Yash Sanjay Bhalgat

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EDUCATION

University of Oxford **Oct '21 - Oct '25** (Expected)
DPhil (PhD), Computer Vision and Machine Learning @ Visual Geometry Group (VGG)
Advisors: Andrew Zisserman, Andrea Vedaldi, João Henriques, Iro Laina

University of Michigan, Ann Arbor **Sep '17 - Dec '18**
Masters, Computer Science and Engineering

Indian Institute of Technology, Bombay **Jul '13 - May '17**
B.Tech. (with *Honors*) in Electrical Engineering and *Minor* in Computer Science

WORK EXPERIENCE

Multiple startups, *Part-time AI Consultant* [Feb '23 - Mar '24]

- *AI chip company*: Developing real-time low-power Computer Vision algorithms for augmented reality on smart glasses.
- *Content moderation company*: Deploying Large Language Model (LLM) solutions to moderate multimodal data online.

Qualcomm AI Research | *Senior Machine Learning Researcher* [Nov '20 - Jul '21]
Machine Learning Researcher [Jun '19 - Oct '20]

- Spearheaded the ultra-low resource always-on vision project from model design, quantization to final hardware mapping
- Filed 12 inventions in 2020-21 of which 6 ideas have been filed for patent protection. Notable works on 3D hand-pose estimation [DIR-Net], low-bit quantization [LSQ+, QKD], structured [StructConv] and unstructured [LTP] pruning
- Led Qualcomm's team in the MicroNet Challenge at NeurIPS 2019, and achieved 3rd position in ImageNet track [Code]
- Managed/mentored interns - Jangho Kim and John Yang (PhD @ SNU) with contributions to the AR/VR project

Voxel51, Inc., *Computer Vision & Machine Learning Engineer* [Feb '19 - May '19]

- Researched and developed production pipelines for real-time vehicle tracking for querying on large-scale video databases

PUBLICATIONS

Conference Publications (Full list: *Google scholar*) * equal contribution

9. N2F2: Hierarchical Scene Understanding with Nested Neural Feature Fields. [Paper]
ECCV, 2024. *Yash Bhalgat*, Iro Laina, João Henriques, Andrew Zisserman, Andrea Vedaldi.
8. SiLVR: Scalable Lidar-Visual Reconstruction with Neural Radiance Fields for Robotic Inspection. [Paper]
ICRA, 2024. Yifu Tao, *Yash Bhalgat*, Lanke Frank Tarimo Fu, Matias Mattamala, Nived Chebrolu, Maurice Fallon.
7. Neural Refinement for Absolute Pose Regression with Feature Synthesis. [Paper]
CVPR, 2024. Shuai Chen, *Yash Bhalgat*, Xinghui Li, Jiawang Bian, Kejie Li, Zirui Wang, Victor Adrian Prisacariu.
6. Contrastive Lift: 3D Object Instance Segmentation by Slow-Fast Contrastive Fusion. [Paper][Code]
NeurIPS, 2023 (**Spotlight**). *Yash Bhalgat*, Iro Laina, João Henriques, Andrea Vedaldi, Andrew Zisserman.
5. A Light Touch Approach to Teaching Transformers Multi-view Geometry. [Paper]
CVPR, 2023. *Yash Bhalgat*, João Henriques, Andrew Zisserman.
4. A Prompt Array Keeps the Bias Away: Debiasing Vision-Language Models with Adversarial Learning. [Paper]
AACL-IJCNLP, 2022. Hugo Berg, Siobhan Hall, *Yash Bhalgat*, Wonsuk Yang, Hannah Kirk, A. Shtedritski, M. Bain.
3. Dynamic Iterative Refinement for Efficient 3D Hand Pose Estimation. [Paper]
WACV, 2022. John Yang, *Yash Bhalgat*, Simyung Chang, Fatih Porikli, Nojun Kwak.
2. Structured Convolutions for Efficient Neural Network Design. [Paper]
NeurIPS, 2020. *Yash Bhalgat*, Yizhe Zhang, Jamie Lin, Fatih Porikli.
1. CatsEyes: Categorizing seismic structures with scattering wavelet networks. [Paper] [Poster]
ICASSP, 2018, *Yash Bhalgat*, Laurent Duval, Jean Charlety.

