Sebastiano Panichella - Curriculum vitae & major scientific achievements

Contact Information

Address: University of Bern (UniBe)
Schtzenmattstrasse 14, 3012 Bern, Switzerland.
E-mail: sebastiano.panichella@unibe.ch (or alternatively spanichella@gmail.com)
Home Page: https://spanichella.github.io/
Google Scholar Ref:
https://scholar.google.it/citations?user=HiNuBFgAAAAJ&hl=en&oi=ao
Short CV: https://spanichella.github.io/img/CV-short.pdf
Detailed CV: https://spanichella.github.io/img/CV.pdf

Education

Sebastiano Panichella was born in Italy. He received the PhD in Computer Science from the University of Sannio defending the thesis entitled *"Supporting Newcomers in Open Source Software Development Projects"* (**July 18th 2014**). **Supervisors**: Prof. Massimiliano Di Penta and Prof. Gerardo Canfora.

Employment history & Institutional responsibilities

Currently, he is a Senior Computer Science Researcher at the University of Bern (from ***09-2024***). Previously he was a Senior Computer Science Researcher and Lecturer in Software Engineering at ZHAW (from 08-2018 to 08-2024), a postdoc at the University of Zurich (**2014-11-01 - 2018-08-19**) in the lab of Prof Gall and part-time (External) Lecturer at the University of Zurich (between ***2018-2022***).
His **research interests** are in the domain of Software Engineering (SE), cloud computing (CC), and Data Science (DS): DevOps (e.g., Continuous Delivery, Continuous Integration), Machine learning applied to SE, Software maintenance and evolution (with particular focus on Cloud, mobile, AI-based, and Cyber-physical applications). He authored or co-authored **around one hundred** (considering also demonstration, dataset and poster) papers appeared in International Conferences and Journals (26 of them published during the postdoctoral experience at the University of Zurich).

Major scientific achievements

Achievement 1 - Funding, Leadership of Projects, and Related Impact. In the last decade, He has demonstrated his ability to receive funding and lead projects as a PI and co-PI, on topics related to Data Science (e.g., Mobile Computing), Mining Software Repositories, DevOps and MLOps, Human-computer Interactions, Software Evolution, and Software Evolution and Testing for Cyber-physical and AI Systems:

- PI (at UniBe) of the Horizon EU "Marie Sklodowska-Curie Actions-funded Doctoral Networks" for the project "InnoGuard: Hybrid and Generative Intelligence for Trustworthy Autonomous Cyber-Physical Systems". **Total project 607,132.8 EUR (595,779.42 CHF)**.
- PI of the H2020 EU project COSMOS: "DevOps for Complex Cyber-physical Systems". **Total H2020 project 5MIL EUR, Sebastiano Panichella got direct funding for 770,000 EUR**. Web page: https://www.cosmos-devops.org/
- PI for a Hasler Foundation Project. The funding will support and complement the studies of a Ph.D. student working "Testing Unmanned Aerial Vehicles" in the context of the COSMOS H2020 project (contract no. 957254). **Total project 50,000 CHF**
- PI for the Doctoral funding at the SoE ZHAW. **Total project funding:114,000 CHF**.

- PI of the Innosuisse national project "ARIES: Exploiting User Journeys and Testing Automation for Supporting Efficient Energy Service Platforms". **Total project funding: 500,000 CHF**. Web page: https://spanichella.g devops/index.html
- PI for the project "SwarmOps: Human-sensing based MLOps for Collaborative Cyber-physical systems" (2024-2028). (**Total project 667,280 CHF**).
  Web page: https://spanichella.github.io/projects.html
- Co-PI for the SURF-MobileAppsData SNF project. **Total SNSF (CHF) 349,926**. Web page: http://www.ifi.uzh Projects.html

