TANNER WAMBUI MUTURI

twambui.github.io , /in/tannermuturi
tanner.muturi@gmail.com, twmtyg@umsystem.edu

EDUCATION

University of Missouri-Columbia| USA **Expected Jul 2026**
PhD in Engineering (major in Computer Vision and Robotics) (*CGPA: 3.95/4.0)*

Middle East Technical University – Ankara| Turkey **Oct 2020 – Feb 2023**
Master of Science in Civil Engineering (*CGPA 3.79/4.0*)

Middle East Technical University - NCC| Northern Cyprus **Sep 2016 – Aug 2020**
Bachelor of Science in Civil Engineering (*CGPA 4.0/4.0*)

RELEVANT RESEARCH EXPERIENCE **Nov 2019 – To date**

Vision-Language Spatial Reasoning in 3D Warehouse Environments
University of Missouri-Columbia

- Finetuned a SpatialQA vision-language-model using LoRA for distance estimation, object counting, multi-choice grounding and spatial relation inference, enabling 3D scene understanding from RGB and depth images in warehouse environments.
- Achieved a ranking of 4th overall on the 9th AI City challenge ranking

ScoutAI: Robotic AI System for Sidewalk Survey
University of Missouri-Columbia

- Designed and implemented a ROS2-based autonomous navigation pipeline integrating LiDAR, IMU, and RGB sensors for real-time 3D mapping and obstacle detection on NVIDIA Jetson Orin.
- Developed ROS2 nodes in C++ and performed unit tests using Gazebo simulation.
- Streamlined simulation workflows by leveraging Docker containers for dependency management and cross-platform compatibility.
- Results are to be compiled and published in a peer review journal.

Computer Vision for Pavement Crack Detection
University of Missouri-Columbia

- Adopted Generative AI for shadow removal in pavement images. Consequently, finetuned Meta's Segment Anything Model (SAM) in a python environment using PyTorch for crack segmentation. Published findings in Transportation Research Record, a peer-reviewed journal in the field.
- Collaborated with lab members in the Optimized Road Damage Detection Challenge (2024), training a YOLOv9 model to improve crack detection with a focus on reducing inference time and memory usage for real-time deployment.

RELEVANT WORK EXPERIENCE

Graduate Research Assistant| University of Missouri – Columbia, USA **Aug 2023 – To date**

- Contributed to training AI models for traffic signal performance investigation as part of a Missouri Division of Transportation (MODOT) funded project.
- Adopted data analysis techniques for extraction of freight activity as part of a US DOT funded project.
- Developed and taught modules on NVIDIA JetBot for autonomous driving.

TECHNICAL SKILLS

- **Programming**: Python (Pytorch, TensorFlow), C++, SQL
- **Frameworks/Tools:** ROS1/ROS2, Bazel, Docker, Git, Gazebo, Ubuntu/Linux
- **Domains**: Machine Learning, Computer Vision, Robotics, Embedded Systems.

PUBLICATIONS

- **Muturi, T.**, Kyem, B. A., Asamoah, J. K., Owor, N. J., Dzinyela, R., Danyo, A., ... & Aboah, A. (2025). Prompt-guided spatial understanding with rgb-d transformers for fine-grained object relation reasoning. In *Proceedings of the IEEE/CVF International Conference on Computer Vision* (pp. 5280-5288).

- Owor, N. J., Asamoah, J. K., **Muturi, T.**, Owor, A. J., Kyem, B. A., Danyo, A., ... & Aboah, A. (2025). A unified detection pipeline for robust object detection in fisheye-based traffic surveillance. In *Proceedings of the IEEE/CVF International Conference on Computer Vision* (pp. 5255-5262).
- **Muturi, T.**, Adu-Gyamfi, Y., & Kesse, D. (2025). Complex Shadow Removal in Pavement Imagery: Leveraging Diffusion Models for Advanced Solutions. *Transportation Research Record*, 03611981251346165.
- **Muturi, T.,** & Adu-Gyamfi, Y. (2025). Enhanced Crack Segmentation Using Meta's Segment Anything Model with Low-Cost Ground Truths and Multimodal Prompts. *Transportation Research Record*, 03611981251322484.
- Behzadian, A., **Muturi, T.,** Owor, N. J., & Adu-Gyamfi, Y. (2024, December). Optimizing Road Damage Detection with YOLOv10: A Resource-Efficient Approach Utilizing Augmentation, Data Sampling, and Hyperparameter Tuning. In *2024 IEEE International Conference on Big Data (BigData)* (pp. 8439-8446). IEEE
- Arthur, E., **Muturi, T.**, & Adu-Gyamfi, Y. (2024). Training Vehicle Detection and Classification Models with Less Data: An Active Learning Approach. *Transportation Research Record*, *2678*(11), 2146-2164.

HONOURS/AWARDS

- **Fourth Place** in 9th in the AI City Challenge 2025 – Track 3: Warehouse Spatial Intelligence (3D Vision and Spatial Reasoning). **July 2025**
- Deaton Scholar of the Brady & Anne Deaton Institute for University Leadership in International Development **May 2025**
- **Third Place** in Mizzou GPC's Second Annual Interdisciplinary Case Competition on enhancing campus mobility, safety and sustainability. **January 2025**
- **Fifth Place in** Optimized Road Damage Detection Challenge (ORDDC'2024) for pavement distress detection and classification **December 2024**
- Participant of the inaugural CITI-Sci 2024 Mizzou Program sponsored by the U.S. National Science Foundation (NSF) **November 2024**
- **Fourth place** in student competition in Data Science for Pavement Science Symposium; **Pavement distress detection and classification** **August 2022**

VOLUNTEERING/SERVICE

Event Manager| Mizzou College of Engineering Graduate Student Association (CEGSA) **Jun 2025 – To date**

- Planned, organized and executed events to engage members and achieve organizational goals.

President | Mizzou Institute of Transportation Engineers (ITE) Chapter **Sep 2025 – To date**

- Developed and managed the student chapter's annual budget

Speaker Selection Committee Member| Alternative Career Exploration in the Sciences (ACES) **Sep 2024 – To date**

- Planned, organized and executed events to engage members and achieve organizational goals.

Committee Member | Transportation Research Board (TRB) AI Ethics and Equity Subcommittee **Jan 2023 – To date**

- Collaborated in the development of a circular on AI Ethics and Equity in transportation planning.