Riccardo Pinciroli, Ph.D.

» Data Scientist
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Academic Positions

Oct. 2020 – Jun. 2023	**Postdoctoral Fellow.** Gran Sasso Science Institute, Italy. *Topic:* Performance evaluation of cyber-physical systems (e.g., smart hospitals), uncertainty propagation, agent-based models to investigate virus propagation. *Supervisor:* Dr. Trubiani C.
Sep. 2019 – Sep. 2020	**Postdoctoral Fellow.** Dept. of Computer Science, William and Mary, VA, USA. *Topic:* Performance prediction for resource allocation in the cloud, effective serving of deep neural network applications, reliability analysis of storage devices. *Supervisor:* Dr. Smirni E.
Feb. 2019 – Sep. 2019	**Research Associate.** Dept. of Computer Science, William and Mary, VA, USA. *Topic:* Performance prediction for resource allocation in the cloud, effective serving of deep neural network applications, reliability analysis of storage devices. *Supervisor:* Dr. Smirni E.
Nov. 2017 – Jan. 2019	**Research Associate.** DEIB, Politecnico di Milano, Italy. *Topic:* Performance and capacity analysis of university private cloud to support the research projects. *Supervisor:* Dr. Di Nitto E.

Education

Nov. 2014 – Feb. 2018	**Ph.D.** in Information Technology at Politecnico di Milano, Italy. *Dissertation:* Energy efficiency in large data-centers using performance evaluation techniques *Advisors:* Dr. Gribaudo M. and Dr. Serazzi G.
Oct. 2012 – Oct. 2014	**M.Sc.** in Computer Engineering at Politecnico di Milano, Italy. *Thesis:* Energy consumption minimization in systems with multi-class workloads *Advisors:* Dr. Gribaudo M. and Dr. Serazzi G. *Final Score:* 110/110 cum laude
Oct. 2009 – Jul. 2012	**B.Sc.** in Computer Engineering at Politecnico di Milano, Italy.

Visiting Experiences

Feb. 2018 – Jun. 2018	**Visiting Scholar.** Dept. of Computer Science, William and Mary, VA, USA. *Supervisor:* Dr. Smirni E.
Jan. 2016 – Apr. 2016	**Visiting Scholar.** ECE Dept., Duke University, NC, USA. *Supervisor:* Dr. Trivedi K.

Research Activities

Performance and Dependability Analysis — Performance and dependability analysis of large-scale and complex systems using data analysis, stochastic formalisms (queuing networks, Petri nets, and Markov chains), simulation (discrete-event and agent-based), machine learning, and experimental evaluation.

Cloud Computing — Profiling and modeling of virtual resources and microservice design patterns for performance prediction and optimization. These models consider bursty workloads and allow meeting objectives defined on the latency distribution.

Cyber-physical Systems — Analysis of architectural patterns and coordination mechanisms to optimize the performance of systems whose space is dynamic and agents exhibit malicious behaviors.

Uncertainty Propagation — Analysis of stochastic models to investigate how the uncertainty on input parameters propagates through a model and affects output measures.

Keywords: Performance; Dependability; Uncertainty Propagation; Energy Consumption; Cloud Computing; Cyber-physical Systems; Complex Systems; Stochastic Models; Queuing Networks; Petri Nets; Markov Chains; Simulation; Machine Learning; Data Analysis; Data Science

Organization

2023
- **Publicity Chair.** ACM SIGMETRICS 2023
- **Co-chair.** Workshop on Artificial Intelligence for Performance Modeling, Prediction, and Control (AIPerf 2023)
- **Co-chair.** International Workshop on Context-aware, Autonomous and Smart Architecture (CASA 2023)

2021
- **Co-organizer.** SEDUCE PRIN Project Meeting in L'Aquila

Scientific Committees

2023
- **Program Committee.** European Conference on Software Architecture (ECSA 2023)
- **Program Committee (Industrial Track).** European Conference on Software Architecture (ECSA 2023)
- **Program Committee.** Technical track on Software Architecture: Theory, Technology, and Applications (SAT-TA) at SAC 2023
- **Program Committee (Emerging Research Track).** ACM/SPEC International Conference on Performance Engineering (ICPE 2023)
- **Program Committee (Poster Track).** IEEE International Conference on Software Architecture (ICSA 2023)
- **Program Committee.** Workshop on Hot Topics in Cloud Computing Performance (HotCloudPerf 2023)
- **Program Committee.** International Workshop on Formal Approaches for Advanced Computing Systems (FAACS 2023)

Scientific Committees (continued)

Program Committee. Workshop on Conceptual design for Internet of Robotic Things (CD4IoRT 2023)

2022   **Program Committee (Industrial Track).** European Conference on Software Architecture (ECSA 2022)