A key aspect that attract collaborations and funding are his accessible and replicable research results. Tangible examples are the frameworks widely used by academia and industry, developed as follow-up development activities of approaches proposed in top publications in A and A* conferences and top journals. To provide relevant examples, his team has developed frameworks now used as a reference to test and monitor the safety states of Unmanned aerial vehicles (UAVs) and self-driving cars (SDCs), which requires both sensor-based and digital twins analysis of simulated and real autonomous systems. These frameworks are at the core of new and original tool competitions organized in past and recent international events, where he acted as general/workshop chair:

- https://shonan.nii.ac.jp/seminars/204/
- https://conf.researchr.org/committee/icst-2025/icst-2025-organizing-committee
- https://conf.researchr.org/track/icst-2025/icst-2025-tool-competition–self-driving-cartesting
- https://conf.researchr.org/track/icst-2025/icst-2025-tool-competition–uav-testing
- https://sbft24.github.io/tools/ , https://sbft23.github.io/tools/ , https://sbst22.github.io/
- https://nlbse2024.github.io/index.html , https://nlbse2023.github.io/tools/

Some of these frameworks where the concrete results of his recently finished COSMOS EU project. Interestingly, the European Commission's Innovation Radar Assessment of the project stated that the innovations developed in the COSMOS H2020 project (https://www.cosmosdevops. org/) have been analyzed by the European Commission's Innovation Radar (https://innovation-radar.ec.europa.eu/) and categorized as "Market Maturity" and "Market Ready" (https://innovation-radar.ec.europa.eu/methodology/#maturity-info) as reported in the selected EU portal (https://innovation-radar.ec.europa.eu/innovation/57508). Very few projects have been marked with such evaluation. The main significance of such recognition results in a concrete invitation to build a startup/company on topics related to the COSMOS project.

Achievement 2 - Contributions to the Research Field, the Community, and Education

- **Impact in the Field and the Community:** Over the last six years, his projects, research publications, and collaborations have positioned him as a leading researcher in mining software repositories, automated development, testing, and monitoring of cyber-physical and AI-enabled systems. His work complements research at other Swiss universities. His research results are published at leading conferences where his research areas find applications (e.g., ICSE, ASE, ESEC/FSE, ICST, etc.) and internationally renowned software and systems engineering journals (e.g., TOSEM, TSE, EMSE, JSS, etc.). In terms of community services, He regularly serves as the organizer, PC member, and reviewer for international conferences, workshops , and scientific journals, and I am very well connected and/or organize regularly international events (conferences

and workshops[1]), involving numerous national and international leading scientists and research institutions in Switzerland and abroad. Complementary, his collaborations involve a dense set of flagship companies such as automotive (e.g., AICAS), aviation (GMV), robotics (e.g., Anybotics), e-health (Siemens Healthcare), and other intelligent system domains. Key Contributions:

  - **Mining Software Repositories & DevOps for Software Systems and CPSs**: he analyzed diverse software data (e.g., Apache projects, mobile app logs) to support development activities. His recent studies has been on AI-based systems and CPSs (e.g., in automotive, healthcare, robotics), which need better adaptability to dynamic environments. As the technical coordinator of the COSMOS H2020 project (link), He defined DevOps practices for testing and monitoring CPSs in critical sectors. Through studies, workshops, and special issues, He explored DevOps, MLOps, and Digital Twin strategies, especially for continuous delivery and test automation. Current projects aim to enhance CPSs monitoring, leveraging operational data (e.g., sensors, models) for security and safety. **AI for Software Engineering & Software Engineering for AI-CPSs**: He applied AI (e.g., ML, NLP) to predict bugs, automate tests, and address inconsistencies. In the SURF SNF project, He combined AI and human input analysis to enhance software maintenance and testing. His recent ARIES Innosuisse Project focused on AI-driven tools for efficient energy systems. Upcoming projects (SwarmOps, Innoguard) will advance the adaptability of AI-CPSs to human needs.

