Emanuele Iannone Ph.D. in Computer Science

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Personal Information

Full Name	Emanuele Iannone
Nationality	Italian
Birth	September 1, 1996

Work Experience

2023 – cur. **Postdoctoral Researchers (Research Assistant)**
Institute of Software Security, Hamburg University of Technology (TUHH)
Duties: Research on security vulnerability testing and working on designing novel automated vulnerability repair solutions in the context of Horizon EU project "Cybersecurity for AI-Augmented Systems" (SEC4AI4SEC, grant ID: 101120393).
Start: November 2023

Education

2020 – 2024 **Doctor of Philosophy (Ph.D.) in Computer Science**
University of Salerno
Advisor: Prof. Fabio Palomba
Thesis title: *There's Something About Vulnerabilities: Empirical Comprehension and Novel Automated Approaches*.
Research Topic: Detection and Assessment of Software Vulnerabilities in Software Maintenance and Evolution.

2018 – 2020 **M.Sc. Computer Science**
University of Salerno
Final Mark: 110/110 cum laude
Supervisors: Prof. Fabio Palomba, Prof. Andrea De Lucia
Thesis title: *Toward Automatic Exploit Generation of Known API Vulnerabilities*.

2015 – 2018 **B.Sc. Computer Science**
University of Salerno
Final Mark: 110/110 cum laude
Supervisor: Prof. Andrea De Lucia
Thesis title: *Automated Refactoring of Energy-Related Code Smells of Android Applications*.

Research Projects

2023 **Cybersecurity for AI-Augmented Systems (Sec4AI4Sec)**
Grant Agreement ID: 101120393
Funder: European Commission
Funding Schema: *HORIZON-RIA - HORIZON Research and Innovation Actions*
Affiliation: Hamburg University of Technology (TUHH)
Role: Work Package on the design of novel automated vulnerability repair solutions.

Research Internships

2022 **Visiting Ph.D. Student at University of Luxembourg (UniLu)**
Period: Oct 2022 - Dec 2022 (2 mo)
Supervisor: Prof. Tegawendé F. Bissyande
Research Work: *Synthesizing Commit Messages from Bug Reports with Pre-trained Transformers.*

Visiting Ph.D. Student at Tampere University (TUNI)
Period: May 2022 - Jun 2022 (1 mo)
Supervisor: Prof. Davide Taibi
Research Work: *Detecting Vulnerability in Open-Source Software with Crowd-Sourced Information.*

Research Summary

My research is rooted in Empirical Software Engineering, a sub-domain of Software Engineering that focuses on conducting experiments on software systems (products, processes, and resources) and developers. Since my Ph.D. program, I have focused on software security, with particular attention to security testing, automated exploit generation, mining vulnerability-related data from software repositories, and vulnerability assessment. In my daily research activities, I use quantitative and qualitative methods to investigate various phenomena occurring during the maintenance and evolution of software systems. In particular, I have been adopting AI tools and techniques to analyze source code and software repositories, as well as traditional heuristic approaches.

To date, I have concretely contributed to the following research topics:
👉 **Software Vulnerability Analysis.** My main research topic concerns the analysis of detection and assessment techniques for software vulnerabilities and, more in general, security issues. Specifically, I investigated how vulnerabilities appear and live in software systems' source code [J2], aiming to experiment with machine learning models for their early detection (at the commit level) [J3] and propose novel solutions for fine-grained assessment, such as generating security test cases for third-party vulnerabilities [C2] or predicting the risk of exploitation [J5]. I have also investigated what other factors can influence the security of software applications, such as code refactoring [J4]. Part of my research on this topic during my Ph.D. program has been summarized in a Doctoral Symposium paper [C5].
👉 **Software Analytics.** I regularly employ a wide range of automated tools to extract information (source code, issue text, commit logs) from software projects hosted on public repositories like GitHub. Most of my work analyzes the evolution of certain key aspects in modern software development, like security [J2], code readability [C3], and other socio-technical factors [J1].
👉 **Source Code Refactoring.** Being interested in software quality, I have investigated the effect of software refactoring on different non-functional aspects, such as code readability [C3] and security [J4].
👉 **Green Mobile Software Engineering.** My first experiences in research started with problems concerning the energy consumption of mobile applications. I have developed and experimented with new automated solutions that assist developers in detecting and removing possible causes of energy waste, either via source code analysis [C1] or predictive models [C4].

