

# Harkirat Behl

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EMPLOYMENT	Microsoft <i>Member of Technical Staff, Microsoft AI</i> <ul style="list-style-type: none"><li>• Co-Lead, Post-training, Phi-4: Post-training improved Phi-4 base by 20% on internal benchmark</li><li>• Core contributor of MAI-1, MAI-1.5, MAI-2: Created some of the best synthetic datasets, based on overall improvement</li></ul> <i>Senior Researcher, Microsoft Research</i> <ul style="list-style-type: none"><li>• Core contributor for Phi-1, Phi-2, Phi-3 (<b>30 million</b> downloads on Hugging Face), Phi-bonnaci (AI Math Tutor - shipped into NY Public Schools)</li><li>• Created the main dataset (<i>sci-phi</i>) that leads to the superior performance on STEM, which is the main selling point of Phi models.</li><li>• Research on unified vision-language modeling, video generation, MoEs: 1.5k Github stars, multiple top-tier publications</li></ul>	Redmond, US Apr 2024 -  Apr 2022 - 24
EDUCATION	University of Oxford Ph.D. (Tencent scholarship, Result: no corrections) Automated and Reliable Deep learning, Advisors: Philip Torr and Pawan Kumar  Indian Institute of Technology (IIT) Kanpur B.Tech (APM scholarship, Academic Excellence Award)	Oxford, UK 2021  Kanpur, India 2018
PUBLICITY IN MAJOR MEDIA	<ul style="list-style-type: none"><li>• Wall Street Journal, For AI Giants, Smaller Is Sometimes Better</li><li>• Wired, Pocket-Sized AI Models Could Unlock a New Era of Computing</li><li>• New York Times, Microsoft Makes a New Push Into Smaller A.I. Systems</li><li>• Meet the Creator of Microsoft Phi-2</li><li>• Scientific American, When It Comes to AI Models, Bigger Isn't Always Better</li></ul>	July 2024 May 2024 April 2024 Feb 2024 Nov 2023
INVITED TALKS	The Small Language Models Revolution <ul style="list-style-type: none"><li>• Microsoft Reverb (offsite of 100 Partner+ level Microsoft leaders, held once a year)</li><li>• Microsoft IC3-AI Tech Talk</li><li>• HMG (UK Government) Tech Intelligence team</li><li>• Microsoft AI Compilers Workshop</li><li>• Github, AI for Code Reading Group</li><li>• Microsoft PoAA (Pals of Autonomous Agents)</li></ul> Phi-2: The surprising power of small language models <ul style="list-style-type: none"><li>• JEM council meeting (Microsoft E+D research leaders meeting)</li><li>• Perception Cloud team, Zurich</li></ul> Phi-bonnaci: AI Math Tutor <ul style="list-style-type: none"><li>• Microsoft AI Frontiers Offsite</li><li>• Bill &amp; Melinda Gates Foundation Representatives</li></ul> Robust and Reliable Computer Vision <ul style="list-style-type: none"><li>• Microsoft Research Redmond</li></ul> Meta Learning for Scene Understanding <ul style="list-style-type: none"><li>• Machine Learning for Autonomous Driving Workshop, NeurIPS 2019</li><li>• Robotic Vision Summer School, Australia</li></ul>	Sep. 2024 Sep. 2024 June 2024 May 2024 May 2024 May 2024  Apr. 2024 Mar. 2024  Jan. 2024 Dec. 2023  Aug. 2021  Dec. 2019 Feb. 2019

