

Armstrong Aboah, Ph.D.

Assistant Professor

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Google Scholar Citation: 409

Github: <https://github.com/aboah1994>

EDUCATION

University of Missouri, Columbia, MO, USA

Doctor of Philosophy (Civil Engineering),

Jan 2020 – Dec 2022

- Concentration in Computer Vision and Machine Learning ○ Dissertation: *AI-based framework for automatically extracting high-low features from NDS data to understand driver behavior*

Tennessee Technological University, Cookeville, USA

Master of Science,

Aug 2018 – Dec 2019

- Concentration in Transportation Planning

Kwame Nkrumah University of S&T, Kumasi, Ghana

Bachelor of Science,

Sep 2013 – July 2017

- Concentration in Structure Engineering

RESEARCH INTERESTS

- Transportation Planning
- Human Factors and Ergonomics
- Intelligent Transportation Systems
- Autonomous and Connected Vehicles
- Medical Image Analysis
- Digital Twins and Smart Cities
- Big Data Analytics in Transportation
- Travel demand modeling and forecasting
- Transportation and Traffic Safety Research
- Public Transportation
- Congestion Management
- Pavement and Asset Management

TEACHING INTEREST

- Transportation Planning
- Statics
- Traffic Safety
- Highway Design
- Travel Demand Modeling
- Pavement Design

ACADEMIC APPOINTMENTS

- | | | |
|---------------------------------------|-------------------------------|-------------------|
| • Assistant Professor | North Dakota State University | Feb 2024-Present |
| • Assistant Research Professor | University of Arizona | Aug 2023-Jan 2024 |
| • Research Associate | Northwestern University | Jan 2023-Aug 2023 |

PROFESSIONAL ACTIVITIES

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|--------------------------------|--|------------------|
| • Continuing Edu. Chair | ASCE – North Dakota Chapter | Jun 2024-Present |
| • Member | Transportation and Development Institute | Jun 2024-Present |
| • Member | American Society of Civil Engineers (ASCE) | May 2024-Present |
| • Member | IEEE | Feb 2024-Present |

RESEARCH

REFEREED JOURNAL PUBLICATIONS (* Student Supervised, ° Corresponding author)

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1. Duah, J. O. *, Aboah, A.^C, & Osafo-Gyamfi, S. (2024). *DivNEDS: Diverse Naturalistic Edge Driving Scene Dataset for Autonomous Vehicle Scene Understanding*. **IEEE Access**.
 2. Shoman, M., Aboah, A., Daud, A., & Adu-Gyamfi, Y. (2024). *Graph Convolutional Gated Recurrent Unit Network for Traffic Prediction using Loop Detector Data*. **Advances in Data Science and Adaptive Analysis**.
 3. Aboah, A.^C, Adu-Gyamfi Yaw, Anuj Sharma et al. (2023): “*Driver Maneuver Detection and Analysis using Time Series Segmentation and Classification*”, **ASCE Journal of Transportation Research Part A**.
 4. Aboah, Armstrong^C, Michael Boeding, Yaw Adu-Gyamfi (2022). *Mobile Sensing for Multipurpose Applications in Transportation*. **Journal of Big Data Analytics in Transportation**.
 5. Aboah, A.^C, & Adu-Gyamfi, Y. (2020). *Smartphone-Based Pavement Roughness Estimation Using Deep Learning with Entity Embedding*. **Advances in Data Science and Adaptive Analysis**, 12(03n04), 2050007.
 6. Shoman, M., Aboah, A.^C, & Adu-Gyamfi, Y. (2020). *Deep learning framework for predicting bus delays on multiple routes using heterogenous datasets*. **Journal of Big Data Analytics in Transportation**, 2(3), 275- 290.

REFEREED CONFERENCE PUBLICATIONS (* STUDENT SUPERVISED)

