Samuel Chun Pong Lau

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Google Scholar   ORCID

Employment

City University of Hong Kong, Hong Kong	*2023 – present*

- o Assistant Professor, School of Data Science

Johns Hopkins University, Baltimore, MD 21218, USA	*2022 – 2023*

- o Postdoctoral Fellow, Mathematical Institute for Data Science
- o Sponsoring Faculty: Prof. Rama Chellappa

Education

Johns Hopkins University	**USA**
Ph.D. in Computer Science	*2020-2021*

- o Affiliation: Artificial Intelligence for Engineering and Medicine Lab, Mathematical Institute for Data Science
- o Advisor: Prof. Rama Chellappa
- o Thesis: **Robust Machine Learning In Computer Vision**

University of Maryland, College Park	**USA**
M.S. in Applied Mathematics and Scientific Computation	*2018-2020*

- o Affiliation: University of Maryland Institute for Advanced Computer Studies
- o Advisor: Prof. Rama Chellappa

The Chinese University of Hong Kong	**Hong Kong**
M.Phil. in Mathematics	*2016-2018*

- o Advisor: Prof. Ronald Lok Ming Lui
- o Thesis: **Deformation Processing for Image Restoration and Retargeting**

The Chinese University of Hong Kong	**Hong Kong**
B.Sc. in Mathematics, Second Class Honors Upper Division	*2012-2016*

- o Streams: Enrichment Stream in Mathematics, Computational and Applied Mathematics Stream

Research Interests

Atmospheric Turbulence Mitigation, Biometric Recognition at Long Range, Adversarial Machine Learning, Generative Model, Scientific Computing

Research Experience

MINDS Postdoctoral Fellow at Johns Hopkins University	*2022.1 – present*

- o Advisor: Prof. Rama Chellappa
- o Collaboration with: Prof. Alan Yuille, Prof. Vishal Patel
- o Project: IARPA Biometric Recognition And Identification At Altitude And Range (BRIAR)

- *Atmospheric Turbulence Restoration*
- *Face Detection, Alignment and Recognition at Range and Altitude*
- *Body and Gait Recognitions at Recognition at Range and Altitude*

Research Assistant at Johns Hopkins University   *2020.8 – 2021.12*
- Advisor: Prof. Rama Chellappa
- Collaboration with: Prof. Soheil Feizi
- Project: DARPA Guaranteeing AI Robustness Against Deception (GARD)
  - *On-manifold Adversarial Training with Exact Manifold Information using Normalizing Flow*
  - *Robust Object Detection*
  - *Identification of Attack-Specific Signatures in Adversarial Examples*
  - *Robust Interpolated On-Manifold Adversarial Training*
  - *Transferability of Robustness in Mutual Learning*
  - *Foundation Research on On-Manifold Adversarial Robustness*

Research Assistant at University of Maryland, College Park   *2018.12 - 2020.8*
- Advisor: Prof. Rama Chellappa
- Collaboration with: Prof. Carlos Castillo
- Project: IARPA JANUS
  - *Single Face Restoration at Long Range*
  - *Single Face Semantic-Aware Restoration and Recognition at Long Range*
  - *Semi-Supervised Facial Landmark Localization and Restoration at Long Range*
  - *Extends to BRIAR project*

Research Assistant at The Chinese University of Hong Kong   *2016.8 - 2018.8*
- Advisor: Prof. Ronald Lok Ming Lui
- Project: Mathematical Models for Deformation Analysis and Their Applications
  - *Restoration of Atmospheric Turbulence-Distorted Images via RPCA and Quasiconformal Maps*
  - *Real-Time Turbulence-Degraded Images Restoration in a Variational Framework*
  - *Data-Driven Turbulence-Degraded Images Restoration*

Research Internship at The Chinese University of Hong Kong   *2015.9 - 2016.7*
- Advisor: Prof. Ronald Lok Ming Lui
- Conducted research in Convolutional Neural Network with applications to computer vision
- Conducted research in Quasi-conformal Geometry with applications to motion frames interpolation

Book Chapter

[1] **CP Lau**, J Liu, WA Lin, H Souri, P Khorramshahi, R Chellappa, Adversarial Attacks and Robust Defenses in Deep Learning. *Handbook of Statistics: Deep Learning, North Holland.* (2022).
[2] **CP Lau** and R Chellappa, Remote Face Recognition. *Encyclopedia of Cryptography, Security and Privacy*, Springer. (2021).