Program Committee (Work-in-Progress and Vision Track). ACM/SPEC International Conference on Performance Engineering (ICPE 2022)

Program Committee (Artifact Evaluation Track). ACM/SPEC International Conference on Performance Engineering (ICPE 2022)

Program Committee. IEEE International Conference on JointCloud Computing (JCC 2022)

Program Committee (Artifact Evaluation Track). International Conference on Quantitative Evaluation of SysTems (QEST 2022)

Program Committee. Workshop on Hot Topics in Cloud Computing Performance (HotCloudPerf 2022)

Program Committee. International Workshop on Energy-Efficient Data Centres (E2DC 2022)

Program Committee. Workshop on Cloud, IoT and Fog Systems (CIFS 2022)

Program Committee. Workshop on Software Engineering for Resilient Systems (SERENE 2022)

2021   **Program Committee.** IEEE International Symposium on the Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2021)

Program Committee. IEEE International Conference on JointCloud Computing (JCC 2021)

Program Committee (Cloud Computing and Data Centers Track). IEEE International Conference on Distributed Computing Systems (ICDCS 2021)

Program Committee (Artifact Evaluation Track). ACM/SPEC International Conference on Performance Engineering (ICPE 2021)

Program Committee (Artifact Evaluation Track). International Conference on Quantitative Evaluation of SysTems (QEST 2021)

Program Committee. International Workshop on Energy-Efficient Data Centres (E2DC 2021)

2020   **Program Committee.** International Conference on Quantitative Evaluation of SysTems (QEST 2020)

Program Committee. IEEE International Symposium on the Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2020)

Review Activities for International Journals

Elsevier   Journal of Network and Computer Applications

Journal of Parallel and Distributed Computing

Reliability Engineering and System Safety

IEEE   Transactions on Cloud Computing

Communications Magazine

Transactions on Computers

Transactions on Mobile Computing

Transactions on Dependable and Secure Computing

Transactions on Network and Service Management

Review Activities for International Journals (continued)

	🔖	Transactions on Reliability
	🔖	Transactions on Software Engineering
	🔖	Transactions on Systems, Man, and Cybernetics: Systems
Springer	🔖	Queueing Systems
Taylor & Francis	🔖	Communications in Statistics – Simulation and Computation

Teaching Activities

2022/2023 🔖 **Simulation Theory and Applications** (for Ph.D. students), held by Dr. Pinciroli R. at Gran Sasso Science Institute
Role: Teacher

2020/2021 – 2021/2022 🔖 **Formal Methods at Work** (for Ph.D. students), held by Dr. Trubiani C. and Dr. Pinciroli R. at Gran Sasso Science Institute
Role: Teacher

2018/2019 – 2019/2020 🔖 **Impianti e Servizi Informatici** (for B.Sc. students), held by Dr. Mirandola R. at Politecnico di Milano (online)
Role: Teaching assistant

2018/2019 🔖 **Computer Systems Performance Evaluation** (for M.Sc. students), held by Dr. Gribaudo M. at Politecnico di Milano
Role: Teaching assistant

2017/2018 🔖 **Computer Systems Performance Evaluation** (for M.Sc. students), held by Dr. Serazzi G. at Politecnico di Milano
Role: Teaching assistant

2014/2015 – 2016/2017 🔖 **Performance Evaluation of Computer Systems** (for M.Sc. students), held by Dr. Gribaudo M. at Politecnico di Milano (Como)
Role: Teaching assistant

Contributed Talks

2023 🔖 International Conference on Advanced Information Systems Engineering (Research Track)

🔖 International Conference on Software Architecture (Research Track)

🔖 Conference on System and Service Quality

🔖 SEDUCE PRIN Project Meeting in Trieste

2022 🔖 International Symposium on Leveraging Applications of Formal Methods, Verification and Validation (Research Track)

🔖 Annual Reliability and Maintainability Symposium (Research Track)

🔖 Conference on System and Service Quality

🔖 Robotic and Software Engineering Meeting in L'Aquila

2021 🔖 International Conference on Performance Engineering (Research Track)

🔖 International Conference on Software Architecture (Research Track)

🔖 SEDUCE PRIN Project Meeting in L'Aquila

2020 🔖 Conference on Embedded Networked Sensor Systems (Poster Track)

Contributed Talks (continued)

2017   🔖   International Conference on System Reliability and Safety (Research Track)

         🔖   Workshop on the Practical Application of Stochastic Modelling

2016   🔖   International Conference on Performance Evaluation Methodologies and Tools (Research Track)

2015   🔖   International Symposium on Computer and Information Sciences (Research Track)

Publications

Journal Articles

J1   M. Murgia, **R. Pinciroli**, C. Trubiani, and E. Tuosto, "Comparing Performance Abstractions for Collective Adaptive Systems", *International Journal on Software Tools for Technology Transfer*, 2023, [Early Access].

