Neehar Peri

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Education

Ph.D in Robotics, Carnegie Mellon University — Aug 2021 - Present
3D Perception In-The-Wild

M.S in Robotics, Carnegie Mellon University — Aug 2023
Long-Tailed 3D Detection via Multi-Modal Fusion

B.S. in Computer Engineering, University of Maryland - College Park — May 2021
QUEST Honors Program

Conference Publications

- SplatGym: Simulating Agents from Dynamic Urban Scenes using Gaussians — Under Review
  AB Vasudevan, ***N Peri****, H Turki, J Vertens, S Tulsiani, D Ramanan*
- Shelf-Supervised Multi-Modal Pre-Training for 3D Object Detection — Under Review
  M Khurana,* ***N Peri****, D Ramanan, J Hays*
- Planning with Adaptive World Models for Autonomous Driving — Under Review
  AB Vasudevan, ***N Peri****, D Ramanan*
- Long-Tailed 3D Detection via 2D Late Fusion — Under Review
  Y Ma,* ***N Peri****, S Wei, D, Ramanan, W Hua*, Y Li *, S Kong**
- Revisiting Few-Shot Object Detection with Vision-Language Models — Under Review
  A Madan,* ***N Peri****, S Kong, D Ramanan*
- I Can't Beleive It's Not Scene Flow — Under Review
  I Khatri, K Vedder*,* ***N Peri****, D Ramanan, J Hays*
- Better Call SAL: Towards Segmenting Anything in LiDAR — Under Review
  A Osep, T Meinhardt*, F Ferroni,* ***N Peri****, D Ramanan, L Leal-Taixe*
- ZeroFlow: Scaling Scene Flow via Distillation — ICLR 2024
  K Vedder, ***N Peri****, N Chodosh, I Khatri, E Eaton, D Jayaraman, Y Liu, D Ramanan, J Hays*
- Towards Long-Tailed 3D Detection — CoRL 2022
  N Peri*, A Dave, D Ramanan*, S Kong**
- A Brief Survey of Person Recognition at a Distance — ASILOMAR 2022
  C Nalty,* ***N Peri****, J Gleason*, CD Castillo, S Hu, T Bourlai, R Chellappa*
- Forecasting from LiDAR via Future Object Detection — CVPR 2022
  N Peri*, J Luieten, M Li, A Osep, L Leal-Taixe, D Ramanan*
- Assessment of a Novel Virtual Environment for Examining Human Cognitive-Motor Performance during Execution of Action Sequences — HCII 2022
  AA Shaver,* ***N Peri****, R Mezebish, G Matthew, A Berson, C Gaskins, GP Davis, GE Katz, I Samuel, JA Reggia, J Purtilo, RJ Gentili*
- A Synthesis-Based Approach for Thermal-to-Visible Face Verification — FG 2021
  N Peri*, J Gleason, CD Castillo, T Bourlai, VM Patel, R Chellappa*
- PreferenceNet: Encoding Human Preferences in Auction Design with Deep Learning — NeurIPS 2021
  N Peri*, MJ Curry*, S Dooley, JP Dickerson*
- The Devil is in the Details: Self-Supervised Attention for Vehicle Re-ID — ECCV 2020
  P Khorramshahi,* ***N Peri****, JC Chen, R Chellappa*
- A Dual Path Model with Adaptive Attention for Vehicle Re-ID — ICCV 2019††
  P Khorramshahi, A Kumar, ***N Peri****, SS Rambhatla, JC Chen, R Chellappa*

Workshop Publications

- Semi-Supervised Federated Multi-Organ Segmentation with Partial Labels — AAPM 2024†
  R Pemmaraju,* ***N Peri****
- An Empirical Analysis of Range for 3D Object Detection — ICCV 2023†
  N Peri*, M Li, B Wilson, YX Wang, J Hays, D Ramanan*
- ReBound: An Open-Source 3D Bounding Box Annotation Tool for Active Learning — CHI 2023†
  W Chen, A Edgley*, R Hota*, J Liu*, E Schwartz*, A Yizar*,* ***N Peri*****, J Purtilo**
- Deep k-NN Defense Against Clean-label Data Poisoning Attacks — ECCV 2020†
  N Peri*, N Gupta*, WR Huang*, L Fowl, C Zhu, S Feizi, T Goldstein, JP Dickerson*

