# NICOLA SACCOMANNO

## EDUCATION

**University of Udine, Udine**  *May 2023*
PhD in Computer Science, with honors/distinction (XXXV° cycle)
Supervisor: *Prof.* A. Montanari, Co-supervisors: *Dr.* A. Brunello, *Dr.* A. Dalla Torre
Thesis: *Fingerprint-based Indoor Positioning and Beyond: Modeling, Representation, and Learning*
Topics: Indoor positioning system, fingerprinting, machine and deep learning, databases, data science.

**University of Udine, Udine & Alpen-Adria Universität, Klagenfurt**  *March 2019*
International joint Master degree in Computer Science, 110/110 cum laude
Thesis: *Trajectories for fingerprint-based location services*
Supervisor: *Prof.* A. Montanari, Co-supervisors: *Prof.* Johann Eder, *MSc.* P. Gallo
Topics: Outdoor positioning system, fingerprinting, trajectories, distance functions.

**University of Udine, Udine**  *October 2016*
Bachelor degree in Computer Science, 104/110
Thesis: *Map-matching: a possible method for the selection of candidates*
Supervisor: *Prof.* A. Montanari, Co-supervisors: *MSc.* A. Brunello, *MSc.* P. Gallo
Topics: Outdoor positioning system, fingerprinting, map-matching.

**ITST Kennedy, Pordenone**  *July 2013*
High School Diploma in Information Technology, 89/100
Final work: *RFIDroid*
Topics: Android app, RFID devices, HTML, databases.

## EXPERIENCE

**University of Udine**  Feb 2024 - Now
*Postdoctoral research fellow*  *Udine, ITA*
· Project: "Machine Learning, Prediction, Interpretation, and Integration of Runtime Verification and Machine Learning".

**University of Udine**  Feb 2023 - Jan 2024
*Postdoctoral research fellow*  *Udine, ITA*
· Project: "Integration of learning capabilities in a framework for the synthesis of controllers".

**Centro ALGORITMI, School of Engineering @ Universidade do Minho**  Sep 2022 - Nov 2022
*Visiting PhD Student*  *Guimarães, PT*
· Research period supervised by *dr.* Joaquin-Torres Sospedra. Topic: Localisation based on Channel State Information.

**Computer Science Department @ University College London**  Jun 2022 - Aug 2022
*Visiting PhD Student*  *London, UK*
· Hosted by the Intelligent Social Systems Lab supervised by *prof.* Mirco Musolesi. Topic: Deep generative privacy-preserving models for mobility data.

**Data Science and Automatic Verification Lab @ University of Udine**  Oct 2018 - Mar 2019
*Internship*  *Udine, ITA*
· Project: "Trajectory management in positioning databases."

**Alpen-Adria-Universitat**  Sep 2017 - Feb 2018
*Visiting Student*  *Klagenfurt, AUT*
· Visiting period (as Master Student). Grant by University of Udine and ERASMUS+.

**Data Science Lab @ University of Udine**  Apr 2016 - Sep 2016
*Internship*  *Udine, ITA*
· Project: "Management and analysis of data about moving objects: from position observation to synthesis and analysis of trajectories."

**Dave srl** — 2013 (2 weeks)
*High School Internship* — *Porcia, ITA*

· Development of a full-stack Android application to manage the entrance and the leaving of people from a company, using an Android tablet and an RFID scanner.

## TEACHING ACTIVITY

**Database systems** — AY 2023-2024
*Master degree in Management Engineering* — *University of Udine*

· 48 hours; lead professor.

**Database systems** — AY 2022-2023
*Bachelor degrees in Internet of things, Big Data, Machine Learning, & Computer Science* — *University of Udine*

· 12 hours; main professor Angelo Montanari. Covered topics: SQL (DDL and DML) DBMSs, and concurrency.

**Database systems** — AY 2021-2022
*Bachelor degrees in Internet of things, Big Data, Machine Learning, & Computer Science* — *University of Udine*

· 24 hours; main professor Angelo Montanari. Covered topics: SQL (DDL and DML) DBMSs, and concurrency.

**Foundation of Data Science** — AY 2020-2021
*Bachelor degree in Internet of things, Big Data, Machine Learning* — *University of Udine*

· 24 hours; main professor Massimo Franceschet. Covered topics: Big Data, Text Mining.

## ACADEMIC ACTIVITY

**Mentoring**

· I have/am (Co-)Supervised/ing the thesis of 5 Master (MSc), 10 Bachelor (BSc) students, and multiple students' advanced project.

**Reviewing, PC membership, and organizing roles**

· I am/have been part of the organizing committee of the following conferences: AIxIA('22 - Local Committee and Publicity Chair), CILC('23), GandALF ('23)
· I am/have been part of the program committee of the following conferences: AAAI('23-'24), IJCAI('24), ACM SIGIR('22-'23), IPIN('23 Wi-Fi CSI-Based Indoor Positioning special session), OVERLAY('23)
· I have acted as (sub-)reviewer for the following conferences/journals: IEEE Sensors Journal, IEEE Internet of Things Journal, MDPI Applied Science, IJCAI('22), ADBIS('22), PACM IMWUT, ICTAI('20-'21), DECLARATIVE AI('23), Expert Systems With Applications.
· I have been session chair at the following events: OVERLAY('23 - session Applications of Learning and Formal Methods)

**Student representative**

· (2021 - 2023) Serving as PhD Students' rep. in the Mathematics, Computer Science, and Physics Department board
· (2020 - 2023) Serving as PhD Students' rep. in the Computer Science, Mathematics and Physics PhD academic board

