



Pietro Ferrara

ASSISTANT PROFESSOR

Ca' Foscari University of Venice, via Torino 155, 30172 - Mestre (VE), Italy

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Career

Ca' Foscari University

TENURE-TRACK ASSISTANT PROFESSOR

Venice, Italy

From Nov. 2019

JuliaSoft

HEAD OF RESEARCH AND DEVELOPMENT AND RESEARCH SCIENTIST

Verona, Italy

Feb. 2016 - Nov. 2019

- My main goal was to investigate and extend the barriers of science in order to deliver innovative solutions to deliver higher quality tools than our competitors.
- Extend and improve Julia's analyses to new programming languages (e.g., .NET [FCS18]), novel properties (e.g., leakages through intents [SFS18] and privacy analyses [FOS18]), and making the overall framework more flexible and expressive (e.g., through framework specifications [NF18]). This ranged from the design and mathematical formalization of the new features, their implementation and commercialization, and the academic dissemination of these results through scientific articles and talks.
- Create and maintain a network of scientific collaborations, and design and develop scientific projects from the initial proposal to their development.
- Supervision of interns for their stage and bachelor or master theses.
- Participate to the scientific community by being a program committee member of various international conferences and workshops, reviewing papers for several conferences and journals, participating and giving talks in international conferences, and giving lectures at different universities both for bachelor and master courses, and for scientific seminars.

IBM Thomas J. Watson Research Center

RESEARCH STAFF MEMBER

Yorktown Heights, NY, U.S.A.

Jul. 2013 - Dec. 2015

- Research: Apply static and dynamic analysis to security properties of mobile software (mostly privacy properties in Android) by developing various tools to detect violations at compile or run time. This effort already led to about 10 publications (one awarded as an ACM Distinguished Paper), and an IBM Research Accomplishment Award.
- Community: Program committee member of 2 conferences, demo co-chair at OOPSLA 2015, reviewer for 10 international conferences or journals, interviewer of various Software Engineer and Research Staff Member candidates at IBM Research.

ETH Zürich

LECTURER AND POSTDOC

Switzerland

Apr. 2009 - Jul. 2013

- Supervisor: Peter Müller (Full professor, ETH Zürich)
- Research: Design and implement a novel generic static analyzer (Sample) combining various value and heap analyses. 4 PhD and 6 master/bachelor students extended Sample with novel analyses. Overall, this effort led to 10 publications in international journals and conferences. Sample currently supports various languages (namely, Scala, Chalice, and TouchDevelop), and many value (e.g., numerical) and heap (e.g., pointer and shape) analyses.
- Funding: Actively participate to the writing of two project proposals (600'000CHF in total, equivalent to about 580'000\$), and to their development as technical head and co-principal investigator.
- Teaching: Lecturer of a master course on static program analysis. Teaching assistant (teaching exercise sessions and evaluating final written exams or projects) various times for 3 different courses (both at bachelor and master level) on object-oriented programming languages, formal methods, and program verification. Supervise 3 master and 2 bachelor theses.
- Community: Program committee member of 3 conferences, external reviewer for 20 international journals and conferences, interviewer of about 30 candidates for PhD positions at ETH.

Education

Ecole Polytechnique, and Ca' Foscari University

PHD DEGREE IN COMPUTER SCIENCE

Paris, France and Venice, Italy

Oct. 2005 - May 2009

Subject: "Static analysis via abstract interpretation of multithread programs".

Advisors: Radhia Cousot (research director, CNRS/Ecole Normale Supérieure) and Agostino Cortesi (full professor and head of the Department of Computer Science, Università Ca' Foscari of Venice).

Reviewers: Manuel Hermenegildo (full professor, Universidad Politécnica Madrid) and Helmut Seidl (full professor, Technische Universität München).

Examiners: Eric Goubault (research director, CEA) and Francesco Logozzo (researcher, Microsoft Research).

Defended at Ecole Normale Supérieure of Paris on May 22nd, 2009.

Ca' Foscari University

MASTER DEGREE IN COMPUTER SCIENCE

Grade: 110/110 cum laude.

Subject: "Development of a static analyzer for object oriented languages and application to the firewall analysis of JavaCard".

Advisor: Prof. Agostino Cortesi, Co-advisor: Dr. Francesco Logozzo (Ecole Polytechnique, Paris).

Venice, Italy

Sept. 2003 - Feb. 2005

Ca' Foscari University

BACHELOR DEGREE IN COMPUTER SCIENCE

Grade: 110/110 cum laude.

Venice, Italy

Sept. 2000 - Jul. 2003

Liceo Scientifico Statale "G. Bruno"

HIGH SCHOOL DEGREE - STUDIES OF SCIENCE

Grade: 94/100.

Venice, Italy

Sept. 1995 - Jul. 2000

Research Interests and Vision

My research interests are focused on the application of rigorous mathematical theories to enhance the reliability, security, and performances of software by means of static analysis. Abstract interpretation is a framework applied to develop sound static analyses proving properties on all possible executions of a program. However, approximation is necessary to achieve computability, and the analysis might produce false alarms. Finding a good balance between precision, efficiency, and soundness depends on specific applications, and it usually requires deep research investigation. I am particularly interested in new scenarios where static analysis might have a relevant impact, and I have focused my recent research activity on mobile and .NET software.

Keywords: abstract interpretation, static analysis, mobile programs, software engineering, program verification, multithreading, security.

Awards, Honors and Fellowships

Jun. 2018	ACM SIGSOFT FME Distinguished Paper Award , FormaliSE	Gothenburg, Sweden
Oct. 2015	IBM Research Accomplishment , "Fundamental Contributions to Program Analysis and Programming Languages for Mobile"	U.S.A
Jul. 2014	ACM SIGSOFT Distinguished Paper Award , ISSTA	San Jose, U.S.A
Jul. 2011	Invited , Microsoft Research Faculty Summit	Redmond, U.S.A
Oct. 2008	3 months Fellowship , French Ministry of Foreign Affairs	France
May 2006	Vinci Fellowship , Italian-French University "italo-francese"	
Feb. 2006	2nd place , Clusit Security Summit	Milan, Italy

