

2022 19th Conference on Robots and Vision (CRV 2022)

**Toronto, Ontario, Canada
31 May – 2 June 2022**



**IEEE Catalog Number: CFP22347-POD
ISBN: 978-1-6654-9775-6**

**Copyright © 2022 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP22347-POD
ISBN (Print-On-Demand):	978-1-6654-9775-6
ISBN (Online):	978-1-6654-9774-9

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

2022 19th Conference on Robots and Vision (CRV) **CRV 2022**

Table of Contents

Welcome Message	ix
Conference Organization	x
Program Committee	xi
Sponsors	xiii

Oral Session 1: 3D Vision

A Simple Method to Boost Human Pose Estimation Accuracy by Correcting the Joint Regressor for the Human3.6m Dataset	1
<i>Eric Hedlin (University of British Columbia, Canada), Helge Rhodin (University of British Columbia, Canada), and Kwang Moo Yi (University of British Columbia, Canada)</i>	
Instance Segmentation of Herring and Salmon Schools in Acoustic Echograms using a Hybrid U-Net	8
<i>Alex L. Slonimer (University of Victoria, Canada; ASL Environmental Sciences, Canada), Melissa Cote (University of Victoria, Canada), Tunai Porto Marques (University of Victoria, Canada), Alireza Rezoanifar (University of Victoria, Canada), Stan E. Dosso (University of Victoria, Canada), Alexandra Branzan Albu (University of Victoria, Canada), Kaan Ersahin (ASL Environmental Sciences, Canada), Todd Mudge (ASL Environmental Sciences, Canada), and Stephane Gauthier (Fisheries and Oceans, Canada)</i>	
Supervised Contrastive Learning for Detecting Anomalous Driving Behaviours from Multimodal Videos	16
<i>Shehroz S. Khan (KITE – Toronto Rehabilitation Institute, University Health Network, Canada; University of Toronto, Canada), Ziting Shen (University of Toronto, Canada), Haoying Sun (University of Toronto, Canada), Ax Patel (University of Toronto, Canada), and Ali Abedi (KITE – Toronto Rehabilitation Institute, University Health Network, Canada)</i>	

Oral Session 2: Planning and Control

ROS-X-Habitat: Bridging the ROS Ecosystem with Embodied AI	24
<i>Guanxiong Chen (The University of British Columbia, Canada), Haoyu Yang (The University of British Columbia, Canada), and Ian M. Mitchell (The University of British Columbia, Canada)</i>	

Temporal Convolutions for Multi-Step Quadrotor Motion Prediction	32
<i>Samuel Looper (University of Toronto, Canada) and Steven L. Waslander (University of Toronto, Canada)</i>	

Poster Session 1

Multiple Classifiers Based Adversarial Training for Unsupervised Domain Adaptation	40
<i>Yiju Yang (University of Kansas, USA), Taejoon Kim (University of Kansas, USA), and Guanghui Wang (Ryerson University, Canada)</i>	
Semi-Supervised Grounding Alignment for Multi-Modal Feature Learning	48
<i>Shih-Han Chou (University of British Columbia, Canada; Vector Institute for AI, Canada), Zicong Fan (ETH Zürich, Switzerland), James J. Little (University of British Columbia, Canada), and Leonid Sigal (University of British Columbia, Canada; Vector Institute for AI, Canada; Canada CIFAR AI Chair)</i>	
The GIST and RIST of Iterative Self-Training for Semi-Supervised Segmentation	58
<i>Eu Wern Teh (University of Guelph, Canada; Vector Institute; ModiFace Inc., Canada), Terrance DeVries (University of Guelph, Canada; Vector Institute), Brendan Duke (ModiFace Inc., Canada; University of Toronto), Ruowei Jiang (ModiFace Inc., Canada), Parham Aarabi (ModiFace Inc., Canada; University of Toronto), and Graham W. Taylor (University of Guelph, Canada; Vector Institute)</i>	
A View Invariant Human Action Recognition System for Noisy Inputs	67
<i>Joo Wang Kim (Escuela Superior Politecnica del Litoral, Ecuador), Jefferson Hernandez (Escuela Superior Politecnica del Litoral, Ecuador), Richard Cobos (Escuela Superior Politecnica del Litoral, Ecuador), Ricardo Palacios (Escuela Superior Politecnica del Litoral, Ecuador), and Andres G. Abad (Escuela Superior Politecnica del Litoral, Ecuador)</i>	
Adaptive Memory Management for Video Object Segmentation	75
<i>Ali Pourganjalikhan (Concordia University, Canada) and Charalambos Poullis (Concordia University, Canada)</i>	
M2A: Motion Aware Attention for Accurate Video Action Recognition	83
<i>Brennan Gebotys (University of Waterloo, Canada), Alexander Wong (University of Waterloo, Canada), and David A. Clausi (University of Waterloo, Canada)</i>	
Object Class Aware Video Anomaly Detection Through Image Translation	90
<i>Mohammad Baradaran (Laval University, Canada) and Robert Bergevin (Laval University, Canada)</i>	
Integrating High-Resolution Tactile Sensing into Grasp Stability Prediction	98
<i>Lachlan Chumbley (Monash University, Australia), Morris Gu (Monash University, Australia), Rhys Newbury (Monash University, Australia), Jurgen Leitner (LYRO Robotics, Australia), and Akansel Cosgun (Monash University, Australia)</i>	
The Lasso Method for Multi-Robot Foraging	106
<i>Andrew Vardy (Memorial University of Newfoundland, Canada)</i>	

