VIKRAM VOLETI

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

🌐 voletiv.github.io   ✉ vikram.voleti@gmail.com   *Google Scholar*   in *LinkedIn*

RESEARCH	**Deep learning for image, video, 3D**: led multiple projects; experienced in collaborating with international partners in industry and academia; expert at machine learning research and development.

Projects: Video prediction using Score-based Diffusion models [1], Neural ODEs [13]; 3D human pose estimation and inverse kinematics [3]; Image generation with Normalizing flows [4], neural radiance fields, GANs [15], etc.

EDUCATION

Mila, University of Montreal, Canada — *Fall 2018 - present (Aug 2023)*
PhD in Computer Science — *Supervisor*: Prof. Christopher Pal   (A) 4.0 / 4.3

Indian Institute of Technology (IIT), Kharagpur, India — *2009 - 2014*
Dual Degree (B.Tech. (H) + M.Tech.) in Electrical Engineering   8.44 / 10
with Master's specialization in Instrumentation and Signal Processing

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RESEARCH INTERNSHIPS DURING PhD

∞ Meta (formerly **Facebook**), Menlo Park, USA   *Aug-Dec 2022*
Team: AI for Metaverse (AI4RL); *Supervisors*: Dr. Yashar Mehdad, Dr. Barlas Oguz
- Research on denoising diffusion models for video and 3D object generation
- Leading project on 3D object generation in virtual reality, collaborating with international teams

⬡ Unity Technologies, Montreal, Canada (MITACS Research Intern)   *Oct 2021 - Aug 2022*
Team: Deep Pose, Unity Labs; *Supervisor*: Dr. Boris Oreshkin
- 3D human pose estimation and inverse kinematics from videos, published at SIGGRAPH Asia [3]
- Led project on AI-assisted animation workflows, contributed to product pipeline with code, demos

G Google, Mountain View, USA   *Sep-Dec 2019*
Team: Google AI Perception; *Supervisors*: Dr. Bryan Seybold, Dr. Sourish Chaudhuri
- Research on multimodal semi-supervised Active Speaker Detection in videos

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WORK EXPERIENCE

IIIT Hyderabad, India — Research Fellow; *Supervisor*: Prof. C. V. Jawahar   *May 2017 - Aug 2018*
- Synthesized educational videos in regional Indian languages by generating lips from audio
- Developed automated pipeline to create large-scale audio-video dataset
- Full paper published at ICASSP 2019 [15], short paper published at CVPR 2018 Workshop

GreyOrange Robotics, Gurgaon, India — Image Processing Engineer   *Feb 2016 - May 2017*
- Developed embedded vision module for video processing in real time for warehouse automation
- Solely responsible for development and testing of code, video processing module, camera drivers, server

Airbus, Bengaluru, India — Associate Engineer   *Jul 2014 - Feb 2016*
- Avionics software development and integration following standard avionics coding guidelines (DO-178B)
- Simulated signal-level modifications to the Flight Warning Computer, contributed to the full coding V-cycle

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OTHER PROFESSIONAL EXPERIENCE

Blue Lion Labs, Canada — AI Advisor   *Oct 2020 - present*
- Provide technical guidance and mentorship to startup on the design and development of AI/ML systems

NextAI - Toronto, Canada — AI Scientist-in-Residence   *Mar-Sep 2020*
- Provided scientific and technical support to start-ups selected in yearly co-hort of NextAI accelerator

IVADO/Mila Deep Learning School, Montreal, Canada — Teaching Assistant   *Sep 2019*

NextAI - Montreal, Canada — Scientist-in-Residence   *Apr-Sep 2019*
- Provided scientific and technical support to start-ups selected in yearly co-hort of NextAI accelerator

Playment, Bengaluru, India — Computer Vision Consultant   *Jan-Jun 2018*
- Provided technical guidance to early-stage startup on semantic segmentation models for autonomous driving

TalentSprint, Hyderabad, India — Mentor, Foundations of AI & ML (inaugural program)   *Jan-May 2018*
- Designed and delivered tutorials on machine learning, and provided mentorship to industry professionals

