

# Harkirat Behl

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EMPLOYMENT	Microsoft <i>Member of Technical Staff, Microsoft AI</i> <ul style="list-style-type: none"><li>Co-led Phi-4 post-training: +20% on internal benchmark, <b>5 Million</b> downloads.</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 2024 -  2022-23
EDUCATION	University of Oxford Ph.D. (Tencent scholarship, Result: no corrections) Automated and Verified 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 Isnt 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>Plutos.dev AI</li><li>MSR Project Green Reasoning Workshop</li><li>Brazilian Podcast - IA Sob Controle</li><li>MSR AI Frontiers Anniversary</li><li>Microsoft IC3-AI Tech Talk</li><li>Microsoft Reverb (offsite of 100 Partner+ level Microsoft leaders, held once a year)</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>	Mar. 2025 Mar. 2025 Feb. 2025 Nov. 2024 Sep. 2024 Oct. 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

- Phi-4 Technical Report  
(#) Marah Abdin, Jyoti Aneja, [Harkirat Behl](#), 24 more authors  
arXiv 2024
- 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](#), et. al.  
arXiv 2024
- Phi-2: The surprising power of small language models  
(#) Marah Abdin, Jyoti Aneja, Sebastien Bubeck, 23 more authors  
Microsoft Research Blog 2023
- 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

## PUBLICATIONS

- Peekaboo: Interactive Video Generation via Masked-Diffusion  
Yash Jain, Anshul Nasery, Vibhav Vineet, [Harkirat Behl](#)  
CVPR 2024
- Scaling the Convex Barrier with Sparse Dual Solvers  
Alessandro De Palma, [Harkirat Singh Behl](#), Rudy Bunel, Philip Torr, M. Pawan Kumar  
JMLR 2024
- Dataset-aware Mixture-of-Experts  
Yash Jain, [Harkirat Behl](#), Zsolt Kira, Vibhav Vineet  
NeurIPS 2023
- Efficiently Robustify Pre-Trained Models  
Nishant Jain, [Harkirat Behl](#), Yogesh Rawat, Vibhav Vineet  
ICCV 2023
- 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
- 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
- Overcoming the Convex Barrier for Simplex Inputs  
[Harkirat Singh](#), M. Pawan Kumar, Philip Torr, Krishnamurthy (Dj) Dvijotham  
NeurIPS 2021
- Scaling the Convex Barrier with Active Sets  
[Harkirat Singh Behl](#)\*, Alessandro De Palma\*, Rudy Bunel, Philip Torr, M. Pawan Kumar  
ICLR 2021
- 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
- STEER: Simple Temporal Regularization for Neural ODEs  
Arnab Ghosh, [Harkirat Singh Behl](#), Philip Torr, Vinay Namboodiri  
NeurIPS 2020
- AutoSimulate: (Quickly) Learning Synthetic Data Generation  
[Harkirat Singh Behl](#), Atilim Gunes Baydin, Ran Gal, Philip Torr, Vibhav Vineet  
ECCV 2020
- 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)
- Alpha MAML: Adaptive Model-Agnostic Meta-Learning  
[Harkirat Singh Behl](#), Atilim Gunes Baydin, Philip Torr  
ICML 2019 Workshop
- 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	
	• Vision Conferences: CVPR, ICCV, ECCV	2021-present
	• ML Conferences: NeurIPS, ICML, ICLR, AAAI, AISTATS (intermittently)	2021-present
	• Graphics Conferences : SIGGRAPH, SIGGRAPH-Asia	2021-present
	• Journals : IJCV, T-PAMI	2021-present
	• Workshops (intermittently): NeurIPS, ICML and vision workshops	2019-present
	PhD thesis Examiner	
	• Understanding Multimodal Representation Learning via Latent Variable Models Ravindra Yadav, Indian Institute of Technology Kanpur	2022
MENTORING	• Behrooz Tahmasebi (MIT)	2024
	• Mohammad Derakhshani (University of Amsterdam)	2023
	• Yash Jain (Georgia Tech) → (Applied Scientist, Microsoft)	2023
	• Jiashu Xu (Harvard University) → (Research Scientist, Nvidia)	2023
	• Robbie Netzorg (UC Berkeley)	2022
	• Nishant Jain (IIT Roorkee) → (Research Associate, Google Deepmind)	2022
	• Yunhao (Andy) Ge (University of Southern California) → (Research Scientist, Nvidia)	2021
TEACHING EXPERIENCE	• Tutor, Information Engineering Systems (Estimation, Inference, Image Processing, Signal Analysis), Oxford	2020-21
	• Lab Demonstrator, Optimization Methods for Engineering Computation, Oxford	2019-20
	• Lab Demonstrator, Image and Signal Analysis, Oxford	2019-20
	• Senior Academic Mentor, Statistical Thermodynamics, C Programming, Numerical Computation Methods, IIT Kanpur	2015-16
	• Academic Mentor, Essentials of Programming, IIT Kanpur	2014-15
POSITIONS OF RESPONSIBILITY	• Junior Advisor, St Cross College, Oxford	2019-21
	• Communities Representative, St Cross College, Oxford	2019-20
	• Secretary, University of Oxford Sikh Society, Oxford	2019-20
	• Academic core team member, Counselling Service, IIT Kanpur	2015-16
	• Member, AUV team (Autonomous Underwater Vehicle), IIT Kanpur	2014-16
	• Mentor, Robotics Club, IIT Kanpur	2015-16
	• Senior Executive Finance, Techkriti'15, IIT Kanpur	2014-15
	• Student Guide, Counselling Service, IIT Kanpur	2014-15
SPORTS	• Captain, Wolfson and St Cross College Cricket team, Oxford	2019-21
	• Member, OUCCC team (Oxford University Club Cricket Club), Oxford	2018-21
	• Member, Table Tennis team for Udghosh sports tournament, IIT Kanpur	2015
	• Member of runner-up team, Intramural Basketball championship, IIT Kanpur	2014
REFERENCES	• Prof. Philip H.S. Torr, phst@robots.ox.ac.uk Professor, University of Oxford, FRS, FEng	
	• Sebastien Bubeck, sebastien.bubeck@gmail.com OpenAI; Previously Vice President and Distinguished Scientist, Microsoft Research	
	• Prof. Yin Tat Lee, yintatlee@gmail.com OpenAI; Associate Professor, University of Washington	
	• M. Pawan Kumar, mpawan@deepmind.com DeepMind; Previously Associate Professor, University of Oxford	