
Rapporto annuale 2024/2025

Indice

1.	Progetti finanziati 2024/2025	3
	1.1. In corso	3
	1.2. Conclusi	4
2.	Pubblicazioni 2024/2025	4
3.	Presentazioni a conferenze	7
4.	Collaborazioni principali	8
5.	Conferenze e seminari	9
6.	Eventi	9
7.	Affiliazioni e riconoscimenti	9

Introduzione

Fondato nel maggio del 2020, l'Istituto di sistemi informatici è composto da professoressse e professori che sviluppano e promuovono la ricerca e l'insegnamento di livello mondiale nel settore dei sistemi. I sistemi informatici comprendono tutte le aree dell'informatica direttamente correlate o che hanno un impatto su progettazione, architettura, sviluppo, implementazione e funzionamento di sistemi software e hardware.

Gli argomenti di interesse includono, ma non sono limitati a: sistemi operativi, networking, sistemi distribuiti, sicurezza e privacy, sistemi in tempo reale, cloud computing, gestione dei dati, linguaggi di programmazione, middleware, ubiquitous computing, IA affidabile, sistemi embedded, architettura del computer e un'ampia gamma di applicazioni. Storicamente queste aree sono esistite indipendentemente, ma la maggiore complessità degli artefatti informatici richiede sforzi di collaborazione da più punti di vista per affrontare i problemi rilevanti.

1. Progetti finanziati 2024/2025

1.1. In corso

- CLOUDSTARS: Cloud Open Source Research Mobility Network; Prof. Patrick Eugster; EU Horizon
- STRIDE - Secure Transparent Resilient Independent Distributed Execution; Dr. Shamiek Mangipudi; Competitive Foundations; SNSF Bridge Proof of Concept
- DEEDS - DEterministic Distributed Systems; Prof. Patrick Eugster; Competitive Foundations; Hasler Foundation
- Automated Probabilistic Reasoning for Quantum Networks; Dr. Rodrigo Otoni; Competitive Foundations; Hasler Foundation
- DEDIC: DEterministic DIstributed Computing; Prof. Patrick Eugster; Enti privati; SAP
- BASIS - hyBRId Asynchronous/Synchronous dIstributed Systems; Prof. Patrick Eugster; Competitive Foundations; SNSF Div II
- FORWARD - Fine-grained netwORk floW behAvior pReDiction; Prof. Patrick Eugster; Competitive Foundations; SNSF Div II
- TRUST-ME - TRUStworthy enhancement of job SaTisfaction and productivity using Micro-sensing in work Environments; Prof. Marc Langheinrich; Competitive Foundations; SNSF
- EXperiMental - Wearable Technology and EXplainable AI for Mental Health and Inclusivity in Schools; Prof. Marc Langheinrich; Competitive Foundations; SNSF
- SmartCHANGE - AI-based Long-term Health Risk Evaluation for Driving Behaviour Change Strategies in Children and Youth; Prof. Marc Langheinrich; Competitive Foundations; EU Horizon
- Building Bridges Between Uncertainty Estimation and Explainable AI for Reliable and Understandable Data-driven Decision-making; Prof. Marc Langheinrich; Competitive Foundations; Hasler Foundation
- XAI-PAC - Towards Explainable and Private Affective Computing; Dr. Martin Gjoreski; Competitive Foundations; SNSF
- State Management for Replication; Prof. Fernando Pedone; Competitive Foundations; Hasler Foundation
- Approximating Deep Neural Networks via Custom Arithmetic: A Tradeoff Between Accuracy and Power Consumption; Prof. Laura Pozzi; Competitive Foundations; Hasler Foundation
- PROSELF - Semi-automated Self-Tracking Systems to Improve Personal Productivity; Prof. Silvia Santini; Competitive Foundations; SNSF

