HABEEB OLUFOWOBI, Ph.D.

Assistant Professor, Department of Computer Science & Engineering

The University of Texas at Arlington

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CURRENT APPOINTMENT

- **Assistant Professor,** Department of Computer Science and Engineering, University of Texas at Arlington (UTA), TX, United States **August 2020 - Present**

  As an Assistant Professor in the CSE department, I teach classes every semester, supervise a research group of graduate and undergraduate students, formulate new research questions, write research papers for publication, and write proposals to receive research funding. In addition, I give presentations at professional conferences, serve on department committees, and serve on program committees for conferences and reviewers for various journals. Also, I visit and give talks at companies, give invited talks and meet faculty at other universities, serve as a judge on hackathons and research events, advise engineering student organizations, and host undergraduate and high school students for outreach events.

PAST APPOINTMENT

- **Lecturer,** Electrical Engineering and Computer Science Department**,** Howard University, Washington DC, United States **August 2019 – May 2020**

  As a lecturer in the EECS department, I taught four classes a semester, wrote research papers for publication, gave presentations at professional conferences, wrote proposals for research funding, served on the ABET accreditation committee, was responsible for advising and mentoring more than 100 students, and managing their course schedules and registrations.

EDUCATION

Howard University, Washington, DC **May 2019**

- **Ph.D. Computer Science**
- **Concentration:** Embedded Systems Security
- **Dissertation:** Fail-Operational Intrusion Detection Systems (FO-IDS): A Mechanism for Securing Automotive In-Vehicle Networks

California State Polytechnic University, Pomona: **Dec. 2014**

- **Master of Science in Electrical Engineering:** Computer Systems Emphasis

Fountain University Osogbo, Nigeria **July 2011**

- **Bachelor of Science in Computer Science (with honors)**

RESEARCH AND TEACHING INTEREST

Embedded Systems Security, Security in IoT, Network Security, Cloud Computing, Machine Learning and Data Provenance, Real-time Systems, and Connected Autonomous Vehicles.

My research mainly focused on developing methods for ensuring the security and trustworthiness of real-time embedded and distributed systems.

RESEARCH EXPERIENCE

Cyber-Physical Systems Security Lab, UT Arlington, Arlington, TX

Assistant Professor, Computer Science & Engineering **Aug. 2020 - Current**

Director, CSS Lab

Embedded System and Security Lab, Howard University, Washington, DC

Graduate Research Assistant/Project Lead **Jan. 2016 – Aug. 2020**

- **CARS** - "Cars Assuring Resilient Security"

  Involved in research that explores the security issues arising out of the growing use of electrical components that creates access points to vehicular distributed systems, that a potential hacker can exploit. Inherent security challenges such as distributed denial of service attacks, impersonation and fuzzy attacks are investigated to:

  - Establish theoretical foundations of fail-operational intrusion detection systems (FO-IDS),
  - Explore design space in the context of defending against attacks in automotive in-vehicle networks
  - Devise response and recovery protocols to ensure resilient operation, and
  - Evaluate the performance of the FO-IDS using actual vehicular test beds and data.
- Security and Data Provenance in Internet of Things (IoT)
  - This project is aimed at developing a framework that can be used to securely collect data provenance on memory constrained embedded systems device.

Oak Ridge National Lab: Research Intern **June 2017 – Aug. 2017**

In-vehicle network security research and development for the in-vehicle network (CAN bus) to:

- Detect when an attack is imminent or when anomalous events occur on the vehicular bus systems.
- Investigates on ways to mitigate such anomalies and attack as they occur.
- Demonstrates injection attacks on real vehicles to take control of critical functions.
- Evaluate the performance of the proposed detection strategies and how it impedes the performance of the vehicular operations.

IBM Research Lab, Almaden: Research Intern **June 2016 – Aug. 2016**

Developed a data provenance model for the Internet of Things (IoT) systems enabling:

- The verification of systems correctness, integrity, and transparency of information shared across IoT platform.
- Providing mechanisms to ensure secure code and data provenance management on IoT platform.
- Investigate how provenance graphs can be used to detect anomalies in shared information on the IoT platform.

