Yizhak Ben-Shabat (Itzik)

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EDUCATION

Technion - Israeli Institute of Technology 2015 - 2019
Ph.D. Engineering
Title: Classification, Segmentation, and Geometrical Analysis of 3D Point Clouds with Deep Learning
Supervisors: Prof. Michael Lindenbaum and Prof. Anath Fischer

Technion- Israeli Institute of Technology 2012 - 2015
M.Sc. Engineering
Thesis: Adaptive Hierarchical Multi-Resolution Volumetric Geometric Modeling of Porous Micro-Structures
GPA: 96.7/100 (**Summa Cum Laude**)

Technion- Israeli Institute of Technology 2004 - 2008
B.Sc. Engineering
GPA: 87.8/100 (**Cum Laude**)

EMPLOYMENT HISTORY

Senior Scientist – Roblox 2024 - present
Conducted cutting-edge research in 3D computer vision and deep learning, focusing on geometric processing, shape analysis, motion generation, and neural implicit representations. Develop novel algorithms for 3D reconstruction, and segmentation contributing to top-tier publications. Collaborate with academic and industry partners while mentoring the next generation of researchers.

Research Fellow - T.R.D.F 2021 - 2023
Managed a team of six Ph.D. and Master's students, overseeing their research projects from inception to completion, while also orchestrating the release of open-source code and managing budgets to ensure successful outcomes and foster a collaborative research environment.

Research Fellow - Australian National University, Australian Centre for Robotic Vision 2019 - 2021
Managed collaborative projects with Ph.D. students, overseeing ambitious endeavors, including data collection. Led independent research and facilitated the successful release of open-source code.

Ph.D. Candidate - Technion - Israeli Institute of Technology 2015 - 2019
Led impactful research projects while concurrently serving as a lecturer for a CAD course. Additionally, contributed to the academic community by releasing open-source code from research endeavors.

Master's Student - Technion - Israeli Institute of Technology 2012 – 2015
Engaged in research projects, served as a teaching assistant for a CAD course, and released open-source code to contribute to the academic community.

Israel Defense Force - Mechanical Engineer 2009 - 2012
Executed and managed projects for the development of physical products, encompassing CAD design, manufacturing, assembly, and experimental evaluation processes.

TECHNICAL SKILLS

Programming languages	Proficient in **Python, MATLAB**, Familiar with **C**, **C++** and **LabVIEW**
Platforms	Linux (Ubuntu), Windows
Expertise	Proficient in **PyTorch**
DL, ML, CV, Graphics, Point Clouds	Experience in **TensorFlow, Tensorboard, OpenCV, W&B, Open3D, PyVista**, Familiar with Point Cloud Library (**PCL**), **OpenGL**.

PUBLICATIONS (Scholar profile)

1. "Neural Experts: Mixture of Experts for Implicit Neural Representations", Yizhak Ben-Shabat*, Chamin Hewa Koneputugodage*, Sameera Ramasinghe, Stephen Gould. **NeurIPS**, 2024. [paper][preprint] [project website] [full video] [code]

2. "Temporally Grounding Instructional Diagrams in Unconstrained Videos",Frederic Zhang, Cristian Rodriguez, Yizhak Ben-Shabat, Anoop Cherian, Stephen Gould. **WACV**, 2025. [paper][preprint] [code]

3. "3DInAction: Understanding Human Actions in 3D Point Clouds", Yizhak Ben-Shabat, Oren Shrout, Stephen Gould, **CVPR**, 2024. [paper]

4. "Small Steps and Level Sets: Fitting Neural Surface Models with Point Guidance", Chamin P Hewa Koneputugodage, Yizhak Ben-Shabat, Dylan Campbell, Stephen Gould, **CVPR** 2024

5. "IKEA Ego 3D Dataset: Understanding furniture assembly actions from ego-view 3D Point Clouds", Yizhak Ben-Shabat, Eviatar Segev, Jonathan Paul, Oren Shrout, Stephen Gould, **WACV**, 2024. [paper][project website][dataset].

6. "Aligning Step-by-Step Instructional Diagrams to Video Demonstrations", Jiahao Zhang, Anoop Cherian, Yanbin Liu, Yizhak Ben-Shabat, Cristian Rodriguez, Stephen Gould, **CVPR**, 2023. [paper][project website] [dataset].

7. "GraVoS: Voxel Selection for 3D Point-Cloud Detection", Oren Shrout, Yizhak Ben-Shabat, Ayellet Tal, **CVPR**, 2023. [paper][project page].

8. "Octree Guided Unoriented Surface Reconstruction", Chamin Hewa Koneputugodage, Yizhak Ben-Shabat, Stephen Gould, **CVPR**, 2023. [paper][video].