1.2. Conclusi

- BASE - Behavioral Analytics for Smart Environments; Prof. Marc Langheinrich; Competitive Foundations; SNSF
- CausalDPL – Towards Scalable Multimodal Causal Deep Learning: An Exploratory Study; Prof. Silvia Santini and Dr. Pietro Barbiero; Competitive Foundations; Hasler Foundation

2. Pubblicazioni 2024/2025

Articolo pubblicato in rivista scientifica

- Pasquale Poverino, Fabio Di Lauro, Matteo Biagiola, Paolo Tonella, Antonio Carzaniga: Parallelization in System-Level Testing: Novel Approaches to Manage Test Suite Dependencies. *IEEE Transactions on Software Engineering* 51(7): 2088-2101, 2025
- Mohammad Hosseini, Sina Darabi, Hannaneh B. Pasandi, Mohammad Nakhjiri, Patrick Eugster: Poison Comes in Small Packages: Application-driven Reexamination of Datacenter Microbursts. *Proceedings of the ACM on Measurement and Analysis of Computer Systems* 9(2): 1-23, 2025
- Davide Rovelli, Michele Dalle Rive, Patrick Eugster: Toward a Practical Deterministic Datapath for 6G End Devices. *IEEE Networks* 39(3): 75-82, 2025
- Pavel Chuprikov, Patrick Eugster, Shamiek Mangipudi: Security Policy as Code. *IEEE Security and Privacy* 23(2): 23-31, 2025
- Rodrigo Otoni, Martin Blich, Patrick Eugster, Natasha Sharygina: Validation of CHC Satisfiability with ATHENA. *ACM Formal Aspects of Computing* 37(4): 30:1-30:20, 2025
- Zoja Anzur, Klara Zinkovic, Junos Lukan, Pietro Barbiero, Gasper Slapnicar, Mohan Li, Martin Gjoreski, Maike E. Debus, Sebastijan Trojer, Mitja Lustrek, Marc Langheinrich: A Review of Methods for Unobtrusive Measurement of Work-Related Well-Being. *Machine Learning and Knowledge Extraction* 7(3): 62, 2025
- Alessandro Gobetti, Martin Gjoreski, Hristijan Gjoreski, Nicholas D. Lane, Marc Langheinrich: FedMMA-HAR: Federated Learning for Human Activity Recognition with Missing Modalities Using Head-Worn Wearables. *IEEE Pervasive Computing* 23(4): 40-49, 2024
- Matea Marinova, Emilija Chona, Andrej Kotevski, Borjan Sazdov, Ivana Kiprijanovska, Simon Stankoski, Martin Gjoreski, Charles Nduka, Hristijan Gjoreski: Deep Learning for Facial Expression and Human Activity Recognition Using Smart Glasses. *IEEE Access* 13: 48257-48270, 2025
- Cristian Tirelli, Juan Sapriza, Rubén Rodríguez Álvarez, Lorenzo Ferretti, Benoît W. Denking, Giovanni Ansaloni, José Angel Miranda, David Atienza, Laura Pozzi: SAT-Based Exact Modulo Scheduling Mapping for Resource-Constrained CGRAs. *ACM Journal on Emerging Technologies in Computing Systems* 20(3): 8:1-8:26, 2024
- Riccardo Felici, Laura Pozzi, Carlo A. Furia: HyperPUT: Generating Synthetic Faulty Programs to Challenge Bug-Finding Tools. *Empirical Software Engineering* 29(2): 38, 2024
- Nouran Abdalazim, Leonardo Alchieri, Lidia Alecci, Pietro Barbiero, Silvia Santini: The Impact of Domain Shift on Predicting Perceived Sleep Quality from Wearables. *Sensors* 25(13):4012, 2025
- Lidia Alecci, Matías Laporte, Leonardo Alchieri, Nouran Abdalazim, Silvia Santini: What the Heart Can (not) Tell: Potential and Pitfalls of Biometric Recognition Methods Based on Photoplethysmography. *Sensors* 25(24):7586, 2025

