EDOARDO ALLEGRINI

MORE THAN A TITLE

I am a researcher working at the intersection of AI, social networks, and cybersecurity, with 2+ years of experience combating disinformation through interpretable, algorithmic solutions. In this field, my work focuses on the detection and classification of social bots developing biologically inspired techniques to encode and analyze user behavior on social media platforms. I am the first author of two peer-reviewed conference papers in social bot detection.

I combine a rigorous research mindset with hands-on engineering experience, demonstrated through personal projects using Python, Docker, Bash, Go, and SQL (among others). I also have practical experience with leading machine learning and deep learning frameworks. With a B.Sc. in Computer Science and an M.Sc. in Cybersecurity nearing completion, I apply my skills at the intersection of AI and cybersecurity to solve complex, real-world problems at scale.

EDUCATION

Master of Science, CYBERSECURITY, Sapienza University of Rome — *Oct 2023 - Oct 2025 (Expected)*

Bachelor of Science, COMPUTER SCIENCE (L-31), Sapienza University of Rome — *Oct 2020 - Jun 2023*
Thesis: A novel genetic approach for Social Bot detection
Grade: 110/110 Cum Laude

High School, SCIENTIFIC STUDIES, Liceo Classico e Scientifico Socrate — *2015 - 2020*

EXPERIENCE

Research Scholarship — *Mar 2025 - May 2025*
Sapienza University of Rome — *Rome, IT*

Research direction: Enhancing Executables Analysis for Malware Detection with LLM-Powered Static Analysis

Description: This research aims to design and develop an advanced binary analysis tool that integrates Large Language Models (LLMs) to improve static analysis. By leveraging LLMs' capabilities in code understanding, pattern recognition, and semantic inference, the tool will enhance the accuracy and efficiency of identifying malicious code structures, obfuscation techniques, and behavioral indicators. The project will explore novel methodologies for incorporating LLM-driven reasoning into traditional static analysis workflows, ultimately improving malware classification, reverse engineering, and threat attribution.

Research Scholarship — *Feb 2024 - Feb 2025*
Sapienza University of Rome — *Rome, IT*

Research direction: Designing, developing and testing an innovative approach to accurately detect and identify bot activity on social media platforms.

Description: Conducted research focused on countering disinformation through the detection and classification of social bots, culminating in two conference publications. Developed a novel procedure, inspired by DNA sequence similarity metrics, to classify social media accounts based on behavioral patterns extracted from user timelines. The

methodology expanded traditional bot detection strategies by encoding and analyzing nuanced users' behaviors on social networks, providing an interpretable, behaviorally grounded framework for automated bot classification.

Graduate Researcher *2023 - Present*
NetSecurityLab, Sapienza University of Rome *Rome, IT*

- Conducting research on IPv6 security.
- Conducting research on AI for cybersecurity, with a focus on leveraging LLMs to enhance static analysis of executables.
- Advising undergrads in bachelor thesis projects.

PUBLICATIONS

[1] **Edoardo Allegrini**, Edoardo Di Paolo, Marinella Petrocchi, Angelo Spognardi. "Deciphering Social Behaviour: a Novel Biological Approach For Social Users Classification". In: *Proceedings of the 40th ACM/SIGAPP Symposium on Applied Computing*. SAC '25. New York, NY, USA: Association for Computing Machinery, 2025, pp. 907–914. ISBN: 9798400706295. DOI: 10.1145/3672608.3707950. URL: https://doi.org/10.1145/3672608.3707950.

[2] **Edoardo Allegrini**, Edoardo Di Paolo, Marinella Petrocchi, Angelo Spognardi. "A Proposal for Uncovering Hidden Social Bots via Genetic Similarity". In: *27th International Conference on Discovery Science*. 2024. URL: https://doi.org/10.48550/arXiv.2410.13512.