9. "DiGS: Divergence Guided Shape Implicit Neural Representation for Unoriented Point Clouds", Yizhak Ben-Shabat, Chamin Hewa Koneputugodage, Stephen Gould, **CVPR**, 2022. [paper] [project website] [full video] [code] [podcast].

10. "GoferBot: A Visual Guided Human-Robot Collaborative Assembly System", Zheyu Zhuang*, Yizhak Ben-Shabat*, Jiahao Zhang, Stephen Gould, Robert Mahony, **IROS**, 2022. [paper][video] *equal contribution

11. "CloudWalker: Random walks for 3D point cloud shape analysis", Adi Mesika, Yizhak Ben-Shabat, Ayellet Tal, SMI, 2022. [paper] [code]

12. "The IKEA ASM Dataset: Understanding People Assembling Furniture through Actions, Objects and Pose", Yizhak Ben-Shabat, Xin Yu, Fatemeh Sadat Saleh, Dylan Campbell, Cristian Rodriguez-Opazo, Hongdong Li, Stephen Gould, **WACV** (online), 2021. [paper] [project website] [full video] [code].

13. "DeepFit: 3D Surface Fitting via Neural Network Weighted Least Squares", Yizhak Ben-Shabat, Stephen-Gould, **ECCV (oral)**, 2020. [paper] [short video] [full video] [code].

14. "DPDist : Comparing Point Clouds Using Deep Point Cloud Distance", Dahlia Urbach, Yizhak Ben-Shabat, Michael Lindenbaum, **ECCV** , 2020.[paper][code].

15. "Vidat: ANU CVML Video Annotation Tool", Public-domain Software, Jiahao (David) Zhang, Yizhak Ben-Shabat and Stephen Gould, [code], 2020.

16. "Nesti-Net: Normal Estimation for Unstructured 3D Point Clouds using Convolutional Neural Networks", Yizhak Ben-Shabat, Michael Lindenbaum, Anath Fischer, **CVPR**, 2019. [paper] [video] [code].

17. "3DmFV: 3D Point Cloud Classification in Real-Time using Convolutional Neural Networks ", Yizhak Ben-Shabat, Michael Lindenbaum, Anath Fischer, IEEE Robotics and Automation Letters (**RA-L**), 2018. [paper][code].

18. "Graph Based Over-Segmentation Methods for 3D Point Clouds", Yizhak Ben-Shabat, Tamar Avraham, Michael Lindenbaum, and Anath Fischer. Computer Vision and Image Understanding (**CVIU**), Vol. 174, pp. 12-23, 2018. [paper]

19. "Geometric Analysis of Porous Structures Based on Hough Transform and Genetic Algorithms for Additive Manufacturing", Gil Elbaz, Yizhak Ben-Shabat, Anath Fischer, Virtual and Physical Prototyping, pp. 69-76, 2016. [paper].

20. "Design of Adaptive Porous Micro-structures using Curvature Analysis for Additive Manufacturing", Yizhak Ben-Shabat, Anath Fischer, the 25th CIRP Design Conference. 2015. [paper]

21. "Design of Adaptive Porous Micro-structures for Additive Manufacturing", Yizhak Ben Shabat, Anath Fischer, the 24th CIRP Design Conference. 2014. [paper].

22. "Multi-Sensor Multi-Resolution Data Fusion Modeling", Dmitry Tansky, Anath Fischer, Bianca Colosimo, Luca Pagani, Yizhak. Ben-Shabat, the 24th CIRP Design Conference. 2014. [paper]

RESEARCH INTERSTS

- 3D Computer Vision
- Surface Reconstruction using Implicit Neural Representations (INRs)
- Normal estimation
- 3D Action understanding
- Deep learning for 3D point cloud data

SELECTED PROJECTS

Project title: **3DInAction: Understanding human action from unstructured 3D point clouds** 2021 - present
Position: Research Fellow
Grant: 250K €, European Union's Horizon 2020 Research and Innovation Programme, Marie Sklodowska-Curie grant agreement No. 89346 (MSCA Individual Global Fellowship).
Collaborators: Prof. Stephen Gould (ANU), Ayellet Tal (Technion).

Project title: **3D Object Detection under Foliage Occlusions using Aerial LiDAR** 2022-2023
Position: Research Fellow
Grant: Advanced Defense Research Institute, Israeli Ministry of Defense Directorate of Defense Research and Development.
Collaborators: Prof. Ayellet Tal (Technion).

Project title: **Humans, robots, and actions** 2019 - 2021
Position: Research Fellow
Grant: Australian Research Council (ARC), Australian Centre for Robotic Vision (ACRV), Australian National University (ANU) node, Canberra, Australia.
Collaborators: Prof. Stephen Gould (ANU), Hongdong Li (ANU).