- Alvise Dei Rossi, Davide Marzorati, Tiziano Gerosa, Radoslava Švihrová, Silvia Santini, and Francesca Faraci. 2025. Unobtrusive Perceived Sleep Quality Monitoring in the Wild. Proceedings of the ACM on Interactive, Mobile, Wearable, and Ubiquitous Technologies 9(3) Article 77: 1-26, 2025

Contributo in atti di convegno

- Mohammad Hosseini, Sina Darabi, Patrick Eugster, Mahmood Choopani, Amir Hossein Jahangir: Rethinking Web Caching: An Optimization for the Latency-Constrained Internet. 23rd ACM Workshop on Hot Topics in Networks (HotNets 2024): 326-334
- Davide Rovelli, Pavel Chuprikov, Philipp Berdesinski, Ali Pahlevan, Patrick Jahnke, Patrick Eugster: FiDe: Reliable and Fast Crash Failure Detection to Boost Datacenter Coordination. 2025 USENIX Annual Technical Conference (ATC 2025): 765-788
- Rodrigo Otoni, Martin Blicha, Matias Barandiaran Rivera, Patrick Eugster, Jan Kofron, Natasha Sharygina: Unsatisfiability Proofs for Horn Solving. 2025 International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS 2025): 67-87
- Mohammad Hosseini, Sina Darabi, Hannaneh B. Pasandi, Mohammad Nakhjiri, Patrick Eugster: Application-driven Reexamination of Datacenter Microbursts. Abstracts of the 2025 ACM SIGMETRICS International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS 2025): 28-30
- Jérôme Graf, Vitalii Demianiuk, Pavel Chuprikov, Feiran Yang, Sergey I. Nikolenko, Patrick Eugster: CGFE: Efficient Range Encoding for TCAMs. 2025 IEEE Conference on Computer Communications (INFOCOM 2025): 1-10
- Davide Rovelli, Patrick Eugster: Digital Cluster Circuits for Reliable Datacenters. 2025 Workshop on Disruptive Ideas and New Interdisciplinary Results (DISRUPT 2025) at 55th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2025): 201-205
- Gabriele Dominici, Pietro Barbiero, Francesco Giannini, Martin Gjoreski, Giuseppe Marra, Marc Langheinrich: Counterfactual Concept Bottleneck Models. 13th International Conference on Learning Representations (ICLR 2025)
- Gabriele Dominici, Pietro Barbiero, Mateo Espinosa Zarlenga, Alberto Termine, Martin Gjoreski, Giuseppe Marra, Marc Langheinrich: Causal Concept Graph Models: Beyond Causal Opacity in Deep Learning. 13th International Conference on Learning Representations (ICLR 2025)
- Fatima Ezzeddine, Rinad Akel, Ihab Sbeity, Silvia Giordano, Marc Langheinrich, Omran Ayoub: On the Interplay of Explainability, Privacy and Predictive Performance with Explanation-assisted Model Extraction. Late-breaking Work, Demos, Doctoral Consortium of 3rd World Conference on eXplainable Artificial Intelligence (xAI 2025): 1-8
- Dario Fenoglio, Gabriele Dominici, Pietro Barbiero, Alberto Tonda, Martin Gjoreski, Marc Langheinrich: Federated Behavioural Planes: Explaining the Evolution of Client Behaviour in Federated Learning. 2024 Conference on Neural Information Processing Systems (NeurIPS 2024)
- Nenad Milosevic, Daniel Cason, Zarko Milosevic, Robert Soule, and Fernando Pedone: Message Size Matters: AlterBFT's Approach to Practical Synchronous BFT in Public Clouds. 26th ACM/IFIP International Middleware Conference (Middleware 2025): 427-440
- Nenad Milosevic, Robert Soule, Fernando Pedone: The Case for Synchronous Distributed Protocols in Public Clouds. ACM Symposium on Cloud Computing (SoCC 2025): 585-599
- Michele Cattaneo, Elia Batista, Fernando Pedone: B+AVL Trees: Towards Data Structures for Robust and Efficient Blockchain State Synchronization. 44th International Symposium on Reliable Distributed Systems (SRDS 2025): 311-322