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1. Tran, D. Q., Aboah, A., Jeon, Y., Shoman, M., Park, M., & Park, S. (2024). *Low-Light Image Enhancement Framework for Improved Object Detection in Fisheye Lens Datasets*. **Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision**.
 2. Shoman, M., Wang, D., Aboah, A., & Abdel-Aty, M. (2024). *Enhancing traffic safety with parallel dense video captioning for end-to-end event analysis*. **Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision**.
 3. Abdulateef Ajibola Daud, ..., Aboah, Armstrong (2024). *Edge Computing-Enabled Road Condition Monitoring: System Development and Evaluation*. **Transportation Research Board (TRB)**.
 4. Neema Jakisa Owor*, Aboah, Armstrong (2024). *Image2PCI – A Multitask Learning Framework for Estimating Pavement Condition Indices Directly from Images*. **Transportation Research Board (TRB)**.
 5. Linlin Zhang, Xiang Yu, Aboah, Armstrong (2024). *3D Object Detection and High-Resolution Traffic Parameters Extraction Using Low-Resolution LiDAR Data*. **Transportation Research Board (TRB)**.
 6. Bin Wang*, Hongyi Pan, Armstrong Aboah, et al. (2024). *GazeGNN: A Gaze-Guided Graph Neural Network for Chest X-Ray Classification*. **Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision**.
 7. Kelvin Kwakye*, Armstrong Aboah, Younho Seong, Sun Yi (2023). *Classification of human driver distraction using 3D convolutional neural networks*. **Proceedings of the Human Factors and Ergonomics Society Annual Meeting**.
 8. Aboah, Armstrong, Ulas Bagci, Yaw Adu-Gyamfi (2023). *DeepSegmenter: Temporal Action Localization for Detecting Anomalies in Untrimmed Naturalistic Driving Videos*. **In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPRw)**.
Impact Factor: 45.17
 9. Kelvin Kwakye*, Younho Seong, Sun Yi, Aboah, Armstrong (2023). *DriveSAM: Cognitive Perspective on Driving Maneuvers Based on Drivers’ Attention Using Eye Gaze Data*. **1st International Conference on Smart Mobility and Vehicle Electrification**

10. Bin Wang*, **Armstrong Aboah**, Zheyuan Zhang, Hongyi Pan, Ulas Bagci (2023). *GazeSAM: Interactive Image Segmentation with Eye Gaze and Segment Anything Model*. **NeuRIPS 2023 Workshop on Gaze Meets ML**.
11. **Aboah, Armstrong**, Bin Wang, Ulas Bagci, Yaw Adu-Gyamfi (2023). *Real-time Multi-Class Helmet Violation Detection Using Few-Shot Data Sampling Technique and YOLOv8*. **In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPRw)**. Impact Factor: 45.17
12. Shoman, M., **Aboah, A.**, Morehead, A., Duan, Y., Daud, A., & Adu-Gyamfi, Y. (2022). *A Region-Based Deep Learning Approach to Automated Retail Checkout*. **In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (pp. 3210-3215) (CVPRw)**. Impact Factor: 45.17
13. **Aboah, Armstrong**, Elizabeth Arthur, Yaw Adu-Gyamfi (2021). *A New Benchmark Dataset For Pavement Distress Detection And Severity Analysis*. **Transportation Research Board. (TRB)**
14. Maged Shoman, **Aboah, Armstrong**, Yaw Adu-Gyamfi (2021). *Evaluation of Connected Vehicles Data for Congestion and Incident Detection*. **Transportation Research Board (TRB)**.
15. Maged Shoman, **Aboah, Armstrong**, Yaw Adu-Gyamfi (2021). *Development and Visualization of Winter Severity Impact using Multisource Data*. **Transportation Research Board. (TRB)**
16. **Aboah, A.** (2021): *Vision-based system for traffic anomaly detection using deep learning and decision trees*. **In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshop (pp. 4207-4212) (CVPRw)**. Impact Factor: 45.17.

PROPOSAL WRITING

Winning Proposals

1. **Sponsor:** AI SUSTEIN - Seed Grant
Title: “Advancing Power Grid Monitoring System: A Lightweight Deep Learning Framework for Real-Time Fault Detection and Continuous Smart Monitoring”
Amount: \$15,000
Contribution: Proposal Writer and PI
Period: Aug 2024 - May 2025
2. **Sponsor:** RCA
Title: “Development of an IoT-Based Sensor for Advancing Safety Monitoring and Intervention at Work Zone Areas”
Amount: \$153,889
Contribution: Proposal Writer and PI
Duration: Jun 2024 – May 2025
3. **Sponsor:** NDSU EXPLORE Undergraduate Research Program
Title: “Advanced Traffic Sign Retro-reflectivity Condition Estimation Using Computer Vision”
Amount: \$2,400
Contribution: Proposal Writer and PI
Duration: Jun 2024 – August 2024

Other Proposals (pending)

