



VIKRAM VOLETI


PhD candidate at Mila; former Research Intern at  Google,  Unity,  Meta ; 4+ years of work experience

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RESEARCH	Deep learning for image, video, 3D: expert at machine learning research and development; experienced in leading multiple projects collaborating with international partners in industry and academia. Projects include: • Score-based denoising diffusion models for video [1], deriving non-isotropic covariance [2] • Image generation using normalizing flows [4][9]; video generation using Neural ODEs [14], GANs [16][17] • 3D human pose estimation and inverse kinematics [3], 3D object generation using NeRFs, diffusion • Contributed to projects on 4D generation, simulation [10], fairness/uncertainty [5][12], federated learning [6]
EDUCATION	<div><div> Mila, University of Montreal, Canada</div><div>Sep 2018 - present (Aug 2023)</div><div>PhD in Computer Science — <i>Supervisor:</i> Prof. Christopher Pal</div><div>(A) 4.0 / 4.3</div></div> <div><div> Indian Institute of Technology (IIT), Kharagpur, India</div><div>2009 - 2014</div><div>Dual Degree (B.Tech. (Honours) + M.Tech.) in Electrical Engineering with Master's specialization in Instrumentation and Signal Processing</div><div>8.44 / 10</div></div>
RESEARCH INTERNSHIPS DURING PHD	<div><div> Meta (formerly Facebook), Menlo Park, USA</div><div>Aug-Dec 2022</div><div><i>Team:</i> AI for Metaverse (AI4RL); <i>Supervisors:</i> Dr. Yashar Mehdad, Dr. Barlas Oguz</div><div>• Research and development of solutions for text to 3D object generation using diffusion models, NeRF</div><div>• Led project in collaboration with international teams, applied research to virtual reality product</div></div> <div><div> Unity Technologies, Montreal, Canada (MITACS Research Intern)</div><div>Oct 2021 - Aug 2022</div><div><i>Team:</i> Deep Pose, Unity Labs; <i>Supervisor:</i> Dr. Boris Oreshkin</div><div>• 3D human pose estimation and inverse kinematics from videos, published at SIGGRAPH Asia [3]</div><div>• Led project on AI-assisted animation workflows, contributed to product pipeline with code, demos</div></div> <div><div> Google, Mountain View, USA</div><div>Sep-Dec 2019</div><div><i>Team:</i> Google AI Perception; <i>Supervisors:</i> Dr. Bryan Seybold, Dr. Sourish Chaudhuri</div><div>• Research on multimodal semi-supervised Active Speaker Detection in videos</div></div>
WORK EXPERIENCE	<div><div>IIIT Hyderabad, India — Research Fellow; <i>Supervisor:</i> Prof. C. V. Jawahar</div><div>May 2017 - Aug 2018</div><div>• Synthesized educational videos in regional Indian languages by generating lips from audio</div><div>• Developed automated pipeline to create large-scale audio-video dataset</div><div>• Full paper published at ICASSP 2019 [16], short paper published at CVPR 2018 Workshop [17]</div></div> <div><div>GreyOrange Robotics, Gurgaon, India — Image Processing Engineer</div><div>Feb 2016 - May 2017</div><div>• Developed computer vision solutions for robotic applications in real time for warehouse automation</div><div>• Solely responsible for development and testing of code, video processing module, camera drivers, server</div></div> <div><div>Airbus, Bengaluru, India — Associate Engineer</div><div>Jul 2014 - Feb 2016</div><div>• Avionics software development and integration following standard avionics coding guidelines (DO-178B)</div><div>• Simulated signal-level modifications to the Flight Warning Computer, contributed to the full coding V-cycle</div></div>