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AWARDS

Outstanding Reviewer at CVPR 2021	*May 2021*
Microsoft Diversity Award for Doctoral Research, $6,000	*Dec 2020*
MITACS Accelerate Research Internship, $30,000	*Oct 2020*
University of Montreal entrance scholarship, $37,000	*Sep 2018*
IIIT Hyderabad merit scholarship for summer school, $1,000	*Jul 2017*

SERVICE	**Organizer** — **ICCV 2021** - Differentiable 3D Vision and Graphics workshop	*Feb-Oct 2021*
	OWCV 2021 (Canadian Computer Vision workshop), Canada	*Feb-Apr 2021*
	GRAPHQUON 2020 (Canadian Computer Graphics workshop), Canada	*Oct-Dec 2020*

Reviewer — Journal on Computer Vision and Image Understanding, CVPR 2022, ACML 2021, NeurIPS 2021, ICCV 2021, CVPR 2021 (***Outstanding Reviewer***), ICLR 2020, NeurIPS 2020, ICML 2020, NeurIPS 2019, CCAI @ ICLR 2020, CCAI @ NeurIPS 2019, LLD @ ICLR 2019

PAST RESEARCH INTERNSHIPS

KU Leuven, Belgium — *Supervisor*: Prof. Ingrid Verbauwhede, ESAT   *Summer 2013*
- Designed arithmetic operations using Carry-Free Logic, simulated circuits in Xilinx

IIT Kharagpur, India — *Supervisor*: Prof. Aurobinda Routray, Electrical Engineering   *Summer 2012*
- Made a gesture recognition program in MATLAB using Hidden Markov Models

Imperial College, UK — *Supervisor*: Prof. Peter Cheung, Electrical & Electronics   *Summer 2011*
- Measured the relative power consumption among the LookUp Tables (LUTs) of an FPGA

RESEARCH PAPERS (SELECT)

[1] "MCVD: Masked Conditional Video Diffusion for Prediction, Generation, and Interpolation", **V. Voleti**, A. Jolicoeur-Martineau, C. Pal - *NeurIPS 2022* [arXiv]

[2] "Score-based Denoising Diffusion with Non-Isotropic Gaussian Noise Models", **V. Voleti**, C. Pal, A. Oberman - *NeurIPS 2022 Workshop* [arXiv]

[3] "SMPL-IK: Learned Morphology-Aware Inverse Kinematics for AI Driven Artistic Workflows", **V. Voleti**, B. N. Oreshkin, F. Bocquelet, F. G. Harvey, L. Ménard, C. Pal - *SIGGRAPH Asia 2022* [arXiv]

[4] "Multi-Resolution Continuous Normalizing Flows", **V. Voleti**, C. Finlay, A. Oberman, C. Pal - *Submitted to a journal* [arXiv]

[5] "FairCal : Fairness Calibration for Face Verification", T. Salvador, S. Cairns, **V. Voleti**, N. Marshall, A. Oberman - *ICLR 2022* [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 - *CVIS 2022 (Oral)*

[7] "Generative Models of Brain Dynamics", M. Ramezanian-Panahi, G. Abrevaya, JC. Gagnon-Audet, **V. Voleti**, I. Rish, G. Dumas - *Frontiers in Artificial Intelligence (journal)* [arXiv]

[8] "Towards Generating Large Synthetic Phytoplankton Datasets for Efficient Monitoring of Harmful Algal Blooms", N. Bamra, **V. Voleti**, A. Wong, J. Deglint - *FSS at AAAI 2022* [arXiv]

[9] "Improving Continuous Normalizing Flows using a Multi-Resolution Framework", **V. Voleti**, C. Finlay, A. Oberman, C. Pal - *ICML 2021 Workshop*

[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 - *ICLR 2021* [arXiv]

[11] "Frustratingly Easy Uncertainty Estimation for Distribution Shift", T. Salvador, **V. Voleti**, A. Iannantuono, A. Oberman - *Preprint* [arXiv]

[12] "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 - *ICML 2020* [arXiv]

[13] "Simple Video Generation using Neural ODEs", **V. Voleti**, D. Kanaa, S. E. Kahou, C. Pal - *NeurIPS 2019 Workshop* [arXiv]

[14] "Comparing Normalization in Conditional Computation Tasks", V. Michalski, **V. Voleti**, S. E. Kahou, A. Oritz, P. Vincent, C. Pal, D. Precup - *ICML 2019 Workshop* [arXiv]