Publications

JOURNALS

[FMC20]	P. Ferrara, A. Mandal, A. Cortesi, F. Spoto: "Static Analysis for Discovering IoT Vulnerabilities", International Journal on Software Tools for Technology Transfer, to appear
[FCS20]	P. Ferrara, A. Cortesi, F. Spoto: "From CIL to Java-bytecode: Semantics-based Translation for Static Analysis Leveraging", Science of Computer Programming, Volume 191, June 2020 (ERA: A)
[FMCb19]	P. Ferrara, A. Mandal, A. Cortesi, F. Spoto: "Cross-Programming Language Taint Analysis for the IoT Ecosystem", Electronic Communication of the European Association of Software Science and Technology, Volume 77, October 2019
[SBE19]	F. Spoto, E. Burato, M. D. Ernst, P. Ferrara, A. Lovato, D. Macedonio, C. Spiridon: "Static Identification of Injection Attacks in Java", ACM Transactions on Programming Languages and Systems, Volume 41 Issue 3, July 2019 (ERA: A*, MS PL: 2nd/268)
[MPC19]	A. Mandal, F. Panarotto, A. Cortesi, P. Ferrara, F. Spoto: "Static Analysis of Android Auto Infotainment and ODB-II Apps", Software: Practice and Experience, Volume 49, Issue 7, Pages 1131-1161, July 2019 (ERA: A, AM Journal: 56th/376)
[CFH18]	A. Cortesi, P. Ferrara, R. Halder, and M. Zanioli: "Combining Symbolic and Numerical Domains for Information Leakage Analysis", Transactions on Computational Science, Volume 31, pages 98-135, 2018
[Ferr16]	P. Ferrara: "A generic framework for heap and value analyses of object-oriented programming languages", Theoretical Computer Science, Volume 631, pages 43-72, June 2016 (ERA: A)
[CFC15a]	A. Cortesi, G. Costantini, and P. Ferrara: "The Abstract Domain of Trapezoid Step Functions", Computer Languages, Systems & Structures, Volume 43, pages 41-68, October 2015

- [CFC15]** G. Costantini, P. Ferrara and A. Cortesi: “*A Suite of Abstract Domains for Static Analysis of String Values*”, Software: Practice and Experience, Volume 45, Issue 1, pages 245–287, February 2015 (ERA: A, AM Journal: 56th/376)
- [Ferr13]** P. Ferrara: “*A generic static analyzer for multithreaded Java programs*”, Software: Practice and Experience, Volume 43, Issue 6, pages 663–684, June 2013 (ERA: A, AM Journal: 56th/376)

INTERNATIONAL CONFERENCES

- [MPK20]** A. Mandal, P. Ferrara, Y. Khlyebnikov, A. Cortesi, F. Spoto : “*Cross-Program Taint Analysis for IoT Systems*”, Proceedings of the 35th ACM Symposium on Applied Computing (SAC 2020), ACM Press, Brno, Czech Republic, March 30-April 3, 2020 (MS SE: 17th/285, AM PLSE: 43th/342)
- [FOS20]** P. Ferrara, L. Olivieri, F. Spoto: “*BackFlow: Backward Context-sensitive Flow Reconstruction of Taint Analysis Results*”, Proceedings of the 21th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2020), LNCS, Springer, New Orleans, United States, January 19-21, 2020 (MS SE: 34th/285, AM PLSE: 8th/342)
- [PCF18]** F. Panarotto, A. Cortesi, P. Ferrara, A. Mandal and F. Spoto: “*Static Analysis of Android Apps Interaction with Automotive CAN*”, Proceedings of the 3rd International Conference on Smart Computing and Communication (SmartCom 2018), Tokyo, Japan, December 10-12, 2018
- [SFS18]** R. Salvia, P. Ferrara, F. Spoto and A. Cortesi: “*Static Detection of Leaks across Intents*”, Proceedings of the 17th IEEE International Conference On Trust, Security And Privacy In Computing And Communications (TrustCom 2018), New York, USA, July 31-August 3, 2018 (CORE: A, MS CS 11th/793)
- [FOS18]** P. Ferrara, L. Olivieri and F. Spoto: “*Tailoring Taint Analysis to GDPR*”, Proceedings of the Annual Privacy Forum 2018, Barcelona, Spain, June 13-14, 2018
- [FCS18]** P. Ferrara, A. Cortesi and F. Spoto: “*CIL to Java-bytecode Translation for Static Analysis Leveraging*”, Proceedings of the 6th Conference on Formal Methods in Software Engineering (FormalISE 2018), Gothenburg, Sweden, June 2, 2018 (ACM SIGSOFT FME Distinguished Paper Award)
- [MCF18]** A. Mandal, A. Cortesi, P. Ferrara, F. Panarotto and F. Spoto: “*Vulnerability Analysis of Android Auto Infotainment Apps*”, Proceedings of the ACM International Conference on Computing Frontiers 2018 (CF 2018), Ischia, Italy, May 8-10, 2018
- [PPH17]** D. Piorkowski, S. Penney, A. Z. Henley, M. Pistoia, M. M. Burnett, O. Tripp, P. Ferrara: “*Foraging goes mobile: Foraging while debugging on mobile devices*”, Proceedings of IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC 2017), Raleigh, USA, October 11-14, 2017 (acceptance rate: 29%, Honorable mention)
- [APT17]** A. Aydin, D. Piorkowski, O. Tripp, P. Ferrara and M. Pistoia: “*Visual Configuration of Mobile Privacy Policies*”, Proceedings of the 20th International Conference on Fundamental Approaches to Software Engineering (FASE 2017), ARCoSS, LNCS, Springer, Uppsala, Sweden, April 22-29, 2017 (acceptance rate: 26%, MS SE: 29th/285, AM PLSE: 32th/342)
- [FTLK17]** P. Ferrara, O. Tripp, P. Liu, and E. Koskinen: “*Using Abstract Interpretation to Correct Synchronization Faults*”, Proceedings of the 18th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2017), ARCoSS, LNCS, Springer, Paris, France, January 15-17, 2017 (MS SE: 34th/285, AM PLSE: 8th/342)
- [TPT16]** P. Tsankov, M. Pistoia, O. Tripp, M. Vechev, and P. Ferrara: “*FASE: Functionality-Aware Security Enforcement*”, Proceedings of the 31st ACM Annual Computer Security Applications Conference (ACSAC 2015), ACM Press, Los Angeles, USA, December 7-11, 2015 (CORE: A, acceptance rate: 24%, MS SP 12th/138, AM SP: 17th/97)
- [FTP15]** P. Ferrara, O. Tripp, and M. Pistoia: “*MorphDroid: Fine-grained Privacy Verification*”, Proceedings of the 31st ACM Annual Computer Security Applications Conference (ACSAC 2015), ACM Press, Los Angeles, USA, December 7-11, 2015 (CORE: A, acceptance rate: 24%, MS SP 12th/138, AM SP: 17th/97)
- [BFTP15]** L. Brutschy, P. Ferrara, O. Tripp, and M. Pistoia: “*ShamDroid: Gracefully Degrading Functionality in the Presence of Limited Resource Access*”, Proceedings of the 30th ACM Conference on Object-oriented Programming (OOPSLA 2015), ACM Press, Pittsburgh, USA, October 27-30, 2015 (CORE: A*, acceptance rate: 25%, MS SE 4th/285, PL: 4th/168, AM PLSE: 5th/342)
- [BCF15]** G. Barbon, A. Cortesi, P. Ferrara, M. Pistoia and O. Tripp: “*Privacy Analysis of Android Apps: Implicit Flows and Quantitative Analysis (invited paper)*”, in Proceedings of the 14th International Conference on Computer Information Systems and Industrial Management Applications (CISIM 2015), LNCS, Springer, Warsaw, Poland, September 24-26, 2015
- [FMN15]** P. Ferrara, P. Müller and M. Novacek: “*Automatic Inference of Heap Properties Exploiting Value Domains*”, Proceedings of the 16th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2015), ARCoSS, LNCS, Springer, Mumbai, India, January 12-14, 2015 (MS SE: 34th/285, AM PLSE: 8th/342)
- [CFPT15]** A. Cortesi, P. Ferrara, M. Pistoia and O. Tripp: “*Datacentric Semantics for Verification of Privacy Policy Compliance by Mobile Applications*”, Proceedings of the 16th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2015), ARCoSS, LNCS, Springer, Mumbai, India, January 12-14, 2015 (MS SE: 34th/285, AM PLSE: 8th/342)

