

Tianrui Guan

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Google Scholar

EDUCATION

- **University of Maryland, College Park** College Park, MD
• *Ph.D., Computer Science, advisor: Dinesh Manocha* Jan 2022 - Current
Masters of Science with Thesis, Computer Science, GPA: 4.0 Aug 2019 - Dec 2021
- **University of Maryland, College Park** College Park, MD
• *Bachelor of Science, Computer Science and Statistics, GPA: 3.97* Aug 2016 - May 2019
Graduated with Magna Cum Laude Latin Honor, Computer Science Department Honors

RESEARCH PROJECTS

- **Language and Visual Hallucination for LVLMs**
Dataset and Analysis of Large VLMs like GPT-4V, LLaVA-1.5, Gemini Vision Pro, etc. in progress
- **Visual-Language Model and Retrieval for navigation**
Visual-language Model for Object Navigation, Visual Illusion and Language Hallucination of LVLMs in progress
- **Global and Local Point Matching**
Cross-source Point Registration, Robotic Navigation and Localization in progress
- **Autonomous Driving**
3D Object Detection, Trajectory Prediction, Tracking
- **Terrain Classifications and Segmentation in Unstructured Environment**
Semantic Segmentation, Terrain Classification, Traversability Estimation, Robotic Navigation and Control
- **UAV Activity Recognition**
Aerial Activity Recognition, Edge Computing

WORKING EXPERIENCE

- **Amazon Lab126** Sunnyvale, CA
Research Intern Summer 2023 - Current
 - **Visual-Language Model: LLM-oriented Object Retrieval and Object Navigation.** (under review)
- **Baidu USA** Sunnyvale, CA
Research Intern Summer 2021, 2022
 - **Terrain Traversability Mapping and Navigation System (Accepted to RSS 2022 and Autonomous Robots):** We built a traversability estimation system for unstructured environment and excavator applications, including perception, navigation and control. We built the infrastructure and first prototype of our navigation system in unstructured worksite.
 - **Terrain Classification with Adaptive Scheduling Control (Accepted to ICRA 2023):** We proposed a terrain classification network using both visual and inertial information of the terrain. Our method can make accurate prediction known terrain and generalize to unknown terrain based on its navigation properties. We implemented a adaptive control framework that can lead to better navigation result.
- **University of Maryland, College Park** College Park, MD
• *Research Assistant - Department of Computer Science* August 2021 - Current
Teaching Assistant - Department of Computer Science 2018 - 2021

LIST OF PUBLICATIONS AND CONTRIBUTED WORKS

1. **Tianrui Guan***, Fuxiao Liu*, Xiyang Wu, Ruiqi Xian, Zongxia Li, Xiaoyu Liu, Xijun Wang, Lichang Chen, Furong Huang, Yaser Yacoob, Dinesh Manocha, Tianyi Zhou. HallusionBench: An Advanced Diagnostic Suite for Entangled Language Hallucination & Visual Illusion in Large Vision-Language Models. *Conference on Computer Vision and Pattern Recognition (CVPR 2024)*. [Link](#) [Code](#)
2. **Tianrui Guan**, Yurou Yang, Harry Cheng, Muyuan Lin, Richard Kim, Rajasimman Madhivanan, Arnie Sen, Dinesh Manocha. LOC-ZSON: Language-driven Object-Centric Zero-Shot Object Retrieval and Navigation. *IEEE International Conference on Robotics and Automation (ICRA 2024)*. [Link](#)

