# SAGAR **DASGUPTA**

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## RESEARCH INTERESTS

- Intelligent Transportation Systems (ITS) and Transportation Digital Twin
- Cybersecurity of Transportation Cyber-Physical Systems and C-V2X Communication
- Artificial Intelligence and Machine Learning for Smart and Resilient Mobility

## EDUCATION

**Ph.D., Civil Engineering,The University of Alabama** | Transportation — Tuscaloosa, AL
Advisor: Mizanur Rahman — 2020-2024
Committee: Steven Jones (Civil), Alexander Hainen (Civil), Thejesh Bandi (Physics), Jordan Larson (Aerospace)
Dissertation: Cyber-Resilient Positioning and Navigation for Autonomous Ground Vehicles
Department of Civil, Construction, and Environmental Engineering

**M.Sc., Mechanical Engineering, Clemson University** — Clemson, SC
Department of Mechanical Engineering — 2017-2020

**B.Tech., Mechanical Engineering, Motilal Nehru National Institute of Technology** — India
Department of Mechanical Engineering — 2011-2015

## APPOINTMENTS

### Academic: Research

**Postdoctoral Fellow** — 2024 - Present

USDOT National Center for Transportation Cybersecurity and Resiliency (TraCR)
Department of Civil, Construction, and Environmental Engineering
The University of Alabama, Tuscaloosa, AL

**Graduate Research Assistant** — 2021-2024
Connected and Automated Mobility Lab (CAM Lab)
Department of Civil, Construction, and Environmental Engineering
The University of Alabama, Tuscaloosa, AL
**Research Projects:**
- Cyber Resilient Localization and Navigation for Autonomous Vehicles (NSF)
- Multimodal In-Vehicle Sensor Fusion for Cyber-Secured Autonomous Navigation (TraCR)
- Transportation Infrastructure Security (University of Alabama Cyber Institute (UACI))

**Graduate Research Assistant** — 2017-2020
Department of Mechanical Engineering
Clemson University, Clemson, SC

### Academic: Teaching

**Graduate Teaching Assistant** — 2020-2021
Department of Civil, Construction, and Environmental Engineering
The University of Alabama, Tuscaloosa, AL

Courses taught: Civil and Construction Surveying, Introduction to Transportation Engineering, Transportation Cyber-Physical Systems, Traffic Flow Theory

### Professional

Senior Engineer 2015-2017
HMCL Niloy Bangladesh Limited, Jessore, Bangladesh
Department of Planning

## TEACHING EXPERIENCE

**CE260 Civil and Construction Surveying** | Undergraduate Level Fall 2020, Spring 2021
Teaching Assistant
**CE350 Introduction to Transportation Engineering** | Undergraduate Level Summer 2022, Fall 2024
Guest lecturer
**CE691 Transportation Cyber-Physical Systems** | Undergraduate Level Spring 2022
Guest lecturer
**CE491/591-003 Traffic Flow Theory** | Undergraduate & Graduate Level Fall 2023, Fall 2024
Guest lecturer

## FUNDING

### US Department of Transportation (USDOT)
### USDOT National Center for Transportation Cyber Security and Resiliency (TraCR) 2025

• "Trustworthy Autonomous Vehicle Navigation through Cyber Resilience," PI: Mizanur Rahman (The University of Alabama); Co-PI(s): **Sagar Dasgupta** (The University of Alabama), Mashrur Ronnie Chowdhury (Clemson University), and Long Cheng (Clemson University)

• "Towards Deployment-Ready Post-Quantum Cryptography Enabled Vehicle-to-Everything (V2X)," PI: Mizanur Rahman (The University of Alabama Tuscaloosa); Co- PI (s): Ahmad Alsharif (The University of Alabama), **Sagar Dasgupta** (The University of Alabama), Shuhong Gao (Clemson University), Mashrur Ronnie Chowdhury (Clemson University), M. Sabbir Salek (Clemson University), Ryann Cartor (Clemson University), M. Hadi Amini (Florida International University), Kemal Akkaya (Florida International University).