Selected Publications and Preprints

Submitted

- **CP Lau**, J Liu, R Chellappa, Attribute Guided Encryption with Facial Texture Masking: Dual Manifold Adversarial Attack on Face Recognition. Under review
- J Liu[1], **CP Lau**[1], R Chellappa, DiffProtect: Generate Adversarial Examples with Diffusion Models for Facial Privacy Protection. Under review
- M Suin, N Nair, **CP Lau**, R Chellappa, Diffuse and Recognise: A Region-Adaptive Diffusion Model for Identity-Preserving Blind Face Restoration. Under review
- S Huang, **CP Lau**, R Chellappa, Whole-body Detection Recognition and Identification at Altitude and Range. Under review
- Y Guo, C Peng, S Huang, R Prabhakar, **CP Lau**, R Chellappa, GADER: GAit DEtection and Recognition in the Wild. Under review
- Z Wang, Y Guo, S Huang, C Peng, R Prabhakar, **CP Lau**, R Chellappa, HyperGait: A Video-based Multitask Network for Gait Recognition and Human Attribute Estimation at an Extremely Long Distance. Under review
- Z Wang, J Liu, L Qi, **CP Lau**, R Chellappa, MMT-Gait: A Multi-Modality Gait Recognition Framework with a 4D Transformer. Under review
- H Souri[1], P Khorramshahi[1], **CP Lau**, M Goldblum, R Chellappa, Identification of Attack-Specific Signatures in Adversarial Examples. Under review

Published/Accepted

[16] **CP Lau**, M Suin, R Chellappa, ATDetect: Face Detection and Keypoint Extraction at Range and Altitude. IEEE International Joint Conference on Biometrics. (2023)

[15] **CP Lau**, J Liu, H Souri, WA Lin, S Feizi, R Chellappa, Interpolated Joint Space Adversarial Training for Robust and Generalizable Defenses. *IEEE Transactions on Pattern Analysis and Machine Intelligence* (**TPAMI**). (2023)

[14] K Shah, A Shah, **CP Lau,** C Melo, R Chellappa, Multi-View Action Recognition using Contrastive Learning. *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*. (2023)

[13] Y Guo, C Peng, **CP Lau**, R Chellappa, Multi-Modal Human Authentication Using Silhouettes, Gait and RGB. *IEEE International Conference and Workshops on Automatic Face and Gesture Recognition*. (2023)

[12] J Liu, **CP Lau**, H Souri, S Feizi, R Chellappa, Mutual Adversarial Training: Learning together is better than going alone. *IEEE Transactions on Information Forensics & Security* (**TIFS**). (2022)

[11] J Liu, A Levine, **CP Lau**, R Chellappa, S Feizi, Segment and Complete: Defending Object Detectors against Adversarial Patch Attacks with Robust Patch Detection. Conference on Computer Vision and Pattern Recognition (**CVPR**). (2022)

[10] PH MA, **CP Lau**, N Yu, A Li, JP Sheng, Application of Deep Learning for Image-based Chinese Food Nutrients Estimation. *Food Chemistry*. (2021)

[9] **CP Lau**, C Castillo, R Chellappa, ATFaceGAN: Single Face Semantic Aware Image Restoration and Recognition from Atmospheric Turbulence. *IEEE Transactions on Biometrics, Behavior, and Identity Science* (**TBIOM**). (2021)

[8] PH MA, **CP Lau**, N Yu, A Li, JP Sheng, Q Wang, P Liu, Image-based Nutrient Estimation for Chinese Dishes Using Deep Learning, *Food Research International* (2021)

[7] **CP Lau**, A Kumar, R Chellappa, AT-Key: Semi-Supervised Landmarks Guided Restoration of Atmospheric Turbulent Images, *IEEE Journal of Selected Topics in Signal Processing* (**JSTSP**).(2021)

[6] WA Lin[1], **CP Lau**[1], A Levine, R Chellappa, S Feizi, Dual Manifold Adversarial Robustness: Defense against Lp and non-Lp Adversarial Attacks, *Conference on Neural Information Processing Systems (NeurIPS)* (2020)

[5] WH Chak, **CP Lau**, LM Lui, Subsampled Turbulence Removal Network. *Journal on Mathematics, Computation and Geometry of Data* (2020)

[4] **CP Lau**, H Souri, R Chellappa, ATFaceGAN: Single Face Image Restoration and Recognition from Atmospheric Turbulence. *IEEE International Conference and Workshops on Automatic Face and Gesture Recognition* (2020) (**Oral**) (**Honorable Mention Award**)

[3] **CP Lau**, YH Lai, LM Lui, Restoration of Atmospheric Turbulence-distorted Images via RPCA and Quasiconformal Maps. *Inverse Problem* (2019).

