George Gunter

PhD Student, Vanderbilt University, Institute for Software Integrated Systems

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Education

Vanderbilt University May 2025 (Expected)
PhD in Civil Engineering (GPA: 3.77)
Dissertation title: *Formal safety and cyber-security in mixed-autonomy traffic*
Committee: Dr. Daniel Work (chair), Dr. Hiba Baroud, Dr. Ahmad Taha, Dr. Jonathan Sprinkle

University of Illinois at Urbana–Champaign May 2019
B.S. in Civil Engineering (GPA 3.60)
Minor in Mathematics
Minor in Computer Science

Honors and Awards

NSF CPS Rising Star, National Science Foundation 2023
Accepted to the National Science Foundation NSF Rising Stars in Cyber Physical Systems (CPS) workshop.

NSF Graduate Research Fellowship, National Science Foundation 2020-2024
One of 20 Civil Engineers nationally to receive an NSF Graduate Research Fellowship in 2020.

Dwight D. Eisenhower Transportation Fellowship, Federal Highway Administration 2020,2023,2024
Recipient of the Dwight D. Eisenhower Fellowship in transportation.

University Graduate Fellowship, Vanderbilt University 2019-2022
Recipient of a Vanderbilt Graduate Student Fellowship.

Langelier Scholar, University of Illinois 2017
Recipient of 2017/18 Langelier Scholarship, awarded for excellence in Environmental Engineering.

Bailey Scholar, University of Illinois 2017
Recipient of 2017/18 Bailey Scholarship, awarded for excellence in Leadership.

Significant Publications

1. **G. Gunter**, M. Nice, M. Bunting, J. Sprinkle, D. Work. "Can control barrier functions keep automated vehicles safe in live freeway traffic?" *Submitted to ACM/IEEE 15th International Conference on Cyber-Physical Systems*, 2025.

2. **G. Gunter**, H. Li, A. Hojati, M. Nice, M. Bunting, J. Sprinkle, C. Gunter, B. Li, D. Work. "Automated vehicles as stealthy attack vectors on mixed-autonomy traffic flows" *Submitted to ACM Transactions on Cyber-Physical Systems.*

3. M.Nice, **G. Gunter**, J.Ji, Y.Zhang, W.Barbour, M.Bunting, J.Sprinkle, D.Work. "A middle way to traffic enlightenment" *ACM/IEEE 15th International Conference on Cyber-Physical Systems*, 2024.

4. **G. Gunter**, R. Stern, W. Barbour, R. Bhadani, M. Bunting, Y. Wang, D. Gloudemans, C. Janssen, B. Piccoli, B. Seibold, J. Sprinkle, D. Work. "Are commercially implemented adaptive cruise control systems string stable?" *IEEE Transactions on Intelligent Transportation Systems, 2020.*

5. Y Wang, **G. Gunter**, M Nice, DB Work . "Online parameter estimation methods for adaptive cruise control systems" *IEEE Transactions on Intelligent Vehicles, 2020.*

6. **G. Gunter**, R. Stern, C. Janssen, D. Work. "Model based string stability of adaptive cruise control systems using field data" *IEEE Transactions on Intelligent Vehicles, 2019.*

Conference Publications

1. Z. Zhang, **G. Gunter**, M.Quinones Grueiro, Y.Zhang, W.Barbour, G.Biswas, D.Work. "Phase Re-service in Reinforcement Learning Traffic Signal Control" *IEEE Intelligent Transportation Systems Conference*, 2024.

2. **G. Gunter**, D.Work, "Safe driving with control barrier functions in mixed autonomy traffic when cut-ins occur" *European Control Conference*, 2022.

3. **G. Gunter**, M.Nice, M.Bunting, J.Sprinkle, D.Work. "Experimental testing of a control barrier function on an automated vehicle in live multi-lane traffic" *2nd Workshop on Data-Driven and Intelligent Cyber-Physical Systems for Smart Cities Workshop (DI-CPS)*, 2022.

4. **G. Gunter**, C.Gunter, D.Work. "WiP: Detecting malicious agents in partially observed mixed-autonomy vehicular traffic" *Symposium on the Science of Security (HotSoS)*, 2022.

5. N. Lichtlé, E.Vinitsky, **G. Gunter**, A. Velu, A.Bayen. "Modeling adaptive cruise control vehicles from experimental data: model comparison" *IEEE Intelligent Transportation Systems Conference*, 2021.

6. J.Lee, **G. Gunter**, R.Ramadan, S.Almatrudi, et. al."Integrated framework of vehicle dynamics, instabilities, energy models, and sparse flow smoothing controllers" *Proceedings of the Workshop on Data-Driven and Intelligent Cyber-Physical Systems*, 2021.

7. Y.Wang, **G.Gunter**, D.Work."Estimating adaptive cruise control model parameters from on-board radar units" *Accepted for presentation at the Transportation Research Board Annual Meeting*, Washington DC, Jan 12-15, 2020.

8. R.Stern, **G. Gunter**, D.Work, "Modeling adaptive cruise control vehicles from experimental data: model comparison" *6th International Conference on Models and Technologies for Intelligent Transportation Systems*, 2019.

9. **G. Gunter**, R.Stern, D.Work, "Modeling adaptive cruise control vehicles from experimental data: model comparison" *IEEE Intelligent Transportation Systems Conference*, 2019.

10. **G. Gunter**, Y. Wang , D.Gloudemans, R.Stern, D.Work, M.L. Delle Monache, R. Bhadani, M. Bunting, R. Lysecky, J.Sprinkle, B. Seibold, B. Piccoli, "WiP Abstract: String stability of commercial adaptive cruise control vehicles" *Proceedings of the 10th ACM/IEEE International Conference on Cyber-Physical Systems*, 2019.

Teaching experience

Vanderbilt Summer Academy (VSA) Summer, 2023

Co-taught and created course content for a three week immersive course on robotics and electrical engineering for high achieving high school students.

Vanderbilt Program for Talented Youth Fall2022/Spring 2023

Co-taught a 12 week course on 'Data Science for Transportation' to high achieving high school students.

Guest lecturer: Introduction to transportation engineering (Vanderbilt University) Spring 2024

Delivered lectures and developed slides for lectures on basics of traffic flow modeling.

Guest lecturer: Automated vehicles and traffic flow (Vanderbilt University) Fall 2023/2024

Delivered lectures and developed slides for lectures on applications of control barrier functions as well as traffic flow modeling.

Project participation

NSF CPS Frontier: Computation-Aware Algorithmic Design for Cyber-Physical Systems, 2022-Current
As part of this NSF CPS project I have worked on development and experimental testing of the computational feasibility of control algorithms for safety-critical control. I am responsible for implementing controllers onto a live AV, data collection, and data analysis.

CIRCLES Consortium, 2019-2022
As part of the CIRCLES consortium I developed approaches for verifying necessary properties of potential traffic wave-smoothing control algorithms. I additionally developed techniques for supervising AV control algorithms for real-time safety.

Academic appointments

Graduate Researcher, Vanderbilt University, Institute for Software Integrated Systems June 2019 - Current

Visiting Scholar, Institute for Pure and Applied Mathematics, UCLA Fall 2020

Undergraduate Researcher, Vanderbilt University, Institute for Software Integrated Systems June 2018 - May 2019

Undergraduate Researcher, University of Arizona Cognitive and Autonomous (CAT) Vehicle Research Experience for Undergraduates (REU) June 2017 - Aug 2017

Undergraduate Researcher, University of Illinois at Urbana-Champaign Aug 2014 - Dec 2018