• "Policy Analysis and Guidance to Support Secure Transportation Cyber-Physical-Social Systems," PI: Trayce Hockstad (The University of Alabama ); Co-PI(s): Mizanur Rahman (The University of Alabama), Trayce Hockstad (The University of Alabama), Latifur Khan (The University of Texas at Dallas), Mashrur Ron- nie Chowdhury (Clemson University), M Sabbir Salek (Clemson University) and **Sagar Dasgupta** (The University of Alabama)

• "Towards Securing Electric Vehicle Charging Systems against Passive and Active Attacks," PI: Ahmad Alsharif (The University of Alabama); Co-PI (s): Mizanur Rahman (The University of Alabama), Bharat Balasubramanian (The University of Alabama), **Sagar Dasgupta** (The University of Alabama), Mashrur Ronnie Chowdhury (Clemson University), and M. Sabbir Salek (Clemson University)

## TECHNOLOGY DEMONSTRATIONS

USDOT Future of Transportation Summit 2024 August 2024
Securing GNSS-based Autonomous Vehicle Navigation
Washington DC
Role: Team-lead

TraCR Annual Conference 2024 May 2024
Securing GNSS-based Autonomous Vehicle Navigation
Greenville, SC

Role: Team-lead

IEEE International Automated Vehicle Validation Conference 2023 Oct 2023
GPS Guardians: Cyber-resilient Navigation of Autonomous Vehicles
Austin, TX
Role: Team-lead

## PRESS RELEASES AND NEWS ARTICLES

- GPS Hacking. Overcoming The Threat. Podcast interview – Cybercrime Magazine
  Soundcloud Link
- A promising, inexpensive system to overcome GPS hacking that could help keep self-driving vehicles from heading to the wrong destination has been developed by the University of Alabama researchers
  Campaign Archive Link
- Low-cost Solution Viable for Self-Driving Cars to Spot Hacked GPS
  University of Alabama News Link

## NEWSLETTER ARTICLE

Muhammad Sami Irfan, **Sagar Dasgupta**, and Mizanur Rahman, "Cyberattack Resilient Navigation System for Autonomous Vehicles: An In-Vehicle Sensor Fusion-based Approach," Industrial Control Systems Joint Working Group (ICSJWG) June 2022 Quarterly Newsletter

## PUBLICATIONS

### Peer-Reviewed Journal Articles

1. S. **Dasgupta**, M. Rahman, and S. Jones, "Harnessing digital twin technology for adaptive traffic signal control: Improving signalized intersection performance and user satisfaction," *IEEE Internet of Things Journal*, pp. 1–1, 2024 DOI: 10.1109/TITS.2022.1234567

2. M. S. Irfan, S. **Dasgupta**, and M. Rahman, "Towards transportation digital twin systems for traffic safety and mobility: A review," *IEEE Internet of Things Journal*, 2024 DOI: 10.1109/JIOT.2024.3395186

3. S. **Dasgupta**, M. Rahman, M. Islam, and M. Chowdhury, "A sensor fusion-based GNSS spoofing attack detection framework for autonomous vehicles," *IEEE Transactions on Intelligent Transportation Systems*, vol. 23, no. 12, pp. 23559–23572, 2022 DOI: 10.1109/TITS.2022.3197817

4. S. **Dasgupta**, T. Ghosh, and M. Rahman, "A reinforcement learning approach for global navigation satellite system spoofing attack detection in autonomous vehicles," *Transportation research record*, vol. 2676, no. 12, pp. 318–330, 2022 DOI: 10.1177/03611981221095509

5. S. **Dasgupta**, A. Jain, and A. Paul, "Sinusoidal delta wing: Challenges and opportunities," *Journal of Aeronautical and Automotive Engineering (JAAE)*, vol. 2, no. 1, 2015

6. S. **Dasgupta**, A. Jain, and N. K. Singh, "An evaporative air cooler and desiccant wheel based air conditioning for humid regions of India," *International Journal of Applied Engineering Research*, vol. 10, no. 19, 2015

7. M. M. S. Reza, A. K. Yadav, and S. **Dasgupta**, "CFD analysis of forced convection over radial heat sink," *Journal of Modern Science and Technology*, pp. 135–143, 2016

### Preprints

1. M. W. Haque, S. **Dasgupta**, and M. Rahman, "Grid2guide: A* enabled small language model for indoor navigation," *arXiv preprint arXiv:2508.08100*, 2025