J2   **R. Pinciroli**, C. Smith, and C. Trubiani, "Modeling More Software Performance Antipatterns in Cyber-Physical Systems", *Software and Systems Modeling*, 2023, [Early Access].

J3   **R. Pinciroli** and C. Trubiani, "Performance Analysis of Fault-Tolerant Multi-Agent Coordination Mechanisms", *IEEE Transactions on Industrial Informatics*, pp. 1–12, 2023, [Early Access].

J4   **R. Pinciroli**, L. Yang, J. Alter, and E. Smirni, "Lifespan and Failures of SSDs and HDDs: Similarities, Differences, and Prediction Models", *IEEE Transactions on Dependable and Secure Computing*, vol. 20, no. 1, pp. 256–272, 2023.

J5   A. Schmedding, **R. Pinciroli**, L. Yang, and E. Smirni, "Epidemic Spread Modeling for COVID-19 Using Cross-fertilization of Mobility Data", *IEEE Transactions on Big Data*, pp. 1–16, 2023, [Early Access].

J6   C. Trubiani, **R. Pinciroli**, A. Biaggi, and F. A. Fontana, "Automated Detection of Software Performance Antipatterns in Java-Based Applications", *IEEE Transactions on Software Engineering*, vol. 49, no. 4, pp. 2873–2891, 2023.

J7   F. Antonelli, V. Cortellessa, M. Gribaudo, **R. Pinciroli**, K. Trivedi, and C. Trubiani, "Analytical modeling of performance indices under epistemic uncertainty applied to cloud computing systems", *Future Generation Computer Systems*, vol. 102, pp. 746–761, 2020.

J8   **R. Pinciroli**, A. Ali, F. Yan, and E. Smirni, "CEDULE+: Resource Management for Burstable Cloud Instances Using Predictive Analytics", *IEEE Transactions on Network and Service Management*, pp. 1–13, 2020.

J9   M. Gribaudo, **R. Pinciroli**, and K. Trivedi, "Epistemic uncertainty propagation in power models", *Electronic Notes in Theoretical Computer Science*, vol. 337, pp. 67–86, 2018.

J10   **R. Pinciroli** and S. Distefano, "Characterization and evaluation of mobile crowdsensing performance and energy indicators", *ACM SIGMETRICS Performance Evaluation Review*, vol. 44, no. 4, pp. 80–90, 2017.

Conference Proceedings

C1   **R. Pinciroli**, A. Aleti, and C. Trubiani, "Performance Modeling and Analysis of Design Patterns for Microservice Systems", in *Proceedings of the International Conference on Software Architecture (ICSA)*, [Best Paper Candidate], IEEE, 2023, pp. 35–46.

C2   **R. Pinciroli**, R. Mirandola, and C. Trubiani, "Modular Quality-of-Service Analysis of Software Design Models for Cyber-Physical Systems", in *Proceedings of the Advanced Information Systems Engineering (CAiSE)*, ser. Lecture Notes in Computer Science, vol. 13901, Springer, 2023, pp. 88–104.

C3   A. Ali, **R. Pinciroli**, F. Yan, and E. Smirni, "Optimizing Inference Serving on Serverless Platforms", in *Proceedings of the Very Large Data Base Endowment (VLDB)*, vol. 15, VLDB Endowment, 2022, pp. 2071–2084.

C4   M. Murgia, **R. Pinciroli**, C. Trubiani, and E. Tuosto, "On Model-Based Performance Analysis of Collective Adaptive Systems", in *Proceedings of the International Symposium on Leveraging Applications of Formal Methods, Verification and Validation (ISoLA)*, ser. Lecture Notes in Computer Science, vol. 13703, Springer, 2022, pp. 266–282.

C5   **R. Pinciroli**, L. Yang, J. Alter, and E. Smirni, "Machine Learning Models for SSD and HDD Reliability Prediction", in *Proceedings of the Annual Reliability and Maintainability Symposium (RAMS)*, IEEE, 2022, pp. 1–7.

C6   A. Schmedding, L. Yang, **R. Pinciroli**, and E. Smirni, "GeoSpread: an Epidemic Spread Modeling Tool for COVID-19 Using Mobility Data", in *Proceedings of the International Conference on Information Technology for Social Good (GoodIT)*, ACM, 2022, pp. 125–131.

C7   **R. Pinciroli**, C. U. Smith, and C. Trubiani, "QN-based Modeling and Analysis of Software Performance Antipatterns for Cyber-Physical Systems", in *Proceedings of the International Conference on Performance Engineering (ICPE)*, ACM/SPEC, 2021, pp. 93–104.

