

# VIVEKA KULHARIA

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## EDUCATION

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### University of Oxford, UK

October 2017 - April 2022

DPhil in Computer Vision

Supervisors: Professor Philip H.S. Torr, Dr. Puneet K. Dokania

Information Engineering, Department of Engineering Science

### Indian Institute of Technology Kanpur, India

July 2012 - July 2016

Bachelor Of Technology

GPA: 9.1/10

Department of Computer Science and Engineering

## RESEARCH INTERESTS

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Computer Vision, Diffusion models, Generative AI

## RELEVANT EXPERIENCE

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### Moonvalley, Seattle, USA

April 2025 - Present

*Member of Technical Staff*

- Research Engineer on the Data Intelligence team behind Marey, a state-of-the-art video generation model that surpassed OpenAIs Sora 1 (T2V) at launch.
- Ownership of end-to-end video data quality assessment, including metadata validation and correction by efficiently processing millions of videos using optimized GPU and CPU pipelines
- Lead the synthetic data post-processing pipeline and contributed to post-training dataset creation to improve model performance.

### Cruise LLC, Seattle, USA

October 2022 - April 2025

*Senior Applied Scientist*

- Work spanned simulation data, generative AI, critical machine learning models for perception (Blog)
- Improved perception model edge case handling (recall improved by > 30%) by building end-to-end synthetic/real-to-real training data generation pipeline. Models deployed across two different sensor systems for self-driving perception.
- Led the technical effort and cross-team alignment to integrate Generative AI into the perception stack
- Proficiently utilized state-of-the-art generative methods like Diffusion models (paper) and GANs to enhance perception system robustness

### Huawei Technologies, Helsinki, Finland

May 2022 - September 2022

*Senior Computer Vision Researcher, Cloud R&D*

- Delivered production-ready neural network for similar image search on petalsearch.com
- Led data preparation, benchmarked different neural networks to decide the candidate for our task, created tools for very fast evaluations, coordinated with internal and external team members for project goal alignment, helped deliver the trained neural network for deployment

**Niantic Research, London**

May 2021 - August 2021

*Research & Development Intern with Dr. Eric Brachmann, Dr. Aron Monszpart, Dr. Sara Vicente, Dr. Guillermo Garcia-Hernando, and Prof. Gabriel J. Brostow*

- Developed novel neural network architecture for 3D scene understanding to target augmented reality
- Created specialized dataset to support the research objectives

**Amazon Lab 126, Sunnyvale, California**

June 2019 - September 2019

*Applied Scientist Intern with Dr. Siddhartha Chandra, Dr. Amit Agrawal, and Dr. Ambrish Tyagi*

- Developed state-of-the-art weakly supervised image segmentation method, accepted in ECCV 2020

**Visual Computing Group, TUM, Munich**

June 2017 - August 2017

*Research Intern advised by Prof. Matthias Niessner*

- Created a model to predict coarse 3D shape and colors of an object given its single-viewpoint image
- Rendered images and created voxel data from available meshes using MLib
- Worked on getting finer and diverse predictions

**Microsoft Research India**

June 2016 - May 2017

*Research Fellow with Dr. Sundararajan Sellamanickam*

- Worked on Cloud Services Modeling. Designed anomaly detection models for multi-variate time-series
- Explored MRF based approach to compare time-series of different types based on unusual characteristics
- Created recommender system for Office application

**Xerox Research Centre India**

May 2015 - July 2015

*Research Intern advised by Dr. Narayanan Unny*

- Explored lasso regression to get interpretable Sparse model for a high feature dataset
- Created a novel method to estimate missing values under constraints

**Monet Networks Inc.**

May 2014-July 2014

*Intern advised by Dr. Anurag Bist, CEO*

- Understood the existing Facial Expression Recognition API and its usage. Worked on backend to capture and store video using existing WebRTC APIs
- Developed specific metrics on non-verbal cue analytics for content rating

**PUBLICATIONS**

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1. **GenMM: Geometrically and Temporally Consistent Multimodal Data Generation for Video and LiDAR**

Bharat Singh\*, **Viveka Kulharia\***, Luyu Yang\*, Avinash Ravichandran, Ambrish Tyagi, Ashish Shrivastava

Preprint arXiv:2406.10722, 2024

2. **Can neural networks count digit frequency?**

Padmaksh Khandelwal, **Viveka Kulharia**

Journal of Student Research, 2023

3. **Calibrating Deep Neural Networks using Focal Loss**

Jishnu Mukhoti\*, **Viveka Kulharia\***, Amartya Sanyal, Stuart Golodetz, Philip H. S. Torr, Puneet K. Dokania