2. K. Rahimi, M. W. Haque, S. **Dasgupta**, and M. Rahman, "Vision-based localization and llm-based navigation for indoor environments," *arXiv preprint arXiv:2508.08120*, 2025

3. M. U. Ahmad, S. **Dasgupta**, M. Rahman, S. Khan, M. W. Haque, S. R. Saba, D. Bodoh, N. Huynh, L. Zhao, and E. E. Ozguven, "Lessons learned from the real-world deployment of multi-sensor fusion for proactive work zone safety application," *arXiv preprint arXiv:2508.01599*, 2025
4. M. U. Ahmad, A. Abrar, S. **Dasgupta**, and M. Rahman, "Opencams: An open-source connected and automated mobility co-simulation platform for advanced transportation research," *arXiv preprint arXiv:2507.09186*, 2025
5. S. **Dasgupta**, K. H. Shakib, and M. Rahman, "Experimental validation of sensor fusion-based gnss spoofing attack detection framework for autonomous vehicles," *arXiv preprint arXiv:2401.01304*, 2024
6. S. **Dasgupta**, A. Ahmed, M. Rahman, and T. N. Bandi, "Unveiling the stealthy threat: Analyzing slow drift gps spoofing attacks for autonomous vehicles in urban environments and enabling the resilience," *arXiv preprint arXiv:2401.01394*, 2024
7. E. Rua, K. H. Shakib, S. **Dasgupta**, M. Rahman, and S. Jones, "Digital twin technology enabled proactive safety application for vulnerable road users: A real-world case study," *arXiv preprint arXiv:2312.10041*, 2023
8. S. **Dasgupta**, K. Shakib, M. Rahman, S. V. Croope, and S. Jones, "Audio analytics-based human trafficking detection framework for autonomous vehicles," *arXiv preprint arXiv:2209.04071*, 2022
9. F. Walden, S. **Dasgupta**, M. Rahman, and M. Islam, "Improving the environmental perception of autonomous vehicles using deep learning-based audio classification," *arXiv preprint arXiv:2209.04075*, 2022

## Book Chapters

1. S. **Dasgupta**, M. S. Irfan, M. Rahman, and M. Chowdhury, "Detection and mitigation of spoofing attacks in-based autonomous ground vehicle navigation systems," in *Data Analytics for Intelligent Transportation Systems (Second Edition)* (M. Chowdhury, K. Dey, and A. Apon, eds.), pp. 403–427, Elsevier, second edition ed., 2025 DOI: 10.1016/B978-0-443-13878-2.00016-3
2. S. **Dasgupta**, X. Zhu, M. S. Irfan, M. Rahman, J. Gong, and S. Jones, "AI machine vision for safety and mobility: an autonomous vehicle perspective," in *Handbook on Artificial Intelligence and Transport*, p. 380, Edward Elgar Publishing, 2023 DOI: 10.4337/9781803929545.00023
3. S. Guo, X. Qian, S. **Dasgupta**, M. Rahman, and S. Jones, "Sensing and monitoring of urban roadway traffic state with large-scale ride-sourcing vehicles," in *The Rise of Smart Cities*, pp. 551–582, Elsevier, 2022 DOI: 10.1016/B978-0-12-817784-6.00003-5
4. A. Abrar, S. **Dasgupta**, M. Rahman, and A. Alsharif, "AI-driven post-quantum cryptography for cyber-resilient v2x communication in transportation cyber-physical systems," in *Artificial Intelligence for Cyberphysical Systems Security and Resilience*, Springer, 2025. (Under Review)
5. M. U. Ahmad, A. Abrar, S. **Dasgupta**, and M. Rahman, "Detection and mitigation of spoofing attacks in gnss-based autonomous ground vehicle navigation systems," in *An End-to-End Co-Simulation Testbed for Cybersecurity Research and Development in Intelligent Transportation System*, WSP, 2025. (Under Preperation)
6. M. W. Haque, M. Erfan, S. **Dasgupta**, M. R. Rahman, and M. Rahman, "Security vulnerabilities in software supply chain for autonomous vehicles," in *An End-to-End Co-Simulation Testbed for Cybersecurity Research and Development in Intelligent Transportation System*, WSP, 2025. (Under Preperation)