- [BFM14]** L. Brutschy, P. Ferrara, and P. Müller: “*Static Analysis for Independent App Developers*”, Proceedings of the 29th ACM Conference on Object-oriented Programming (OOPSLA 2014), ACM Press, Portland, USA, October 20-24, 2014 (CORE: A*, acceptance rate: 28%, MS SE 4th/285, PL: 4th/168, AM PLSE: 5th/342)
- [TFP14]** O. Tripp, P. Ferrara and M. Pistoia: “*Hybrid Security Analysis of Web JavaScript Code via Dynamic Partial Evaluation*”, Proceedings of the International Symposium on Software Testing and Analysis (ISSTA 2014), ACM Press, San Jose, USA, July 23-25, 2014 (CORE: A, acceptance rate: 28%, MS SE: 24th/285, AM PLSE: 4th/342, ACM SIGSOFT Distinguished Paper Award)
- [FSB14]** P. Ferrara, D. Schweizer and L. Brutschy: “*TouchCost: Cost Analysis of TouchDevelop Scripts*”, Proceedings of the 17th International Conference on Fundamental Approaches to Software Engineering (FASE 2014), ARCoSS, LNCS, Springer, Grenoble, France, April 5-13, 2014 (acceptance rate: 26%, MS SE: 29th/285, AM PLSE: 32th/342)
- [Ferr14]** P. Ferrara: “*Generic Combination of Heap and Value Analyses in Abstract Interpretation*”, Proceedings of the 15th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2014), ARCoSS, LNCS, Springer, San Diego, USA, January 19-21, 2014 (MS SE: 34th/285, AM PLSE: 8th/342)
- [CFCM13]** G. Costantini, P. Ferrara, A. Cortesi and G. Maggiore: “*The Domain of Parametric Hypercubes for Static Analysis of Computer Games Software*”, Proceedings of the 15th International Conference on Formal Engineering Methods (ICFEM 2013), LNCS, Springer, Queenstown, New Zealand, October 29-November 1, 2013 (acceptance rate: 32%)
- [CFC13]** A. Cortesi, P. Ferrara and N. Chaki: “*Static Analysis Techniques for Robotics Software Verification (invited paper)*”, in Proceedings of the 44th International Symposium of Robotics (ISR 2013), Seoul, Korea, October 24-26, 2013 (CORE: A)
- [CFC12]** G. Costantini, P. Ferrara and A. Cortesi: “*Linear approximation of continuous systems with Trapezoid Step Functions*”, Proceedings of the 10th Asian Symposium on Programming Languages and Systems (APLAS 2012), LNCS, Springer, Kyoto, Japan, December 11-13, 2012 (MS PL: 42th/168, AM PLSE: 80th/342)
- [FFJ12]** P. Ferrara, R. Fuchs and U. Juhász: “*TVAl+: TVLA and Value Analyses Together*”, Proceedings of the 10th International Conference on Software Engineering and Formal Methods (SEFM 2012), LNCS, Springer, Thessaloniki, Greece, October 3-5, 2012 (acceptance rate: 25%, MS SE: 76th/285, AM PLSE: 104th/342)
- [ZFC12]** M. Zanioli, P. Ferrara and A. Cortesi: “*SAILS: static analysis of information leakage with Sample*”, Proceedings of the 27th ACM Symposium on Applied Computing (SAC 2012), ACM Press, Riva del Garda, Italy, March 26-30, 2012 (acceptance rate: 26%, MS SE: 17th/285, AM PLSE: 43th/342)
- [FM12]** P. Ferrara and P. Müller: “*Automatic inference of access permissions*”, Proceedings of the 13th International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI 2012), LNCS, Springer, Philadelphia, USA, January 22-24, 2012 (MS SE: 34th/285, AM PLSE: 8th/342)
- [CFC11]** G. Costantini, P. Ferrara and A. Cortesi: “*Static analysis of string values*”, Proceedings of the 13th International Conference on Formal Engineering Methods (ICFEM 2011), LNCS, Springer, Durham, United Kingdom, October 25-28, 2011
- [Ferr10]** P. Ferrara: “*Static type analysis of pattern matching by abstract interpretation*”, Proceedings of the IFIP Conference on Formal Techniques for Distributed Systems (FORTE/FMOODS 2010), LNCS, Springer, Amsterdam, Netherlands, June 7-10, 2010 (CORE: A, MS DPC: 45th/203, AM NET: 18th/177)
- [Ferr09a]** P. Ferrara: “*Checkmate: a generic static analyzer of Java multithreaded programs*”, Proceedings of the 7th IEEE International Conference on Software Engineering and Formal Methods (SEFM 2009), IEEE Computer Society, Hanoi, Vietnam, November 23-27, 2009 (acceptance rate: 35%, MS SE: 76th/285, AM PLSE: 104th/342)
- [Ferr08b]** P. Ferrara: “*Static analysis of the determinism of multithreaded programs*”, Proceedings of the 6th IEEE International Conference on Software Engineering and Formal Methods (SEFM 2008), IEEE Computer Society, Cape Town, South Africa, November 10-14, 2008 (CORE: A, acceptance rate: 28%, MS SE: 76th/285, AM PLSE: 104th/342)
- [FLF08]** P. Ferrara, F. Logozzo and M. Fähndrich: “*Safer unsafe code for .NET*”, Proceedings of the 23rd ACM Conference on Object-oriented Programming (OOPSLA 2008), ACM Press, Nashville, USA, October 19-23, 2008 (CORE: A*, acceptance rate: 28%, MS SE: 4th/285, MS PL: 4th/168, AM PLSE: 5th/342)
- [Ferr08]** P. Ferrara: “*Static analysis via abstract interpretation of the happens-before memory model*”, Proceedings of the 2nd International Conference on Tests and Proofs (TAP 2008), LNCS, vol. 4966, Springer, Prato, Italy, April 9-11, 2008