Publications

Journal Articles

[J5] **E. Iannone**, G. Sellitto, E. Iaccarino, F. Ferrucci, A. De Lucia, and F. Palomba, "Early and realistic exploitability prediction of just-disclosed software vulnerabilities: How reliable can it be?" *ACM Trans. Softw. Eng. Methodol.*, vol. 33, no. 6, Jun. 2024, ISSN: 1049-331X. DOI: 10.1145/3654443.

[J4] **E. Iannone**, Z. Codabux, V. Lenarduzzi, A. De Lucia, and F. Palomba, "Rubbing salt in the wound? a large-scale investigation into the effects of refactoring on security," *Empirical Software Engineering*, vol. 28, no. 4, p. 89, 2023, ISSN: 1573-7616. DOI: 10.1007/s10664-023-10287-x.

[J3] F. Lomio, **E. Iannone**, A. De Lucia, F. Palomba, and V. Lenarduzzi, "Just-in-time software vulnerability detection: Are we there yet?" *Journal of Systems and Software*, p. 111 283, 2022, ISSN: 0164-1212. DOI: 10.1016/j.jss.2022.111283.

[J2] **E. Iannone**, R. Guadagni, F. Ferrucci, A. De Lucia, and F. Palomba, "The secret life of software vulnerabilities: A large-scale empirical study," *IEEE Transactions on Software Engineering*, vol. 49, no. 1, pp. 44–63, 2023. DOI: 10.1109/TSE.2022.3140868.

[J1] M. De Stefano, **E. Iannone**, F. Pecorelli, and D. A. Tamburri, "Impacts of software community patterns on process and product: An empirical study," *Science of Computer Programming*, vol. 214, p. 102 731, 2022, ISSN: 0167-6423. DOI: 10.1016/j.scico.2021.102731.

Conference Proceedings

[C5] **E. Iannone** and F. Palomba, "The phantom menace: Unmasking security issues in evolving software," in *2022 IEEE International Conference on Software Maintenance and Evolution (ICSME)*, 2022, pp. 612–616. DOI: 10.1109/ICSME55016.2022.00085.

[C4] **E. Iannone**, M. De Stefano, F. Pecorelli, and A. De Lucia, "Predicting the energy consumption level of java classes in android apps: An exploratory analysis," in *2022 IEEE/ACM 9th International Conference on Mobile Software Engineering and Systems (MobileSoft)*, 2022, pp. 1–5. DOI: 10.1145/3524613.3527805.

[C3] G. Sellitto, **E. Iannone**, Z. Codabux, V. Lenarduzzi, A. De Lucia, F. Palomba, and F. Ferrucci, "Toward understanding the impact of refactoring on program comprehension," in *2022 IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER)*, 2022, pp. 731–742. DOI: 10.1109/SANER53432.2022.00090.

[C2] **E. Iannone**, D. Di Nucci, A. Sabetta, and A. De Lucia, "Toward automated exploit generation for known vulnerabilities in open-source libraries," in *2021 IEEE/ACM 29th International Conference on Program Comprehension (ICPC)*, 2021, pp. 396–400. DOI: 10.1109/ICPC52881.2021.00046.

[C1] **E. Iannone**, F. Pecorelli, D. Di Nucci, F. Palomba, and A. De Lucia, "Refactoring android-specific energy smells: A plugin for android studio," in *Proceedings of the 28th International Conference on Program Comprehension*, ser. ICPC '20, Seoul, Republic of Korea: Association for Computing Machinery, 2020, pp. 451–455, ISBN: 9781450379588. DOI: 10.1145/3387904.3389298.

Event Organization and Community Services

2024 **Organizing Co-Chair – SECUTE 2024 Workshop**
1st International Workshop on Security Testing for Complex Software Systems
Co-located with EASE 2024

Social Media Editor (ongoing)
Science of Computer Programming

2023 **Local Arrangement Team**
15th Seminar on Advanced Techniques & Tools for Software Evolution (SATToSE 2023) + 16th International Summer School on Software Engineering (ISSSE 2023)

2022 **Student Volunteer**
44th IEEE/ACM International Conference on Software Engineering (ICSE 2022) + Co-located Events

2021 **Publicity Co-Chair**
29th IEEE/ACM International Conference on Program Comprehension (ICPC 2021)