[15] "Cross-Language Speech Dependent Lip-Synchronization", **V. Voleti**, A. Jha, V. P. Namboodiri, C. V. Jawahar - *ICASSP 2019* [pdf]

[16] "Lip-Synchronization for Dubbed Instructional Videos", **V. Voleti**, A. Jha, V. P. Namboodiri, C. V. Jawahar - *CVPR 2018 Workshop* (FIVER) [pdf]

[17] "A Multimodal Approach for Image De-fencing and Depth Inpainting", S. Jonna, **V. Voleti**, R. R. Sahay, and M. S. Kankanhalli - *ICAPR* 2015 [pdf, IEEE]

TALKS	• "MVCD: Masked Conditional Video Diffusion" — NeurIPS 2022, New Orleans, USA [slides]	*Dec 2022*
	• "SMPL-IK: Learned Morphology-Aware Inverse Kinematics for AI Driven Artistic Workflows" — SIGGRAPH Asia, Diagu, South Korea [slides, video]	*Dec 2022*
	• "Normalizing flows" — Learning Representations (course), University of Montreal, Canada	*Nov 2022*
	• "Score-based Denoising Diffusion Models - a tutorial" — Mila, Canada [slides, video]	*Sep 2022*
	• "Solving Video Tasks using Denoising Diffusion Models" — Samsung Toronto, Canada [slides]	*Aug 2022*
	• "MVCD: Masked Conditional Video Diffusion" — Mila, Canada	*May 2022*
	• "Denoising Diffusion GANs" — Mila, Canada [slides]	*Feb 2022*
	• "Training GANs by Solving ODEs" — Mila, Canada [slides]	*Apr 2021*
	• "Score-based Generative Models with SDEs" — Mila, Canada [slides]	*Feb 2021*
	• "Continuous Normalizing Flows" — Mila, Canada [slides]	*Sep 2020*
	• "GANs: the story so far" — Summer Symposium on AI Research, India [slides, video]	*Jul 2020*
	• "A brief tutorial on Neural ODEs" — Mila, Canada [slides, video]	*Jul 2020*
	• "Mathematics of Neural ODEs" — University of Guelph, Canada [slides]	*Apr 2020*
	• "Simple Video Generation using Neural ODEs" — IIIT Hyderabad, India [slides]	*Jan 2020*
	• Tutorial on "GANs" — AI for Social Good Summer Lab, Montreal	*May 2019*
	• "BigGAN" — Mila, University of Montreal, Canada [slides]	*Oct 2018*
	• "Image de-fencing using RGB-D data" — MPI Informatics, Saarbrücken, Germany [slides]	*Feb 2018*
	• "Intuition behind LSTMs" at IIIT Hyderabad, India [slides]	*Feb 2018*
	• Tutorial on "Back-propagation" — IIIT-Hyderabad, India [slides]	*Aug 2017*
	• "Mathematics of back-propagation" — GreyOrange Robotics, India [slides]	*Feb 2017*

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	***Nov 2020***
	• Representation Learning (IFT 6135) by Prof. Aishwarya Agrawal	
	University of Montreal, Montreal, Canada — Teaching Assistant	***Sep-Dec 2020***
	• Fundamentals of Machine Learning (IFT 6390) by Prof. Ioannis Mitliagkas	
	Summer Symposium on AI Research, India — Guest Speaker	***Jul 2020***
	University of Montreal, Montreal, Canada — Teaching Assistant	***Sep 2019***
	• Fundamentals of Machine Learning (IFT 6390) by Prof. Ioannis Mitliagkas	
	IVADO/Mila Deep Learning School, Montreal, Canada — Teaching Assistant	***Sep 2019***
	AI for Social Good Summer Lab, Montreal, Canada — Lecturer	***May 2019***
	TalentSprint, Hyderabad, India — Mentor, Foundations of AI & ML (inaugural program)	***Jan-May 2018***
	• Designed and presented tutorials on machine learning, and mentored industry professionals	

THESIS PROJECTS	*Supervisor*: Prof. Rajiv Sahay, Electrical Engineering, IIT Kharagpur, India	
	Master's thesis — "De-fencing of Images using RGB-D Data"	*2013 - 2014*
	• 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"	*2012 - 2013*
	• Measurement of synchronization between audio and video using bilabial cues in both modes	