

Ryan Szeto

Senior Computer Vision Engineer, SafelyYou




Areas of Expertise

Computer vision, deep learning, video inpainting, generative video models

Programming

Python	●●●●
PyTorch	●●●●
Bash	●●●●○
OpenCV	●●●●○
Slurm	●●●●○
Docker	●●●○
TensorFlow	●●●○

Web

	ryanszeto.com
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Education

University of Michigan

Ph.D. in Computer Science and Engineering

Ann Arbor, MI

Sep 2015 – Aug 2021

M.S. in Computer Science and Engineering

Sep 2015 – Aug 2017

Dissertation: *Enforcing Realism and Temporal Consistency for Large-Scale Video Inpainting*

Advisors: Prof. Jason J. Corso, Prof. Honglak Lee

University of Massachusetts

Amherst, MA

B.S. in Computer Science

Sep 2011 – May 2015

B.S. in Mathematics

Sep 2011 – May 2015

Research and Industrial Experience

Senior Computer Vision Engineer

Remote

SafelyYou, Inc.

May 2022 – present

- *Fall Detection*. Develop machine learning models to detect falls from cameras installed in dementia care facilities.

Software Engineering Contractor for Toyota Research Institute

Cambridge, MA

HireArt

Jan 2022 – Mar 2022

- *Driving Simulation Research*. Wrote scenarios for the open-source driving simulator CARLA. Collaborated with research scientists to design experiments for collecting meaningful data in simulation.

Graduate Student Research Assistant

Ann Arbor, MI

Vision and Robotics Lab, University of Michigan

Sep 2015 – Aug 2021

Advisors: Prof. Jason J. Corso, Prof. Honglak Lee

- *Video Inpainting Benchmark*. Developed a benchmark to diagnose important failure modes of video inpainting methods at a large scale. Videos and occlusion masks were collected and stratified by certain attributes of their content, and inpainting models were evaluated by visual quality based on realism, temporal consistency, and reconstruction performance measures. The benchmark provides a valuable tool for quickly identifying failure cases and improving video inpainting models.
- *Video Frame Inpainting*. Proposed a deep learning solution to video frame inpainting composed of a bidirectional prediction module and a temporally-aware frame blending module. It produces more accurate and qualitatively satisfying results than prior techniques in video inpainting, frame interpolation, and video prediction.
- *Viewpoint Estimation with Human Guidance*. Click-Here CNN estimates the location of the camera relative to an object by using a 2D image and the location of a semantic keypoint on the image, provided by a human, as guidance. Experiments revealed that keypoint information can help models obtain better viewpoint estimates than those that only use information from the image.

Assistant Engineer, Machine Learning Intern

Samsung Semiconductor, Inc.

Mentor: Dr. Mostafa El-Khamy

San Diego, CA

May 2019 – Aug 2019

- *Hyperconsistency for Video-to-Video Translation Tasks.* Developed the hyperconsistency (HyperCon) algorithm to reduce flickering artifacts from applying image processing to video frames independently. It identifies consistencies in high frame rate space and propagates them into the post-processed result. HyperCon reduces flickering more reliably than prior video consistency work for tasks as disparate as video inpainting and style transfer.

Research Intern

Toyota Research Institute

Mentor: Dr. Simon Stent

Cambridge, MA

Jun 2017 – Sep 2017

- *Evaluating the Generality of Video Prediction Models.* Investigated the robustness of existing video prediction models to unseen objects and rates of motion. Experiments revealed that video prediction models generally fail to adapt to the novel appearances and motion parameters of objects observed in the input frames.

Software Engineering Intern

IBM

Littleton, MA

May 2015 – Aug 2015

- *IBM Guardium.* Designed and implemented an interface to manage permissions through an access manager, and reduced page load times by 80% by consolidating remote database queries.

Undergraduate Research Assistant

RIPPLES Lab, University of Massachusetts

Advisors: Prof. Rick Adrion, Prof. Paul Dickson

Amherst, MA

Jan 2013 – May 2015

- *Presentations Automatically Organized from Lectures.* Implemented a portable lecture capture system that processes video feeds of the lecturer, the whiteboard, and the computer screen in real-time.
- *Honors Thesis: Whiteboard Marker Detection.* Proposed a real-time whiteboard marker segmentation algorithm that generates marker stroke candidates by connecting components from a Difference-of-Gaussians edge detector, then filtering them with a sparse stroke detector.

Software Engineering Intern

The MathWorks, Inc.

Natick, MA

May 2014 – August 2014

- *MATLAB Online.* Improved the Variable Editor by writing QUnit tests and implementing cut/copy/paste functionality.