Cal Poly Pomona ECE Dept.: Graduate Research Assistant **August 2013 – Dec. 2014**

- Worked on project involving creating a Smart Monitoring and Response Tool "SMART" to enable real-time energy management of a DC-based distributed micro grid.
- Studied concepts such as moving target defense, message authentication codes and AES encryption
- Created an Android application that provides a way to help people share rides and carpool that implements RSA encryption messages

TEACHING EXPERIENCE

- **University of Texas at Arlington**
  - Spring 2022, 2023
    - CSE 5388/6388 Computer Network Security (New course developed)
  - Spring 2021
    - CSE 4344/5344 Computer Network
  - Fall 2020, 2021, 2022
    - CSE 5333/4392 Cloud Computing

- **UNCF HBCU CS Academy**
  - Summer 2020
    - Data Structures and Algorithms
- **Howard University, Washington, DC**
  - Spring 2020
    - CSCI 136 Computer Science II – Intro to Data Structures & Algorithm
    - CSCI 354 Computer Science III - Data structures & algorithms
  - Fall 2019
    - CSCI 365 Cloud Computing
    - CSCI 354 Computer Science III - Data structures & algorithms
  - Spring 2018
    - EECE 156 Math I Laboratory
  - Fall 2017 - **Teaching Assistant**
    - Operating Systems Concept
    - Computer Organization I, II
  - Spring 2016 - **Teaching Assistant**
    - Computer Organization I, II
  - Fall 2016 - **Teaching Assistant**
    - Modelling and Simulation
- **California State Polytechnic University, Pomona - Teaching Assistant**
  - Spring 2014
    - Electromagnetic Fields
  - Winter 2014
    - Software Engineering

PROFESSIONAL EXPERIENCE

Synaptics: HISD Project Management Intern **June 2014 – Sept. 2014**

- Provide DFT (Design for Test) feedback to design hardware and firmware team
- Design and document electrical/electronic aspects of functional test systems.
- Create test specification to ensure appropriate product test coverage.
- Work with mechanical engineering and 3rd party system builders to build mechanical fixturing and enclosures.
- Manage and report on test development project deliverables including schedule and cost.
- Create, manage and maintained the system BOMs for projects in Agile

Etisalat Nigeria (EMTS): Analyst, IT Service Desk and Incident Management **Dec. 2011 – Jan. 2013**

- Served as a member of the project team that designed and delivered the SAP-e-procurement (Supplier Relationship Management, Contract Lifecycle Management, Spend Performance Management, and Master Data)

- Served as a member of O2D project team, developing strategies to ensure compliance with new industry standards for electronic exchange.
- Providing first and second level support in the event of incidents/downtimes to application and hardware.
- Design, implement, and manage network server software and hardware.

MENTORING AND SUPERVISING

Current Graduate Students

- Emmanuel Oseghale, Trustworthiness of Real-Time Embedded Systems, PhD student, Computer Science
- Afia Anjum, IoT Communication Network Security, PhD student, Computer Science
- Paul Agbaje, Embedded Systems Security, PhD student, Computer Science
- Arkajyoti Mitra, CPS Security (Cybersecurity), PhD student, Computer Science
- Avinash Mahala, MS Student, Computer Science
- David Oyekola, Undergraduate, Computer Science

Graduate Thesis and Project Committees

- Cristian Garces, Ph.D. Diagnostic Evaluation
- Aref Shiran, Ph.D. Diagnostic Evaluation
- Mohit Singhal, Ph.D. Comprehensive Examination
- Trivedi Bhaskar, Ph.D. Diagnostic Evaluation
- Amnah Abdelrahman, M.Sc. (Thesis), May 2021

Student Organization

- Faculty Advisor – National Society of Black Engineers (NSBE), UTA.

PUBLICATIONS

- **Journals**
  1. Agbaje, Paul, Afia Anjum, Arkajyoti Mitra, Emmanuel Oseghale, Gedare Bloom, and Habeeb Olufowobi. "Survey of Interoperability Challenges in the Internet of Vehicles." *IEEE Transactions on Intelligent Transportation Systems* 23, no. 12 (2022): 22838-22861.
  2. Olufowobi, Habeeb, Young, Clinton, Zambreno, Joseph, and Bloom, Gedare. "SAIDuCANT: Specification-based Automotive Intrusion Detection using Controller Area Network (CAN) Timing." *IEEE Transactions on Vehicular Technology (TVT) 2019*.
  3. Young, Clinton, Olufowobi, Habeeb, Zambreno, Joseph, and Bloom, Gedare. "Survey of Automotive Controller Area Network Intrusion Detection Systems." *IEEE Design & Test* (2019).
- **Conference and Workshop Articles**
  1. Anjum, Afia, and Habeeb Olufowobi. "Towards Mitigating Blackhole Attack in NDN-Enabled IoT." In 2023 IEEE International Conference on Consumer Electronics (ICCE), IEEE, 2023.
  2. Anjum, Afia, and Habeeb Olufowobi. "Poster: Mitigating Blackhole Attack in NDNoT." In 2022 IEEE Symposium on Security and Privacy.
  3. Banerjee, Vijay, Sena Hounsinou, Habeeb Olufowobi, Monowar Hasan, and Gedare Bloom. "Secure Reboots for Real-Time Cyber-Physical Systems." In Proceedings of the 4th Workshop on CPS & IoT Security and Privacy, pp. 27-33. 2022.