## Conference Proceedings

1. S. **Dasgupta**, C. Hollis, M. Rahman, T. Atkison, and S. Jones, "An innovative attack modeling and attack detection approach for a waiting time-based adaptive traffic signal controller," in *International Conference on Transportation and Development 2022*, pp. 72–84, 2022 DOI: 10.1061/9780784484326.008
2. S. **Dasgupta**, R. Mizanur, and B. Thejesh, N., "AI-based GNSS spoofing attack detection for autonomous vehicles using satellite characteristics data," in *Proceedings of the 2023 International Technical Meeting of The Institute of Navigation*, pp. 514–525, 2023 DOI: 10.33012/2023.18608

## Peer-Reviewed Conference Presentations

1. S. **Dasgupta**, A. Ahmed, M. Rahman, and T. Bandi, "Unveiling the stealthy threat: Analyzing slow drift GPS spoofing attacks for autonomous vehicles in urban environments and enabling the resilience," in *Transportation Research Board (TRB) 103rd Annual Meeting 2024*, 2024

2. S. **Dasgupta**, K. Shakib, and M. Rahman, "Experimental validation of sensor fusion-based GNSS spoofing attack detection framework for autonomous vehicles," in *Transportation Research Board (TRB) 103rd Annual Meeting 2024*, 2024

3. S. **Dasgupta**, M. Rahman, and S. Jones, "Harnessing digital twin technology for adaptive traffic signal control: Improving signalized intersection performance and user satisfaction," in *Transportation Research Board (TRB) 103rd Annual Meeting 2024*, 2024

4. E. Rua, K. Shakib, S. **Dasgupta**, M. Rahman, and S. Jones, "Digital twin technology enabled proactive safety application for vulnerable road users: A real-world case study," in *Transportation Research Board (TRB) 103rd Annual Meeting 2024*, 2024

5. S. **Dasgupta**, R. Mizanur, and B. Thejesh, N., "AI-based GNSS spoofing attack detection for autonomous vehicles using satellite characteristics data," in *Proceedings of the 2023 International Technical Meeting of The Institute of Navigation*, pp. 514–525, 2023

6. S. **Dasgupta**, K. Shakib, M. Rahman, S. V. Croope, and S. Jones, "Audio analytics-based human trafficking detection framework for autonomous vehicles," in *Transportation Research Board (TRB) 102nd Annual Meeting 2023*, 2023

7. S. M. Irfan, M. Rahman, T. Atkinson, S. **Dasgupta**, and A. Hainen, "Reinforcement learning based cyberattack model for adaptive traffic signal controller in connected transportation systems," in *Transportation Research Board (TRB) 102nd Annual Meeting 2023*, 2023

8. S. **Dasgupta**, T. Ghosh, and M. Rahman, "A reinforcement learning approach for global navigation satellite system spoofing attack detection in autonomous vehicles," in *Transportation Research Board (TRB) 101st Annual Meeting 2022*, 2022

9. S. **Dasgupta**, M. Rahman, M. Islam, and M. Chowdhury, "Prediction-based GNSS spoofing attack detection for autonomous vehicles," in *Transportation Research Board (TRB) 100th Annual Meeting 2021*, 2021

10. S. **Dasgupta**, C. Hollis, M. Rahman, T. Atkison, and S. Jones, "An innovative attack modeling and attack detection approach for a waiting time-based adaptive traffic signal controller," in *International Conference on Transportation and Development 2022*, pp. 72–84, 2022

11. S. **Dasgupta**, M. Rahman, A. D. Lidbe, W. Lu, and S. Jones, "A transportation digital-twin approach for adaptive traffic control systems," in *International Conference on Transportation and Development 2022*, 2022

## Podium Presentations and Talks

1. M. Rahman, S. **Dasgupta**, and M. S. Irfan, "Cybersecure GNSS-based navigation for autonomous ground vehicles," in *2024 IEEE Computer Society Annual Symposium on VLSI, ISVLSI 2024*, (Knoxville, TN, USA), July 1-3 2024. **Invited Talk**

2. S. **Dasgupta**, A. Ahmed, M. S. Irfan, M. Rahman, and T. Bandi, "Unveiling the stealthy threat: Analyzing slow drift GPS spoofing attacks for autonomous vehicles in urban environments and enabling the resilience," in *TraCR Annual Conference 2024*, (Greenville, SC, USA), May 6-7 2024