Undergraduate Research Assistant

Center for e-Design, University of Massachusetts

Advisors: Prof. Jack Wileden, Prof. Sundar Krishnamurthy

Amherst, MA

Jan 2012 – Dec 2012

- *Computer-Aided Design (CAD) Data Exchange.* Developed a system that translated CAD part files between PTC Creo and SolidWorks while preserving dimensions and constraints by following a translation protocol inspired by programming language theory.

Selected Publications

Ryan Szeto and Jason J. Corso. "The DEVIL is in the Details: A Diagnostic Evaluation Benchmark for Video Inpainting." *IEEE/CVF Conference on Computer Vision and Pattern Recognition*, 2022.

Ryan Szeto. "Enforcing Realism and Temporal Consistency for Large-Scale Video Inpainting." *University of Michigan Ph.D. Dissertation*, 2021.

Ryan Szeto, Mostafa El-Khamy, Jungwon Lee, and Jason J. Corso. "HyperCon: Image-To-Video Model Transfer for Video-To-Video Translation Tasks." *IEEE Winter Conference on Applications of Computer Vision*, 2021.

Ryan Szeto, Ximeng Sun, Kunyi Lu, and Jason J. Corso. "A Temporally-Aware Interpolation Network for Video Frame Inpainting." *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2020.

Ximeng Sun*, Ryan Szeto*, and Jason J. Corso. "A Temporally-Aware Interpolation Network for Video Frame Inpainting." *Asian Conference on Computer Vision*, 2018.

Ryan Szeto, Simon Stent, German Ros, and Jason J. Corso. "A Dataset To Evaluate The Representations Learned By Video Prediction Models." *International Conference on Learning Representations (Workshop Track)*, 2018.

Ryan Szeto and Jason J. Corso. "Click Here: Human-Localized Keypoints as Guidance for Viewpoint Estimation." *IEEE International Conference on Computer Vision*, 2017.

Paul E. Dickson, Chris Kondrat, **Ryan B. Szeto**, W. Richards Adrion, Tung T. Pham, and Tim D. Richards. "Portable Lecture Capture That Captures the Complete Lecture." *IEEE International Symposium on Multimedia*, 2015.

Ellysha Raelen Recto, Brendan Murphy, **Ryan Szeto**, and Tung Pham. "PAOL and Lecture-Viewer." *ASEE Zone 1 Conference*, 2014.

Teaching Experience

Graduate Student Instructor for EECS 542: Advanced Topics in Computer Vision <i>University of Michigan, Department of Electrical Engineering and Computer Science</i>	Sep 2020 – Dec 2020
Grader for CMPSCI 670: Graduate Computer Vision <i>University of Massachusetts, School of Computer Science</i>	Sep 2014 – Dec 2014
Grader for CMPSCI 220: Programming Methodology <i>University of Massachusetts, School of Computer Science</i>	Jan 2012 – Dec 2012

Awards and Distinctions

NSF Graduate Research Fellowship – Honorable Mention <i>National Science Foundation</i>	2017
Outstanding Achievement in Artificial Intelligence Award <i>UMass School of Computer Science</i>	2015
Honors Dean's Award for Outstanding Honors Thesis <i>UMass Commonwealth Honors College</i>	2015
Honors Research Grant – \$1000 <i>UMass Commonwealth Honors College</i>	2014
Phi Beta Kappa <i>Phi Beta Kappa</i>	2014
Research Assistant Fellowship – \$500 <i>UMass Commonwealth Honors College</i>	2013
Cisco Award for Outstanding Achievement <i>UMass School of Computer Science</i>	2012

Academic Service

Student reviewer for IEEE Winter Conference on Applications of Computer Vision (WACV)	2020
Student reviewer for Signal Processing Letters (SPL)	2020
Student reviewer for International Conference on Machine Learning (ICML)	2018
Student reviewer for IEEE Conference on Computer Vision and Pattern Recognition (CVPR)	2018
Student reviewer for Robotics and Autonomous Systems (RAS)	2017
Student reviewer for IEEE International Conference on Robotics and Automation (ICRA)	2016

Mentorship Experience

Lumiere Education	Jun 2021 – Sep 2021
<ul style="list-style-type: none"><i>Recyclable Object Classification and Detection.</i> Mentored an international high school student on an independent research project for identifying and localizing recyclable items in photographs with state-of-the-art deep neural networks.	
Vision and Robotics Lab, University of Michigan	Jun 2016 – Aug 2016
<ul style="list-style-type: none"><i>Vehicle Crash Analysis.</i> Mentored three U-M undergraduate students by helping them conduct summer-long projects related to object tracking, annotation collection, and physical simulations, as well as prepare written progress reports and oral presentations to their project sponsors.	