Project title: **Multi modal processing of images and point clouds using deep learning** Summer 2018
Position: Visiting PhD Researcher
Grant: Research Visit – Life Science Network.

Collaborators: Prof. Matthias Niessner, Visual Computing and Artificial Intelligence Lab, Technical University of Munich (TUM), Germany.

Project title: **Developing generic technology for efficient representation of points cloud by using over-segmentation methods** 2015 - 2018
Position: Ph.D. Researcher
Grant: MAGNET Omek, Ministry of Industry and Trade, (Co-P.I. Technion, Elbit, Intel).
Collaborators: Prof. Anath Fischer, Prof. Michael Lindenbaum, Dr. Tamar Avraham

Project title: **Real multi data and knowledge based proactive quality control system for in-process multi-stage defect reduction (MuProD)**
Position: MSc. Researcher
Grant: EU 7th Framework Programme. 3-year project (Co-P.I. Technion, IBM Research labs- Israel, Spain, Italy, Germany, Switzerland). 2012 - 2015
Collaborators: Prof. Anath Fischer

PROFESSIONAL ACTIVITIES

Invited talk on "Seeing through the (point) clouds. A journey towards 3D understanding", Haifa University Seminar, December 2023, Haifa, Israel
Invited talk on "Seeing through the (point) clouds. A postdoctoral journey towards 3D understanding", Israel Computer Vision Day 2021, January 2022. Tel Aviv, Israel
Invited talk on "Deepfit - 3D Surface Fitting via Neural Network Weighted Least Squares", Machine and Deep Learning Israel ECCVi community meetup, August 2020, Tel Aviv(online), Israel.
Invited talk on "How to create your academic digital persona?", Australian Centre for Robotic Vision ANU node retreat, November 2019. Canberra, Australia.
Invited talk on "Classification, Segmentation and Normal Estimation of 3D Point Clouds using CNNs", Israel Conference on Robotics (ICR), July 2019, Herzliya, Israel.
Invited talk on "Normal Estimation for Unstructured 3D Point Clouds using Convolutional Neural Networks", Machine and Deep Learning Israel CVPRi community meetup, June 2019, Tel Aviv, Israel.
Invited talk on "Classification and Normal Estimation of 3D Point Clouds using Deep Learning", Hebrew University, May 2019, Jerusalem, Israel.
Invited talk on "Classification and Normal Estimation of 3D Point Clouds using Deep Learning", Weizmann Institute, March 2019, Rehovot, Israel.
Invited talk on "3DmFV: 3D Point Cloud Classification in Real-Time using Convolutional Neural Networks", Israel Computer Vision Day, November 2018, Tel Aviv, Israel.

Co-organizer, Social Media Chair, Winter Conference on Applications in Computer Vision (WACV) 2025
Co-organizer, Poster and Website chair, Robotic vision summer school (RVSS) 2022
Mentor, MIT's Summer Geometry Initiative 2022
Co-organizer, Robotic vision summer school (RVSS) 2021.
Co-organizer of Tutorial on "Deep Declarative Networks and Differentiable Optimization Layers", ECCV 2020

Reviewer for CVPR, ECCV, ICCV, WACV (2020 - present)
Reviewer for NeurIPS, ICLR, ICML (2021 – present)
Reviewer for IROS, RA-L (2020 – present)
Reviewer for CAD, Remote Sensing (2019 – present)

FELLOWSHIPS, HONORS AND AWARDS

Marie Sklodowska-Curie Individual Global Fellowship (3 year 250K € grant) 2020-2023

ISEF International Fellowship for post-doctorate research	2020-2021
Israel Machine Vision (IMVC) graduate student award	2019
Scholarship for academic excellence, **Jacobs award** for doctoral students	2017
Consistent Honorary TA, CAD Systems 1 (Undergraduate course), Mechanical Engineering, Technion. (for semesters: s2017, s2016, w2016, s2015, w2015, s2014)	2014 - 2017
Scholarship for academic excellence, **Daniel award** for doctoral students	2016
Mechanical engineering department scholarship for academic excellence	Spring 2016
HP Indigo award for academic excellence	2015

TEACHING AND MENTORING

Co-supervising 2 PhD students at ANU on the topics of shape neural implicit representations and action understanding	2020 - 2025
Co-supervised a PhD student and 3 MSc students at Technion on the topics of 3D point cloud classification, object detection, segmentation, and 3D Saliency detection	2020 - 2023
Guest lecture at Cornell Tech course on "Special Topics in Computer vision" (CS 7670)	2023
Guest lecture at Technion course on "Advanced topics in Shape Analysis" (49056)	2022
Guest lecture at ANU course on "Advanced Topics in Computer Vision" (ENGN8501)	2020
Lecturer - CAD Systems 1, undergraduate	2015 - 2019
Project advisor for undergraduate research projects	2015 - 2019
TA - CAD Systems 1, undergraduate	2013 - 2019
TA - CAD Lab, undergraduate	2008

TALKING PAPERS PODCAST (link)

Founder, producer, and host. Interviewing authors of cutting-edge research papers in computer vision, deep learning, machine learning, AI, Graphics, and 3D vision.