3. S. **Dasgupta**, K. H. Shakib, M. S. Irfan, and M. Rahman, "Experimental validation of sensor fusion-based GNSS spoofing attack detection framework for autonomous vehicles," in *TraCR Annual Conference 2024*, (Greenville, SC, USA), May 6-7 2024

4. K. H. Shakib, F. Walden, S. **Dasgupta**, and M. Rahman, "Improving the environmental perception of autonomous vehicles using deep learning based audio classification," in *IEEE International Automated Vehicle Validation Conference 2023*, (Austin, Texas, USA), October 16-18 2023

5. S. **Dasgupta**, C. Hollis, M. Rahman, T. Atkison, and S. Jones, "An innovative attack modelling and attack detection approach for a waiting time-based adaptive traffic signal controller," in *ASCE International Conference on Transportation & Development*, (Seattle, WA, USA), May 31 - June 3 2022

6. S. **Dasgupta** and M. Rahman, "AI-based GNSS spoofing attack detection for autonomous vehicle using satellite characteristics data," in *International Technical Meeting of the Institute of Navigation (ION ITM 2023)*, (Long Beach, CA, USA), January 23 2023

7. F. Walden, S. **Dasgupta**, M. Rahman, and M. Islam, "Improving the environmental perception of autonomous vehicles using deep learning based audio classification," in *ASCE International Conference on Transportation & Development*, (Austin, Texas, USA), June 14-17 2023

8. S. **Dasgupta**, M. Rahman, M. Islam, M. Chowdhury, and S. Jones, "A sensor fusion-based GNSS spoofing attack detection framework for autonomous vehicles," in *ASCE International Conference on Transportation & Development*, (Seattle, WA, USA), May 31 - June 3 2022

9. S. **Dasgupta**, M. Rahman, W. Lu, A. Lidbe, and S. Jones, "A transportation digital-twin approach for adaptive traffic control systems," in *ASCE International Conference on Transportation & Development*, (Seattle, WA, USA), May 31 - June 3 2022

10. M. Rahman and S. **Dasgupta**, "GNSS/GPS vulnerabilities - an autonomous vehicle perspective," in *Guest Lecture. Presentation to the Clemson University Graduate Students*, (Clemson, SC, USA), October 21 2021. **Invited Talk**

### Technical Papers

1. S. A. Chowdhury, S. **Dasgupta**, J. Saylor, and J. Wagner, "A diesel engine emission system based on brownian diffusion a separation," tech. rep., SAE Technical Paper, 2021 DOI: 10.4271/2021-01-0583

## PROPOSAL WRITING EXPERIENCE

### Funded Proposals

### National Science Foundation (NSF)

- **CAREER:** Cyber Resilient Navigation for Autonomous Systems under Threat Uncertainties and Contested Environments. (Award Number: 2340456), Start Date: 06/01/2024, End Date: 05/31/2029, $536,016
  (**Role:** As graduate research assistant, led technical development for three of four project objectives.)

- **CRII: SaTC:** Cyber Resilient Localization and Navigation for Autonomous Vehicles (Award Number: 2104999),Start Date: 05/01/2021, End Date: 04/30/2024, $175,000
  (**Role:** As graduate research assistant, contributed to the development of the technical components)

### US Department of Transportation (USDOT)

- National Center for Transportation Cyber Security and Resiliency (TraCR), Start Date: 02/01/2023, End Date: 01/31/2028, $20,000,000 (UA's share$1,500,000)
  (**Role:** As graduate research assistant, contributed to the development of the technical components)

### Federal Motor Carrier Safety Administration (FMCSA)

- Multi-Sensor Fusion for Proactive Commercial Motor-Vehicle Safety at Work Zone Start Date: 08/16/2023, End Date: 08/15/2025, $1,085,359
  (**Role:** As graduate research assistant, contributed to the development of the technical components)
- Roadside-to-Vehicle Crash Avoidance Warning System for Commercial Motor Vehicles on Rural Roads
  (**Role:** As apost-doc, led the development of the first project in the proposal, titled 'Development of a Hazardous Road Conditions Detection System for Rural Roads during Nighttime and/or Inclement Weather,' focusing on innovative solutions to enhance road safety under challenging conditions.)