- Nenad Milosevic, Daniel Cason, Zarko Milosevic, Fernando Pedone: How Robust Are Synchronous Consensus Protocols? 28th International Conference on Principles of Distributed Systems (OPODIS 2024): 20:1-20:25
- Cristian Tirelli, Laura Pozzi: Mapping Code on Coarse Grained Reconfigurable Arrays Using a SAT Solver. Workshops of the 30th European Conference on Parallel and Distributed Processing (Euro-Par 2024 Part II): 348-353
- Cristian Tirelli, Rodrigo Otoni, Laura Pozzi: Monomorphism-Based CGRA Mapping Via Space and Time Decoupling. 2025 Conference on Design, Automation and Test in Europe (DATE 2025): 1-7
- Paolo lenne, Laura Pozzi, Philip Brisk: The Rise and Fall of Automatic Instruction-Set Extensions. 36th IEEE International Conference on Application-specific Systems, Architectures and Processors (ASAP 2025): 119-120
- Yuxuan Wang, Cristian Tirelli, Lara Orlandic, Juan Sapriza, Rubén Rodríguez Álvarez, Giovanni Ansaloni, Laura Pozzi, David Atienza: An MLIR-Based Compilation Framework for CGRA Application Deployment. 21st International Symposium on Applied Reconfigurable Computing. Architectures, Tools, and Applications (ARC 2025): 33-50
- Dario Fenoglio, Mohan Li, Davide Casnici, Matias Laporte, Shkurta Gashi, Silvia Santini, Martin Gjoreski, Marc Langheinrich: Multi-Frequency Federated Learning for Human Activity Recognition Using Head-Worn Sensors. 2024 International Conference on Intelligent Environments (IE 2024): 17-24
- Alvise Dei Rossi, Davide Marzorati, Radoslava Švihrová, Michal Bechny, Silvia Santini, Francesca Faraci: Modeling Perceived Sleep Quality Through Objective and Subjective Data. 12th International Conference on Affective Computing and Intelligent Interaction Workshops and Demos (ACIIW 2024): 218-221
- Leonardo Alchieri, Vittoria Scocco, Nouran Abdalazim, Lidia Alecci, Silvia Santini: Improving Human Behavior Recognition Using Bilateral Electrodermal Activity Data Collected from Wearable Devices. 2025 International Conference on Activity and Behavior Computing (ABC 2025): 1-10
- Giovanni De Felice, Arianna Casanova Flores, Francesco De Santis, Silvia Santini, Johannes Schneider, Pietro Barbiero, Alberto Termine. Causally Reliable Concept Bottleneck Models. NeurIPS 2025.

Altre pubblicazioni

- Rodrigo Otoni, Martin Blich, Matias Barandiaran Rivera, Patrick Eugster, Jan Kofron, Natasha Sharygina: Artifact for “Unsatisfiability Proofs for Horn Solving”. Zenodo, 2025
- Ahmad Raeisi, Mahdi Dolati, Sina Darabi, M. Sadegh Talebi, Patrick Eugster, Ahmad Khonsari: GOGH: Correlation-Guided Orchestration of GPUs in Heterogeneous Clusters. CoRR abs/2510.15652, 2025
- Francesco Bombassei De Bona, Ioana Andreea Câmpanu, Marc Langheinrich, Martin Gjoreski, Georgiana Juravle: Data from "LIFETRACE: A Longitudinal Multimodal Dataset on Daily Physical Activity, Well-Being, and Habits". Zenodo, 2025
- Mor Vered, Teena Hassan, Mandani Ntehouli, Sang Won Bae, Martin Gjoreski: XAI for U 2025. 2nd International Workshop on Explainable AI for Ubiquitous, Pervasive and Wearable Computing. UbiComp 2025 Companion: 1670-1673
- Mandani Ntehouli, Francesco Bombassei De Bona, Martin Gjoreski, Gerasimos Spanakis: Evaluating the Quality of Counterfactual Explanations in Multivariate Time-Series. UbiComp Companion 2025: 1674-1678
- Swathy Satheesan Cheruvalath, Matías Laporte, Francesco Bombassei De Bona, Teena Hassan, Martin Gjoreski: Generating Explanations for Models Predicting Student Exam Performance. UbiComp 2025 Companion: 1679-1684