- Towards Real-Time Systems for Vehicle Re-ID, Multi-Camera Tracking, and Anomaly Detection — CVPR 2020†
  N Peri*, *P Khorramshahi*, SS Rambhatla*, V Shenoy, S Rawat, JC Chen, R Chellappa*
- Attention Driven Vehicle Re-ID and Unsupervised Anomaly Detection for Traffic Understanding — CVPR 2019†
  *P Khorramshahi, **N Peri**, A Kumar, A Shah, R Chellappa*

Journal Publications

- Accelerating Image Recognition Using High Performance Computing — ITEA 2023
  *J Adams, JM Barton, R Chellappa, J Gabberty, J Gleason, S Hu, J Johnson, F Moor-Clingenpeel, B Oshiro, **N Peri**, D Richie, V To*
- Data and Algorithms for End-to-End Thermal Spectrum Face Verification — TBIOM 2023
  *T Bourlai, J Rose, S Mokalla, A Zabin, L Hornak, CB Nalty, **N Peri**, J Gleason, CD Castillo, VM Patel, R Chellappa*

*Equal Contribution
⋆Equal Supervision
†Selected for Spotlight Presentation
††Selected for Oral Presentation

Patents

- End-to-End Systems and Methods for Streaming 3D Detection And Forecasting from LiDAR Point Clouds — 17/692,973
  ***N Peri**, D Ramanan*

Academic Experience

Carnegie Mellon University, Pittsburgh, PA, *Robotics Institute* — *Apr 2020 – Present*
- Leading research on 3D object detection, multi-object tracking, motion forecasting, and multi-agent planning for embodied perception
- Advisor: Deva Ramanan

University of Maryland, College Park, MD, *UMIACS* — *May 2018 – May 2021*
- Conducted research in unsupervised traffic anomaly detection and discriminative representation learning for vehicle re-id
- Led research in defending against clean-label adversarial poisoning attacks
- Established novel method for encoding human preferences in revenue maximizing auction design
- Advisors: Rama Chellappa & John P. Dickerson

Industry Experience

NVIDIA, Pittsburgh, PA, *Research Scientist Intern* — *January 2024 – Current*
- Leading research on multi-modal and multi-view 3D object detection in-the-wild
- Built GNN-based 3D multi-object tracker which outperforms production tracker

MUKH Technologies, College Park, MD, *Research Engineer* — *Aug 2020 – May 2023*
- Led research on improving thermal-to-visible face synthesis for zero-shot identification
- Built robust face verification pipelines for multi-spectral data streams

Argo AI, Pittsburgh, PA, *Research Scientist Intern* — *May 2021 – Oct 2022*
- Developed end-to-end 3D object detection and forecasting pipeline from LiDAR point clouds
- Implemented novel metrics that jointly evaluate detection and forecasting accuracy

Bank of America, Charlotte, NC, *Conversational Commerce Technology Intern* — *Jun 2019 – Aug 2019*
- Developed novel deep learning pipeline to validate quality of utterance-intent pairs in chatbot conversations using PyTorch, AllenNLP, and NLTK
- Deployed RESTful Active Learning API to introduce targeted learning feedback loop and improve intent classification model performance

Teaching Experience

16-720, Carnegie Mellon University, Robotics Institute, *Head Teaching Assistant* — *Spring 2022, Fall 2022*
- Managed team of teaching assistants to effectively coordinate course responsibilities
- Graded course projects and held office hours

ENEE 244, University of Maryland, ECE Department, *Undergraduate Teaching Fellow* — *Spring 2019*
- Led Introduction to Digital Logic recitation for a discussion section of 15 students