OTHER PROFESSIONAL EXPERIENCE	<div><div>Blue Lion Labs, Canada — AI Advisor</div><div>Oct 2020 - present</div><div>• Provide technical guidance and mentorship to startup on the design and development of AI/ML systems</div></div> <div><div>NextAI, Canada — AI Scientist-in-Residence</div><div>Apr-Sep 2019, Mar-Sep 2020</div><div>• Provided scientific and technical support to start-ups selected in yearly co-hort of NextAI accelerator</div></div> <div><div>IVADO/Mila Deep Learning School, Montreal, Canada — Teaching Assistant</div><div>Sep 2019</div></div> <div><div>Playment, Bengaluru, India — Computer Vision Consultant</div><div>Jan-Jun 2018</div><div>• Provided technical guidance to early-stage startup on semantic segmentation models for autonomous driving</div></div> <div><div>TalentSprint, Hyderabad, India — Mentor, Foundations of AI & ML (inaugural program)</div><div>Jan-May 2018</div><div>• Designed and delivered tutorials on machine learning, and provided mentorship to industry professionals</div></div>
AWARDS	<div>Outstanding Reviewer at CVPR 2021</div> <div>May 2021</div> <div>Microsoft Diversity Award for Doctoral Research, \$6,000</div> <div>Dec 2020</div> <div>MITACS Accelerate Research Internship, \$30,000</div> <div>Oct 2020</div> <div>University of Montreal entrance scholarship, \$37,000</div> <div>Sep 2018</div> <div>IIIT Hyderabad merit scholarship for summer school, \$1,000</div> <div>Jul 2017</div>

SERVICE	Organizer — ICCV 2021 - Differentiable 3D Vision and Graphics workshop OWCV 2021 (Canadian Computer Vision workshop), Canada GRAPHQUON 2020 (Canadian Computer Graphics workshop), Canada Reviewer — Journal on Computer Vision and Image Understanding, CVPR 2022, ACML 2021, NeurIPS 2021, ICCV 2021, CVPR 2021 (<i>Outstanding Reviewer</i>), ICLR 2020, NeurIPS 2020, ICML 2020, NeurIPS 2019, CCAI @ ICLR 2020, CCAI @ NeurIPS 2019, LLD @ ICLR 2019	Feb-Oct 2021 Feb-Apr 2021 Oct-Dec 2020
PAST RESEARCH INTERNSHIPS	KU Leuven , Belgium — <i>Supervisor</i> : Prof. Ingrid Verbauwhede, ESAT • Designed arithmetic operations using Carry-Free Logic, simulated circuits in Xilinx IIT Kharagpur , India — <i>Supervisor</i> : Prof. Aurobinda Routray, Electrical Engineering • Made a gesture recognition program in MATLAB using Hidden Markov Models Imperial College , UK — <i>Supervisor</i> : Prof. Peter Cheung, Electrical & Electronics • Measured the relative power consumption among the LookUp Tables (LUTs) of an FPGA	Summer 2013 Summer 2012 Summer 2011
RESEARCH PAPERS (SELECT)	[1] “MCVD: Masked Conditional Video Diffusion for Prediction, Generation, and Interpolation”, V. Voleti , A. Jolicoeur-Martineau, C. Pal - <i>NeurIPS 2022</i> [arXiv] [2] “Score-based Denoising Diffusion with Non-Isotropic Gaussian Noise Models”, V. Voleti , C. Pal, A. Oberman - <i>NeurIPS 2022 Workshop</i> [arXiv] [3] “SMPL-IK: Learned Morphology-Aware Inverse Kinematics for AI Driven Artistic Workflows”, V. Voleti , B. N. Oreshkin, F. Bocquet, F. G. Harvey, L. Ménard, C. Pal - <i>SIGGRAPH Asia 2022</i> [arXiv] [4] “Multi-Resolution Continuous Normalizing Flows”, V. Voleti , C. Finlay, A. Oberman, C. Pal - <i>Submitted to a journal</i> [arXiv] [5] “FairCal : Fairness Calibration for Face Verification”, T. Salvador, S. Cairns, V. Voleti , N. Marshall, A. Oberman - <i>ICLR 2022</i> [arXiv] [6] “Plankton-FL: Exploration of Federated Learning for Privacy-Preserving Training of Deep Neural Networks for Phytoplankton Classification”, D. Zhang, V. Voleti , A. Wong, J. Deglint - <i>CVIS 2022 (Oral)</i> [7] “Generative Models of Brain Dynamics”, M. Ramezani-Panahi, G. Abrevaya, JC. Gagnon-Audet, V. Voleti , I. Rish, G. Dumas - <i>Frontiers in Artificial Intelligence (journal)</i> [arXiv] [8] “Towards Generating Large Synthetic Phytoplankton Datasets for Efficient Monitoring of Harmful Algal Blooms”, N. Bamra, V. Voleti , A. Wong, J. Deglint - <i>FSS at AAAI 2022</i> [arXiv] [9] “Improving Continuous Normalizing Flows using a Multi-Resolution Framework”, V. Voleti , C. Finlay, A. Oberman, C. Pal - <i>ICML 2021 Workshop</i> [10] “gradSim: Differentiable simulation for system identification and visuomotor control”, K. M. Jatavallabhula, M. Macklin, F. Golemo, V. Voleti , L. Petrini, M. Weiss, B. Considine, J. Parent-Lévesque, K. Xie, K. Erleben, L. Paull, F. Shkurti, D. Nowrouzezahrai, S. Fidler - <i>ICLR 2021</i> [arXiv] [11] “Accounting for Variance in Machine Learning Benchmarks”, X. Bouthillier, P. Delaunay, M. Bronzi, A. Trofimov, B. Nichyporuk, J. Szeto, N. Sepah, E. Raff, K. Madan, V. Voleti , S. E. Kahou, V. Michalski, D. Serdyuk, T. Arbel, C. Pal, G. Varoquaux, P. Vincent - <i>MLSys 2021</i> [arXiv] [12] “Frustratingly Easy Uncertainty Estimation for Distribution Shift”, T. Salvador, V. Voleti , A. Iannantuono, A. Oberman - <i>Preprint</i> [arXiv] [13] “Learning to Combine Top-Down and Bottom-Up Signals in RNNs with Attention over Modules”, S. Mittal, A. Lamb, A. Goyal, V. Voleti , M. Shanahan, G. Lajoie, M. Mozer, Y. Bengio - <i>ICML 2020</i> [arXiv] [14] “Simple Video Generation using Neural ODEs”, V. Voleti , D. Kanaa, S. E. Kahou, C. Pal - <i>NeurIPS 2019 Workshop</i> [arXiv] [15] “Comparing Normalization in Conditional Computation Tasks”, V. Michalski, V. Voleti , S. E. Kahou, A. Oritz, P. Vincent, C. Pal, D. Precup - <i>ICML 2019 Workshop</i> [arXiv] [16] “Cross-Language Speech Dependent Lip-Synchronization”, V. Voleti , A. Jha, V. P. Namboodiri, C. V. Jawahar - <i>ICASSP 2019</i> [pdf] [17] “Lip-Synchronization for Dubbed Instructional Videos”, V. Voleti , A. Jha, V. P. Namboodiri, C. V. Jawahar - <i>CVPR 2018 Workshop (FIVER)</i> [pdf] [18] “A Multimodal Approach for Image De-fencing and Depth Inpainting”, S. Jonna, V. Voleti , R. R. Sahay, and M. S. Kankanhalli - <i>ICAPR 2015</i> [pdf , IEEE]	