Invited Talk and Guest Lectures

2023 **MSR for Vulnerability Prediction: Mining Vulnerability-Contributing Commits**
Cybersecurity Data Science, M.Sc. Information and Communication Systems
Hamburg University of Technology (TUHH), Hamburg, Germany (May 31, 2023)

2022 **MSR for Vulnerability Prediction: Lessons Learned, Challenges, and Recommendations**
1st Summer School on Security Testing and Verification
KU Leuven, Leuven, Belgium (September 22, 2022)

2021 **Automated Test Case Generation: Toward Its Application in Exploit Generation for Known Vulnerabilities**
SAP Security Research Exchange Meeting
Online (July 8, 2021)

Reviewing Activities

Journals

Referee for several Software Engineering-themed journals:
- *IEEE Transactions on Software Engineering (TSE)*
- *ACM Transactions on Software Engineering and Methodology (TOSEM)*
- *Springer's Empirical Software Engineering (EMSE)*
- *Elsevier's Journal of Systems and Software (JSS)*
- *Springer's Automated Software Engineering Journal (AUSE)*
- *Wiley's Journal of Software: Evolution and Process (JSEP)*
- *Elsevier's Science of Computer Programming (SCICO)*

Conferences

2025 **Program Committee Member**, Posters and Vision Track
29th International Conference on Evaluation and Assessment in Software Engineering (EASE 2025)

Program Committee Member, Research Track; Tool Demonstration Track
41st International Conference on Software Maintenance and Evolution (ICSME 2025)

Program Committee Member
4th International Workshop on Designing and Measuring Security in Systems with AI (DeMeSSAI'25)

Program Committee Member, Ideas, Visions and Reflections Track
32nd ACM International Conference on the Foundations of Software Engineering (FSE 2025)

Program Committee Member, Research Track
32nd IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER 2025)

Reviewing Activities (continued)

- **Program Committee Member**
  2nd International Workshop on Software Quality Assurance for Artificial Intelligence (SQA4AI 2025)

2024
- **Program Committee Member**, NIER Track
  40th International Conference on Software Maintenance and Evolution (ICSME 2024)
- **Program Committee Member**, NIER Track
  39th IEEE/ACM International Conference on Automated Software (ASE 2024)
- **Program Committee Member**, Data and Tool Showcase Track
  20th International Conference on Mining Software Repositories (MSR 2024)
- **Program Committee Member**, Research Track
  31st IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER 2024)

2023
- **Program Committee Member**, RENE/NIER Track
  15th Symposium on Search-Based Software Engineering (SSBSE 2023)
- **Program Committee Member**, Research Track
  10th International Conference on Mobile Software Engineering and Systems (MOBILESoft 2023)
- **"Junior" Program Committee Member**, Research Track
  20th International Conference on Mining Software Repositories (MSR 2023)

2022
- **Invited Reviewer**
  26th ACM Conf. on Computer-Supported Cooperative Work & Social Computing (CSCW 2023)
- **Program Committee Member**, RENE/NIER Track
  14th Symposium on Search-Based Software Engineering (SSBSE 2022)
- **Program Committee Member**, NIER Track
  37th IEEE/ACM International Conference on Automated Software Engineering (ASE 2022)
- **"Shadow" Program Committee Member**
  19th International Conference on Mining Software Repositories (MSR 2022)
- **Program Committee Member**
  1st International Workshop on Software Quality Assurance for Artificial Intelligence (SQA4AI 2022)

2021
- **Invited Reviewer**
  25th ACM Conference On Computer-Supported Cooperative Work And Social Computing (CSCW 2022)
- **Program Committee Member**
  16th International Conference on Software Engineering Advances (ICSEA 2021)

Miscellaneous

Awards and Achievements

2023 **TSE 2023 Distinguished Reviewer Award**
IEEE Transactions on Software Engineering

2022 **SANER 2022 Distinguished Paper Award**
Toward Understanding The Impact of Refactoring on Program Comprehension [C3].

Skills

Languages	Italian (Native), English (Fluent)
Technology	Java, Python, C, R, HTML, CSS, JavaScript, Angular, Ionic, Capacitor, MySQL, SQLite, Neo4J, Spring Boot, Android, Git, Bash, Docker, LaTeX

Last update on February 5, 2025