PREPRINTS

(#): alphabetical ordering

4. Phi-3: A Highly Capable Language Model Locally on Your Phone  
(#) Marah Abdin, Sam Ade Jacobs, Ammar Ahmad Awan, Jyoti Aneja, Ahmed Awadallah, Hany Awadalla, Nguyen Bach, Amit Bahree, Arash Bakhtiari, [Harkirat Behl](#), ....  
arXiv 2024
3. Phi-2: The surprising power of small language models  
(#) Marah Abdin, Jyoti Aneja, Sebastien Bubeck, ..., [Harkirat Singh Behl](#), ..., Yi Zhang  
Microsoft Research Blog 2023
2. Textbooks are all You Need  
(#) Suriya Gunasekar, Yi Zhang, Jyoti Aneja, Caio Cesar Teodoro Mendes, Allie Del Giorno, Sivakanth Gopi, Mojan Javaheripi, Piero Kauffmann, Gustavo de Rosa, Olli Saarikivi, Adil Salim, Shital Shah, [Harkirat Singh Behl](#), Xin Wang, Sebastien Bubeck, Ronen Eldan, Adam Tauman Kalai, Yin Tat Lee, Yuanzhi Li  
arXiv 2023
1. Unlocking Spatial Comprehension in Text-to-Image Diffusion Models  
Mohammad Mahdi Derakhshani, Menglin Xia, [Harkirat Behl](#), Cees GM Snoek, Victor Rhle  
arXiv 2023

PUBLICATIONS

14. Peekaboo: Interactive Video Generation via Masked-Diffusion  
Yash Jain, Anshul Nasery, Vibhav Vineet, [Harkirat Behl](#)  
CVPR 2024
13. Scaling the Convex Barrier with Sparse Dual Solvers  
Alessandro De Palma, [Harkirat Singh Behl](#), Rudy Bunel, Philip Torr, M. Pawan Kumar  
JMLR 2024
12. Dataset-aware Mixture-of-Experts  
Yash Jain, [Harkirat Behl](#), Zsolt Kira, Vibhav Vineet  
NeurIPS 2023
11. Efficiently Robustify Pre-Trained Models  
Nishant Jain, [Harkirat Behl](#), Yogesh Rawat, Vibhav Vineet  
ICCV 2023
10. X-Decoder: Generalized Decoding for Pixel, Image and Language  
Xueyan Zou\* , Zi-Yi Dou\*, Jianwei Yang\*, Zhe Gan, Linjie Li, Chunyuan Li, Xiyang Dai, [Harkirat Behl](#), Jianfeng Wang, Lu Yuan, Nanyun Peng, Lijuan Wang, Yong Jae Lee, Jianfeng Gao  
CVPR 2023
9. Neural-Sim: Learning to Generate Training Data with NeRF  
Yunhao Ge, [Harkirat Behl](#), Jiashu Xu, Suriya Gunasekar, Neel Joshi, Yale Song, Xin Wang, Laurent Itti, and Vibhav Vineet  
ECCV 2022
8. Overcoming the Convex Barrier for Simplex Inputs  
[Harkirat Singh](#), M. Pawan Kumar, Philip Torr, Krishnamurthy (Dj) Dvijotham  
NeurIPS 2021
7. Scaling the Convex Barrier with Active Sets  
[Harkirat Singh Behl](#)\*, Alessandro De Palma\*, Rudy Bunel, Philip Torr, M. Pawan Kumar  
ICLR 2021
6. Progressive Skeletonization: Trimming more fat from a network at initialization  
Pau Jorge, Amartya Sanyal, [Harkirat Singh Behl](#), Philip Torr, Gregory Rogez, Puneet Dokania  
ICLR 2021
5. STEER: Simple Temporal Regularization for Neural ODEs  
Arnab Ghosh, [Harkirat Singh Behl](#), Philip Torr, Vinay Namboodiri  
NeurIPS 2020
4. AutoSimulate: (Quickly) Learning Synthetic Data Generation  
[Harkirat Singh Behl](#), Atilim Gunes Baydin, Ran Gal, Philip Torr, Vibhav Vineet  
ECCV 2020
3. Meta Learning Deep Visual Words for Fast Video Object Segmentation  
[Harkirat Singh Behl](#), Mohammad Najafi, Anurag Arnab, Philip Torr  
IROS 2020 (Oral)  
NeurIPS 2019 ML4AD Workshop (Oral)
2. Alpha MAML: Adaptive Model-Agnostic Meta-Learning  
[Harkirat Singh Behl](#), Atilim Gunes Baydin, Philip Torr  
ICML 2019 Workshop
1. Incremental Tube Construction for Human Action Detection  
[Harkirat Singh Behl](#), Michael Sapienza, Gurkirt Singh, Suman Saha, Fabio Cuzolin, Philip Torr  
BMVC 2018