- **Top Selected publications that influenced (or will influence) the research field**:

  1. S. Panichella, A. Di Sorbo, Emitza Guzman, A. Visaggio, G. Canfora and H. Gall: How Can I Improve My App? Classifying User Reviews for Software Maintenance and Evolution. International Conference on Software Maintenance and Evolution. 2015
  2. G. Grano, C. Laaber, A. Panichella, and S. Panichella: Testing with Fewer Resources: An Adaptive Approach to Performance-Aware Test Case Generation. Transactions on Software Engineering. 2019
  3. A. Di Sorbo, F. Zampetti, A. Visaggio, M. Di Penta, and S. Panichella: Automated Identification and Qualitative Characterization of Safety Concerns Reported in UAV Software Platforms. Transactions on Software Engineering and Methodology. 2022
  4. Z., Fiorella; Tamburri, D. ; Panichella, S.; Panichella, A.; Canfora, G.; Di Penta, M.: Continuous Integration and Delivery practices for Cyber-Physical systems: An interview-based study. Transactions on Software Engineering and Methodology. 2022
  5. F. Zampetti, R. Kapur, M. Di Penta, S. Panichella: An Empirical Characterization of Software Bugs in Open-Source Cyber-Physical Systems. Journal of Systems Software. 2022
  6. C. Birchler, S. Khatiri, B. Bosshard, A. Gambi, S. Panichella: "Machine Learning-based Test Selection for Simulation-based Testing of Self-driving Cars Software". Empirical Software Engineering. 2023.
  7. S. Khatiri, S. Panichella, P. Tonella: Simulation-based Test Case Generation for Unmanned Aerial Vehicles in the Neighborhood of Real Flights. International Conference on Software Testing, Verification and Validation. 2023
  8. C. Birchler, T. Kombarabettu Mohammed, P. Rani, T. Nechita, T. Kehrer, S. Panichella: How does Simulation-based Testing for Self-driving Cars match Human Perception? ACM International Conference on the Foundations of Software Engineering. 2024

[1]https://adevops4iot.github.io/ - https://sbst22.github.io/ - https://sbft23.github.io/ - https://sbft24.github.io/ - https://nlbse2022.github.io/ - https://nlbse2023.github.io/ - https://nlbse2024.github.io/

9. S. Panichella contributions to the book: "Large Language Models in Cybersecurity and Cyberdefense: Novel Threats and Mitigations Perspectives". Chapters: "Vulnerabilities Introduced by LLMs through Code Suggestions", "Enhancing Security Awareness and Education for Large Language Models". 2024
10. C. Birchler, S. Khatiri, P. Rani, T. Kehrer, S. Panichella: A Roadmap for Simulation-Based Testing of Autonomous Cyber-Physical Systems: Challenges and Future Direction. Special issue "A 2030 Roadmap for Software Engineering" in Transactions on Software Engineering and Methodology. 2025

- **Contributions to Education and Supervision of Junior Researchers**: He started teaching as a student assistant at the University of Salerno and later independently during his PhD at the University of Sannio. At UZH, he led the "Software Maintenance and Evolution" course and continued as an external lecturer after joining ZHAW. His teaching expanded at ZHAW with courses including Software Development, DevOps, Cloud Computing, and Java Programming. Recently at UniBe, He taught the Software Skills Lab (topics: Java, Linear Data Structures, Graphs, Trees, Sets, and Maps) and co-lecture the Software Engineering course (topics: DevOps and AI-based systems). He also offers research seminars and supervises student projects in DevOps and software engineering. Over the years, He contributed to **educational chapters and am co-authoring a book on "DevOps for Cyber-Physical Systems" (targeted for 2025), involving 30+ international researchers**. He **supervised** 14 undergrad students, 22 MSc students and currently/recently **supervised (or co-supervised)** the work of 8 research assistants, and 9 PhD students (6 of them during the postdoctoral experience at the University of Zurich), with new projects in 2025 adding 5 PhD students. Many of these works resulted in peer-reviewed publications, including award-winning theses such as Pooja Rani's Best PhD Thesis at UniBe in 2023.

