Geoff Twardokus

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Research Interests

Cyber-physical systems security, quantum computing and post-quantum security, digital twins, applied cryptography.

Education

- **Ph.D. Electrical and Computer Engineering** — **May 2026 (Expected)**
  Rochester Institute of Technology — *Rochester, NY*
  ◦ Dissertation Title: *Achieving Practical and Efficient Quantum-Resistant Security for Connected Vehicles in Next-Generation Cellular Vehicle-to-Everything*. Advisor: Dr. Hanif Rahbari.
- **M.S. Computing Security** — **August 2021**
  Rochester Institute of Technology — *Rochester, NY*
  ◦ Thesis Title: *Intelligent Lower-Layer Denial-of-Service Attacks Against Cellular Vehicle-to-Everything*
- **B.S. Computing Security** — **August 2021**
  Rochester Institute of Technology — *Rochester, NY*

Manuscripts Under Review

1. **G. Twardokus** and H. Rahbari, "Quantum-Resistant Safety Message Authentication for NextG C-V2X: A Cross-Layer Approach," submitted to the *IEEE Journal on Selected Areas in Communications (**JSAC**)*. Pre-print: https://bit.ly/48uVXnJ.
2. **G. Twardokus**, D. Lyu, and H. Rahbari, "Bridging Simulation and Reality: Digital Twinning for Exploring Safety and Security in Connected Vehicle Systems" submitted to *ACM/IEEE **SenSys***, Nov. 2025.

Peer-Reviewed Publications

Journal Articles

1. **G. Twardokus** and H. Rahbari, "Towards Protecting 5G Sidelink Scheduling in C-V2X Against Intelligent DoS Attacks," *IEEE Transactions on Wireless Communications* (**TWC**), vol. 22, no. 11, pp. 7273–7286, Nov. 2023.

Conference Papers

2. **G. Twardokus**, N. Bindel, H. Rahbari, and S. McCarthy, "When Cryptography Needs a Hand: Practical Post-Quantum Authentication for V2V Communications," *Network and Distributed System Security* (**NDSS**) *Symposium*, San Diego, CA, Feb. 2024.
   → NDSS is an A* CORE conference (acceptance rate $\leq 20\%$) globally ranked in the top four among cybersecurity venues.
3. **G. Twardokus** and H. Rahbari, "Vehicle-to-Nothing? Securing C-V2X Against Protocol-Aware DoS Attacks," *Proc. IEEE Int. Conf. on Computer Communications* (**INFOCOM**), Virtual, May 2022.
   → INFOCOM is an A* CORE conference (acceptance rate $\leq 20\%$), #1 network and wireless conference on Google Scholar.
4. **G. Twardokus**, J. Ponicki, S. Baker, P. Carenzo, H. Rahbari, and S. Mishra, "Targeted Discreditation Attack against Trust Management in Connected Vehicles," *Proc. IEEE Int. Conf. on Communications* (**ICC**), Virtual, Jun. 2021.

Peer-Reviewed Workshop and Demo Papers

1. **G. Twardokus**, W. Joslin, H. Rahbari, and W. Layton, "Assessing the Viability of Quantum-Resistant IKEv2 over Constrained and Internet-Scale Networks," *Proc. ACM Quantum Security and Privacy Workshop* (**QSEC**), pp. 28–33, Taipei, Taiwan, Oct. 2025.
2. **G. Twardokus** and H. Rahbari, "DT-CoVeSS: Advancing NextG C-V2X Security Evaluation through High-Fidelity Digital Twinning," *First IEEE Workshop on Digital Twins over NextG Wireless Networks* (**DTwin**), London, UK, May 2025.
3. **G. Twardokus** and H. Rahbari, "Demo: An Open-Source Hardware-in-the-Loop Testbed for Post-Quantum V2V Security Research," *Proc. ISOC Symposium on Vehicle Security and Privacy* (**VehicleSec**), San Diego, CA, Feb. 2024.
4. **G. Twardokus** and H. Rahbari, "Evaluating V2V Security on an SDR Testbed," *Proc. IEEE International Workshop on Computer and Networking Experimental Research using Testbeds* (**CNERT**), Virtual, May 2021.

Grant Writing Experience

Individual Applications

1. **DOD: National Defense Science and Engineering Graduate Fellowship Program** **Nov. 2022**
   Amount: $140,000 *Result: Second-Round Finalist*
   - Title: Distributed Deception-Based Cyberdefense for Tactical Internet-of-Battlefield-Things (IoBT) MANETs
   - Second-round finalist placed in **top $\sim$30% of applications**.

