 01/2017 – 09/2017
• Developed key machine learning algorithms in the core products, including real-time AI color calibration system, virtual makeup addon, removal and recommendation system, and face detection and alignment system.
• Our startup was then [acquired by Shiseido Americas](#).
- Teld New Energy** Qingdao, Shandong, China
Research Engineer in Electric Vehicle Research Team 05/2015 – 08/2015
• Research topic: grouped smart mass charging system for electric vehicles (EV).
• Developed a smart charging algorithm for massively grouped EV charging based on SVM and dynamic programming to mitigated charging load and surge on power system, optimized the use of renewable energy.
- Nagoya University** Nagoya, Aichi, Japan
Research Assistant in Suzuoki Lab 05/2014 – 08/2014
• Advisor: Prof. Takeyoshi Kato
• Research topic: mathematical modelling of renewable energy.

CHALLENGES

CVPR 2021 Challenge on Agriculture-Vision Pattern Recognition 04/2021 – 06/2021

- Team leader and first contributor. Ranked the 4th place in supervised track. [[GitHub](#)][[Leaderboard](#)]
- Developed a multi-modal and self-constructing GCN for multi-label agricultural pattern recognition given RGB and infra-red aerial agriculture images.

CVPR 2021 Challenge on Signer-Independent Isolated Sign Language Recognition 12/2020 – 04/2021

- Team leader and first contributor. **1st place winner** in both RGB and RGB+D tracks. [[GitHub](#)][[Leaderboard](#)]
 - Proposed a novel spatio-temporal GCN with attention mechanism to learn dynamics in whole-body skeleton graph as well as fusing with RGB, optical flow and depth HHA video modalities via a unified skeleton-aware multi-modal framework to recognize sign language glosses from input RGB+D videos.
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PUBLICATIONS

- B. Sun, Y. Zhang, **S. Jiang**, and Y. Fu, “Hybrid Pixel-Unshuffled Network for Lightweight Image Super-Resolution,” *AAAI*, 2023. [[Preprint](#)][[GitHub](#)][[Demo](#)]
 - **S. Jiang**, B. Sun, L. Wang, Y. Bai, K. Li, and Y. Fu, “Sign Language Recognition via Skeleton-aware Multi-modal Ensemble,” *Under Review*, 2022. [[Preprint](#)][[GitHub](#)]
 - **S. Jiang**, B. Sun, L. Wang, Y. Bai, K. Li, and Y. Fu, “Skeleton Aware Multi-modal Sign Language Recognition,” in *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops*, 2021. [[Paper](#)][[GitHub](#)]
 - **S. Jiang**, Z. Tao, and Y. Fu, “Geometrically Editable Face Image Translation with Adversarial Networks,” *IEEE Transactions on Image Processing (TIP)*, vol. 30, pp. 2771-2783, 2021. [[Paper](#)]
 - **S. Jiang**, H. Liu, Y. Wu, and Y. Fu, “Spatially Constrained GAN for Face and Fashion Synthesis,” in *16th IEEE International Conference on Automatic Face & Gesture Recognition (FG)*, 2021. [[Paper](#)][[GitHub](#)][[Award](#)][[Web](#)]
 - Y. Yin, J. P. Robinson, **S. Jiang**, and Y. Fu, “SuperFront: From Low-resolution to High-resolution Frontal Face Synthesis,” in *Proceedings of ACM Multimedia (ACMMM)*, 2021. [[Paper](#)][[GitHub](#)]
 - Y. Yin, **S. Jiang**, J. P. Robinson, and Y. Fu, “Dual-attention GAN for Large-pose Face Frontalization,” in *15th IEEE International Conference on Automatic Face & Gesture Recognition (FG)*, 2020. [[Paper](#)][[GitHub](#)]
 - S. Sarkar, W. Kang, **S. Jiang**, K. Li, S. Ray, E. Luther, A. R. Ivanov, Y. Fu, and T. Konry, “Machine Learning-aided Quantification of Antibody-based Cancer Immunotherapy by Natural Killer Cells in Microfluidic Droplets,” *Lab on a Chip*, 20(13), pp. 2317-2327, 2020. [[Paper](#)]
 - Z. Hong, T. Sun, **S. Jiang**, K. Li, Y. Fu, H. Xu, J. Zhang, Y. Liu, Q. Ye, and H. Cang, “Harnessing Deep Learning to Overcome Photo-toxicity for Live-cell Imaging,” *Under Review*, 2020.
 - **S. Jiang**, Z. Tao, and Y. Fu, “Segmentation Guided Image-to-Image Translation with Adversarial Networks,” in *14th IEEE International Conference on Automatic Face & Gesture Recognition (FG)*, 2019. [[Paper](#)][[GitHub](#)]
 - T. Alashkar, **S. Jiang**, and Y. Fu, “Rule-Based Facial Makeup Recommendation System,” in *12th IEEE International Conference on Automatic Face & Gesture Recognition (FG)*, 2017. [[Paper](#)]
 - T. Alashkar, **S. Jiang**, S. Wang, and Y. Fu, “Examples-Rules Guided Deep Neural Network for Makeup Recommendation,” in *Proceedings of AAAI Conference on Artificial Intelligence (AAAI)*, 2017. [[Paper](#)]
 - **S. Jiang** and T. Kato, “Dynamic Modelling of Combined Cycle Power Plant for Load Frequency Control with Large Penetration of Renewable Energy,” in *7th JUACEP Workshop*. 2014.
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OTHER PROJECTS

Light-weight and Video-based Multi-person 2D Pose Estimation with Tracking 02/2020 – 12/2020

