

Nirnimesh Ghose Assistant Professor

CONTACT INFORMATION

Department: School of Computing
University: University of Nebraska–Lincoln
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RESEARCH INTERESTS

Network security and privacy with applications to emerging wireless networks, cyber-physical systems, Internet-of-things, aviation and transportation networks, bio-social inspired dynamic spectrum access and the interaction between cybersecurity and social networks.

EDUCATION

- **The University of Arizona, Tucson, Arizona**
Ph.D. in Electrical and Computing Engineering, May 2019
 - Dissertation Title: *“Authentication and Message Integrity Verification without secrets”*
 - Advisor: Dr. Loukas Lazos
 - GPA: 4.00/4.00
- **Illinois Institute of Technology, Chicago, Illinois**
Master of Science in Electrical and Computing Engineering, May 2012
 - Thesis Title: *“Congestion control and packet reordering for multipath transmission control protocol”*
 - Advisor: Dr. Tricha Anjali
 - GPA: 3.52/4.00
- **Uttar Pradesh Technical University (UPTU), Lucknow, U.P., India**
Bachelor of Technology in Electronics and Communication Engineering, June 2010
 - Undergrad Project: *“Cell phone controlled home appliances using microcontroller AT89S8253”*
 - GPA: 74.5/100

ACADEMIC EXPERIENCE

- **University of Nebraska - Lincoln, Nebraska** August 2019 - Present
Assistant Professor
- **The University of Arizona, Tucson, Arizona** May 2019 - July 2019
Research Specialist, Principal, Advisor: Dr. Loukas Lazos
- **The University of Arizona, Tucson, Arizona** January 2014 - May 2019
Research Assistant, Advisor: Dr. Loukas Lazos
- **Illinois Institute of Technology, Chicago, Illinois** January 2011 - May 2012
Research Assistant, Advisor: Dr. Tricha Anjali
- **Illinois Institute of Technology, Chicago, Illinois** June 2011 - November 2011
Research Assistant, Advisor: Dr. Kenneth Zdunek
- **Indian Institute of Technology, BHU, Varanasi, U.P. India** May 2009 - August 2009
Undergrad Research Assistant, Advisor: Dr. P. Chakravarty

INDUSTRY EXPERIENCE

- **Fidelity, Covington, Kentucky** August 2012 - December 2013

Application Developer

PUBLICATIONS

Underlined are the students under my supervision.

Manuscripts under Review

1. Oguchi, Ebuka; **Ghose, Nirnimesh**; Can Vuran, Mehmet, “Soil Assisted Trust-Establishment For Underground Internet-of-Things,” *Under review at IEEE Internet of Things Journal*, November, 2023. (Contribution: 40%–Mentored my Ph.D. student through the work and assisted in writing).
2. Afrin, Fahmida; Wang, Boyang; **Ghose, Nirnimesh**, “STADL-RF: Spatial-Temporal Agnostic Radio Fingerprinting,” in *Proc. of ACM Conference on Security and Privacy in Wireless and Mobile Networks (ACM WiSec 2024)*, Seoul, Korea, pp. 1 - 12, May 27 to 30, 2024. (Contribution: 60%–Mentored my M.S. student through the work and assisted in writing).

Journal Papers

1. **Ghose, Nirnimesh**; Gupta, Kaustubh; Lazos, Loukas; Li, Ming; Xu, Ziqi; Li, Jingcheng, “ZITA: Zero-Interaction Two-Factor Authentication using Contact Traces and In-band Proximity Verification,” *Accepted at IEEE Transactions on Mobile Computing*, September, 2023. (Contribution: 80%–Major contribution in developing the protocol, security analysis and mentoring my M.S. student to undertake experimentation).
2. **Ghose, Nirnimesh**; Lazos, Loukas; Li, Ming; “In-band Secret-Free Pairing Protocol for COTS Wireless Devices,” *IEEE Transactions on Mobile Computing (TMC)*, Vol. 21, No. 2, pp. 612 - 628, February 2022. (Contribution: 80%–Major contribution in developing the protocol, security analysis and experimentation).
..... Before joining UNL
3. **Ghose, Nirnimesh**; Hu, Bocan; Zhang Yan; Lazos, Loukas, “Secure Physical Layer Voting,” *IEEE Transactions on Mobile Computing*, Vol. 17, No. 3, pp. 688 - 702, March 2018.