INTERNATIONAL WORKSHOPS WITH PROGRAM COMMITTEE

- [FMCa19]** P. Ferrara, A. Mandal, A. Cortesi, F. Spoto: “*Static Analysis for the OWASP IoT Top 10 2018*”, Workshop on Security practices for Internet of Things (SPIoT 2019), Prague, Czech Republic, April 7, 2019
- [FMC19]** P. Ferrara, A. Mandal, A. Cortesi, F. Spoto: “*Cross Programming Language Taint Analysis for the IoT Ecosystem*”, Interactive Workshop on the Industrial Application of Verification and Testing (InterAVT 2019), Prague, Czech Republic, April 6, 2019
- [FA19]** P. Ferrara, P. Anderson: “*Semantic Static Analysis of IoT Software*”, Proceedings of Embedded World 2019, Nuremberg, Germany, February 26-28, 2019

- [NF18]** L. Negrini, P. Ferrara: “SARL: Framework Specification for Static Analysis”, Proceedings of The Ninth Workshop on Tools for Automatic Program Analysis (TAPAS 2018), Freiburg im Breisgau, Germany, August 28, 2018
- [FS18]** P. Ferrara and F. Spoto: “Static Analysis for GDPR Compliance”, Proceedings of the 2nd Italian Conference on Cybersecurity (ITASEC 2018), Milan, Italy, February 6-8, 2018
- [BFS17]** E. Burato, P. Ferrara and F. Spoto: “Security Analysis of the OWASP Benchmark with Julia”, Proceedings of the 1st Italian Conference on Cybersecurity (ITASEC 2017), Venice, Italy, January 17-20, 2017
- [BSCF16]** Gianluca Barbon, Enrico Steffanlongo, Agostino Cortesi and Pietro Ferrara: “DAPA: Degradation-Aware Privacy Analysis of Android Apps”, Proceedings of the 12th International Workshop on Security and Trust Management (STM 2016), Heraklion, Greece, September 26-27, 2016
- [TPFR16]** Omer Tripp, Marco Pistoia, Pietro Ferrara, and Julia Rubin: “Pinpointing mobile malware using code analysis”, Proceedings of the IEEE/ACM International Conference on Mobile Software Engineering and Systems (MOBILESoft 2016), Austin, USA, May 16-17 2016
- [PTF15]** Marco Pistoia, Omer Tripp, Pietro Ferrara, and Paolina Centonze: “Automatic Detection, Correction and Visualization of Security Vulnerabilities in Mobile Apps (invited paper)”, Proceedings of the 3rd Workshop on Mobile Development Lifecycle (MobileDeLi 2015), Pittsburgh, USA, October 26, 2015
- [BFM14a]** L. Brutschy, P. Ferrara, and P. Müller: “TouchGuru: Integrating Static Analysis with a Mobile Development Environment (invited paper)”, Proceedings of the 2nd Workshop on Mobile Development Lifecycle (MobileDeLi 2014), Portland, USA, October 21, 2014
- [CCF13]** A. Cortesi, G. Costantini and P. Ferrara: “A survey on Product Operators in Abstract Interpretation”, Proceedings of the Festschrift for Dave Schmidt, Electronic Proceedings in Theoretical Computer Science, U.S.A., September 19-20, 2013
- [Ferr08a]** P. Ferrara: “A fast and precise analysis for data race detection”, Proceedings of the Third Workshop on Bytecode Semantics, Verification, Analysis and Transformation (Bytecode 2008), Budapest, Hungary, April 6, 2008
- [Ferr06]** P. Ferrara: “JAIL: Firewall Analysis of Java Card by Abstract Interpretation”, Proceedings of the 1st International Workshop on Emerging Applications of Abstract Interpretation (EAAI 2006), Vienna, Austria, March 26, 2006

THESIS

- [Ferr09]** P. Ferrara: “Static analysis via abstract interpretation of multithread programs”, PhD thesis under the supervision of Radhia Cousot and Agostino Cortesi defended at Ecole Normale Supérieure of Paris on May 22nd, 2009

For each conference and journal publication, the following metrics are reported:

- acceptance rate when less than 35%
- CORE: the CORE ranking¹ when A* or A (all others are B)
- ERA: the ERA 2010 journal ranking²
- MS: Microsoft Academics ranking³ when in the top 30% of conferences/journals in:
 - Software Engineering (SE)
 - Security & Privacy (SP)
 - Computer Security (CS)
 - Programming Languages (PL)
 - Distributed & Parallel Computing (DPC)
 - Journals in Computer Science (Journal)
- AM: Arnet Miner ranking⁴ when in the top 30% of conferences in:
 - Programming Languages and Software Engineering (PLSE)
 - Network (NET)
 - Security and Privacy (SP)

Community Service

¹<http://103.1.187.206/core/>

²https://research.unsw.edu.au/sites/all/files/related_files/regular_page_content/era2010_journal_title_list.xls