## HONORS AND AWARDS

- **Outstanding Research by a Ph.D. Student Award**, CCEE, UA 2025
- **2nd Place,** TraCR Annual Conference Student Poster Competition 2024
- **Gulf Region Intelligent Transportation Society Scholarship** 2023 & 2024
- **Lifesavers Conference Traffic Safety Scholar (TSS) Award** 2023
- **Finalist,** 3 Minutes Presentation at the TRB ACP30 2023 Competition 2023
- **Conference Travel Grant to Attend ASCE ICTD 2022,** UA Graduate School 2022
- **Honorary Mention,** ASCE T&DI Artificial Intelligence Student Competition 2022
- **Indian Council for Cultural Relations Scholarship,** Govt. of India 2011-2015
- **Bangladesh Higher Secondary Board Scholarship,** Govt. of Bangladesh 2021
- **Bangladesh Primary School Board Scholarship (Talent pool),** Govt. of Bangladesh 2003

## SERVICE

### Academic and Professional Committees

- **Member**, IEEE VTS Committee on Autonomous Vehicles 2024-Present
- **Friends of Committee**, TRB Standing Committee on Transportation for National Defense 2022-2025
- **Friends of Committee**, TRB Standing Committee on Systems, Enterprise, and Cyber Resilience 2022-2025
- **Friends of Committee**, TRB Standing Committee on Artificial Intelligence and Advanced Computing Applications 2021-2025
- **Friends of Committee**, TRB Standing Committee on Intelligent Transportation Systems 2024-2027

### Student Organizations

- **President,** ITE Student Chapter, University of Alabama 2022-2024
- **Treasurer,** Chi Epsilon Student Chapter, University of Alabama 2021-2022
- **Vice-President,** Chi Epsilon Student Chapter, University of Alabama 2020-2021
- **Treasurer,** ITE Student Chapter, University of Alabama 2020-2021

### Journal and Conference Paper Reviewer

- IEEE Transactions on Intelligent Transportation Systems
- IEEE Transactions on Vehicular Technology
- IEEE Transactions on Intelligent Vehicles
- IEEE Transactions on Information Forensics and Security
- IEEE International Automated Vehicle Validation Conference 2024
- Scientific Reports
- Transportation Research Record
- International Journal of Digital Earth
- Transportation Research Board Annual Meeting

## PROFESSIONAL AFFILIATIONS

- **Member**, Chi Epsilon Civil Engineering Honor Society 2021-Present
- **Student Member**, American Society of Civil Engineers (ASCE) 2020-2024
- **Student Member**, Institute of Navigation (ION) 2023-2024
- **Student Member**, Institute of Transportation Engineers (ITE) 2022-2024
- **Student Member**, Institute of Electrical and Electronics Engineers (IEEE) 2020-2024

- **Student Member**, Intelligent Transportation Systems Society(ITSS), IEEE 2020-2024
- **Student Member**, American Society of Mechanical Engineers (ASME) 2018-2023
- **Student Member**, Vehicular Technology Society, IEEE 2020-2024
- **Student Member**, Council on RFID, IEEE 2020-2024

## MENTORING

### Ph.D. Students

- Muhammad Sami Irfan (Completed BS in Electrical Engineering)
- Minhaj Uddin Ahmad (Completed BS in Electrical Engineering)
- Akid Abrar (Completed BS in Computer Science and Engineering)
- Suhala Rabab Saba (Completed BS in Electrical Engineering)
- Md Wasiul Haque (Completed BS in Electrical Engineering)

### M.S. Student

- Tharun Chowdary Malepati (Completed BS in Computer Science and Engineering)

### Undergraduate Students

- Keyan Rahimi (Pursuing BS in Computer Science and Engineering)(**2025 NSF REU Student**)
- Amari Knox (Pursuing BS in Civil Engineering)(**2025 NSF REU Student**)
- Mamade Conneh (Pursuing BS in Civil Engineering)(**2024 NSF REU Student**)
- Sohee Kim (Pursuing BS in Computer Science and Engineering)(**2024 NSF REU Student**)
- Abdullah Ahmed (Pursuing BS in Computer Science and Engineering)(**2023 NSF REU Student**)
- Finley Walden (Completed BS in Computer Science and Engineering)
- Asit Singh (Completed BS in Computer Science and Engineering)
- Courtland Hollis (Completed BS in Civil Engineering)