Peer-Reviewed Conference Papers

1. Duong, Truc T.; Wisniewska, Anna; **Ghose, Nirnimesh**, “Poster: Reciprocal Altruism as a Rogue Node Detection Mechanism in Dynamic Spectrum Access Networks,” in *Proc. of IEEE Consumer Communications & Networking Conference (IEEE CCNC)*, Las Vegas, NV, pp. 1 - 2, Jan. 06 to 09, 2024. (Contribution: 20%–Data collection and developing the empirical model for simulation).
2. Karanam, Venkat Sai Suman Lamba; Afrin, Fahmida; Ramamurthy, Byrav; **Ghose, Nirnimesh**, “Poster: Cross-layer Device Identification for Smart Grid Substation Networks,” in *Proc. of IEEE Conference on Communications and Network Security (IEEE CNS)*, Orlando, FL, pp. 1 - 2, Oct. 02 to 05, 2023. (Contribution: 30%–Mentored my M.S. student through the work and assisted in writing).
3. Oguchi, Ebuka; **Ghose, Nirnimesh**, “VET: Autonomous Vehicular Credential Verification using Trajectory and Motion Vectors,” *Proc. of EAI International Conference on Security and Privacy in Communication Networks (EAI SecureComm 2023)*, Hong Kong SAR, Hong Kong, pp. 1 - 23, Oct. 19 to 21, 2023. (Contribution: 50%–Mentored my Ph.D. student through the work and assisted in writing).
4. Gupta, Kaustubh; **Ghose, Nirnimesh**; Wang, Boyang, “RADTEC: Re-authentication of IoT Devices with Machine Learning,” in *Proc. of IEEE Consumer Communications & Networking Conference (CCNC)*, Las Vegas, NV, pp. 817 - 822, Jan. 08 to 12, 2023. (Contribution: 60%–Mentored my M.S. student through the work and assisted in writing).
5. Duong, Truc T; Wisniewska, Anna; **Ghose, Nirnimesh**, “Decentralized Rogue Node Detection in Fair Bio-Inspired Dynamic Spectrum Access Networks,” in *Proc. of IEEE International Conference on Computational Intelligence and Communication Networks (CICN)*, Al-Khobar,

- KSA, pp. 743 - 747, Dec. 04 to 06, 2022. (Contribution: 20%–Data collection and developing the empirical model for simulation).
6. Li, Haipeng; Gupta, Kaustubh; Wang, Chenggang; **Ghose, Nirnimesh**; Wang, Boyang, “RadioNet: Robust Deep-Learning Based Radio Fingerprinting,” in *Proc. of IEEE Conference on Communications and Network Security (IEEE CNS), Austin, TX*, pp. 190 - 198, Oct. 03 to 05, 2022. (Contribution: 50%–Mentored my M.S. student through the work and assisted in writing).
 7. Oguchi, Ebuka; **Ghose, Nirnimesh**; Can Vuran, Mehmet, “STUN: Secret-Free Trust- Establishment For Underground Wireless Networks,” *Proc. of IEEE INFOCOM Wkshp Wireless-Sec: 5G & Beyond Wireless Security, Virtual Event*, pp. 1 - 6, May 02 to 05, 2022. (Contribution: 60%–Mentored my Ph.D. student through the work and assisted in writing).
 8. Xu, Ziqi; Li, Jingcheng; Pan, Yanjun; Lazos, Loukas; Li, Ming; **Ghose, Nirnimesh**, “PoF: Proof-of-Following for Vehicle Platoons.” in *Proc. of Network and Distributed System Security Symposium (NDSS 2022), San Diego, CA (Hybrid Event)*, Apr. 24 to 28, 2022. (Contribution: 20%–Mentored the student in developing the protocol and data collection).
 9. Wisniewska, Anna; **Ghose, Nirnimesh**; Khan, Bilal, “Evaluation of a Bio-Socially Inspired Secure DSA Scheme Using Testbed-Calibrated Hybrid Simulations,” in *Proc. of IEEE Information Technology, Electronics and Mobile Communication Conference, Virtual Event*, pp. 0934 - 0939, Oct. 27 to 30, 2021. (Contribution: 20%–Data collection and developing the empirical model for simulation).
 10. Li, Haipeng; Wang, Chenggang; **Ghose, Nirnimesh**; Wang, Boyang, “Robust Deep-learning-based Radio Fingerprinting with Fine-Tuning,” in *Proc. of 14th ACM Conference on Security and Privacy in Wireless and Mobile Networks (ACM WiSec 2021), Virtual Event*, pp. 395 - 397, June 28 to July 2, 2021. (Contribution: 20%–Mentored the student in developing the protocol and data collection).
- Before joining UNL
11. **Ghose, Nirnimesh**; Lazos, Loukas; Rozenblit, Jerzy; Breiger, Ronald; “Multimodal Graph Analysis of Cyber Attacks,” in *Proc. of 2019 Spring Simulation Conference (SpringSim19), Tucson, AZ*, pp. 1 - 12, Apr. 29 - May 2, 2019.
 12. **Ghose, Nirnimesh**; Lazos, Loukas; Li, Ming, “Secure Device Bootstrapping without Secrets Resistant to Signal Manipulation Attacks,” in *Proc. of 39th IEEE Symposium on Security & Privacy (Oakland) 2018 (S&P 2018), San Francisco, CA*, pp. 819 - 835, May 21-23, 2018. (Acceptance rate: **11.48%**).
 13. **Ghose, Nirnimesh**; Lazos, Loukas; Li, Ming, “SFIRE: Secret-Free In-band Trust Establishment for COTS Wireless Devices,” in *Proc. of 37th IEEE International Conference on Computer Communication (IEEE INFOCOM 2018), Honolulu, HI*, pp. 1529 - 1537, Apr. 15-19, 2018. (Acceptance rate: **19.2%**).
 14. **Ghose, Nirnimesh**; Lazos, Loukas; Li, Ming, “HELP: Helper-Enabled In-Band Device Pairing Resistant Against Signal Cancellation,” in *Proc. of 26th USENIX Security Symposium (USENIX Security’17), Vancouver, BC, Canada*, pp. 433 - 450, Aug. 16-18, 2017. (Acceptance rate: **16.1%**).
 15. **Ghose, Nirnimesh**; Lazos, Loukas, “Verifying ADS-B navigation information through Doppler shift measurements,” in *Proc. of 34th IEEE/AIAA Digital Avionics Systems Conference (DASC)*, pp.4A2-1 - 4A2-11, Sept. 13-17, 2015. (**2nd Best Graduate Student Paper**).