[2] **CP Lau**, YH Lai, LM Lui, Variational models for joint subsampling and reconstruction of turbulence-degraded images. *Journal of Scientific Computing*, 1-38 (2018).

[1] **CP Lau**, CP Yung, LM Lui, Image retargeting via Beltrami representation. *IEEE Transactions on Image Processing* (**TIP**), 27(12), 5787-5801 (2018).

Selected Awards

IEEE International Conference and Workshops on Automatic Face and Gesture Recognition	**USA**
○ *Best Paper (Honorable Mention Award)*	*2020*
NeurIPS 2020	**USA**
○ *Travel Award*	*2020*
University of Maryland, College Park	**USA**
○ *Dean's Fellowship*	*2018-2020*
2017 Imaging Science Camp, VISSA	**Shenzhen, China**
○ *Presidential Prize for Best Presentation by Prof. Tony F. Chan*	*2017*
The Chinese University of Hong Kong	**Hong Kong**
○ *Postgraduate Studentship*	*2016-2018*

Talks

1. Face Recognition Workshop London 2023, March 13-14, 2023, London
    Title: Facial Privacy Protection with Attribute Guidance and Texture Masking

2. NeurIPS 2020, December 6-12, 2020, Virtual
    Title: Dual Manifold Adversarial Robustness: Defense against Lp and non-Lp Adversarial Attacks (**Link**)

3. 15th IEEE International Conference on Automatic Face and Gesture Recognition (FG), November16-20, 2020, Virtual
    Title: ATFaceGAN: Single Face Image Restoration and Recognition from Atmospheric Turbulence (**Link**)

4. SIAM Conference on Imaging Science (IS18), June 5-8, 2018, Bologna, Italy

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[1] First two authors contributed equally

Title: Variational Models for Joint Subsampling and Reconstruction of Turbulence-degraded Images

5. (Invited talk) The International Conference on Image Processing: Theory, Method and Applications (ICIPTMA), May 19-21, 2017, Heilongjiang, China
    Title: Restoration of Atmospheric Turbulence-distorted images via RPCA and Quasiconformal Maps

6. 2017 Imaging Science Camp, March 10-12, 2017, Shenzhen, China
    Title: Restoration of Atmospheric Turbulence-distorted images via RPCA and Quasiconformal Maps

Professional Service

Journal Reviewer
- *IEEE Transactions on Neural Networks and Learning Systems*
- *IEEE Transactions on Pattern Analysis and Machine Intelligence*
- *IEEE Transactions on Image Processing*
- *IEEE Transactions on Multimedia*
- *IEEE Transactions on Computational Imaging*
- *IEEE Transactions on Information Forensics and Security*

Conference Reviewer
- *AAAI Conference on Artificial Intelligence*
- *Conference on Computer Vision and Pattern Recognition (CVPR)*
- *European Conference on Computer Vision (ECCV)*
- *International Conference on Computer Vision (ICCV)*
- *The Conference and Workshop on Neural Information Processing Systems (NeurIPS)*
- *International Conference on Machine Learning (ICML)*
- *Winter Conference on Applications of Computer Vision (WACV).*

Teaching Experience

School of Data Science, City University of Hong Kong
- *Instructor*   *2023-present*
  - SDSC 6011 Optimization for Data Science. Fall 2023

Department of Electrical and Computer Engineering, Johns Hopkins University
- *Teaching Assistant, Guest Lecturer*   *2020-2021*
  - EN.520.665 Machine Perception. Fall 2021
  - EN.520.650 Machine Intelligence. Spring 2021
  - EN.520.665 Machine Perception. Fall 2020

Department of Mathematics, University of Maryland, College Park
- *Teaching Assistant*   *2018-2019*
  - MATH120 Elementary Calculus I. Spring 2019
  - MATH141 Calculus II. Fall 2018

Department of Mathematics, The Chinese University of Hong Kong

- *Teaching Assistant*   *2016-2018*
  - MATH4250 Game Theory. Spring 2018
  - MATH3360 Mathematical Imaging. Fall 2017.
  - MATH4250 Game Theory. Spring 2017.
  - MATH3360 Mathematical Imaging. Fall 2016.

Mentoring Experience

- **Jiang Liu, (PhD student)**, *Johns Hopkins University*   *2020-present*
- **Zhaoyang Wang, (PhD student)**, *Johns Hopkins University*   *2021-present*
- **Yuxiang Guo, (PhD student)**, *Johns Hopkins University*   *2021-present*
- **Siyuan Huang, (PhD student)**, *Johns Hopkins University*   *2022-present*

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