CERTIFICATES

Certificate	Issuing Organization	Date
C1 Certificate in Advanced English (CAE)	Cambridge University Press & Assessment English	*Aug 2024*
Information Engineer – State Exam, Section B	National Council of Engineers (Italy)	*Nov 2023*
CyberX – Mind4Future Program	Cyber 4.0 and Leonardo S.p.A.	*Feb - May 2023*
B1 Preliminary English Certificate	Cambridge University Press & Assessment English	*Jul 2019*

PROJECTS

Robot Kinematics with Artificial Neural Networks *Oct 2024 - Dec 2024*
Repository - Key Technologies: Python, Machine Learning, Gymnasium, Docker

This project investigates the use of Artificial Neural Networks (ANNs) for modeling robot kinematics. Specifically, it focuses on approximating forward kinematics and solving inverse kinematics for three robot systems: Reacher2, Reacher3, and Reacher5.

CacheCloudNet *Jun 2024 - Sep 2024*
Repository - Key Technologies: Python, ROS2, Gazebo

An IoT network architecture utilizing balloons and drones to enable efficient data caching and relay. Designed to improve sensor-based data collection in dynamic and constrained environments.
Key Features:

- **Efficient Data Caching:** Implemented caching strategies such as FIFO, LFU, and LRU to optimize storage and retrieval.
- **Dynamic Sensor Management:** Automated sensor deployment and movement for maximized coverage.
- **Performance Evaluation:** Conducted simulations to compare cache replacement policy effectiveness.

Malware Detection with malware images using CNN techniques *Jun 2023 - Jul 2023*
Repository - Key Technologies: Python, Deep Learning, CNN

The purpose of this project is to advance malware defense by developing a Malware Detection System (MDS) utilizing

Convolutional Neural Networks (CNNs). Rather than relying on traditional feature extraction-based machine learning algorithms, this work explored the use of CNNs to classify executable files as either malware or benign by analyzing their corresponding images.

A botnet architecture made by Command and Control (C&C) and some bots *Jun 2023 - Jul 2023*
`Repository` – `Key Technologies:` Python, Mininet

This project involves a tool designed to simulate a botnet with centralized control through a Command and Control (C&C) interface. The CLI allows for comprehensive management of the bots, enabling execution of various cyber attacks, including:

- Distributed Denial of Service (DDoS) attacks.
- Batch email sending.
- Spoofing of software and hardware information on the bots.

This tool provides valuable insights into botnet behavior and attack strategies, serving as a resource for cybersecurity research and testing.

WASAPhoto *Sep 2022 - Jan 2023*
`Repository` – `Key Technologies:` Go, SQL, Vue.js, Node.js

WASAPhoto is a platform for sharing photos with friends and followers. Users can upload images from their PC, view a stream of photos from accounts they follow, and interact through likes and comments. Features include:

- Reverse chronological photo stream with upload timestamps and engagement metrics.
- Ability to like, comment, and manage comments on photos.
- User profiles displaying personal photos, follower/following count, and photo management.
- Functionality to ban and unban users, and search for profiles via username.
- Simplified login process and options for changing usernames and managing photo uploads.

VOLUNTEERING

Christmas Lunch Assistance for Homeless People *Dec 2019 – Present*
Provide assistance and service to homeless people during the Christmas lunch event.

Community of Sant'Egidio – Elderly Support *Mar 2018 - Aug 2019*
Programmed and conducted weekly remote calls to monitor the psycho-physical well-being of elderly individuals, addressed their requests for assistance, and planned, assisted, and participated in recreational activities at a community center in Rome.

LANGUAGE SKILLS

Mother Tongue: Italian

Other Languages:

Language	Understanding Listening / Reading	Speaking Interaction / Production	Writing
English	C1 / C1	C2 / C2	C1
Spanish	B1 / A2	A2 / A2	A2

Levels: A1 and A2: Basic user - B1 and B2: Independent user - C1 and C2: Proficient user

CONFERENCES

The 40th ACM/SIGAPP Symposium On Applied Computing *Apr 2025*
Presenter of publication [1].

27th International Conference on Discovery Science 2024 *Oct 2024*
Presenter of publication [2].

Cybertech Europe *Oct 2024*
Invitation by Leonardo S.p.A., Cyber & Security division, as finalist of CyberX - Mind4Future (Agenda).

Cybertech Europe *Oct 2023*
Invitation by Leonardo S.p.A., Cyber & Security division, as finalist of CyberX - Mind4Future (Agenda).