Successful Applications

2. **NSA: Information Security Research and Education + Collaboration (INSuRE+C)** **May 2023**
   Amount: $15,000 *Result: Awarded*
   - Project title: Post-Quantum Cryptography on Constrained Networks
   - Helped craft research thrusts to investigate the challenges of integrating post-quantum cryptography into the Internet Key Exchange Version 2 (IKEv2) protocol.
3. **NSF CAREER: Towards Reliable and Quantum-resistant Connected Vehicle Security** **Jul. 2022**
   Amount: $599,685 *Result: Awarded*
   - Assisted PI in developing technical contribution items on post-quantum security for Cellular Vehicle-to-Everything.
   - Assisted with annual reporting process to NSF program manager.

Unsuccessful Applications

4. **Comcast Innovation Fund: Towards Quantum-Resistant DNSSEC** **Mar. 2025**
   Amount: $50,000 *Result: Not Awarded*
   - Assisted in developing proposal to investigate challenges of deploying post-quantum cryptography in the DNSSEC protocol within the context of constrained networks.
5. **NSF TIP/CISE: Planning Grants to Create Artificial Intelligence (AI)-Ready Test Beds** **Sept. 2024**
   Amount: $200,000 *Result: Not Awarded*
   - Assisted PI in development of technical contribution items.
   - Developed initial draft of broader impacts.
6. **USDOT: Strengthening Mobility and Revolutionizing Transportation (SMART)** **Jul. 2024**
   Amount: $2,000,000 *Result: Not Awarded*
   - Assisted in developing elements of technical contributions towards developing an integrated UAV-based approach for smart intersections in and around Rochester, NY.
   - Drafted broader impacts of proposal, summarizing the benefits of developing smart transportation in the Western NY region for underserved and underrepresented communities.

Conference and Invited Talks

G. Twardokus and W. Joslin, "INSuRE+C Talk - Post-Quantum Cryptography on Constrained Networks," *CAE-R COP Research Symposium* at the *National Cybersecurity Education Colloquium*, St. Louis, MO, Oct. 2024.

G. Twardokus and H. Rahbari, "Research on Connected Vehicle Security in WISP Lab," presented to representatives of the Monroe County Dept. of Transportation and New York State Dept. of Transportation (NYSDOT), Sept. 2024.

G. Twardokus and H. Rahbari, "Sidelink Transmission Scheduling in 5G C-V2X: Attacks and Countermeasures," presented to the Laboratory of Networking & Information Systems at Boston University, Boston, MA, June 29, 2022.

Campus Talks

G. Twardokus, "Wireless Network Security: Principles and Contemporary Issues," invited guest lecture for CSEC 140 – Introduction to Cybersecurity, Rochester Institute of Technology, Rochester, NY, Nov. 2024.

G. Twardokus, "Security Essentials for Transport-Layer Security in NextG Network Architectures," invited guest lecture for CSEC 140 – Introduction to Cybersecurity, Rochester Institute of Technology, Rochester, NY, Oct. 2024.

G. Twardokus, "Post-Quantum V2V Security Research with a Hardware-in-the-Loop Testbed," presented to the RIT Security (RITSEC) Wireless Special Interest Group, Feb. 2024.

G. Twardokus, "Connected Vehicle Security Research in WISP Lab," presented to the RIT Security (RITSEC) Wireless Special Interest Group, Nov. 2022.

Research Experience

- **Graduate Research Assistant** — **May 2023–Present**
  Rochester Institute of Technology — *Rochester, NY*
- **Graduate Cybersecurity Research Assistant** — **May 2020 – May 2022**
  Rochester Institute of Technology — *Rochester, NY*

Teaching Experience

- **Instructor**, Rochester Institute of Technology — **Aug. 2022 – Dec. 2022**
  - CSEC 140 – Introduction to Cybersecurity (24 students).
  - Designed lecture and lab materials, delivered 90-minute lectures twice weekly for 14 weeks.
  - Received outstanding student feedback. Average evaluation score with 79% of students responding exceeded 4.2 out of 5 across all categories. In particular, received **4.84 out of 5 on instructor effectiveness**.
- **Graduate Teaching Assistant**, Rochester Institute of Technology — **Jan. 2023 – May 2023**
  - CSEC 569/669 – Wireless Security
- **Graduate Teaching Assistant**, Rochester Institute of Technology — **Jan. 2021 – May 2021**
  - CSEC 469 – Wireless Security

Industry Experience

- **Data Science Intern** — **May 2022 – Aug. 2022**
  Modern Hire (now HireVue) — *Cleveland, OH (Remote)*

Mentoring Experience

- **Undergraduate Capstone Project Mentor**, CSEC 490–Capstone in Cybersecurity — **2021, 2023, 2025**
  - Advised teams of 4–5 undergraduate cybersecurity students on senior capstone projects.
  - Projects included digital twinning, connected vehicle security, testbed development.