Thesis

1. **Ghose, Nirnimesh**, “Congestion control and packet reordering for multipath transmission control protocol,” MS thes., Illinois Institute of Technology, 2012.
2. **Ghose, Nirnimesh**, “Authentication and Message Integrity Verification without Secrets,” Diss. The University of Arizona, 2019.

FUNDED GRANTS**External Grants**

◇ Collaborative Research: SaTC: CORE: Small: Towards Robust, Scalable, and Resilient Radio Fingerprinting (CNS:2225161) from NSF as PI duration 02/2023–01/2026 for \$586,681 (50%).

Internal Grants

◇ Smart Grid cybersecurity enhancement using smart authentication and intelligent threat detection from NCESR as Co-PI duration 01/2023–12/2024 for \$170,000.00 (50%).

◇ Machine Learning, Data Mining and Wireless PHY-layer for a secure IoT System from NU system as Co-PI duration 07/2021–06/2022 for \$7,100.00 (33%).

MENTORED STUDENTS**Current Students**

◇ Mr. Hakim Lado - Ph.D., Expected May 2027.

◇ Ms. Fahmida Afrin - Ph.D., Expected May 2026.

◇ Mr. Ebuka Philip Oguchi - Ph.D., Expected May 2025.

Past Students

◇ Ms. Fahmida Afrin - M.S. (Thesis: Spatial & Temporal Agnostic Deep-Learning based Radio Fingerprinting) - Summer 2023; Initial Employment: Ph.D. Student - School of Computing, University of Nebraska–Lincoln.

◇ Mr. Kaustubh Gupta - M.S. (Thesis: Machine Learning Based Device Type Classification For IoT Device Re- and Continuous Authentication) - Spring 2022; Initial Employment: Security Analyst - Cloud Response at Amazon.

◇ Ms. Arielle Monson, Senior, B.S., Fall 2022–Spring 2023.

◇ Mr. Lawand Anwer, Senior, B.S., Spring 2023.

◇ Mr. Rochak Rijal, Junior, B.S., Spring 2022.

◇ Ms. Megan E Chaffey, Sophomore, B.S., 2019–20.

TEACHING:**COURSES TAUGHT****Fall 2019**

CSCE 496/896 Special Topics: Mobile and Wireless Security (Enrollment: Undergraduate: 6, Graduate: 0).

Spring 2020

CSCE 465/865 Wireless Communication Networks (Enrollment: Undergraduate: 11, Graduate: 3).

Fall 2020

CSCE 477/877 Cryptography & Security (Enrollment: Undergraduate: 17, Graduate: 0).