4. Autonomous Vehicles for Americans in Tribes and Rurality (AVATAR), Submitted to USDOT for UTC application in 2024. **Amount: \$300,000 (Co-PI)**
5. Predicting Winter Severity Index: Interactive Web Platform, Submitted to Iowa DOT in 2024. **Amount: \$ 100,000 (PI)**
6. Advancing Work Zone Safety for Commercial Motor Vehicles Through AI-Based Monitoring and Intervention System, Submitted to FMSCA (Federal) in 2024. **Amount: \$ 700,000 (PI)**

7. A Mixed-Reality CDL Simulation Environment for Safe CDL Training, Submitted to FMSCA (Federal) in 2024. **Amount: \$ 195,148 (Co-PI)**
8. Early-career development to Enhance Teaching and Research, Submitted to NDSU Foundation in 2024. **Amount: \$ 5000 (PI)**
9. Engineering Countermeasures to Mitigate Reckless Driving Behavior, Submitted to WisDOT. **Amount \$50,000 (NDSU PI share)**

INVITED TALKS & PRESENTATIONS

1. Abdulateef Ajibola Daud, **Armstrong Aboah**. Edge Computing-Enabled Road Condition Monitoring: System Development and Evaluation: Transportation Research Board (TRB) January 2024.
2. Neema Jakisa Owor, **Armstrong Aboah**. Image2PCI – A Multitask Learning Framework for Estimating Pavement Condition Indices Directly from Images: Transportation Research Board (TRB) January 2024.
3. **Armstrong Aboah**. Pavement Distress Detection Using YOLOv5: Data Science in Pavement Symposium. March 2023.
4. **Armstrong Aboah**. Region-Based Deep Learning Approach to Automated Retail Checkout: In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) June 2022.
5. **Armstrong Aboah**. Vision-based system for traffic anomaly detection using deep learning and decision trees: In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) June 2021.
6. **Armstrong Aboah**. A New Benchmark Dataset for Pavement Distress Detection and Severity Analysis: Transportation Research Board (TRB) January 2021.
7. **Armstrong Aboah**. Evaluation of Connected Vehicles Data for Congestion and Incident Detection: Transportation Research Board (TRB) January 2021.
8. **Armstrong Aboah**. Development and Visualization of Winter Severity Impact using Multisource Data: Transportation Research Board (TRB) January 2021.

STUDENT ADVISING

HISTORY

Year	Undergraduate Students	Master's Students	Doctoral Students
2024	2	0	3

DOCTORAL STUDENTS UNDER SUPERVISION

- Name: **Blessing Agyei kyem**
Dissertation Title: Advanced Asset Management System
Role: CHAIR
Status: Expected – SPRING 2028
- Name: **Joshua Kofi Asamoah**
Dissertation Title: TBD
Role: CHAIR
Status: Expected – SPRING 2028

MASTERS STUDENTS UNDER SUPERVISION

- Name: **Blessing Agyei Kyem**
Dissertation Title: TBD
Role: CHAIR
Status: Expected – SPRING 2028

THESIS/DISSERTATION COMMITTEE INVOLVEMENT

- Name: **Talha Ahmed**
Dissertation Title: TBD
Degree: PhD
Status: Expected – TBD
- Name: **Faisal Muhammad Habib**
Dissertation Title: “Utilizing econometric modeling to address road safety issues by analyzing factors affecting injury severities in road crashes of large trucks”
Degree: PhD
Status: Completed

COURSES TAUGHT

UNDERGRADUATE

CODE	NAME	EVAL	PERIOD
CE 363	Transportation Engineering and Pavement Design	4.89 / 5.0	Fall 2023-Fall 2023
CE 454	Geometric Highway Design	TBD	Fall 2024-Present

GRADUATE

CODE	NAME	EVAL	PERIOD
CE 654	Geometric Highway Design	TBD	Fall 2024-Present

SERVICE

DEPARTMENT SERVICE

CCEE High School Outreach 2024
CCEE Scholarship Committee 2024-present

COLLEGE/UNIVERSITY SERVICE

Grant Reviewer - Research and Creative Activity (RCA) Jun 2024-Present

JOURNAL REVIEWS

Updated on 8/31/2024

- **Reviewer** IEEE/CVF CVPR Apr 2024-Present
- **Reviewer** Environmental Modelling and Software Mar 2024-Present
- **Reviewer** ASCE Journal of Transportation Engineering Part A Aug 2022-Present
- **Reviewer** Transportation Research Board Jan 2020-Present
- **Reviewer** Transportation Research Record Jan 2020-Present
- **Reviewer** IET Image Processing Jan 2021-Present