Featured papers and guests:

1. "DORi: Discovering Object Relationships for Moment Localization of a Natural Language Query in a Video", hosting Cristian Rodriguez-Opazo, January 2022.
2. "Deep Declarative Networks: a new hope", hosting Dylan Campbell, January 2022.
3. "UC-Net: Uncertainty Inspired RGB-D Saliency Detection via Conditional Variational Autoencoders", hosting Jing Zhang, January 2022.
4. "Dynamic Neural Radiance Fields for Monocular 4D Facial Avatar Reconstruction", hosting Guy Gafni, February 2022.
5. "Neural Parts: Learning Expressive 3D Shape Abstractions with Invertible Neural Networks", hosting Despoina Paschalidou, February 2022.
6. "VLN BERT: A Recurrent Vision-and-Language BERT for Navigation", hosting Yicong Hong, February 2022.
7. "Shape As Points: A Differentiable Poisson Solver", hosting Songyou Peng, February 2022.
8. "Panoptic 3D Scene Reconstruction From a Single RGB Image", hosting Manuel Dahnert, March 2022.
9. "SampleNet: Differentiable Point Cloud Sampling", hosting Itai Lang, March 2022.
10. "ICON: Implicit Clothed humans Obtained from Normals", hosting Yuliang Xiu, April 2022.
11. "Neural RGB-D Surface Reconstruction", hosting Dejan Azinović May 2022.
12. "DiGS: Divergence guided shape implicit neural representation for unoriented point clouds", hosting Chamin Hewa Koneputugodage, June 2022.
13. "Learning Smooth Neural Functions via Lipschitz Regularization", hosting Hsueh-Ti Derek Liu, July 2022.

14. “BACON: Band-Limited Coordinate Networks for Multiscale Scene Representation”, hosting David Lindell, August 2022.
15. “KeypointNeRF: Generalizing Image-based Volumetric Avatars using Relative Spatial Encoding of Keypoints”, hosting Marko Mihajlovic, October 2022.
16. “Beyond Periodicity: Towards a Unifying Framework for Activations in Coordinate-MLPs”, hosting Sameera Ramasinghe, November 2022.
17. “Stochastic Poisson Surface Reconstruction” hosting Silvia Sellán, December 2022.
18. “Random Walks for Adversarial Meshes”, hosting Amir Belder, December 2022.
19. “CLIPasso: Semantically-Aware Object Sketching”, hosting Yael Vinker, March 2023.
20. “Deep Learning on Implicit Neural Representations of Shapes”, hosting Luca De Luigi, March 2023.
21. "Aligning Step-by-Step Instructional Diagrams to Video Demonstrations", hosting Jiahao Zhang, May 2023.
22. “MobileBrick: Building LEGO for 3D Reconstruction on Mobile Devices", hosting Kejie Li, June 2023.
23. “Panoptic Lifting for 3D Scene Understanding with Neural Fields", hosting Yawar Siddiqui, July 2023.
24. “Word-As-Image for Semantic Typography", hosting Shir Iluz, July 2023.
25. “MagicPony: Learning Articulated 3D Animals in the Wild", hosting Tomas Jakab, August 2023.
26. “CC3D: Layout-Conditioned Generation of Compositional 3D Scenes”, hosting Jeong Joon Park, September 2023.
27. “HMD-NeMo: Online 3D Avatar Motion Generation from Sparse Observations”, hosting Sadegh Aliakbarian, September 2023.
28. “Constructive Solid Geometry on Signed Distance Fields”, hosting Zoë Marschner, November 2023.
29. “Reverse Engineering Self-Supervised Learning”, hosting Ravid Schwartz-Ziv, December 2023.
30. “Variational Barycentric Coordinates”, hosting Anna Dodik, December 2023.
31. “Instant3D: Fast Text-to-3D with Sparse-View Generation and Large Reconstruction Model”, hosting Jiahao Li, February 2024.
32. "Cameras as Rays: Pose Estimation via Ray Diffusion", hosting Jason Zhang, March 2024.
33. “3DInAction: Understanding Human Actions in 3D Point Clouds”, hosting an AI to interview me, June 2024.
34. “3D Paintbrush: Local Stylization of 3D Shapes with Cascaded Score Distillation”, hosting Dale Decatur, July 2024.
35. “The PhD Advisor Hunt - A Student's Perspective”, hosting Derek Liu, February 2025.