3. **Tianrui Guan**, Aswath Muthuselvam, Montana Hoover, Xijun Wang, Jing Liang, Adarsh Jagan Sathyamoorthy, Damon Conover, Dinesh Manocha. CrossLoc3D: Aerial-Ground Cross-Source 3D Place Recognition. *International Conference on Computer Vision (ICCV 2023)*. [Link](#)
4. **Tianrui Guan**, Ruitao Song, Zhixian Ye, Liangjun Zhang. VINet: Visual and Inertial-based Terrain Classification and Adaptive Navigation over Unknown Terrain. *IEEE International Conference on Robotics and Automation (ICRA 2023)*. [Link](#)
5. **Tianrui Guan**, Divya Kothandaraman, Rohan Chandra, Adarsh Jagan Sathyamoorthy, Kasun Weerakoon, Dinesh Manocha. GA-Nav: Efficient Terrain Segmentation for Robot Navigation in Unstructured Outdoor Environments. *IEEE Robotics and Automation Letters (RAL)*, 2022. [Link](#)
6. **Tianrui Guan**, Zhenpeng He, Ruitao Song, Liangjun Zhang. TNES: Terrain Traversability Mapping, Navigation and Excavation System for Autonomous Excavators on Worksite. *Autonomous Robots*. [Link](#)
7. **Tianrui Guan**, Zhenpeng He, Ruitao Song, Dinesh Manocha, Liangjun Zhang. TNS: Terrain traversability mapping and navigation system for autonomous excavators. *Proceedings of Robotics: Science and Systems (RSS 2022)*. [Link](#)
8. **Tianrui Guan***, Jun Wang*, Shiyi Lan, Rohan Chandra, Zuxuan Wu, Larry Davis, Dinesh Manocha. M3DETR: Multi-Representation, Multi-Scale, Mutual-Relation 3D Object Detection With Transformers. *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV 2022)*. [Link](#)
9. Xiyang Wu, Ruiqi Xian, **Tianrui Guan**, Jing Liang, Souradip Chakraborty, Fuxiao Liu, Brian Sadler, Dinesh Manocha, Amrit Singh Bedi. On the Safety Concerns of Deploying LLMs/VLMs in Robotics: Highlighting the Risks and Vulnerabilities. *under submission*. [Link](#)
10. Xiyang Wu, Rohan Chandra, **Tianrui Guan**, Amrit Singh Bedi, Dinesh Manocha. iPLAN: Intent-Aware Planning in Heterogeneous Traffic via Distributed Multi-Agent Reinforcement Learning. *7th Annual Conference on Robot Learning (CoRL), 2023*. **Oral presentation**. [Link](#)
11. Divya Kothandaraman, **Tianrui Guan**, Xijun Wang, Sean Hu, Ming Lin, Dinesh Manocha. FAR: Fourier Aerial Video Recognition. *European Conference on Computer Vision (ECCV 2022)*. [Link](#)
12. Rohan Chandra, **Tianrui Guan**, Srujan Panuganti, Trisha Mittal, Uttaran Bhattacharya, Aniket Bera, Dinesh Manocha. Forecasting Trajectory and Behavior of Road-Agents Using Spectral Clustering in Graph-LSTMs. *IEEE Robotics and Automation Letters (RAL)*, 2020. [Link](#)
13. Xijun Wang, Ruiqi Xian, **Tianrui Guan**, Dinesh Manocha. Prompt Learning for Action Recognition. *Under Review*. [Link](#)
14. Adarsh Jagan Sathyamoorthy, Kasun Weerakoon, **Tianrui Guan**, Mason Russell, Damon Conover, Jason Pusey, Dinesh Manocha. VERN: Vegetation-aware Robot Navigation in Dense Unstructured Outdoor Environments. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2023)*. [Link](#)
15. Jin Fang, Dingfu Zhou, **Tianrui Guan**, Bingshu Wang, Cheng-zhong Xu, Liangjun Zhang. PointStacking: Rethinking Mixup for 3D Object Detection. *Under Review*.
16. Xijun Wang*, Ruiqi Xian*, **Tianrui Guan**, Celso M. de Melo, Stephen M. Nogar, Aniket Bera and Dinesh Manocha. AZTR: Aerial Video Action Recognition with Auto Zoom and Temporal Reasoning. *IEEE International Conference on Robotics and Automation (ICRA 2023)*. [Link](#)
17. Kasun Weerakoon, Adarsh Jagan Sathyamoorthy, Jing Liang, **Tianrui Guan**, Utsav Patel, Dinesh Manocha. GrASPE: Graph based Multimodal Fusion for Robot Navigation in Unstructured Outdoor Environments. *IEEE Robotics and Automation Letters (RAL)*, 2023. [Link](#)
18. Liangjun Zhang, Xibin Song, Liyang Wang, Lingfeng Qian, **Tianrui Guan**, Zhenpeng He, Zhixian Ye, Ruitao Song, Haodong Ding, Dinesh Manocha. Autonomous Excavator System with Real-World Deployment. *IEEE International Conference on Robotics and Automation, Construction Workshop (ICRA Workshop 2022)*. [Link](#)
19. Jing Liang, Kasun Weerakoon, **Tianrui Guan**, Nare Karapetyan, Dinesh Manocha. AdaptiveON: Adaptive Outdoor Navigation Method For Stable and Reliable Motions. *IEEE Robotics and Automation Letters (RAL)*, 2022. [Link](#)