Achievement 3 - Awards, Tools & Industrial and Academic Collaborations

Ensuring replicability and impactful research results is central to fostering academic and industrial collaborations. His approach leverages diverse strategies tailored to partners and research groups, including co-supervision, internships (e.g., Sajad Khatiri's PhD internship at Anybotics), participation in national (Inno Suisse/SNF) and EU (Horizon) projects, and course co-design. Additionally, He organizes conferences and workshops, such as serving as general chair for the 2025 International Conference on Software Testing, Verification, and Validation. Over the past decade, He built extensive collaborations with industrial and research organizations across various domains, including Genedata (biology computation), Stadler (rail), LEDCity (energy efficiency), Siemens AG and Healthcare (DevOps for ICT/healthcare), and more. His team ensures accessible and replicable research outputs, such as frameworks adopted in academia and industry, derived from top-tier publications in A/A* conferences and journals. Dr. Sebastiano Panichella published over 100 published papers in international conferences and journals, many of which have earned best paper awards or nominations. His work has fostered impactful collaborations with academic and industrial partners globally, focusing on innovative solutions in software engineering and DevOps.

Key Achievements and Recognition:

- **Awards - Complete list at https://spanichella.github.io/awards.html** : He received 4 tools awards (and nominations) as well as 12 best paper awards and best paper nominations[2].
- The paper [S. Panichella, A. Di Sorbo, E. Guzman, C. Visaggio, G. Canfora, H. Gall: How can I improve my app? Classifying user reviews for software maintenance and evolution. ICSME 2015], which originated the idea behind his SNF project, is one of the **most cited papers of ICMSE 2015** (as reported in Google Scholar), with over **500 citations** in 9 years.

[2] https://spanichella.github.io/awards.html

- The paper ICPC wrote during the bachelor studies of Dr. Panichella-[G. Capobianco, A. De Lucia, R. Oliveto, A. Panichella, S. Panichella: On the role of the nouns in IR-based traceability recovery. ICPC 2009: 148-157] is **among the most influential papers of ICPC in the last decade [period 2009-2019]**.

- **Top Researcher Rankings**: He ranked among the top 20 most impactful software engineering researchers worldwide (2019, 2021) by the Journal of Systems and Software. Included in Stanford University's top 2% scientists in his field (2022, 2023) and recognized in the top 0.5% by ScholarGPS (2024).

Collaborative Research Highlights:

- **Collaboration with industrial organizations:** Over the years, I have established collaboration with researchers from Switzerland (UZH, USI, ZHAW, ETH, etc.) and abroad involving both academic and industrial organizations in USA (e.g., Washington State University), Canada (e.g., Polytechnique Montreal), Japan (e.g., Sony), etc.: `https://spanichella.github.io/collaborations.html`

- **Frameworks & Global Initiatives**: He developed DevOps testing frameworks and published taxonomies on safety hazards and accidents in UAVs with collaborators from the University of Zurich (UZH) and Universit della Svizzera italiana (USI). He worked on testing and monitoring techniques for self-driving cars in collaboration with institutions such as Delft University of Technology and IMC University of Applied Sciences Krems. The research includes using Virtual Reality (VR) to study human perception of cyber-physical systems (CPS). He organized the Shonan Meeting (2023) on DevOps for CPSs, involving over 50 experts. He plans to publish a book on best practices and future directions in CPS development. **Future Directions**. Dr. Panichella aims to expand collaborations within Switzerland and internationally, advancing research on DevOps, AI, and CPS to tackle emerging challenges in autonomous systems and digital twins.

