

Rey Reza Wiyatno

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RESEARCH INTERESTS

- **Robotic Learning:** semantic visual navigation, learning from interaction, meta-continual learning, learning-based control
- **Robotic Vision:** real world adversarial examples for robotics, object pose estimation, and object tracking

RESEARCH EXPERIENCE

M.Sc. Candidate (supervised by [Prof. Liam Paull](#))

Sep 2019-Present

Robotics and Embodied AI Lab at Mila/University of Montreal, Montréal QC

- Research in robotics and machine learning, particularly in semantic visual navigation for mobile robots

Research Intern (supervised by [Dr. Anqi Xu](#))

Jan 2018-Present

Element AI, Montréal QC

- Developed and prepared multiple visual anomaly detection demos (applied research)
- Conducted research on the applications of adversarial examples in robotics (fundamental research)
- Implemented deep learning based autonomous drone tracking software with ROS
- Investigated state of the art adversarial attack and defense methods in machine learning

Research Assistant (supervised by [Prof. Jeff Orchard](#))

Sep 2017-Dec 2017

Neurocognitive Computing Lab at the University of Waterloo, Waterloo ON

- Researched various biologically inspired learning algorithms for neural networks

PUBLICATIONS

Refereed Conference Publications

- Physical Adversarial Textures That Fool Visual Object Tracking. [Rey Wiyatno](#) and Anqi Xu, in *International Conference on Computer Vision (ICCV'19)*, 8 pages, 2019, arXiv:1904.11042.
- Maximal Jacobian-based Saliency Map Attack. [Rey Wiyatno](#) and Anqi Xu, in *Montréal Artificial Intelligence Symposium (MAIS'18)*, 5 pages, 2018, arXiv:1808.07945.
- Style Memory: Making a Classifier Network Generative. [Rey Wiyatno](#) and Jeff Orchard, in *IEEE International Conference on Cognitive Informatics and Cognitive Computing (ICCI*CC'18)*, 6 pages, 2018, arXiv:1803.01900.

Manuscripts in Preparation

- Adversarial Examples in Modern Machine Learning: A Review. [Rey Wiyatno](#), Anqi Xu, Ousmane Dia, and Archy de Berker, *work in progress*, 89 pages.

Non-refereed Scientific Articles

- Physical Adversarial Textures That Fool Visual Object Tracking. [Rey Wiyatno](#), in *Element AI Lab Blog*, 2019.
- Securing Machine Learning Models Against Adversarial Attacks. [Rey Wiyatno](#), in *Element AI Lab Blog*, 2019.
- Tricking a Machine into Thinking You're Milla Jovovich. [Rey Wiyatno](#), in *Element AI Lab Blog*, 2018.

PRESENTATIONS

- Guest Lecture (CS489/698 - Neural Networks): Adversarial Examples for Neural Networks Mar 2019
David R. Cheriton School of Computer Science at the University of Waterloo, Waterloo ON
- Science Talk: Adversarial Examples in Machine Learning Dec 2018
Neurocognitive Computing Lab at the University of Waterloo, Waterloo ON
- Science Talk: Physical Adversarial Examples for Drone Tracking Aug 2018
Mobile Robotics Lab at McGill University, Montréal QC
- Conference Talk: Style Memory - Making a Classifier Network Generative Jul 2018
IEEE International Conference on Cognitive Informatics and Cognitive Computing 2018, Berkeley CA
- Guest Lecture (CS489/698 - Neural Networks): Long Short-Term Memory Mar 2018
David R. Cheriton School of Computer Science at the University of Waterloo, Waterloo ON

ROBOTICS AND MACHINE LEARNING KNOWLEDGE

- **Machine Learning:** CNN, RNN, LSTM, autoencoders, GAN, adversarial domain adaptation, adversarial attacks, adversarial defenses, semantic visual navigation, explainability, meta learning, reinforcement learning (basics)
- **Robotic Vision:** object detection, object tracking, image segmentation, object pose estimation, human pose estimation, camera relocalization, classical vision algorithms (e.g., edge detectors, Hough transform, optical flow, etc.), stereo geometry
- **Control Theory:** proportional-integral-derivative (PID) controller, controller/plant discretization, controller emulation, pole placement designs, state-space models, direct design of digital controller, system identification