4. Agbaje, Paul, Afia Anjum, Arkajyoti Mitra, Gedare Bloom, and Habeeb Olufowobi. "A Framework for Consistent and Repeatable Controller Area Network IDS Evaluation." in 4th International Workshop on Automotive and Autonomous Vehicle Security (AutoSec), 2022.
5. Anjum, Afia, Paul Agbaje, Sena Hounsinou, and Habeeb Olufowobi. "In-Vehicle Network Anomaly Detection Using Extreme Gradient Boosting Machine." In 2022 11th Mediterranean Conference on Embedded Computing (MECO), pp. 1-6. IEEE, 2022.
6. Hounsinou, Sena, Mark Stidd, Uchenna Ezeobi, Habeeb Olufowobi, Mitra Nasri, and Gedare Bloom. "Vulnerability of Controller Area Network to Schedule-Based Attacks." In 2021 IEEE Real-Time Systems Symposium (RTSS), pp. 495-507. IEEE, 2021.
7. Nwafor, Ebelechukwu, Michael Robson, and Habeeb Olufowobi. "Dynamic Load Sharing in Memory Constrained Devices: A Survey." 2021 IEEE 7th World Forum on Internet of Things (WF-IoT). IEEE, 2021.
8. Ezeobi, Uchenna, Habeeb Olufowobi, Clinton Young, Joseph Zambreno, and Gedare Bloom. "Reverse Engineering Controller Area Network Messages using Unsupervised Machine Learning." IEEE Consumer Electronics Magazine (2020).
9. Ebelechukwu Nwafor and Olufowobi, Habeeb. "Towards an Interactive Visualization Framework for IoT Device Data Flow." *IEEE Workshop on Internet of Things Data Analytics (IoTDA) 2019.*
10. Olufowobi, Habeeb, Sena Hounsinou and Bloom, Gedare. "Controller Area Network Intrusion Prevention System Leveraging Fault Recovery." *ACM Workshop on Cyber-Physical Systems Security & Privacy (CPS-SPC'19).*
11. Olufowobi, Habeeb**,** Ezeobi, Uchenna, Muhati, Eric, Young, Clinton, Zambreno, Joseph, and Bloom, Gedare. "Anomaly Detection Approach Using Adaptive Cumulative Sum Algorithm for Controller Area Network". *Proceedings of the ACM Workshop on Automotive Cybersecurity. ACM, 2019.*
12. Young, Clinton, Olufowobi, Habeeb, Zambreno, Joseph, and Bloom, Gedare. "Automotive Intrusion Detection Based on Constant CAN Message Frequencies Across Vehicle Driving Modes". *Proceedings of the ACM Workshop on Automotive Cybersecurity. ACM, 2019.*
13. Olufowobi, Habeeb, Young, Clinton, Zambreno, Joseph, and Bloom, Gedare. "WiP: Real-Time Modeling for Intrusion Detection in Automotive Controller Area Network." *Real-Time Systems Symposium (RTSS), 2018 IEEE*. IEEE, 2018.
14. Parwez, Md Salik, and Olufowobi, Habeeb. "Cost-constrained Handoff in Next Generation Heterogeneous Wireless Networks". *Ubiquitous Computing, Electronics and Mobile Communication Conference (UEMCON), 2018 IEEE 9th Annual*. IEEE.
15. Olufowobi, Habeeb, Engel, Robert, Baracaldo, Nathalie, Bathen, Luis Angel D., Tata, Samir, and Ludwig, Heiko. "Data Provenance Model for Internet of Things (IoT) Systems." *International Conference on Service-Oriented Computing*. Springer, Cham, 2016.