Unpublished Manuscripts

4. 3D-Aware Instance Segmentation and Tracking in Egocentric Videos. *Yash Bhalgat**, Vadim Tschernezki*, Iro Laina, João Henriques, Andrea Vedaldi, Andrew Zisserman. [arXiv:2408.09860]
3. When LLMs step into the 3D World: A Survey and Meta-Analysis of 3D Tasks via Multi-modal Large Language Models. Xianzheng Ma*, *Yash Bhalgat**, Brandon Smart*, Shuai Chen, Xinghui Li, *et. al.* [arXiv:2405.10255] [Project page]
2. Learned Threshold Pruning. Kambiz Azarian, *Yash Bhalgat*, Jinwon Lee, Tijmen Blankevoort. [arXiv:2003.00075]
1. Quantization-aware Knowledge Distillation. *Yash Bhalgat**, Jangho Kim*, J. Lee, C. Patel, N. Kwak. [arXiv:1911.12491]

Workshop Publications

2. LSQ+: Improving low-bit quantization through learnable offsets & better initialization. *Yash Bhalgat*, Jinwon Lee, Markus Nagel, Tijmen Blankevoort, Nojun Kwak. **CVPRW** *Efficient Deep Learning in Computer Vision, 2020* [Paper]
1. Annotation-cost Minimization for Medical Image Segmentation using Suggestive Mixed Supervision Fully Convolutional Networks. *Yash Bhalgat**, Meet Shah*, Suyash Awate. *Medical Imaging meets* **NeurIPS**, *2018* [Paper]

PATENTS

6 patents in Computer Vision, Machine (Deep) Learning and Edge Computing.
Patent IDs: *US* 17/653,855; *US* 17/175,487; *US* 17/336,048; *US* 17/168,101; *US* 17/067,233; *US* 16/451,693;

INTERNSHIPS & SELECTED PROJECTS

[Project] NeurIPS '19 MicroNet challenge - 3rd place, ImageNet track [Code] [Jul '19 - Oct '19]
- Developed fast evolutionary search algorithm for mixed precision quantization optimized for parameter and MAC count
- Achieved 8x compression on EfficientNet-B0 and MixNet-S on ImageNet with $<$1% accuracy drop

[Internship] IBM Almaden Research Center, *Mentor - Zhe Liu, Pritam Gundecha* [Summer '18]
- Proposed teacher-student learning paradigm for task-agnostic classification in presence of label noise in train data [Paper]

[Internship] IFP Energies nouvelles, Paris, *Mentor - Laurent Duval* [Summer '17]
- Proposed a method for extraction of deformation invariant features of geophysical images. Exploited the sparse structure of data to process gigabyte-sized images in real time (ICASSP 2018) [Paper]

[Thesis] Scattering Wavelet Network based Robust Fingerprint Classification [Jul '16 - Apr '17]
- *Guide: Prof. Vikram Gadre*. Explored Scattering Wavelet Networks for robust feature extraction combined with Local Non-linear Total Variation based texture enhancement. Awarded Undergraduate Research Award (URA02) for this work.

[Internship] IBM Research, Bangalore, *Mentor - Vikas Raykar* [Summer '16]
- Joint multi-modal representations for e-commerce catalog search by visual attributes *without* manual tagging

SKILLS

Languages	Python (proficient), C++ (moderate), Julia, MATLAB, Verilog, Bash, LaTeX
Frameworks	PyTorch (proficient), TensorFlow and Keras (basic), OpenAI gym, CUDA, Theano, OpenCV, git, slurm

TEACHING EXPERIENCE

University of Oxford, *Tutor*	Computer Vision, *with Profs Andrea Vedaldi, Andrew Zisserman*	[Hillary '22]
	Computer Graphics, *with Dr. Jassim Happa, Stuart Golodetz*	[Hillary '22]
	Artificial Intelligence, *with Prof. Bernardo Cuenca Grau*	[Hillary '22]
University of Michigan, *Graduate Student Instructor*	Computational Data Science, *with Prof. Raj Nadakuditi*	[Fall '18]
	Introduction to Logic Design, *with Prof. Matthew Smith*	[Winter '18]
IIT Bombay, *Teaching Assistant*	Wavelets, *with Prof. Vikram Gadre*	[Fall '16, Winter '17]
	Quantum Mechanics and Applications, *with Prof. Siva Prasad*	[Fall '14, Winter '15]

PROFESSIONAL SERVICE

Workshop Organizer: 2^{nd} Workshop on Learning 3D with Multi-View Supervision, CVPR '24
Reviewer: CVPR '24 '23, ECCV '24 '22, ICLR '23, NeurIPS '23, EMNLP '22, '21, TMLR
Area Chair: AI for Content Creation Workshop, CVPR '24. **Website Chair**: BMVC 2022.

SCHOLASTIC ACHIEVEMENTS

- Undergraduate Research Award (URA 02) for exceptional work during Bachelors Thesis at IIT Bombay
- Cargill Global Scholarship 2014-15 and 2015-16 for excellence in leadership and academic skills
- All India Rank **12** in IITJEE-Mains exam among 1,000,000 candidates
- All India Rank **155** in IITJEE-Advanced exam among 150,000 candidates
- All India Rank **60** in KVPY Scholarship by Govt. of India among 0.2 million candidates
- Selected among National Top 30 (for OCSC camp) for International Astronomy Olympiad '13
- Selected among top 300 participants of India to compete in **all three national olympiads**: INPhO (Indian National Physics Olympiad), INChO (Chemistry), INAO (Astronomy)
- Visharad Degree (*equiv.* Bachelors in Music) in Indian Classical Music for playing Tabla