**NeurIPS 2020**

4. **Box2Seg: Attention Weighted Loss and Discriminative Feature Learning for Weakly Supervised Segmentation**  
Viveka Kulharia\*, Siddhartha Chandra\*, Amit Agrawal, Philip Torr, Ambrish Tyagi  
**ECCV 2020**
5. **On using Focal Loss for Neural Network Calibration**  
Jishnu Mukhoti\*, Viveka Kulharia\*, Amartya Sanyal, Stuart Golodetz, Philip H.S. Torr, Puneet K. Dokania  
**ICML 2020** workshop on Uncertainty and Robustness in Deep Learning (UDL) as ‘**Spotlight**’: top 10% of accepted papers
6. **A Revised Generative Evaluation of Visual Dialogue**  
Daniela Massiceti, Viveka Kulharia, Puneet K. Dokania, N. Siddharth, Philip H. S. Torr  
Preprint arXiv:2004.09272, 2020
7. **Domain Partitioning Network**  
Botos Csaba, Adnane Boukhayma, Viveka Kulharia, András Horváth, Philip H. S. Torr  
Preprint arXiv:1902.08134, 2019
8. **Multi-Agent Diverse Generative Adversarial Networks**  
Arnab Ghosh\*, Viveka Kulharia\*, Vinay Namboodiri, Philip H.S. Torr, Puneet K. Dokania  
**CVPR 2018** as ‘**Spotlight paper**’
9. **Similarity Learning for Dense Label Transfer**  
Mohammad Najafi\*, Viveka Kulharia\*, Ajanthan Thalaisyasingam, Philip H. S. Torr  
**CVPR 2018** workshop on The 2018 DAVIS Challenge on Interactive Video Object Segmentation - ‘**Second place**’
10. **Contextual RNN-GANs for Abstract Reasoning Diagram Generation**  
Viveka Kulharia\*, Arnab Ghosh\*, Amitabha Mukerjee, Vinay Namboodiri, Mohit Bansal  
**AAAI 2017** as poster, **NIPS 2016** workshop on Adversarial Training
11. **Message Passing Multi-Agent GANs**  
Arnab Ghosh\*, Viveka Kulharia\*, Vinay Namboodiri  
Preprint arXiv:1612.01294, 2016

## PATENTS

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1. **Segmentation using attention-weighted loss and discriminative feature learning**  
Ambrish Tyagi, Siddhartha Chandra, Amit Kumar Agrawal, Viveka Kulharia  
**US Patent 11,450,008**

## PROFESSIONAL SERVICE

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**Reviewer:** CVPR (2022-25), ECCV (2022), NeurIPS (2021-22), BMVC (2020, 2025), TPAMI (2020-21), L3D-IVU CVPR2023 workshop, Pre-registration Experiment (NeurIPS workshop (2020-21) and special edition of PMLR 2021)

## TALKS

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- 2024 Guest lecture on Diffusion models and GenAI at Plaksha University in May
- 2020 Presented Calibration work at NeurIPS 2020 in December
- 2020 Presented Box2Seg work at Multidisciplinary University Research Initiatives (MURI) in December
- 2020 Talk on Box2Seg work at Five AI, Cambridge in October
- 2020 Presented Box2Seg work at ECCV 2020 in August
- 2018 ‘Understanding and reconstructing scenes’ talk at MURI in Boston, US in September
- 2018 Spotlight talk on MAD-GAN work at CVPR-18 at Salt Lake City, US in June
- 2018 Talk on MAD-GAN work at the University of Adelaide, Australia in February
- 2017 Discussed MAD-GAN work on Dataskeptic podcast in May
- 2017 Guest lecture on GANs in course CS 698O: Visual Recognition at IIT Kanpur in April

## OTHER ACHIEVEMENTS

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- 2018 Won the best poster prize at PAISS - AI summer school in Grenoble, awarded 350 euros
- 2018 Second position in CVPR-18 DAVIS Challenge on Interactive VOS, awarded Adobe creative license.
- 2018 Funding from NAVER Labs to attend Prairie AI Summer School (PAISS) in Inria Grenoble, France
- 2018 Awarded Light Senior Scholarship for the academic year 2018-19 by St Catherine’s College, Oxford
- 2018 Travel grant for Robotics Vision Summer School (RVSS) in Kioloa, Australia
- 2017 Selected for PhD at University of Oxford funded by Toyota Research Institute
- 2016 Travel grant for NUS Workshop on Contemporary Research in Computer Science and Information Systems 2016, Singapore
- 2016 Selected for “Xerox Open 2016”, Bangalore
- 2015 Got 13th position out of 702 registered teams in coding contest OPC-Pravega, Codechef.com
- 2014 Developed programs for Microchip controller dsPIC33FJ256GP710 at Lohia Corp Ltd.
- 2014 Developed Monopoly strategy game for windows 8 pc in Microsoft Appathon
- 2014 Academic Excellence Award by IIT Kanpur for the academic year 2012-13
- 2013 Got Yellow Belt in Taekwondo, IIT Kanpur
- 2012 Got 2nd Place, Basketball, overall among all 1st year students organized by CPA, IIT Kanpur
- 2012 All India Rank 254 in IIT-JEE among 5.6 lakh students
- 2008 Secured All India Rank 1, KVS Junior Mathematics Olympiad

## TEACHING EXPERIENCE

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- **British Physics Olympiad (BPhO) Marker:** Helped Department of Physics, University of Oxford in marking BPhO Round 1 copies in 2017.
- **Mentor, Machine Learning: Tools, techniques, applications (CS 771):** Conducted doubt sessions, helped setting assignment problems and post their solutions in the graduate level course of around 200 students under the guidance of Prof. Harish Karnick in 2016.
- **Teaching Assistant, Data Structure and Algorithms (ESO 207):** Helped setting assignments and exam problems, post their solutions, grade assignments, invigilate exams and set doubt remedy hours in the course of around 300 students under the guidance of Prof. Shashank K Mehta in 2015.
- **Mentor, Fundamentals of Computing (ESC 101):** Mentored 6 students in the course that deals with programming in C under the guidance of Prof. Raghunath Tewari in 2014.

## SKILLS

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- Computer Vision • Deep Learning • Machine Learning
- Diffusion Models • GANs
- Python • PyTorch • Tensorflow • C • C++
- SQL • Shell Script •  $\text{\LaTeX}$