- **Book Chapter**

  Olufowobi, Habeeb and Gedare Bloom. "Connected Cars: Automotive Cybersecurity and Privacy for Smart Cities." In *Smart Cities Cybersecurity and Privacy*, pp. 227-240. Elsevier, 2019.

- **Short Papers**

  Anjum, Afia, and Habeeb Olufowobi. "Poster: Mitigating Blackhole Attack in NDNoT." In Proceeding of the 43rd IEEE Symposium on Security and Privacy (S&P), 2022.

INVITED TALKS

- **Fountain University, Osogbo Nigeria.** Securing Vehicle-to-Vehicle Communications. August 3, 2021
- **Bell Flight, Fort Worth.** Security of Ground and Urban Air Mobility Communication. Sept. 25, 2020
- **Florida A&M University Thought Leaders Series**. Autonomous Security. April 10, 2020

- **University of Nevada Las Vegas**. Automotive Intrusion Detection using CAN Timing. May 15, 2019
- **Fairleigh Dickinson University Teaneck.** Provenance Model in IoT System. March 13, 2019

PRESENTATIONS

- Automotive Intrusion Detection Based on Constant CAN Message Frequencies Across Vehicle Driving Modes, *AutoSec*, Richardson, TX, 2019
- Anomaly Detection Approach Using Adaptive Cumulative Sum Algorithm for Controller Area Network, *AutoSec*, Richardson, TX, 2019
- Cost-constrained Handoff in Next Generation Heterogeneous Wireless Networks, *UEMCON,* New York, NY, 2018
- Real-Time Modeling for Intrusion Detection in Automotive Controller Area Network, *RTSS*, Nashville, TN, 2018

AWARDS AND GRANTS

- **Grants in Submission**
  - CRII: SaTC: Data Poisoning Attack Detection and Mitigation for Internet of Vehicles Communication
  - UTA REP: Securing Connected Autonomous Vehicle from Remote Compromise
  - Google Research: Securing Content-Centric Networking for Internet of Vehicles against Adversarial Input
  - Collaborative Research: CPS: TTP Option: Medium: BB-SAVAGE: Bumper-to-Bumper Security Architecture for Vehicles Across Ground Environments
- **Awards**
  - Best Paper Award, 4th International Workshop on Automotive and Autonomous Vehicle Security, 2022
  - HBCU Blockchain Course Development Proposal Award, 2019
  - Real-Time System Symposium Travel Award, 2018
  - Trans-Atlantic Symposium on Technology and Policy Travel Award, 2017
  - CPS Week Student Travel Award, Carnegie Melon University 2017
  - IEEE Security Development Conference Travel Award, 2016
  - Dean's List – California State Polytechnic University, Pomona, 2014
  - Chancellor's Prize - Best Graduating Student in the University, Fountain University, 2011
  - College Prize - Best Graduating Student in Sciences, Fountain University, 2011
  - Fountain University Scholar Award, in recognition of excellence in academic performance, 2008 – 2011

CERTIFICATIONS

- **PMI Project Management Professional (PMP)**
- **ITIL, SSYB and SFC Certified**

PROFESSIONAL SERVICE

- **Reviewer:** IEEE Transaction on Vehicular Technology
- **Reviewer:** IEEE Internet of Things Journal

- **Reviewer:** IEEE Transaction on Computers
- **Reviewer:** ACM SIGCSE
- **Reviewer:** Elsevier Computers and Security
- **TPC –** Real Time System Symposium (RTSS 2021, 2022)
- **TPC –** IEEE/ACM International Conference on Utility and Cloud Computing (UCC 2022)
- **Artifacts Evaluation Committee –** Real Time System Symposium (RTSS 2021, 2022)
- **TPC -** CPS & IoT Security and Privacy (CPSIoTSec 2020, 2021)
- **TPC -** International Conference on Computer Communication and the Internet (ICCCI 2022)
- **Secondary Reviewer:** Design, Automation and Test Conference (DATE 2022)

PROFESSIONAL MEMBERSHIPS

- IEEE Member (M ’16)
- IEEE Computer Society, Member
- IEEE Communication Society, Member
- Member NSBE

INSTITUTIONAL SERVICE

- Member CSE Broadening Participation Committee
- Member CSE Faculty Search Committee
- Member CSE PhD Admissions Committee