TALKS	<ul style="list-style-type: none"> • “MCVD: Masked Conditional Video Diffusion” — NeurIPS 2022, New Orleans, USA [slides] <i>Dec 2022</i> • “SMPL-IK: Learned Morphology-Aware Inverse Kinematics for AI Driven Artistic Workflows” — SIGGRAPH Asia, Diagu, South Korea [slides, video] <i>Dec 2022</i> • “Normalizing flows” — Learning Representations (course), University of Montreal, Canada <i>Nov 2022</i> • “Score-based Denoising Diffusion Models - a tutorial” — Mila, Canada [slides, video] <i>Sep 2022</i> • “Solving Video Tasks using Denoising Diffusion Models” — Samsung Toronto, Canada [slides] <i>Aug 2022</i> • “MCVD: Masked Conditional Video Diffusion” — Mila, Canada <i>May 2022</i> • “Denoising Diffusion GANs” — Mila, Canada [slides] <i>Feb 2022</i> • “Training GANs by Solving ODEs” — Mila, Canada [slides] <i>Apr 2021</i> • “Score-based Generative Models with SDEs” — Mila, Canada [slides] <i>Feb 2021</i> • “Continuous Normalizing Flows” — Mila, Canada [slides] <i>Sep 2020</i> • “GANs: the story so far” — Summer Symposium on AI Research, India [slides, video] <i>Jul 2020</i> • “A brief tutorial on Neural ODEs” — Mila, Canada [slides, video] <i>Jul 2020</i> • “Mathematics of Neural ODEs” — University of Guelph, Canada [slides] <i>Apr 2020</i> • “Simple Video Generation using Neural ODEs” — IIIT Hyderabad, India [slides] <i>Jan 2020</i> • Tutorial on “GANs” — AI for Social Good Summer Lab, Montreal <i>May 2019</i> • “BigGAN” — Mila, University of Montreal, Canada [slides] <i>Oct 2018</i> • “Image de-fencing using RGB-D data” — MPI Informatics, Saarbrücken, Germany [slides] <i>Feb 2018</i> • “Intuition behind LSTMs” — IIIT Hyderabad, India [slides] <i>Feb 2018</i> • Tutorial on “Back-propagation” — IIIT-Hyderabad, India [slides] <i>Aug 2017</i> • “Mathematics of back-propagation” — GreyOrange Robotics, India [slides] <i>Feb 2017</i> 	
SKILLS	C/C++, CUDA, HTML/CSS, Javascript, Jax, Keras, \LaTeX , MATLAB, OpenCV, OS X, Python, PyTorch, R, Shell, SLURM, Tensorflow, Ubuntu, Verilog, Windows	
TEACHING EXPERIENCE	University of Montreal , Montreal, Canada — Guest Lecturer <i>Nov 2020</i>	
	<ul style="list-style-type: none"> • Representation Learning (IFT 6135) by Prof. Aishwarya Agrawal 	
	University of Montreal , Montreal, Canada — Teaching Assistant <i>Sep-Dec 2020</i>	
	<ul style="list-style-type: none"> • Fundamentals of Machine Learning (IFT 6390) by Prof. Ioannis Mitliagkas 	
	Summer Symposium on AI Research , India — Guest Speaker <i>Jul 2020</i>	
	University of Montreal , Montreal, Canada — Teaching Assistant <i>Sep 2019</i>	
	<ul style="list-style-type: none"> • Fundamentals of Machine Learning (IFT 6390) by Prof. Ioannis Mitliagkas 	
	IVADO/Mila Deep Learning School , Montreal, Canada — Teaching Assistant <i>Sep 2019</i>	
	AI for Social Good Summer Lab , Montreal, Canada — Lecturer <i>May 2019</i>	
	TalentSprint , Hyderabad, India — Mentor, Foundations of AI & ML (inaugural program) <i>Jan-May 2018</i>	
	<ul style="list-style-type: none"> • Designed and presented tutorials on machine learning, and mentored industry professionals 	
THESIS PROJECTS	<i>Supervisor:</i> Prof. Rajiv Sahay, Electrical Engineering, IIT Kharagpur, India	
	Master’s thesis — “De-fencing of Images using RGB-D Data” <i>2013 - 2014</i>	
	<ul style="list-style-type: none"> • Elimination of fence-like occlusions, and inpainting of images using RGB-D data • Nominated for Best Project Award among three departments, research work published at ICAPR 2015 	
	Bachelor’s thesis — “Identification of Bilabial Lip Closures in Audio and Video” <i>2012 - 2013</i>	
	<ul style="list-style-type: none"> • Measurement of synchronization between audio and video using bilabial cues in both modes 	