# QIAO GU

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## EDUCATION

**University of Toronto (U of T)** — Toronto, Canada
*Ph.D.* in **Computer Science** — 09/2021-present
*GPA*: **4.0** / 4.0

**Carnegie Mellon University (CMU)** — Pittsburgh, U.S.
*M.S.* in **Robotics** — 08/2019-08/2021
*GPA:* **4.24** / 4.33

**Hong Kong University of Science and Technology (HKUST)** — Hong Kong
*B. Eng* in **Electronic Engineering** and **Computer Science** — 09/2015-06/2019
*GPA:* **4.15** / 4.30

## RESEARCH INTERESTS

3D Computer Vision, Robot Learning, Lifelong Learning, Detection and Pose Estimation

## PUBLICATIONS

- **Preserving Linear Separability in Continual Learning by Backward Feature Projection**
  **Qiao Gu**, Dongsub Shim, Florian Shkurti.
  Under Review

- **OSSID: Online Self-supervised Instance Detection by (and for) Pose Estimation**
  **Qiao Gu**, Brian Okorn, David Held.
  Robotics and Automation Letter (RA-L) *and* International Conference on Robotics and Automation (ICRA'2022) Paper GitHub

- **ZePHyR: Zero-shot Pose Hypothesis Rating**
  Brian Okorn[*], **Qiao Gu**[*], Martial Hebert, David Held. ([*]equal contribution)
  International Conference on Robotics and Automation (ICRA'2021) Paper GitHub

- **Deep Video Matting via Spatio-Temporal Alignment and Aggregation**
  Yanan Sun, Guanzhi Wang[*], **Qiao Gu**[*], Chi-Keung Tang, Yu-Wing Tai. ([*]equal contribution)
  Conference on Computer Vision and Pattern Recognition (CVPR'2021) Paper

- **iQUANT: Interactive Quantitative Investment Using Sparse Regression Factors**
  Xuanwu Yue, **Qiao Gu**, Deyun Wang, Huamin Qu, Yong Wang.
  EG Conference on Visualization (EuroVis'2021) Paper

- **LADN: Local Adversarial Disentangling Network for Facial Makeup and De-Makeup**
  **Qiao Gu**[*], Guanzhi Wang[*], Mang Tik Chiu, Yu-Wing Tai, Chi-Keung Tang. ([*]equal contribution)
  International Conference on Computer Vision (ICCV'2019) Paper GitHub

- **Characterizing Fluid Response and Sepsis Progression in Emergency Department Patients**
  **Qiao Gu**, Varesh Prasad, Thomas Heldt.
  International Engineering in Medicine and Biology Conference (EMBC'2019) Paper

- **PreserVis, a Visual Analytic System for Traffic and Pollution Patterns**
  **Qiao Gu**, Hang Yin, Lian Chen, Haotian Li, Chengzhong Liu, Xuanwu Yue, Huamin Qu.
  IEEE Conference on Visual Analytics Science and Technology (VAST'2017) Paper

## RESEARCH EXPERIENCE

**University of Toronto** — 09/2021-Present
*Supervisor: Prof. Florian Shkurti*

***Continual Learning on Image Classification***

- Integrated neural network fusion with continual learning to improve image classification.
- Designed dataset condensation method to improve experience replay for continual learning.
- Proposed backward feature projection and regularization to reduce catastrophic forgetting.

**Carnegie Mellon University** 10/2019-08/2021

*Supervisor: Prof. David Held and Prof. Martial Hebert*

***Online Self-supervised Instance Detection***

- Developed a zero-shot instance detector based on template matching, trained over a large synthetic dataset.
- Developed an online self-supervised pipeline to improve detection results using our zero-shot pose estimator.
- Achieved state-of-the-art results on instance detection and zero-shot pose estimation on two challenging datasets.

***Zero-shot Pose Hypothesis Rating***

- Implemented a pipeline to estimate 6D object pose using a single matched pair of oriented SIFT features.
- Designed a deep object pose scoring network to aggregate simple point-wise errors into a robust fitness score.
- Improved the performance over the baseline surface matching method, achieved state-of-the-art among zero-shot object pose estimators, and demonstrated generalization ability to lab-captured data.

**Hong Kong University of Science and Technology** 05/2018-08/2019

*Supervisors: Prof. Chi-Keung Tang and Prof. Yu-Wing Tai*

***Deep Video Matting***

- Collected a large-scale video matting dataset with ground truth alpha mattes for training deep networks.
- Designed a deep neural network to aggregate image features both spatially and temporally across video frames, significantly outperforming the deep image matting and other video matting methods.

***Deep Learning for Facial Makeup and De-Makeup***

- Designed and developed the Local Adversarial Disentangling Network to remove cosmetic makeup of an after-makeup face and transfer the makeup style to another before-makeup face while preserving identity.
- Incorporated multiple overlapping local discriminators and asymmetric losses in the network to improve the quality of the generated image and achieved extreme/dramatic makeup transfer at a state-of-the-art level.
- Collected a high-quality dataset of unpaired images of human faces before and after makeup.

## WORK EXPERIENCE

**Tencent Youtu Lab** 12/2018-02/2019

*Research and Development Intern* Shenzhen, Guangdong, China

- Developed a CNN-based facial landmark detection system running on mobile platforms.
- Implemented a cascaded regression model for face alignment and reduced the Normalized Mean Error by 20%.

## ACADEMIC SERVICES

- Reviewed for RA-L, NeurIPS, CVPR, ICLR, ICCV, ICRA, IROS, ECCV and WACV.
- Co-organizing the Toronto AI in Robotics Seminar.

## AWARDS & HONORS

- Ontario Graduate Scholarships 2022-2023
- HKUST Academic Achievement Medal (**Top 1%**) 2019
- HKSAR Government Scholarships 2017-2019
- Dean's List 2015-2019
- Second Runner-up, Mr. Armin and Mrs. Lillian Kitchell Undergraduate Research Award 2018
- High Fashion Charitable Foundation Exchange Scholarships 2017/2018
- HKSAR Government Scholarship Fund - Reaching Out Award 2017/2018
- HKSAR Government Scholarship Fund - Talent Development Scholarship 2017/2018

## TEACHING

- Teaching Assistant for CSC384: Intro to Artificial Intelligence, Fall 2022, U of T
- Teaching Assistant for CSC384: Intro to Artificial Intelligence, Winter 2022, U of T
- Teaching Assistant for CSC110: Foundations of Computer Science I, Fall 2021, U of T