Vikram Voleti

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Website: voletiv.github.io *Google Scholar* *LinkedIn* *GitHub*

Education

Mila, University of Montreal, Canada — *Fall 2018 - present (anticipated 08/2023)*
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 with Master's specialization in Instrumentation and Signal Processing — 8.44 / 10

Research Experience

Deep learning for image, video, 3D: Video Prediction with Score-based Diffusion models [1]; 3D human pose estimation [2]; Image generation with Continuous Normalizing flows [3]; Video prediction with Neural ODEs [7]

Meta (formerly **Facebook**), Menlo Park, USA — Research Intern — *Aug-Dec 2022*
- *Team*: AI4AR; *Supervisor*: Yashar Mehdad
- Research on denoising diffusion models for 3D object generation

Unity Technologies, Canada — MITACS Research Intern — *Oct 2021 - Aug 2022*
- *Team*: Deep Pose, Unity Labs; *Supervisor*: Dr. Boris Oreshkin
- Research on 3D pose estimation and inverse kinematics from videos [2]

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

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
- Full paper published at ICASSP 2019 [8], short paper published at CVPR 2018 Workshop

Other Experience

Reviewer — CVPR 2022, ACML 2021, NeurIPS 2021, ICCV 2021, CVPR 2021 (***Outstanding Reviewer***), ICLR 2020, NeurIPS 2020, ICML 2020, NeurIPS 2019, workshops

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*

Blue Lion Labs, Canada — AI Advisor — *Oct 2020 - present*

University of Montreal, Montreal, Canada — Teaching Assistant
- Fundamentals of Machine Learning (IFT 6390) by Prof. Ioannis Mitliagkas — *Sep-Dec 2020*

NextAI - Toronto, Canada — AI Scientist in Residence — *Mar-Sep 2020*

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

NextAI - Montreal, Canada — Scientist in Residence — *Apr-Sep 2019*

Playment, Bengaluru, India — Computer Vision Consultant — *Jan-Jun 2018*
- Worked on semantic segmentation models for autonomous driving

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

Research Papers (Recent)

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

[2] "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 - [arXiv]

[3] "Multi-Resolution Continuous Normalizing Flows", V. Voleti, C. Finlay, A. Oberman, C. Pal - [arXiv]

[4] "FairCal : Fairness Calibration for Face Verification", T. Salvador, S. Cairns, V. Voleti, N. Marshall, A. Oberman - *ICLR 2022* [arXiv]

[5] "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]

[6] "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]

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

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

Awards, Talks & Other Efforts

Dec 2020 - Microsoft Diversity Award for Doctoral Research

- *Aug 2022* - "Score-based Denoising Diffusion Models - a tutorial" — Mila, Canada [slides]
- *Aug 2022* - "Solving Video Tasks using Denoising Diffusion Models" — Samsung Toronto, Canada [slides]
- *Feb 2022* - "Denoising Diffusion GANs" — Mila, Canada [slides]
- *May 2021* - Outstanding Reviewer at CVPR 2021
- *Apr 2021* - "Training GANs by Solving ODEs" — Mila, Canada [slides]
- *Feb 2021* - "Score-based Generative Models" — Mila, Canada [slides]
- *Sep 2020* - "Continuous Normalizing Flows" — Mila, Canada [slides]
- *Jul 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]
- *Apr 2020* - "Mathematics of Neural ODEs" — University of Guelph, Canada [slides]
- *Jan 2020* - "Simple Video Generation using Neural ODEs" — IIIT Hyderabad, India [slides]
- *May 2019* - Tutorial on "GANs" — AI for Social Good Summer Lab, Montreal
- *Oct 2018* - "BigGAN" — Mila, University of Montreal, Canada [slides]
- *Feb 2018* - "Image de-fencing using RGB-D data" — MPI Informatics, Saarbrücken, Germany [slides]
- *Feb 2018* - "Intuition behind LSTMs" at IIIT Hyderabad, India [slides]
- *Nov 2017* - Won the SMS Classification challenge in the 2017 Hack2Innovate hackathon in Bangalore, India
- *Aug 2017* - "Mathematics of back-propagation" — GreyOrange Robotics, and IIIT-Hyderabad, India [slides]
- *Jul 2017* - Attended summer schools on Computer Vision and Machine Learning at IIIT-Hyderabad
  - Stood 3rd in Computer Vision Summer School out of 120+ participants, rewarded full fee waiver
  - Stood 4th in Machine Learning Summer School out of 120+ participants, rewarded full fee waiver
- *Apr 2009* - Qualified JEE 2009 by IIT at 99.7 percentile, with All India Rank of 1330 (out of 384,977)

Work Experience

GreyOrange Robotics, Gurgaon, India — Image Processing Engineer *Feb 2016 - May 2017*

- Developed computer vision module for video processing in real time for warehouse automation

Airbus, Bengaluru, India — Associate Engineer *Jul 2014 - Feb 2016*

- Avionics software development and integration following standard avionics coding guidelines (DO-178B)

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 M.Tech. Project Award among three departments (Electrical, Electronics, CS)
- Research paper based on work is published in the proceedings of 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

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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

Skills

C/C++, CUDA, HTML/CSS, Javascript, Jax, Keras, MATLAB, OpenCV, Python, PyTorch, Tensorflow