Invited Talks

- Argoverse 2 End-to-End Forecasting Challenge — Jun 2024
  Invited Talk: CVPR 2024, Workshop on Autonomous Driving
- Foundational Few-Shot Object Detection Challenge — Jun 2024
  Invited Talk: CVPR 2024, Workshop on Visual Perception via Learning in an Open World
- 3D Object Detection for Autonomous Vehicles — Apr 2024
  Guest Lecture: 16-720, Computer Vision
- Better Call SAL: Towards Learning to Segment Anything in LiDAR — Apr 2024
  Invited Talk: Stack AV
- 3D Object Detection for Autonomous Vehicles — Apr 2024
  Guest Lecture: 16-825, Learning for 3D Vision
- Long-Tailed 3D Object Detection via Multi-Modal Fusion — Jan 2024
  Invited Talk: Carnegie Mellon University (R-PAD Lab)
- Argoverse 2 End-to-End Forecasting Challenge — Jun 2023
  Invited Talk: CVPR 2023, Workshop on Autonomous Driving
- 3D Object Detection for Autonomous Vehicles — Mar 2023
  Guest Lecture: 16-825, Learning for 3D Vision
- Image Processing and Convolutions — Sep 2022
  Guest Lecture: 16-720, Computer Vision
- How do Autonomous Vehicles See the World? — Aug 2022
  Invited Talk: Carnegie Mellon University (RoboLaunch)
- Transformers for Vision — Apr 2022
  Guest Lecture: 16-720, Computer Vision
- Training Convolutional Neural Networks — Apr 2022
  Guest Lecture: 16-720, Computer Vision
- Metrics and Methods for Detection and Forecasting in Autonomous Vehicles — Apr 2022
  Invited Talk: National Autonomous Vehicle Conference

Service

Conference Reviewer: NeurIPS 20{21,22,23,24}, CVPR 20{22,23,24}, AAAI 20{23,24}, ICCV 2023, ICLR 2024, ECCV 2024
Journal Reviewer: IJCV 2021, TPAMI 2023
Mentorship: CMU AI Mentoring Program (20{21, 22}), QUEST Mentoring Program (2022), CMU AI for Social Good Summit (2022)
Organizer: Visual Perception and Learning in an Open World (CVPR 20{22, 23, 24}), Computer Vision Reading Group (20{23, 24})
Masters Thesis Committee Member: Bharath Raj, Anish Madan
Other: TRINITY Cluster Management 20{22,23,24}, AUTOBOT Cluster Management 20{22,23,24}, Robotics Institute Summer Scholars Admission Committee (2024)

Mentorship

Name	Institution	Year(s)	Project
Zihan Wang	CMU	2024 –	Multi-view dynamic reconstruction in-the-wild
Nina Johe, Aryan Kakadia, Muzzamil Kham, Morgan Ko, Josh Leeman, Max Son, Sashwat Venkatesh	UMD	2024	CMSC435 software engineering capstone to build an end-to-end platform for medical image analysis
Mehar Khurana	IIITD	2023 – 2024	Shelf-supervised 3D object detection
Anish Madan	CMU	2022 –	Few-shot multi-modal 2D detection with vision-language models
Andrew Shen	CMU	2022 – 2023	Benchmarking modular 3D perception stack for autonomous vehicles
Xindi Wu	CMU	2022	Self-supervised multi-modal representation learning for point clouds

Aminah Yizar, Andrew Edgley, Ezra Schwartz, Joshua Liu, Raunak Hota, Royce He, Wesley Chen	UMD	2022	CMSC435 software engineering capstone to build an active learning framework to allow human-in-the-loop 3D object annotation
Christopher Nalty	MUKH	2021-2022	Synthetic data augmentation for thermal-to-visible face verification
Aastha Senjalia, Andrew Vetter, Benjamin Namovicz, Cheyenne Montgomery, Ferzam Mohammad, Matthew Weinberg, Nicholas Revill	UMD	2021	CMSC435 software engineering capstone to build a visualization platform for autonomous vehicle data. Project won People's Choice Award.

Awards

Name	**Institution**	**Distinction**	**Year**
NSF Graduate Research Fellowship	CMU	National	2023
Maryland Undergraduate Researcher of the Year	UMD	University	2021
Sujan Guha Memorial Best Senior Thesis Award	UMD	Department	2021
CRA Outstanding Undergraduate Researcher (Honorable Mention)	UMD	National	2021
Yurie & Jeong H. Kim Scholarship	UMD	Department	20{18,19,20}