Supervision (or Co-Supervision) of researchers at graduate & postgraduate levels

He **supervised** 14 theses of undergrad students, theses (or projects) of 22 MSc students and has **supervised (or co-supervised)** the work of 8 research assistants, and 10 PhD students (6 of them during the postdoctoral experience at the University of Zurich), which published in relevant conference and journal venues. A complete list on advised researchers and papers accepted can be found at https://spanichella.github.io/teaching_and_advising.html

Teaching (ZHAW, UZH, and UniBe) activities:

University of Bern:

- Software Skills Lab - Topic "Java Crash Course, Linear Data Structures, Graphs and Trees, Sets and Maps, (Data Structure) Algorithms" - 2024.
- Software Engineering Course - Topic "DevOps and testing AI-based cyber-physical systems" - 2022, 2023, 2024.

University of Zurich:

- Lecturer and co-lecturer for the Software Maintenance and Evolution course in 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022. *Learning Goals*: During the course Sebastiano teach to the students the foundations of software evolution and maintenance. This includes successful but aged software systems (i.e. legacy software), object-oriented reengineering, refactoring, change patterns, empirical analysis of software, classification/prediction models, software quality analysis. This course also discusses analysis platforms and tools, test case generation and continuous delivery technologies in the context of autonomous systems (e.g., drones and self-driving cars).

Zurich University of Applied Sciences (ZHAW):

- Software development 2 / project module 4 FS24 (In german "Software Entwicklung 2 / Projektmodul 4") - 2024, 2025.
- DevOps Testing for Complex Systems - 2023, 2024.
- Cloud Computing course - CCP2 2020
- INF-Prog1 2020. Learning Goals: The main features of the Python program language.
- Co-lecturer for the CAS Information Engineering in 2018, 2019, 2020. Learning Goals: Python program language.
- Lab Instructor for the Programming course in Java in 2018, 2019, 2020. Learning Goals: Java program language.

University of Sannio:

- *Lab Instructor* (December 2013) for the Programming Techniques course of Professor Gerardo Canfora
Learning Goals: The Languages and Grammars, JavaCC parser.
- *Teaching Assistant* for the Software Engineering course of Prof. Massimiliano Di Penta:
Learning Goals: Recovering Traceability Links via Information Retrieval Methods

Memberships in panels, boards, and individual scientific reviewing activities

Reviewer/opponent of Ph.D. Dissertations:

- External examinator of Ph.D. Dissertation by Adriano Torres at at University of Adelaide (2024).
- External examinator of Ph.D. Dissertation by Zainab Javed at at National University of Computer and Emerging Sciences, Islamabad, Pakistan (2024).
- External Review of Ph.D.research proposal by Mme Zid at at Polytechnique Montreal, Institute of Computer Science (August 2022).
- Reviewer/opponent of a Ph.D. Dissertation of Nitish Shriniwas at University of Bern, Institute of Computer Science (March 2022).
- Reviewer/opponent of a Ph.D. Dissertation at University of Tartu, Institute of Computer Science (2019/2020)

Editorial Board Member of International Journals:

- *Journal of Software: evolution and process.*
- *Transactions on Software Engineering and Methodology.*

Editor of special Issues at International Journals:

- Editor of Software Track special Issue at Journal of Science of Computer Programming on "SBFT'23: Search-Based and Fuzz Testing Tools". 2023
- Editor of Software Track special Issue at Journal of Science of Computer Programming on SBST22: Search-Based Software Engineering Tools. 2022
- Editor of special issue at Science of Computer Programming Journal on NLP-based software engineering, 2022.
- Editor of the 'Software Engineering for Mobile Applications' special Issue at EMSE Journal, 2018-07.
- Editor of the 'User Feedback and Software Quality in the Mobile Domain' special Issue at IST Journal, 2018-06.