Honors and Awards

- **Travel Grant**, $751.13 — **Jun. 2025**
  - Funded attendance at NSF training event on Colosseum wireless testbed in Boston, MA.
- **Student Travel Grant**, $1,500 — **May 2025**
  - Attendee and presenting workshop author at IEEE INFOCOM 2025 in London, UK.
- **Student Travel Grant**, $500 — **Feb. 2024**
  - Presenting author at ISOC Symposium on Vehicle Security and Privacy (VehicleSec).
- **Student Travel Grant**, $2,000 — **Feb. 2024**
  - Presenting author at Network and Distributed System Security Symposium (NDSS).
- **Travel Grant**, $1,000 — **Aug. 2023**
  - Funded attendance at the 2023 NSF Open AI Cellular (OAIC) Workshop in Blacksburg, VA.

Professional Service

Technical Program Committee (TPC)

- 2025 ACM Wireless of the Students, by the Students, and for the Students (S3) Workshop

Journal Reviewer

	Year	*# of Reviews*
IEEE Transactions on Dependable and Secure Computing (TDSC)	2025	1
IEEE Transactions on Wireless Communications (TWC)	2025	1
IEEE Journal on Selected Areas in Communications (JSAC)	2024	1
IEEE Transactions on Mobile Computing (TMC)	2024	2
IEEE Transactions on Vehicular Technology (TVT)	2024	1
Computing (Springer)	2024	1
Computer Communications (Elsevier)	2023	2

Conference Reviewer

	Year	*# of Reviews*
EAI Int. Conf. on Security and Privacy in Commun. Networks (SecureComm)	2023	1

Sub-Reviewer

	Year	*# of Reviews*
IEEE International Conference on Computer Communications (INFOCOM)	2026	1
ACM Transactions on Cyber-Physical Systems	2025	1
IEEE International Conference on Computer Communications (INFOCOM)	2025	2
IEEE International Conference on Computer Communications (INFOCOM)	2024	1
IEEE Conference on Communications and Network Security (CNS)	2023	1
Int. Symp. Modeling and Optimization in Mobile, Ad hoc, and Wireless Netw. (WiOpt)	2023	1
IEEE International Conference on Communications (ICC)	2023	1
IEEE Conference on Communications and Network Security (CNS)	2022	2

Open-source datasets and testbed development

Experimental Datasets

G. Twardokus, N. Bindel, H. Rahbari, and S. McCarthy, "When Cryptography Needs a Hand: Practical Post-Quantum Authentication for V2V Communications - NDSS'24 Artifacts," Nov. 2023, archived at https://zenodo.org/records/10160535.

Open-Source Testbeds

G. Twardokus et al., "V2Verifier: An Open-Source Testbed for Experimental Evaluation of Security in Vehicle-to-Vehicle (V2V) Communication," 2023–present. https://github.com/twardokus/v2verifier

Media Coverage

External

J. Moore, "RIT showcase offers glimpse of early tech innovation cycle," *TechTarget Feature*, May 2025. Available: https://www.techtarget.com/searchcio/feature/RIT-showcase-offers-glimpse-of-early-tech-innovation-cycle.

J. Gilbert, "RIT creates an open-source space to protect self-driving cars," News 8 WROC. Oct. 2020. [TV] Available: https://www.rochesterfirst.com/news/local-news/rit-creates-an-open-source-space-to-protect-self-driving-cars/.

IEEE Innovation at Work, "Student Research Team Create Prototype of Secure Vehicle-to-Vehicle (V2V) Communications System," Jul. 1, 2020. https://bit.ly/3kxQDov.

University Media

RIT News & Events, "RIT researchers develop cybersecurity protocols for future smart transportation systems", Jun. 2024. https://www.rit.edu/news/rit-researchers-develop-cybersecurity-protocols-future-smart-transportation-systems.

RIT News & Events, "Ph.D. student presents work at IEEE INFOCOM Conference," May 2022. Available: https://www.rit.edu/news/phd-student-presents-work-ieee-infocom-conference.

Professional Memberships

- Institute of Electrical and Electronics Engineers (IEEE) 2013–Present
- IEEE Communications Society 2020–Present
- IEEE Intelligent Transportation Systems Society 2021–Present
- IEEE Vehicular Technology Society 2021–Present
- Association for Computing Machinery (ACM) 2024–Present