- Developed a novel model that utilizes temporal information of human body movement between adjacent video frames via a temporal-aware deep neural network. Refined the pose estimation results in real-time scenarios and handled difficult occlusion cases.
- Compressed parameter size and reduced computational cost by replacing normal CNNs with our proposed novel low-rank pointwise residual modules.
- Improved performance by introducing a multi-scale heatmap fusion and supervision module.
- Collected and labeled yoga data to improve the performance of extreme poses during exercises. [[Example](#)]
- Deployed on mobile devices using CoreML (iOS) and TensorFlow Lite (Android). [[Demo](#)]
- Won [GapFund360 Award](#) and filed two patent applications (Status: Published). [[Patent1](#)][[Patent2](#)]

Face Recognition and Verification in Low-light Condition Using Transfer Learning 05/2019 – 11/2019

- In low-light condition, we utilized mid-range and long-range infra-red (IR) wavelengths to obtain the portrait images of the target persons for face recognition and verification.
- Developed a semi-supervised metric learning method and an unsupervised adversarial method to transfer the knowledge from visible spectrum to IR spectrum.
- Achieved much higher recognition rates (domain adaptation setting) and verification rate (transfer learning).

Single-Image Robust Automatic White Balance Under Mixed Light 09/2016 – 01/2017

- Developed a mixed-light automatic white balance algorithm using iterative neutral color pixels voting scheme and chromatic analysis as additional constraints and solve least square using matting Laplacian matrix.
- Estimated faithful skin color under mixed light with guidance from facial landmarks for neutral color voting.
- Deployed using OpenCV/native C++ and also on Universal Windows Platform (UWP) apps using C#. [[Report](#)]

Facial Attributes Classification, Makeup Recommendation and Addon Systems 02/2016 – 08/2016

- Collected a facial attribute and makeup dataset (e.g., skin color, face, and eye shapes). Developed a facial attribute classification system using pretrained deep features and multi-class SVM.
- The predicted classes of facial attributes were then used to recommend makeup styles for users using a learned knowledge-based system learned from YouTube makeup videos. A makeup add-on system is developed to virtually visualize the recommended makeup.
- Awarded [NSF I-Corps Grant](#). Used in our startup company “Giaran, Inc.” [[Patent](#)]

Machine-Learning Based Snow Effect and Photovoltaic Power Output Prediction 12/2015 – 03/2016

- Predicted the snow effects on photovoltaic (PV) power output during winter when PV panels experienced snowfalls. A fully-connected neural regression and clustering model was trained on historical weather and power data of solar farms to predict the snow effect on the PV power output.

PATENTS

- Y. Fu, **S. Jiang**, “Segmentation Guided Image Generation with Adversarial Networks,”
Granted. *US Patent 10,825,219*. [[Patent](#)]
- Y. Fu, **S. Jiang**, B. Sun, “Light-Weight Pose Estimation Network with Multi-Scale Heatmap Fusion,”
Published. *US Patent App. No.: 62/976,099*. *WIPO Patent App. No.: WO/2021/163103*. [[Patent](#)]
- Y. Fu, **S. Jiang**, “Video 2D Multi-person Pose Estimation using Multi-frame Refinement and Optimization,”
Published. *WIPO Patent App. No.: WO 2020/232069*. [[Patent](#)]
- Y. Fu, S. Wang, S. Lee, **S. Jiang**, B. Sun, H. Mao, K. H. E. Cheung “Systems and Methods for Virtual Facial Makeup Removal and Simulation, Fast Facial Detection and Landmark Tracking, Reduction in Input Video Lag and ... ,”
Published. *US Patent App. No: 16/584,310*. [[Patent](#)]

ACADEMIC SERVICE

Conference PC Member and Reviewer

- International Conference on Computer Vision (ICCV)
- International Joint Conferences on Artificial Intelligence (IJCAI)
- IEEE International Conference on Automatic Face & Gesture Recognition (FG)
- IEEE International Conference on Data Mining (ICDM)
- IEEE International Conference on Multimedia Information Processing and Retrieval (MIPR)

Journal Reviewer

- IEEE Transactions on Image Processing (TIP)
- IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
- Journal of Visual Communication and Image Representation (JVCI)
- The Vision Computer (TVCJ)
- IET Image Processing
- Journal of Electronic Imaging (JEI)

Workshop Reviewer

- IEEE International Workshop on Analysis and Modeling of Faces and Gestures Workshops (AMFG)

HONORS & AWARDS

- NVIDIA CCS Best Student Paper Award 2021
 - Champion of the CVPR 2021 Challenge on Sign Language Recognition (both RGB & RGBD tracks) 2021
 - 4th Rank in CVPR 2021 Challenge on Agriculture-Vision (supervised track) 2021
 - PhD Network Travel Grant, Northeastern University, USA 2019
 - GapFund360 Award, Northeastern University, USA 2018
 - NSF I-Corps Grant, National Science Foundation 2016
 - JASSO Scholarship, Nagoya University, Japan 2014
 - Outstanding Scholarship, Hong Kong Polytechnic University 2010, 2011, 2012, 2013
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SKILLS

- Languages:** English (full professional),
Chinese (native),
Cantonese, Japanese (basic).
- Deep Learning Frameworks:** PyTorch (proficient),
TensorFlow, CoreML (good knowledge).
- Programming Languages:** Python, C/C++, C#, Java, HTML, JavaScript.
- Others:** OpenCV, MATLAB, AWS E2 S3, Google Colab, Slurm, UWP, Git, etc.