Organising committee member of International Conferences and Workshops:

- *Program Committee member* of ICSE, FSE, ASE, ICSME, ICST, ICSOFT, SSBSE, ICPC, SSBSE, SBST, SANER, MSR, WAISE, MaLTeSQuE, SEAA, SATToSE, VST, RoSE, QUATIC.
Complete list at: https://spanichella.github.io/services.html

Reviewer for the following International Journals:

- *Scientific Reports, Nature - Empirical Software Engineering - Transactions on Software Engineering - Transactions on Software Engineering and Methodology - Journal of Systems and Software - Information and Software Technology - Journal of Software: Evolution and Process - Science of Computer Programming - Journal of Computer Science and Technology - Transactions on Mobile Computing - Communications of the ACM - Software Testing, Verification and Reliability - Journal of Object Technology - Transactions on Services Computing - Software: Practice and Experience journal - Communications of the ACM.*
  Complete list at: https://spanichella.github.io/services.html

External Reviewer of Grant Applications

- *External Reviewer of Regular Fondecyt National Projects. Research Projects Sub-Directorate (SPI) of the National Agency for Research and Development (ANID) of the Ministry of Science, Technology, Knowledge and Innovation of Chile*
- *External Reviewer of PRIN (National Project) and member of the CNVR (National Committee for the Evaluation of Research) for the Ministry for University and Research (MUR) in Italy, aimed at financing public research projects.*
- *External Reviewer of projects submitted in the Quebec-Flanders bilateral research cooperation program*
- *External Reviewer of projects submitted in the Mitacs Accelerate research program*

Active memberships in scientific societies, fellowships in renowned academies

- Nominated as Management Committee Member to represent the **COST Action CA22137 in Switzerland. Member of the COST (European Cooperation in Science and Technology)**: WG4 on "Optimisation under uncertainty" - https://www.cost.eu/actions/CA22137/
- Member of the **EU Sparc Robotics group** - https://sparc-robotics-portal.eu
- Member of the **ZHAW Digital Futures Lab** - https://www.zhaw.ch/en/focus-topics/zhaw-digital/digital-futures-lab/ 2023-2024
- He is a **member of IEEE/ACM**.

General Chair of International Conferences:

- *International Conference on Software Testing, Verification and Validation - ICST 2025*

Organising committee member of International Conferences and Workshops:

- *Program Committee member* of ICSE, FSE, ASE, ICSME, ICST, ICSOFT, SSBSE, ICPC, SSBSE, NLBSE, SBFT, SBST, SANER, MSR, WAISE, MaLTeSQuE, SEAA, SATToSE, VST, RoSE, QUATIC, etc.
  Complete list at: https://spanichella.github.io/services.html

Organising research workshops:

- Chair of the *International Workshop on Artificial Intelligence in Software Testing (AIST)* - Collocated with ICST 2024
- Chair of the *Workshop on Natural Language-Based Software Engineering Workshop* (NLBSE) - Collocated with ICSE 2022, 2023, 2024, 2025
- Chair of the *Workshop on Search-Based Software Testing* (SBST) - Collocated with ICSE 2022, ICSE 2023
- Chair of the *Workshop on DevOps Testing for Cyber-Physical Systems - Collocated with ICST 2021 (https://devops4cps-testing.github.io/)*
- Chair of the Tool Competition at SBST and SBFT (2020, 2021, 2024)

- *Chair of the first International Workshop on Cloud-Native Applications Design and Experience - CNAX 2018 Co-located with UCC 2018 and BDCAT 2018 conferences, Zurich, Switzerland.*

Keynote Speaker of International Conferences and co-located events:

- Speaker at the AIST workshop, co-located with the International Conference on Software Testing, Verification and Validation - 2023
  (https://aistworkshop.github.io/#keynote)
- Speaker at the Workshop on Dependable DevOps co-located with the SafeComp conference, 2021.
- Speaker at the Workshop on Validation, Analysis and Evolution of Software Tests - VST 2018
  (http://vst2018.scch.at/#program)

Research Meetings

- *Sebastiano Panichella Led a a Shonnan meeting with the National Institute of Informatics (NII), Japan, on the topic: "DevOps for Cyber-physical Systems".*