Priscilla Kyei Danso

PhD STUDENT · Computer Science
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Biography

My research interests lie at the intersection of compliance automation and cybersecurity. I'm currently developing ComplianceGPT, a hybrid system that uses advanced language models and formal logic to automate regulatory compliance. By translating complex regulations into a logical language, ComplianceGPT provides a more efficient and accurate approach to ensuring adherence to industry standards. Building on my experience with IoT security, where I employed machine learning techniques for device profiling and anomaly detection, I aim to extend these methodologies to the broader realm of compliance automation. I am committed to contributing to a safer and more resilient digital landscape by advancing the state-of-the-art in compliance automation, formal verification, and cybersecurity.

Education

Stony Brook University, New York, USA. September 2023 - Present
Doctor of Philosophy in Computer Science (PhD)

University of New Brunswick, Fredericton, Canada May 2021 - May 2023
Master of Computer Science (MCS)
Thesis: Transferability of Machine Learning Model for IoT device Identification and Vulnerability Assessment.

Kwame Nkrumah University of Science and Techn., Kumasi, Ghana. September 2012 - June 2016
Bachelor of Science Computer Engineering
Project Title: An Integrated Messaging Platform for an Enterprise Environment

Publications

Transferability of machine learning algorithm for IoT device profiling and identification

With *Sajjad Dadkhah, Euclides Carlos Pinto Neto, Alireza Zohourian, Heather Molyneaux, Rongxing Lu, and Ali A Ghorbani*
https://ieeexplore.ieee.org/document/10173670
Appeared in the IEEE Internet of Things Journal

Ensemble-based intrusion detection for internet of things devices

With *Euclides Carlos Pinto Neto, Sajjad Dadkhah, Alireza Zohourian, Heather Molyneaux, and Ali A Ghorbani*
https://ieeexplore.ieee.org/document/10169426
Appeared in the 2022 IEEE 19^{th} International Conference on Smart Communities: Improving Quality of Life Using ICT, IoT and AI (HONET)

Human-Centric machine learning: The role of users in the development of IoT device identification and vulnerability assessment

With *Heather Molyneaux, Alireza Zohourian, Euclides Carlos Pinto Neto, Derrick Whalen, Sajjad Dadkhah, and Ali A Ghorbani*
https://link.springer.com/chapter/10.1007/978-3-031-35822-7_40
Appeared in the 2023 HCI for Cybersecurity, Privacy and Trust

Towards the development of a realistic multidimensional IoT profiling dataset

With *Sajjad Dadkhah, Hassan Mahdikhani, Alireza Zohourian, Kevin Anh Truong, and Ali A Ghorbani*
https://ieeexplore.ieee.org/document/9851966
Appeared in the 2022 19^{th} Annual International Conference on Privacy, Security & Trust (PST)

IoT zigbee device security: A comprehensive review. Internet of Things

With *Alireza Zohourian, Sajjad Dadkhah, Euclides Carlos Pinto Neto, Hassan Mahdikhani, Heather Molyneaux, and Ali A Ghorbani*
https://doi.org/10.1016/j.iot.2023.100791
Appeared in the Elsevier Internet of Things Journal

Research Experience

- Engineered a system utilizing machine learning to profile IoT device types within a network while concurrently evaluating and visualizing the vulnerabilities associated with these devices.
- Collaborated with a team to publish an IoT dataset, aiming to facilitate the efforts of researchers specializing in the identification of IoT devices.
- Formulated and executed the implementation of an ensemble-based Intrusion Detection System (IDS), specifically designed for anomaly detection within an IoT infrastructure.

- Conducted extensive research on Internet of Things (IoT) devices, exploring potential vulnerabilities and implementing various efficient mitigation strategies. Executed experiments and thoroughly documented the results.

Awards and Scholarships

- Thirteenth Summer School on Formal Techniques + FMiTF Bootcamp, sponsored by NSF, May 2024.
- CPS-IOT Week 2024 in Hong Kong, sponsored by NSF as a student travel award, April 2024.
- iMentor scholarship for ACM CCS conference in Copenhagen, Denmark, sponsored by NSF, 2023.
- Academic Scholarship, University of New Brunswick, Faculty of Computer Science Funding, 2021
- Institute for Analytics and Data Science Summer School Scholarship, University of Essex, 2020
- Academic Scholarship, Newmont Ahafo Development Foundation (NADeF), 2016.

Technical Skills

- **Imperative Programming Languages:** Python, Javascript
- **Functional Programming Languages:** OCaml
- **Model Checkers:** NuSMV
- **Data Analysis:** Pandas, Numpy, Scikit-learn, Plotly, Seaborn
- **Cybersecurity:** Nmap, Snort, Wireshark
- **Web Technologies:** HTML, CSS, PHP
- **Databases:** MySQL, PostgreSQL
- **Basic Software and Tools:** Git, LaTeX, Markdown, Mac, MS Office

Teaching Experience

Teaching Assistant, ISE331 Fundamentals of Computer Security, January 2024 - April 2024
Department of Computer Science, Stony Brook University

- Provided guidance and answered student questions during office hours.
- Proctored exams, ensuring a fair and secure testing environment.
- Graded student work, offered constructive feedback, and assigned final grades.