Oral Session 3: Learning-based Planning and Perception

Inter- & Intra-City Image Geolocalization	114
<i>Joshua B. Tanner (Carleton University, Canada), Kevin Dick (Carleton University, Canada), and James R. Green (Carleton University, Canada)</i>	
A Permutation Model for the Self-Supervised Stereo Matching Problem	122
<i>Pierre-André Brousseau (Université de Montréal, Canada) and Sébastien Roy (Université de Montréal, Canada)</i>	
Occlusion-Aware Self-Supervised Stereo Matching with Confidence Guided Raw Disparity Fusion	132
<i>Xiule Fan (University of Waterloo, Canada), Soo Jeon (University of Waterloo, Canada), and Baris Fidan (University of Waterloo, Canada)</i>	

Oral Session 4: Text Recognition

Occluded Text Detection and Recognition in the Wild	140
<i>Zobeir Raisi (University of Waterloo, Canada) and John Zelek (University of Waterloo, Canada)</i>	
Classification of Handwritten Annotations in Mixed-Media Documents	151
<i>Amanda Dash (University of Victoria, Canada) and Alexandra Branzan Albu (University of Victoria, Canada)</i>	

Poster Session 2

Understanding the Impact of Image and Input Resolution on Deep Digital Pathology Patch Classifiers	159
<i>Eu Wern Teh (University of Guelph, Canada) and Graham W. Taylor (University of Guelph, Canada)</i>	
Attention Based Occlusion Removal for Hybrid Telepresence Systems	167
<i>Surabhi Gupta (IIIT Hyderabad, India), Ashwath Shetty (IIIT Hyderabad, India), and Avinash Sharma (IIIT Hyderabad, India)</i>	
Improving Tracking with a Tracklet Associator	175
<i>Rémi Nahon (Polytechnique Montréal, Canada), Guillaume-Alexandre Bilodeau (Polytechnique Montréal, Canada), and Gilles Pesant (Polytechnique Montréal, Canada)</i>	
Anomaly Detection with Adversarially Learned Perturbations of Latent Space	183
<i>Vahid Reza Khazaie (University of Western Ontario, Canada), Anthony Wong (University of Western Ontario, Canada), John Taylor Jewell (University of Western Ontario, Canada), and Yalda Mohsenzadeh (University of Western Ontario, Canada)</i>	
An Exact Fast Fourier Method for Morphological Dilation and Erosion using the Umbra Technique	190
<i>Vivek Sridhar (Brandenburg Technical University, Germany) and Michael Breuß (Brandenburg Technical University, Germany)</i>	

Monocular Robot Navigation with Self-Supervised Pretrained Vision Transformers	197
<i>Miguel Saavedra-Ruiz (Université de Montréal, Canada), Sacha Morin (Université de Montréal, Canada), and Liam Paull (Université de Montréal, Canada)</i>	
TemporalNet: Real-time 2D-3D Video Object Detection	205
<i>Meihong Chen (University of Ottawa, Canada) and Jochen Lang (University of Ottawa, Canada)</i>	
Safe Landing Zones Detection for UAVs using Deep Regression	213
<i>Sakineh Abdollahzadeh (Université du Québec en Outaouais, Canada), Pier-Luc Proulx (Université du Québec en Outaouais, Canada), Mohand Said Allili (Université du Québec en Outaouais, Canada), and Jean-François Lapointe (National Research Council Canada, Canada)</i>	
CellDefectNet: A Machine-Designed Attention Condenser Network for Electroluminescence-Based Photovoltaic Cell Defect Inspection	219
<i>Carol Xu (DarwinAI, Canada), Mahmoud Famouri (Darwin AI, Canada), Gautam Bathla (DarwinAI, Canada), Saejith Nair (University of Waterloo, Canada), Mohammad Javad Shafiee (University of Waterloo, Canada), and Alexander Wong (University of Waterloo, Canada)</i>	
 Oral Session 5: Reasoning in 3D	
Learned Intrinsic Auto-Calibration from Fundamental Matrices	224
<i>Karim Samaha (American University of Beirut, Lebanon), Georges Younes (University of Waterloo, Canada), Daniel Asmar (American University of Beirut, Lebanon), and John Zelek (University of Waterloo, Canada)</i>	
3DVQA: Visual Question Answering for 3D Environments	233
<i>Yasaman Etesam (Simon Fraser University, Canada), Leon Kochiev (Simon Fraser University, Canada), and Angel X. Chang (Simon Fraser University, Canada)</i>	
 Author Index	 241