³<http://academic.research.microsoft.com/?SearchDomain=2&entitytype=3>

⁴<http://arnetminer.org/page/conference-rank/html/All-in-one.html>

- 2020 **Program Committee member**, 12th Working Conference on Verified Software: Theories, Tools, and Experiments (VSTTE)
- Jun. 2020 **Invited Participant**, Dagstuhl Seminar 20251 “Theoretical Advances and Emerging Applications in Abstract Interpretation”
- 2019 **Guest editor**, Special issue of the journal Applied Sciences (ISSN 2076-3417, section “Computing and Artificial Intelligence”) on “Static Analysis Techniques: Recent Advances and New Horizons”
- 2019 **Program Committee member**, SmartCom
- 2018 **Program Committee member**, SOAP
- 2017 **Artifact Evaluation Committee member**, CAV
- Jun. 2017 **Member of the commission for two postdoc positions**, University of Venice and Verone
- 2016 **Program Committee member**, FTfJP
- 2015 **Demonstrations track co-chair**, SPLASH
- 2015 **Organizer**, IBM Programming Languages Day
- Apr. 2015 **External reader**, PhD committee of Junjie Chen at the New York University
- 2014 **External reviewer**, Swiss National Science Foundation
- 2012 to 2018 **Program Committee member**, CISIM
- 2012 **Program Committee member, Session chair**, SAS

Reviewer for the following conferences, workshops and journals: SAS 07, FTfJP 07, VMCAI 08, ESOP 08, LCTES 08, FM 09, CATS 2010, ESOP 2010, Journal of Symbolic Computation – Special issue on WING 2009, FMOODS 2010, AP-NOC 2010, FoVeOOS 2010, ESOP 2011, Journal of Symbolic Computation – Special issue on WING 2010, TOPI 2011, PSI 2011, SAS 2011, ESOP 2012, TACAS 2012, Bytecode 2012, Journal of Computer Science and Technology, Journal of Software and Systems Modeling, VMCAI 2013, ESOP 2013, ICFEM 2013, POPL 2014, Formal Aspects of Computing, CAV 2014, APLAS 2014, VMCAI 2015, NFM 2015, Science of Computer Programming, Computer Languages Systems & Structures – Special issue on VMCAI 2015, VMCAI 2016, ICALP 2016, ESOP 2017, PLDI 2017, Security and Communication Networks, SAS 2017, Computer Languages, Systems & Structures, Journal of Systems and Software, Computer Networks, Sustainable Cities and Society, Security and Communication Networks, Journal of King Saud University – Computer and Information Sciences, Software Tools for Technology Transfer - Special issue on SPIoT 2019.

Grants

Co-principal investigator, “Security Static Analysis for Android Things”

EUR 165'000

UNIVERSITY OF VERONA

Oct. 2018 - Nov. 2019

The goal of this project is to formalize, implement and apply novel security analyses for Android Things software. The project is 2-years-long and involves one postdoc and two professors at University of Verona and two employees at Julia.

Co-principal investigator, “Static analysis for the safety and security of Android systems for automotive infotainment”

EUR 48'000

REGIONE VENETO ESF PROJECT

Jul. 2017 - Jul. 2018

The goal of this project is to formalize, implement and apply novel reliability and security analyses for Android Auto apps. The project is 1-year-long and involves two postdocs (one at University Ca' Foscari of Venice, and one at University of Verona that will spend at least 7 months at Julia).

Co-principal investigator, “TouchBoost – Cloud-based Static Analyses to Improve Lay Programming on Mobile Devices”

CHF 298'000

MICROSOFT

Apr. 2012 - Jul. 2013

The goal of this project is to apply static analysis to improve the efficiency and reliability of programs developed on a mobile device with Microsoft TouchDevelop. The project is 2-years-long and involves one postdoc and one PhD student (Lucas Brutschy).

Technical head, “Verification-Driven Inference of Contracts”

CHF 302'896

SWISS NATIONAL FOUNDATION

Sep. 2010 - Jul. 2013

Project leader: prof. Peter Müller. The goal of this project is to explore the interaction between program verification and static analysis in order to effectively find bugs on software. The project is 3-years-long and involves two PhD students (Uri Juhasz and Milos Novacek).

Internships

Microsoft Research

Redmond - WA, U.S.A.

INTERN

Aug. 2007 - Nov. 2007

“Static analysis of unsafe code in C# via abstract interpretation”, mentor: Francesco Logozzo.

Ca' Foscari University

COLLABORATOR

“Development of a static analyzer for Java Card language”

Venice, Italy

Apr. 2005 - Jun. 2005

Ca' Foscari University

INTERN

I developed an application to evaluate automatically the practice exams of the “Base of programming” course and I help some students to develop simple C applications in Linux environment.

Venice, Italy

Sept. 2004 - Dec. 2004

Tools and Software

Julia for .NET

JULIASOFT

Apply Julia (a 10 years old static analyzer for Java) to the analysis of CIL (.Net bytecode) obtained from the compilation of C# code. Julia has been widely applied to the analysis of Java bytecode. The main challenge is to translate CIL (and in particular, instructions accessing the memory through pointers) to Java Bytecode (that does not support pointers). In particular, CIL is translated into an intermediate XML representation similar to Java bytecode, and this is passed to Julia as BCEL classes.

Verona, Italy

Feb. 2016 - Nov. 2016

Sample: Static Analyzer of Multiple Programming Languages

ETH ZÜRICH

A generic static analyzer that can be automatically plugged with a wide range of different heap and value analyses [Ferr14]. Several value analyses have been already developed [Ferr10, CFC11, ZFC12, FM12, CFC12, CFC14]. In addition, Sample supports several classical heap (e.g., TVLA [FFJ12] and program point-based abstraction) and numerical (e.g., Apron) analyses, as well as trace partitioning. Sample works on an intermediate language (called Simple) simpler than common programming languages, but more refined than bytecode languages. Up to now, translations from TouchDevelop, Scala and Java bytecode to Simple has been developed.

Switzerland

Oct. 2010 - Jul. 2013

Checkmate: Static Analysis of Java Multithreaded Programs [Ferr09a,Ferr13]

ECOLE POLYTECHNIQUE

A generic static analyzer of Java multithreaded programs developed in Java. It is generic w.r.t. the numerical domain, the memory model and the property. It has been instantiated on the analysis of the happens-before memory model [Ferr08], and of the determinism [Ferr08b], together with other more approximated memory models, properties, and a set of well-known non-relational numerical domains.