C8   **R. Pinciroli** and C. Trubiani, "Model-based Performance Analysis for Architecting Cyber-Physical Dynamic Spaces", in *Proceedings of the International Conference on Software Architecture (ICSA)*, IEEE, 2021, pp. 104–114.

C9   A. Ali, **R. Pinciroli**, F. Yan, and E. Smirni, "Batch: machine learning inference serving on serverless platforms with adaptive batching", in *Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis (SC)*, IEEE, 2020, pp. 972–986.

C10   L. Yang, A. Schmedding, **R. Pinciroli**, and E. Smirni, "Simulating COVID-19 containment measures using the South Korean patient data: poster abstract", in *Proceedings of the 18th Conference on Embedded Networked Sensor Systems (SenSys)*, ACM, 2020, pp. 782–783.

C11   A. Ali, **R. Pinciroli**, F. Yan, and E. Smirni, "It's not a Sprint, it's a Marathon: Stretching Multi-resource Burstable Performance in Public Clouds", in *Proceedings of the 20th International Middleware Conference Industrial Track (Middleware)*, ACM, 2019, pp. 36–42.

C12   A. Ali, **R. Pinciroli**, F. Yan, and E. Smirni, "CEDULE: A Scheduling Framework for Burstable Performance in Cloud Computing", in *Proceedings of the International Conference on Autonomic Computing (ICAC)*, IEEE, 2018, pp. 141–150.

C13   **R. Pinciroli**, A. Bobbio, C. Bolchini, D. Cerotti, M. Gribaudo, A. Miele, and K. Trivedi, "Epistemic uncertainty propagation in a weibull environment for a two-core system-on-chip", in *Proceedings of the 2nd International Conference on System Reliability and Safety (ICSRS)*, IEEE, 2017, pp. 516–520.

C14   **R. Pinciroli**, M. Gribaudo, M. Roveri, and G. Serazzi, "Capacity Planning of Fog Computing Infrastructures for Smart Monitoring", in *Workshop on New Frontiers in Quantitative Methods in Informatics (InfQ)*, Springer, 2017, pp. 72–81.

C15   **R. Pinciroli**, M. Gribaudo, and G. Serazzi, "Modeling Multiclass Task-Based Applications on Heterogeneous Distributed Environments", in *Proceedings of the International Conference on Analytical and Stochastic Modeling Techniques and Applications (ASMTA)*, Springer, 2017, pp. 166–180.

C16   D. Cerotti, M. Gribaudo, **R. Pinciroli**, and G. Serazzi, "Optimal population mix in pool depletion systems with two-class workload", in *Proceedings of the 10th International Conference on Performance Evaluation Methodologies and Tools (ValueTools)*, EAI, 2016, pp. 11–18.

C17   D. Cerotti, M. Gribaudo, **R. Pinciroli**, and G. Serazzi, "Stochastic Analysis of Energy Consumption in Pool Depletion Systems", in *Proceedings of the 18th International GI/ITG Conference on Measurement,*

Modelling, and Evaluation of Computing Systems and Dependability and Fault Tolerance (MMB&DFT), Springer, 2016, pp. 25–39.

C18   **R. Pinciroli** and S. Distefano, "Extending Queuing Networks to Assess Mobile CrowdSensing Application Performance", in *Proceedings of the 10th International Conference on Performance Evaluation Methodologies and Tools (ValueTools)*, EAI, 2016, pp. 255–262.

C19   **R. Pinciroli**, K. S. Trivedi, and A. Bobbio, "Parametric Sensitivity and Uncertainty Propagation in Dependability Models", in *Proceedings of the 10th International Conference on Performance Evaluation Methodologies and Tools (ValueTools)*, EAI, 2016, pp. 44–51.

C20   D. Cerotti, M. Gribaudo, P. Piazzolla, **R. Pinciroli**, and G. Serazzi, "Modeling Power Consumption in Multicore CPUs with Multithreading and Frequency Scaling", in *Proceeding of the 30th International Symposium on Computer and Information Sciences (ISCIS)*, Springer, 2015, pp. 81–90.

C21   D. Cerotti, M. Gribaudo, P. Piazzolla, **R. Pinciroli**, and G. Serazzi, "Multi-Class Queuing Networks Models for Energy Optimization", in *Proceedings of the 8th International Conference on Performance Evaluation Methodologies and Tools (ValueTools)*, EAI, 2014, pp. 98–105.

Books and Chapters

B1   D. Cerotti, M. Gribaudo, **R. Pinciroli**, and G. Serazzi, "Modeling Techniques for Pool Depletion Systems", *Systems Modeling: Methodologies and Tools*, pp. 79–94, 2019.

Busto Arsizio – November 26, 2023

Riccardo Pinciroli