20. Adarsh Jagan Sathyamoorthy, Kasun Weerakoon, **Tianrui Guan**, Jing Liang, Dinesh Manocha. TerraPN: Unstructured terrain navigation through Online Self-Supervised Learning. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2022)*. Link
21. Jing Liang, Yi-Ling Qiao, **Tianrui Guan**, Dinesh Manocha. OF-VO: Reliable Navigation among Pedestrians Using Commodity Sensors. *IEEE Robotics and Automation Letters (RAL)*, 2021. Link
22. Adarsh Jagan Sathyamoorthy, Utsav Patel, **Tianrui Guan**, Dinesh Manocha. Frozone: Freezing-Free, Pedestrian-Friendly Navigation in Human Crowds. *IEEE Robotics and Automation Letters (RAL)*, 2020. Link
23. Adarsh Jagan Sathyamoorthy, Jing Liang, Utsav Patel, **Tianrui Guan**, Rohan Chandra, Dinesh Manocha. DenseCAvoid: Real-time Navigation in Dense Crowds using Anticipatory Behaviors. *IEEE International Conference on Robotics and Automation (ICRA 2020)*. Link
24. Rohan Chandra, Uttaran Bhattacharya, Christian Roncal, Aniket Bera, Dinesh Manocha. RobustTP: End-to-End Trajectory Prediction for Heterogeneous Road-Agents in Dense Traffic with Noisy Sensor Inputs. *ACM Computer Science in Cars Symposium (CSCS 2019)*. Contribution of the project: Development of the code and software. Link & Code

ACADEMIC SERVICES

- Reviewer for IEEE/CVF Computer Vision and Pattern Recognition Conference (*CVPR*) 2022 - 2024
- Reviewer for IEEE International Conference on Computer Vision (*ICCV*) 2023
- Reviewer for European Conference on Computer Vision (*ECCV*) 2022, 2024
- Reviewer for Asian Conference on Computer Vision (*ACCV*) 2024
- Reviewer for International Conference on 3D Vision (*3DV*) 2022
- Reviewer for IEEE/CVF Winter Conference on Applications of Computer Vision (*WACV*) 2023
- Reviewer for International Conference on Intelligent Robots and Systems (*IROS*) 2020 - 2023
- Reviewer for International Conference on Robotics and Automation (*ICRA*) 2021 - 2023
- Reviewer for IEEE Robotics and Automation Letters (*RA-L*) Since 2021
- Reviewer for Autonomous Robots (Springer) Since 2023
- Reviewer for IEEE Transactions on Intelligent Vehicles Since 2023
- Reviewer for IEEE Transactions on Circuits and Systems for Video Technology Since 2024

TALKS

- **Large Visual-Language Models and Hallucinations** Feb 2024
AGI Leap Summit
- **Object Retrieval and Navigation using Visual-Language Models** Jan 2024
Baidu Robotics and Autonomous Driving Lab (RAL)
- **Terrain Traversability Mapping and Navigation System for Autonomous Excavators** Jun 2022
Robotics: Science and Systems (RSS 2022)
- **Multi-Representation, Multi-Scale, Mutual-Relation 3D Object Detection With Transformers** Jan 2022
IEEE/CVF Winter Conference on Applications of Computer Vision (WACV 2022)
- **Terrain Segmentation and Traversability Analysis in Unstructured Outdoor Environments** Nov 2021
University of Maryland, College Park

HONORS AND AWARDS

- **RAS Travel Award** | International Conference on Intelligent Robots and System (IROS 2022) *Oct 2022*
- **Goldhaber Travel Award** | University of Maryland, College Park *Aug 2022*
- **ICSSA Travel Award** | University of Maryland, College Park *Aug 2022*
- **SRC Research Scholars Fellowship** | Semiconductor Research Corporation *Aug 2020*
- **MAGNA CUM LAUDE** | University of Maryland, College Park *May 2019*
- **Dean's List** | University of Maryland, College Park *2016 - 2019*
- **Silver Medal** | China National Double Foot Robot Competition *2015*
- The Mathematics Honor Program pre-selected for Shandong University (11th grade, 23 out of 3000+) *2014*