Paris, France

Apr. 2008 - Jan. 2010

Static Analysis of Unsafe Code [FLF08]

MICROSOFT RESEARCH

An extension of Clousot (a generic static analyzer of MSIL programs) written in C# in order to analyze unsafe code (MSIL code dealing with pointers).

Redmond – WA, U.S.A.

Aug. 2007 - Nov. 2007

JAIL: Firewall Analysis of Java Card by Abstract Interpretation [Ferr06]

CA' FOSCARI UNIVERSITY

Tool developed during my master's thesis and the following internship in Java. It analyzes Java Card source code and checks if the applet isolation property is respected.

Venice, Italy

Sept. 2004 - Jun. 2005

Patents

2019

1. Ferrara, Pietro; Pistoia, Marco; Tripp, Omer; Tsankov, Petar: “Light-weight context tracking and repair for preventing integrity and confidentiality violations”, US Patent App. 15/793,317
2. Ferrara, Pietro; Pistoia, Marco; Tripp, Omer: “System, method and apparatus for fine-grained privacy specification and verification”, US Patent 10,250,642
3. Bello, Luciano; Ferrara, Pietro; Pistoia, Marco; Tripp, Omer: “Security enforcement in the presence of dynamic code loading”, US Patent 10,296,737
4. Ferrara, Pietro; Pistoia, Marco; Tripp, Omer: “System, method and apparatus for usable code-level statistical analysis with applications in malware detection”, US Patent App. 16/453,181

2018

5. Brutschy, Lucas; Ferrara, Pietro; Pistoia, Marco; Tripp, Omer: “Fine-grained user control over usages of sensitive system resources having private data with applications in privacy enforcement”, US Patent 9,940,478 2018
6. Ferrara, Pietro; Pistoia, Marco; Tripp, Omer: “Semantic Privacy Enforcement”, US Patent App. 15/223,804
7. Dolby, Julian T; Ferrara, Pietro; Pistoia, Marco; Tripp, Omer: “Install-Time Security Analysis of Mobile Applications”, US Patent App. 15/231,093 2018

8. Ferrara, Pietro; Pistoia, Marco; Ponzo, John; Tripp, Omer: "Application integrity verification in multi-tier architectures", US Patent App. 15/234,833
9. Ferrara, Pietro; Pistoia, Marco; Roos, Pascal; Tripp, Omer: "Machine learning to facilitate incremental static program analysis", US Patent App. 15/244,229
10. Ferrara, Pietro; Pistoia, Marco; Tripp, Omer; Tsankov, Petar I: "Providing efficient information tracking with dynamically selected precision", US Patent App. 15/278,517
11. Ferrara, Pietro; Pistoia, Marco; Tripp, Omer: "Performing entropy-based dataflow analysis", US Patent App. 15/287,071
12. Ferrara, Pietro; Pistoia, Marco; Tripp, Omer: "Cooperative creation of dataflow models using sparse random instrumentation", US Patent 9,996,324
13. Dietsch, Matthias Daniel; Ferrara, Pietro; Pistoia, Marco; Tripp, Omer: "Identifying computer program security access control violations using static analysis", US Patent App. 15/595,285
14. Ferrara, Pietro; Pistoia, Marco; Tripp, Omer: "Privacy detection of a mobile application program", US Patent App. 16/106,514

2017

15. Brutschy, Lucas; Ferrara, Pietro; Pistoia, Marco; Tripp, Omer: "Synthesizing inputs to preserve functionality", US Patent 9,697,018
16. Ferrara, Pietro; Pistoia, Marco; Tripp, Omer; Tsankov, Petar I: "Self-repair and distributed-repair of applications", US Patent 9,684,788
17. Ferrara, Pietro; Pistoia, Marco; Tripp, Omer; Eunho, YANG: "Trace recovery via statistical reasoning", US Patent 9,823,998
18. Dolby, Julian T; Ferrara, Pietro; Pistoia, Marco; Tripp, Omer: "Detection of software or hardware incompatibilities in software packages", US Patent 9,733,927
19. Bello, Luciano; Ferrara, Pietro; Pistoia, Marco; Tripp, Omer: "System and method for bypassing evasion tests with applications in analysis and monitoring of mobile applications", US Patent App. 15/166,817
20. Ferrara, Pietro; Pistoia, Marco; Tripp, Omer: "System, method and apparatus for extracting usage-based fine grained permissions", US Patent App. 15/193,602

Talks

INTERNATIONAL CONFERENCES AND WORKSHOPS

- 13/06/18** Tailoring taint analysis for GDPR, Annual Privacy Forum 2018, Barcelona, Spain
- 02/06/18** CIL to Java-bytecode Translation for Static Analysis Leveraging, Formalise 2018, Gothenburg, Sweden
- 08/02/18** Static Analysis for GDPR Compliance, ITASEC 18, Milan, Italy
- 06/02/18** Code Analysis Reinvented: boosting software security and privacy (tutorial), ITASEC 18, Milan, Italy
- 09/04/14** TouchCost: Cost Analysis of TouchDevelop Scripts, FASE 14, Grenoble, France
- 22/01/14** Generic Combination of Heap and Value Analyses in Abstract Interpretation, VMCAI 14, San Diego, CA, USA
- 11/12/12** Linear approximation of continuous systems with Trapezoid Step Functions, APLAS 12, Kyoto, Japan
- 03/10/12** TVAL+: TVLA and Value Analyses Together, SEFM 12, Thessaloniki, Greece
- 22/01/12** Automatic inference of access permissions, VMCAI 12, Philadelphia, PA, USA
- 26/10/11** Static analysis of string values, ICFEM 11, Durham, Great Britain
- 09/06/10** Static type analysis of pattern matching by abstract interpretation, FORTE/FMOODS 10, Amsterdam, Netherlands
- 26/11/09** Checkmate: a Generic Static Analyzer of Java Multithreaded Programs, SEFM 09, Hanoi, Vietnam
- 11/11/08** Static analysis of the determinism of multithreaded programs, SEFM 08, Cape Town, South Africa
- 10/04/08** Static analysis via abstract interpretation of the happens-before memory model, TAP 2008, Prato, Italy
- 05/04/08** A fast and precise alias analysis for data race detection, Bytecode 08 (ETAPS workshop), Budapest, Hungary
- 26/03/06** JAIL: Firewall Analysis of Java Card by Abstract Interpretation, EAAI '06 (ETAPS workshop), Wien, Austria