- Lorenzo Martignetti, Elia Batista, Gianpaolo Cugola, Fernando Pedone: Scaling Atomic Ordering in Shared Memory. CoRR abs/2509.07781, 2025
- Daniel Cason, Ricardo Guimaraes, Nenad Milosevic, Patrick Eugster, Zarko Milosevic, Fernando Dotti, Fernando Pedone: Boosting Blockchain Consensus with Semantic Gossip. Authorea (preprint, not peer reviewed), 2025
- Leonardo Alchieri, Lino Candian, Nouran Abdalazim, Lidia Alecci, Giovanni De Felice, Silvia Santini: Exploring Generalist Foundation Models for Time Series of Electrodermal Activity Data. UbiComp 2025 Companion: 885–892
- Nouran Abdalazim, Leonardo Alchieri, Lidia Alecci, Giovanni De Felice, Silvia Santini: Blue Mondays and Happy Meals: Investigating the Impact of Contextual Factors on Mood States. UbiComp 2025 Companion: 809–814
- Lidia Alecci, Alessandro Zanzi, Matías Laporte, Leonardo Alchieri, Nouran Abdalazim, Giovanni De Felice, Silvia Santini: Robust PPG Authentication: The Role of Temporal, Individual, and State Variability. UbiComp 2025 Companion: 770–777

3. Presentazioni a conferenze

- Davide Rovelli, ATC 2025, Boston, Stati Uniti, 7-9 luglio 2025: FiDe: Reliable and Fast Crash Failure Detection to Boost Datacenter Coordination,
- Rodrigo Otoni, TACAS 2025, Hamilton, Canada, 3-8 maggio 2025: Unsatisfiability Proofs for Horn Solving
- Jérôme Graf, INFOCOM 2025, Londra, Regno Unito, 19-22 maggio 2025: Efficient Range Encoding for TCAMs,
- Davide Rovelli, DISRUPT 2025, Napoli, Italia, 23-26 giugno 2025: Digital Cluster Circuits for Reliable Datacenters
- Gabriele Dominici, ICLR 2025, Singapore, 24-28 aprile 2025: Counterfactual Concept Bottleneck Models
- Gabriele Dominici, ICLR 2025, Singapore, 24-28 aprile 2025: Causal Concept Graph Models: Beyond Causal Opacity in Deep Learning
- Dario Fenoglio, NeurIPS 2024, Vancouver, Canada, 10-15 dicembre 2024: Federated Behavioural Planes: Explaining the Evolution of Client Behaviour in Federated Learning
- Nenad Milosevic, OPODIS 2024, Lucca, Italia, 11-13 dicembre 2024: How Robust Are Synchronous Consensus Protocols?
- Cristian Tirelli, DATE 2025, Lione, Francia, 31 marzo – 2 aprile 2025: Monomorphism-Based CGRA Mapping Via Space and Time Decoupling
- Leonardo Alchieri, ABC 2025, Abu Dhabi, Emirati Arabi Uniti, 21-25 aprile 2025: Improving Human Behavior Recognition Using Bilateral Electrodermal Activity Data Collected From Wearable Devices