Spring 2021

CSCE 465/865 Wireless Communication Networks (Enrollment: Undergraduate: 13, Graduate: 1).

Fall 2021

CSCE 477/877 Cryptography & Security (Enrollment: Undergraduate: 21, Graduate: 3).

Spring 2022

CSCE 465/865 Wireless Communication Networks (Enrollment: Undergraduate: 7, Graduate: 13).

Fall 2022

CSCE 477/877 Cryptography & Security (Enrollment: Undergraduate: 21, Graduate: 3).

Spring 2023

CSCE 465/865 Wireless Communication Networks (Enrollment: Undergraduate: 8, Graduate: 6).

Fall 2023

CSCE 155A Computer Science I (Enrollment: Undergraduate: 132).

CSCE 477/877 Cryptography & Security (Enrollment: Undergraduate: 32, Graduate: 4).

Spring 2024

CSCE 155A Computer Science I (Enrollment: Undergraduate: 84).

**HONORS AND
AWARDS**

- ◇ Best-in-Session Presentation Award at 12th IEEE IEMCON, 2021
- ◇ Travel grant for 39th IEEE Security and Privacy Symposium (funded by IEEE), 2018
- ◇ Best-in-Session Presentation Award at 37th IEEE INFOCOM, 2018
- ◇ Travel grant award for 37th IEEE INFOCOM (funded by IEEE ComSoc), 2018
- ◇ Travel grant award for 26th USENIX Security Symposium (funded by Google), 2017
- ◇ 2nd Best Graduate Student Paper at 34th Digital Avionics Systems Conference, 2015
- ◇ Travel grant award for 34th DASC (funded by GPSC, University of Arizona), 2015
- ◇ Byron Innovation Project Award for developing Wireless sensor Network prototype, 2011
- ◇ Prestigious KVPY (Young Scientist) Fellowship of DST Govt. of India, 2003

**PROFESSIONAL
SERVICES AND
ACTIVITIES**
Editorial Board

Digital Agriculture, with Pivot Science Publications 2024–present.

Leadership Positions in Organizations

IEEE Nebraska Section Communications Technical Chapter Vice Chair 2024–present.

Conference Organizing Committee

IEEE CNS 2018 (Web Chair).

Journal Reviewers (direct reviews only)

- ◇ ACM Transactions on Intelligent Systems and Technology (1 review 2023).
- ◇ IEEE Transactions on Machine Learning in Communications and Networking (1 review 2022).
- ◇ IEEE Transactions on Mobile Computing (TMC) (4 reviews in 2022, 1 review in 2021, 1 review in 2020, 1 review in 2018).
- ◇ IEEE Transactions on Dependable and Secure Computing (TDSC) (1 review in 2022, 1 review in 2021, 2 reviews in 2020 and 1 review in 2019).
- ◇ IET Wireless Sensor Systems (2 reviews 2021).
- ◇ IEEE/ACM Transactions on Networking (TNET) (2 reviews in 2020 and 1 review in 2015).
- ◇ IEEE Transactions on Network Science and Engineering (TNSE) (1 review in 2020).
- ◇ IEEE Transactions on Vehicular Technology (TVT) (1 review in 2019).
- ◇ IEEE Transactions on Wireless Communications (TWC) (1 review in 2019).
- ◇ IEEE Transactions on Knowledge and Data Engineering (TKDE) (1 review in 2019).
- ◇ IEEE Transactions on Industrial Informatics (TII) (1 review in 2019).
- ◇ Future Generation Computer Systems (Elsevier) (1 review in 2018).
- ◇ Digital Signal Processing (Elsevier) (1 review in 2018).

Conference Reviewers (direct reviews and sub-reviews)

ACM CCS 2023; ACM WiSec 2023, 2018; IEEE CICN 2022; IEEE CCNC 2023, 2022, 2021, 2020;

IEEE CNS 2023, 2022, 2020, 2018; IEEE INFOCOM (Wireless-Sec Wkshp) 2023, 2022; IEEE INFOCOM 2019; ESORICS 2018; IEEE WCNC 2016.

Panel Reviewers

NSF SaTC Summer 2023, 2021.

TECHNOLOGY
SKILLS

USRP National Instruments USRP 2921, Ettus USRP 2, LabView.

Network Simulation tools Network Simulator-2 and Network Simulator-3.

Technology CAD Device level and process level simulation tools - ATLAS (Device), ATHENA.

Mathematical Modeling Tools Mathworks MATLAB.

Computer Programming Java, Spring, Hibernate, C, C++, OTcl.