ACADEMIC SERVICE	Reviewer	
	Reviewed over 50 conference papers in top tier AI conferences	
	<ul style="list-style-type: none"> <li>• Vision Conferences: CVPR, ICCV, ECCV</li> <li>• ML Conferences: NeurIPS, ICML, ICLR, AAAI, AISTATS (intermittently)</li> <li>• Graphics Conferences : SIGGRAPH, SIGGRAPH-Asia</li> <li>• Journals : IJCV, T-PAMI</li> <li>• Workshops (intermittently): NeurIPS, ICML and vision workshops</li> </ul>	2021-present 2021-present 2021-present 2021-present 2019-present
	PhD thesis Examiner	
	<ul style="list-style-type: none"> <li>• Understanding Multimodal Representation Learning via Latent Variable Models Ravindra Yadav, Indian Institute of Technology Kanpur</li> </ul>	2022
MENTORING	<ul style="list-style-type: none"> <li>• Behrooz Tahmasebi (MIT)</li> <li>• Mohammad Derakhshani (University of Amsterdam)</li> <li>• Yash Jain (Georgia Tech) → (Applied Scientist, Microsoft)</li> <li>• Jiashu Xu (Harvard University) → (Research Scientist, Nvidia)</li> <li>• Robbie Netzorg (UC Berkeley)</li> <li>• Nishant Jain (IIT Roorkee) → (Research Associate, Google Deepmind)</li> <li>• Yunhao (Andy) Ge (University of Southern California) → (Research Scientist, Nvidia)</li> </ul>	2024 2023 2023 2023 2022 2022 2021
TEACHING EXPERIENCE	<ul style="list-style-type: none"> <li>• Tutor, Information Engineering Systems (Estimation, Inference, Image Processing, Signal Analysis), Oxford</li> <li>• Lab Demonstrator, Optimization Methods for Engineering Computation, Oxford</li> <li>• Lab Demonstrator, Image and Signal Analysis, Oxford</li> <li>• Senior Academic Mentor, Statistical Thermodynamics, C Programming, Numerical Computation Methods, IIT Kanpur</li> <li>• Academic Mentor, Essentials of Programming, IIT Kanpur</li> </ul>	2020-21 2019-20 2019-20 2015-16 2014-15
POSITIONS OF RESPONSIBILITY	<ul style="list-style-type: none"> <li>• Junior Advisor, St Cross College, Oxford</li> <li>• Communities Representative, St Cross College, Oxford</li> <li>• Secretary, University of Oxford Sikh Society, Oxford</li> <li>• Academic core team member, Counselling Service, IIT Kanpur</li> <li>• Member, AUV team (Autonomous Underwater Vehicle), IIT Kanpur</li> <li>• Mentor, Robotics Club, IIT Kanpur</li> <li>• Senior Executive Finance, Techkriti'15, IIT Kanpur</li> <li>• Student Guide, Counselling Service, IIT Kanpur</li> </ul>	2019-21 2019-20 2019-20 2015-16 2014-16 2015-16 2014-15 2014-15
SPORTS	<ul style="list-style-type: none"> <li>• Captain, Wolfson and St Cross College Cricket team, Oxford</li> <li>• Member, OUCCC team (Oxford University Club Cricket Club), Oxford</li> <li>• Member, Table Tennis team for Udghosh sports tournament, IIT Kanpur</li> <li>• Member of runner-up team, Intramural Basketball championship, IIT Kanpur</li> </ul>	2019-21 2018-21 2015 2014
REFERENCES	<ul style="list-style-type: none"> <li>• Prof. Philip H.S. Torr, phst@robots.ox.ac.uk Professor, University of Oxford Fellow of Royal Society, Fellow of Royal Academy of Engineering</li> <li>• Sebastien Bubeck, sebastien.bubeck@gmail.com OpenAI, Previously Vice President and Distinguished Scientist, Microsoft Research</li> <li>• M. Pawan Kumar, mpawan@deepmind.com Google DeepMind, Previously Associate Professor, University of Oxford</li> <li>• Prof. Yin Tat Lee, yintat@uw.edu Associate Professor, University of Washington Senior Principal Research Manager, Microsoft Research</li> </ul>	