ACADEMIC INSTITUTIONS AND RESEARCH LABS

- 11/06/18** The Julia static analyzer and its application to security vulnerabilities, “Sicurezza e affidabilita’ course”, University Bicocca of Milan, Italy
- 26/05/18** Java and its bytecode, Android, static analysis, CyberChallenge.IT course, University Ca’ Foscari of Venice, Italy
- 26/03/18** La vulnerabilità del software nell’ecosistema IoT, seminar on cybersecurity in Industry 4.0, University of Verona, Italy
- 17/01/18** Julia: reinventing static analysis, University of Padova, Italy
- 17/01/18** Julia: an abstract interpretation-based static analyzer of industrial OO software, “Software Verification” course at University of Padova, Italy
- 06/11/17** Julia: an abstract interpretation-based static analyzer of industrial OO software, Max Planck Institute of Software Systems, Kaiserslauten, Germany
- 29/09/17** Scaling up Static Analyzers by Program Splitting, ETH, Zurich, Switzerland
- 10/11/16** Static Security Analysis for Mobile Software, ENISA Workshop “Mobile attacks and defense: from infrastructure to application”, Berlin, Germany
- 07/04/15** MorphDroid: Fine-grained Privacy Verification, Università Ca’ Foscari of Venice, Italy
- 31/03/15** A generic static analyzer and its application to TouchDevelop, Università della Svizzera Italiana, Lugano, Switzerland
- 22/04/14** Safety and cost analysis of TouchDevelop scripts, Università Ca’ Foscari of Venice, Italy
- 17/04/14** Hybrid Security Analysis of Web JavaScript Code via Dynamic Partial Evaluation, ETH Zurich, Switzerland
- 16/04/14** Static Security Analysis in an Industrial Setting: from Taint to Data-Centric Analysis, IBM Research Zurich, Switzerland
- 26/03/14** Structural Data Leakage, IBM Thomas J. Watson Research Center, Yorktown Heights, NY, USA
- 12/02/14** Secure Language Design and Program Analysis for Security (with Omer Tripp), Harvard University, Boston, MA, USA
- 15/10/12** Static analysis of multithreaded programs, IBM Thomas J. Watson research center, Yorktown, NY, USA
- 20/07/12** TVAL+: Combining TVLA and Value Analyses, Microsoft Research, Redmond, WA, USA
- 13/06/12** Inference of Fractional, Counting and Chalice Access Permissions via Abstract Interpretation, Universidad Complutense de Madrid, Madrid, Spain
- 12/06/12** TVLA and Value Analyses Together, Instituto Madrileño de Estudios Avanzados, Madrid, Spain
- 16/03/12** Automatic inference of access permissions, Department of Computer Science, Università Ca’ Foscari, Venice, Italy
- 10/02/12** Access permission inference via abstract interpretation, Microsoft Research, Redmond, WA, USA
- 30/01/12** Automatic inference of fractional, counting and Chalice access permissions, IBM Watson research center, Hawthorne, NY, USA
- 25/02/11** Automatic inference of access permissions, Ecole Normale Supérieure of Paris, Paris, France
- 08/04/10** Checkmate: a Generic Static Analyzer of Java Multithreaded Programs, Department of Computer Science, Università Ca’ Foscari, Venice, Italy
- 04/03/10** Abstract interpretation of memory models, IFIP WP 2.3, Lachen, Switzerland
- 25/08/09** Static analysis via abstract interpretation of multithread programs, IRISA-INRIA, Rennes, France
- 22/05/09** Static analysis via abstract interpretation of multithread programs, PhD Defense, Ecole Normale Supérieure, Paris, France
- 29/01/09** Static analysis by abstract interpretation of Java multithreaded programs, Chair of Programming Methodology, ETH, Zürich, Switzerland
- 18/12/08** Static analysis of the determinism of multithreaded programs, Lunch seminars, Università Ca’ Foscari of Venice, Venice, Italy
- 20/06/08** Static analysis via abstract interpretation of the happens-before memory model, Ecole Normale Supérieure of Paris, Paris, France
- 28/05/08** Static analysis via abstract interpretation of the happens-before memory model, Lunch seminars, Università Ca’ Foscari of Venice, Venice, Italy
- 19/12/07** Static analysis of unsafe code, Lunch seminars, Università Ca’ Foscari of Venice, Venice, Italy
- 07/11/07** Static analysis of unsafe code, Microsoft Research, Redmond, WA, USA
- 16/02/06** JAIL (Javacard Abstract Intepretation-based lifeguard), Workshop AIDA, Pisa, Italy
- OTHERS**
- 28/03/19** “Start-up: imprenditoria giovane e innovativa”, Associazione Scienze e Tecnica a Verona, Italy
- 13/03/19** “Hunting Software Security Vulnerabilities and Privacy Leaks with Semantic Static Analysis”, Cloud & Cyber Security Expo, London, United Kingdom
- 05/03/19** “Semantic Static Analysis of IoT Software”, VerifySoft Static Code Analysis Day, Offenburg, Germany
- 27/02/19** “Semantic Static Analysis of IoT Software”, Embedded World 2019, Nuremberg, Germany
- 09/10/18** Hunting Software Security Vulnerabilities and Privacy Leaks with Semantic Static Analysis, the IT Security Expo and Congress (it-sa), Nuremberg, Germany
- 05/10/18** Analisi Statica per la Compliance GDPR, ISACA VI Venice AppSec, Venice, Italy
- 07/11/17** Code Analysis Reinvented: boosting Software Security and Privacy, W-JAX, Munich, Germany
- 17/10/17** Software security, reliability and privacy: what role can static analysis play?, 31st AIEA National Conference (ISACA Milan Chapter), Milan, Italy