Teaching Assistant, CSE331 Computer Security Fundamentals, August 2023 - December 2023
Department of Computer Science, Stony Brook University

- Collaborated with faculty to develop assignments that met course objectives.
- Assisted students by holding office hours and addressing their questions.
- Ensured fair exam conditions by proctoring.
- Evaluated student submissions, provided feedback, and assigned grades.

Conference Presentations

Oral Presentations

- **Danso, Priscilla Kyei**, Euclides Carlos Pinto Neto, Sajjad Dadkhah, Alireza Zohourian, Heather Molyneaux, and Ali A Ghorbani. *Ensemble-based intrusion detection for internet of things devices.* In 2022 IEEE 19th International Conference on Smart Communities: Improving Quality of Life Using ICT, IoT and AI (HONET), December 2022. Kennesaw State University, Marietta, Georgia

Poster Presentation

- **Danso, Priscilla Kyei**, Euclides Carlos Pinto Neto, Sajjad Dadkhah, Alireza Zohourian, Heather Molyneaux, and Ali A Ghorbani. *Ensemble-based intrusion detection for internet of things devices.* 2022 19th Annual International Conference on Privacy, Security & Trust (PST), August 2022. Fredericton, New Brunswick, Canada

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- Institute for Analytics and Data Science Summer School Scholarship, University of Essex, July 2020
- Academic Scholarship, Newmont Ahafo Development Foundation (NADeF), September 2016.

Peer Review and Artifact Review

Peer Review for IEEE Internet of Things Journal

- Conducted an in-depth review of a research paper on adversarial attacks and defenses in robotics.
- Provided constructive feedback on the paper's methodology, results, and its overall contribution to the field.
- Recommended revisions to enhance the clarity and impact of the paper.

Artifact Review for the ACM Conference on Computer and Communications Security (CCS 2024)

- Reviewed three artifacts focused on vision in autonomous vehicles, specification and verification of strong timing isolation, and OpenFlow package discovery forwarding.
- Assessed the technical merit, innovation, and potential impact of the artifacts.
- Evaluated and scored the artifacts based on their functional capabilities and usability.

Work Experience

United Nations World Food Programme, Data Analyst. Accra, Ghana. November 2020 - April 2021

- Created a Fleet Management System tailored to optimize operations for multiple pharmaceutical companies spanning all 16 West African countries, employing Microsoft Access.
- Conducted an in-depth assessment of the data integrity and accuracy within the Fleet Management System (FMS), additionally providing training sessions for staff on the effective utilization of the FMS system.

Cobalt Partners, Web Developer Consultant. Accra, Ghana. July 2020 - March 2021

- Contributed to the creation of an Enterprise portal that facilitates the growth and learning of more than 1599 children across 89 classrooms daily, while also supporting 217 jobs in the education sector. Technologies utilized include Laravel, VueJS, HTML, CSS and MySQL.
- Examined educational datasets using Google BigQuery and Microsoft PowerBI to extract valuable insights for informed business decision-making.

Mesika Ghana, Data Scientist. Accra, Ghana. August 2019 - June 2020

- Employed Pandas, Scikit-learn, and Plotly to analyze transaction data for over 1 million customers, implementing segmentation clustering algorithms and deriving valuable business insights.
- Implemented an ETL (Extract, Transform, Load) pipeline to optimize data storage and retrieval efficiency, leveraging Apache Flow, PostgreSQL, and conducting data analysis with MS Excel and PowerBI.
- Utilized Jenkins and Ansible to establish a continuous integration service, automating the entire development pipeline process.
- Collaborated with a team to create a visualization dashboard for customer transactions, employing HTML, Javascript, Python, and CSS.

Ernst and Young Ghana, Intern. Accra, Ghana. April 2019 - July 2019

- Conducted analysis and visualization of ministerial data using Power BI and MS Excel, and concurrently drafted proposals and documentation.
- Performed comprehensive end-to-end testing of applications, evaluating fixes, features, and enhancements to identify and address aberrations.

SuperTech Ghana, Software Developer. Accra, Ghana. January 2018 - March 2019

- Created a document management system utilizing SharePoint, facilitating efficient organization and retrieval of documents.
- Designed custom reports within the Microsoft Dynamics ERP application to enhance the decision-making process for business operations.
- Addressed customer service problems promptly and accurately, adhering to company guidelines and fostering customer loyalty.

IT Consortium, Assistant Programmer, Accram, Ghana June 2016 - December 2017

- Coordinated and oversaw the completion of projects, while also offering technical support for the Ghana online passport application.
- Tracked tickets promptly and accurately through a project management system, employing triage and escalation processes as needed to the respective team leadership.
- Addressed customer service problems promptly and accurately, adhering to company guidelines and fostering customer loyalty.