EDUCATION

M.Sc., Computer Science

Advisor: Prof. Liam Paull

Mila & University of Montreal

Started in Fall 2019

B.ASc., Honours, Mechatronics Engineering, Co-operative Program

Graduation Awards: Dean's Honours List, With Distinction

University of Waterloo

Class of 2019

APPLIED PROJECTS PLEASE VISIT [0RRWIYATN.GITHUB.IO](https://github.com/0RRWIYATN) FOR MORE DETAILS

Visual Anomaly Detection

May 2019-Jun 2019

- Integrated systems to perform learning-based visual anomaly detection with the team at Element AI
- Demoed live at the International Conference on Robotics and Automation (ICRA'19)

Intelligent Manufacturing Visual Inspection Tool

Oct 2018-Feb 2019

- Designed and built a low-cost solution for high quality visual inspection tool that incorporates an enclosure, a four degrees-of-freedom robot arm, and a camera attached at the end effector of the arm, with Mask R-CNN (He et al., 2017) as the defect detector
- Winner of Autodesk Canada Capstone Design Award 2019

Autonomous Drone Tracking

Jul 2018

- Implemented object detection and tracking models which include Single Shot Multibox Detector (Liu et al., 2015), GOTURN (Held et al., 2016), and SiamFC (Bertinetto et al., 2016)
- Developed autonomous drone tracker software with exponential filter and PID controller using ROS

Deep Learning Papers Reproducibility

Jun 2017-May 2018

- Implemented and evaluated Expectation Over Transformation (Athalye et al., 2018), Adversarial Transformation Networks (Baluja et al., 2017), Photo Image Synthesis with Cascaded Refinement Networks (Chen et al., 2017), Adversarial Eyeglasses (Sharif et al., 2016), The One Hundred Layers Tiramisu (Jégou et al., 2016), Generative Adversarial Nets (GAN) (Goodfellow et al., 2014), DCGAN (Radford et al., 2015), WGAN (Arjovsky et al., 2017), Super Resolution with Perceptual Losses (Johnson et al., 2016), Neural Style Transfer (Gatys et al., 2015), Fast Gradient Sign Method (Goodfellow et al., 2014), and DenseNet (Huang et al., 2016)

Auto Photo Enhancing and Dehazing

Jul 2017

- Experimented and trained neural networks for image enhancing and dehazing using L_2 loss in feature space as perceptual similarity objective on MIT-Adobe FiveK and NYU Dehazing datasets

Suitcase Robot

Aug 2015

- Designed and built a RaspberryPi-powered person-following suitcase using color-based tracking

SKILLS

- **Software Tools:** Python, C++, Lua, Keras, TensorFlow, ROS, Gazebo, MoveIt, NumPy, SciPy, OpenCV, Scikit-Learn, Arduino, Processing, Docker, Flask, MATLAB, Linux, LabVIEW, \LaTeX
- **Hardware Tools:** Autodesk Inventor, OpenSCAD, SolidWorks, ANSYS AIM, Eagle, Altium Designer, LTSpice
- **Firmware/Electrical:** Microcontrollers & SoC (e.g., Arduino, RaspberryPi, NVIDIA Jetson, etc.), Wi-Fi microcontrollers, circuits design, PCB layout, electronics troubleshooting, SMD soldering, rework
- **Mechanical:** CAD, product design, design for manufacturing, design for assembly, finite element analysis, injection molding, rapid prototyping, additive manufacturing, laser cutting

INDUSTRIAL EXPERIENCE

Backend and Deep Learning Engineer

May 2017-Aug 2017

Canon Innovation Lab, Waterloo ON

- Designed and implemented backend and algorithms using Docker, Flask, OpenCV, Keras, and TensorFlow for various photography and printing services prototypes

Mechatronics Engineer

May 2016-Dec 2016

OpenROV, Berkeley CA

- Designed the mechanical, electrical, and software of an underwater drone external payload
- Conducted rapid prototype and tested various parts of Trident ROV for production purpose

Computer Vision, Human Machine Interface, and Test Engineer

May 2015-Aug 2015 & Jan 2016-Apr 2016

Flex (formerly Flextronics) - Automotive Division, Toronto ON

- Designed and evaluated various computer vision algorithms for advanced driving assistance systems
- Characterized and tested various cameras and other optical sensors

GRANTS, FUNDINGS, AND AWARDS

Tuition Fee Exemption Scholarships for International Students

Sep 2019-Sep 2020

University of Montréal, total amount of \$22,315.59 per year

Undergraduate Graduation Award: Dean's Honours List, With Distinction

Jun 2019

University of Waterloo

Autodesk Canada Capstone Design Award

Mar 2019

University of Waterloo & Autodesk Canada, total amount of \$5,000