4. Collaborazioni principali

In corso

- Patrick Eugster
 - Prof. Marco Gaboardi (Boston University, Stati Uniti)
 - Prof. Robert Rand (University of Chicago, Stati Uniti)
 - Prof. Srivatsan Ravi (University of Southern California, Stati Uniti)
 - Prof. Mukund Ragothaman (University of Southern California, Stati Uniti)
 - Prof. Robert Soulé (Yale University, Stati Uniti)
 - Prof. Pavel Chuprikov (Polytechnique Paris, Francia)
 - Dr. Savvas Savvides (Fortanix & European University Cyprus, Cipro)
 - Dr. Patrick Jahnke (Turbalance.AI, Stati Uniti)
 - Dr. Vitalii Demianiuk (Turbalance.AI, Stati Uniti)
 - Dr. Christian Pinto (IBM Research Dublin, Irlanda)
- Marc Langheinrich
 - Prof. Mitja Lustrek (Josef Stefan Institute Ljubljana, Slovenia)
 - Prof. Nigel Davies (Lancaster University, Regno Unito)
 - Prof. Mykola Pechenizkiy (TU Eindhoven, Paesi Bassi)
 - Dr. Angieszka Kitkowska (Jönköping University, Svezia)
 - Prof. Christina Pöpper (New York University, Emirati Arabi Uniti)
- Laura Pozzi
 - Prof. George Constantinides (Imperial College London, Regno Unito)
 - Prof. John Wickerson (Imperial College London, Regno Unito)
 - Prof. David Atienza (EPFL, Svizzera)
- Silvia Santini
 - Prof. Maike Debus (Université de Neuchâtel, Svizzera)
 - Prof. Daniel Gatica-Perez (EPFL, Svizzera)
 - Dr. Francesca Faraci (SUPSI, Svizzera)

Conclude

- Patrick Eugster
 - Dr. Igor Konnov (Informal Systems, Regno Unito)
 - Ling Wang (Paderborn University, Germania)

5. Conferenze e seminari

Keynote e relazioni invitate

- Patrick Eugster: Formal Programming Techniques for Secure Data Processing, Confidential Computing Consortium Seminar, online, settembre 2024
- Patrick Eugster: Synchrony in Datacenters?, Workshop on Cloud Control, Stoccolma, Svezia giugno 2025
- Laura Pozzi: XPAT: A Parametrizable Template for Approximate Logic Synthesis, EPFL, Losanna, Svizzera maggio 2025
- Silvia Santini: La medicina oggi e domani con l'Intelligenza Artificiale, Möbius 2024, Lugano, Svizzera, ottobre 2024
- Silvia Santini: Sensors @work: Personal Informatic systems to support well-being and productivity, 6th Dental Innovation Congress, Lugano, Svizzera, ottobre 2024

6. Eventi

Appartenenze a comitati di programma di conferenze

- Patrick Eugster
 - ICDCS 2025 (45th IEEE International Conference on Distributed Computing Systems)
- Fernando Pedone
 - ICDCS 2025 (45th IEEE International Conference on Distributed Computing Systems)
 - DSN 2025 (55th IEEE/IFIP International Conference on Dependable Systems and Networks)
 - ATC 2025 (2025 USENIX Annual Technical Conference)
- Laura Pozzi
 - CASES 2024 (2024 IEEE International Conference on Compilers Architectures and Synthesis for Embedded Systems)
 - ISVLSI 2025 (2025 IEEE Annual Symposium on VLSI)

7. Affiliazioni e riconoscimenti

- Patrick Eugster
 - Membro consiglio della ricerca, SNSF
 - Premiato IFIP Jean-Claude Laprie Award in Dependable Computing 2025. Patrick Eugster, Rachid Guerraoui, Sidath B. Handurukande, P. Kouznetsov, and A.-M. Kermarrec: Lightweight Probabilistic Broadcast (IEEE DSN 2001)
- Marc Langheinrich
 - Membro comitato di direzione, rete nazionale di consulenza scientifica, cluster "Cybersecurity", Cancelleria federale svizzera
 - Membro comitato di direzione, The Future Foundation (Austria)
- Silvia Santini
 - Membro della Commissione federale per la ricerca energetica CORE

Contatto

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