Teaching

From 29/10/2019	Member , Teaching Committee of the PhD in Computer Science	<i>Ca' Foscari University, Venice, Italy</i>
Spring sem. 2020	Lecturer , Introduction to Coding and Data Management 2 (part of the bachelor in Digital Management). 30 hours of lectures.	<i>Ca' Foscari University, Venice, Italy</i>
Spring sem. 2020	Lecturer , Information System for the Arts (part of the master in Economics and Management of Arts and Cultural Activities). 30 hours of lectures.	<i>Ca' Foscari University, Venice, Italy</i>
Spring sem. 2019	Lectures (4 hours) , Software Correctness, Security, and Reliability (prof. A. Cortesi)	<i>Ca' Foscari University, Venice, Italy</i>
Spring sem. 2018	Lectures (4 hours) , Software Correctness, Security, and Reliability (prof. A. Cortesi)	<i>Ca' Foscari University, Venice, Italy</i>
Spring sem. 2017	Lectures (4 hours) and evaluation of student exercises and final projects , Software Correctness, Security, and Reliability (prof. A. Cortesi)	<i>Ca' Foscari University, Venice, Italy</i>
Spring sem. 2012	Lecturer , Static Program Analysis. 13 lectures (2 hours each one with around 20 students) and oral exam preparation and evaluation	<i>ETH Zürich, Switzerland</i>
Spring sem. 2012	Lectures (4 hours) and evaluation of student projects , Analysis and Verification of Programs (prof. A. Cortesi)	<i>Ca' Foscari University, Venice, Italy</i>
Fall sem. 2011	Teaching assistant , Concepts of Object-Oriented Programming (Prof. P. Müller). 13 exercise sessions (2 hours each one with around 20 students) and written exam preparation	<i>ETH Zürich, Switzerland</i>
Spring sem. 2011	Teaching assistant , Functional Programming and Formal Methods (Prof. P. Müller). Exercise sessions and written exam preparation	<i>ETH Zürich, Switzerland</i>
Fall sem. 2010	Head teaching assistant , Concepts of Object-Oriented Programming (Prof. P. Müller). 12 exercise sessions (2 hours each one with around 10 students) and written exam preparation	<i>ETH Zürich, Switzerland</i>
Fall sem. 2010	Lectures (8 hours) and evaluation of student projects , Analysis and Verification of Programs (prof. A. Cortesi)	<i>Ca' Foscari University, Venice, Italy</i>
Spring sem. 2009	Teaching assistant , Functional Programming and Formal Methods (Prof. P. Müller). Exercise sessions and written exam preparation	<i>ETH Zürich, Switzerland</i>
Fall sem. 2009	Teaching assistant , Concepts of Object-Oriented Programming (Prof. P. Müller). 4 exercise sessions (2 hours each one) with around 10 students. Exercise sessions and written exam preparation	<i>ETH Zürich, Switzerland</i>
Fall sem. 2009	Lectures (8 hours) and evaluation of student projects , Analysis and Verification of Programs (prof. A. Cortesi)	<i>Ca' Foscari University, Venice, Italy</i>
Spring sem. 2009	Lectures (8 hours) and evaluation of student projects , Analysis and Verification of Programs (prof. A. Cortesi)	<i>Ca' Foscari University, Venice, Italy</i>
Spring sem. 2008	Lectures (16 hours) , Analysis and Verification of Programs (prof. A. Cortesi)	<i>Ca' Foscari University, Venice, Italy</i>

Student Supervision

11/2017 – 02/2018	Co-supervisor , Master thesis of Luca Olivieri on frontend for GDPR analyses. Supervisor: prof. Fausto Spoto	<i>University of Verona, Italy</i>
10/2017 – 02/2018	Co-supervisor , Master thesis of Luca Negrini on advanced algorithms and application of machine learning to application splitting. Supervisor: prof. Fausto Spoto	<i>University of Verona, Italy</i>
03/2017 – 06/2017	Supervisor , Internship of Dinu Berinde on the application of Julia's analyses to Android programs	<i>University of Verona, Italy</i>
10/2012 - 03/2013	Supervisor , Master thesis at ETH of Zürich of Daniel Schweizer (“Overapproximating the cost of loops in TouchDevelop”)	<i>ETH Zürich, Switzerland</i>
03/2011 - 08/2011	Supervisor , Bachelor thesis at ETH of Zürich of Raphael Fuchs (“Interfacing TVLA and Sample”)	<i>ETH Zürich, Switzerland</i>
03/2011 - 08/2011	Supervisor , Master thesis at ETH of Zürich of Dominik Gabi (“Disjunction on demand”)	<i>ETH Zürich, Switzerland</i>
01/2010 - 06/2010	Supervisor , Bachelor thesis of Roman Scheidegger (“Translating Java bytecode to Simple”)	<i>ETH Zürich, Switzerland</i>
12/2019 - 05/2010	Co-supervisor , Master thesis of Giulia Costantini (“Abstract domains for static analysis of strings”, mark: 110/110 cum laude). Supervisor: prof. Agostino Cortesi	<i>Ca' Foscari University, Venice, Italy</i>

References

Patrick Cousot (pcousot@cs.nyu.edu), Full professor at Courant Institute of Mathematical Sciences

New York University, U.S.A

Peter Müller (peter.mueller@inf.ethz.ch), Full professor and head of the Chair of Programming Methodology

ETH, Zürich, Switzerland

Agostino Cortesi (cortesi@unive.it), Full professor at the Department of Environmental Sciences, Informatics and Statistics

Ca' Foscari University, Venice, Italy

Fausto Spoto (fausto.spoto@univr.it), Associate professor at the Department of Computer Science

University of Verona, Italy

Other Titles

21/06/05 Admitted in the Italian Register of engineers

21/01/05 Obtained the European Computer Driving License

20/02/03 Admitted in the Register of journalists as occasional contributor

Hobbies

Chess

I am a decent chess player⁵) and chess instructor, vice-president of the Battinelli chess club in Verona, member of its governing council, and captain of one of its teams. I have been playing chess since I was a child, and I have been playing for Capablanca club in Mestre (Venice), Paris Université Club in Paris, and Reti Club in Zurich (where I was the captain of one of the teams).

Journalism

In relatively old times (that is, about 15 years ago) I have been an active sport journalist for several newspapers, websites, radios and televisions. I am part of the Register of journalists as occasional contributor since March 2003.

I love skiing

Mountains

(<https://mydolomiti.dolomitisuperski.com/profilopubblico.aspx?p=45A593FB816B5E03E0537D1DC7D95559>

contains my ski performances of the last years - accessible only by logged users) and hiking

(<https://connect.garmin.com/modern/activity/3844672704> is a recent hike (summer 2019) I am particularly proud of), especially in the Dolomiti mountains.