**Affiliations**

· (2022 - 2022) Member of the Intelligent Social Systems Lab, part of the Autonomous Systems Research Group at UCL
· (2022 - present) Member of the AIxIA Working group for Artificial Intelligence in Healthcare
· (2020 - present) Member of the National Group for Scientific Computing (GNCS - Italy)
· (2019 - present) Member of the Data Science and Automatic Verification Laboratory at the University of Udine

## ATTENDED COURSES AND SCHOOLS

**Summer Schools**

· AI and Machine Learning in Healthcare Summer School ('22, Cambridge Centre for AI in Medicine); CIFAR Deep Learning + Reinforcement Learning (DLRL) Summer School ('22, in partnership with Amii, Mila, and the Vector Institute); Mediterranean Machine Learning (M2L) summer school ('21,'23); Oxford Machine Learning Summer School('20)

**Courses (brief)**

· (Advanced) Databases; (Advanced) Algorithms (and complexity); Automated Reasoning; Applied Statistics; Logic; Automatic Verification and Theory; Network Science; Information Retrieval; Systems Security; Distributed Systems; Artificial Intelligence; Deep Learning; Deep Learning for Time-series; Data Science;

## SKILLS

### Technical
· Proficient in: Python and its Scientific Toolkit (NumPy, Pandas, SciPy, Matplotlib, etc.), Sklearn, Pytorch, PytorchLightning, PyTorch Geometric, Tensorflow, Keras, SQL, LaTeX; Familiar with: Java, R, WEKA, C, C++, MiniZinc; Basic knowledge of: C#, HTML, CSS.

### Platforms/tools
· GitHub, Google Cloud Compute Engine, Jupyter Notebook, Weights & Biases, PostgresSQL, PostGIS, MySQL, Office Suite, Linux Shell

### Languages
· Italian (mother tongue), English (Listening: C1, Reading: C1, Spoken Interaction: C1, Spoken Production: C1, Writing: C1), German (Listening: A1, Reading: A1, Spoken Interaction: A1, Spoken Production: A1, Writing: A1), Spanish (basic knowledge)

## SEMINARS, TALKS, INVITED LECTURES

1. 15/11/2023 @ 20th EAI International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services - Speaker: *High-Performance Features in Generalizable Fingerprint-based Indoor Positioning*
2. 07/11/2023 @ 5th Workshop on Artificial Intelligence and fOrmal VERification, Logic, Automata, and sYnthesis (22nd AIxIA international conference) - Speaker: *Towards Machine Learning Enhanced LTL Monitoring*
3. 02/10/2023 @ 29th Annual International Conference on Mobile Computing and Networking - Speaker (poster): *Towards Learning an Optimal Metric for Fingerprint-based Localisation*
4. 01/09/2023 @ Mediterranean Machine Learning Summer School - Speaker (poster): *Machine Learning meets Temporal Logic: an Integrated Framework and its Applications*
5. 14/06/2023 @ Machine and Deep Learning course for the National PhD in Artificial Intelligence program - Invited lecture: *Interpretability in practice: a gentle introduction and case studies* (with Andrea Brunello)
6. 30/11/2022 @ Workshop on Artificial Intelligence for Healthcare (21st AIxIA international conference) - Speaker: *AIOSA: An approach to the automatic identification of obstructive sleep apnea events based on deep learning*
7. 28/11/2022 @ 21st International Conference of the Italian Association for Artificial Intelligence (Doctoral Consortium) - Speaker: *Towards Learning an Optimal Metric for Fingerprint-based Localization*
8. 09/09/2022 @ AI and Machine Learning for Healthcare Summer School, Cambridge Centre for AI in Medicine - Speaker (poster): *Fine grained sleep apnea tagging with deep learning on unselected patients using routinely collected vital signs*
9. 08/09/2022 @ Urban Computing Lab, University of Minho - Invited seminar: *Indoor Localization: modeling, representations, and learning*
10. 22/07/2022 @ Machine and Deep Learning course for the National PhD in Artificial Intelligence program - Invited lecture: *Interpretability in practice: a gentle introduction and case studies* (with Andrea Brunello)
11. 05/07/2022 @ Fourth UK Mobile, Wearable and Ubiquitous Systems Research Symposium - Speaker: *Improving the estimation of fingerprint spatial relationships via deep metric learning on continuous similarities*
12. 16/01/2021 @ Mediterranean Machine Learning Summer School - Speaker (poster): *Indoor positioning through sequence modelling: a simple and effective approach* (virutal)
13. 08/12/2020 @ 17th EAI International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services - Speaker: *Let's Forget About Exact Signal Strength: Indoor Positioning based on Access Point Ranking and Recurrent Neural Networks* (virutal)
14. 01/07/2020 @ 21st IEEE International Conference on Mobile Data Management - Speaker: *A new similarity measure for low-sampling cellular fingerprint trajectories* (virutal)

## LIST OF PUBLICATIONS

**\* denotes (co-)first authorship** in papers with author names ordered alphabetically

1. Brunello A., Montanari A., Saccomanno\* N., and Torres-Sospedra J., "High-Performance Features in Generalizable Fingerprint-based Indoor Positioning". Proceedings of the 20th EAI International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services. Accepted for publication, October 2023.
2. Geatti L., Montanari A., and Saccomanno N., "Towards Machine Learning enhanced LTL Monitoring". Proceedings of the 5th Workshop on Artificial Intelligence and fOrmal VERification, Logic, Automata, and sYnthesis. Accepted for publication, October 2023.

3. Brunello A., Colombi E., Locaputo A., Magnani S., Saccomanno N., and Serra G., "Usage of Language Model for the Filling of Lacunae in Ancient Latin Inscriptions: A Case Study". Proceedings of the 2nd Workshop on Artificial Intelligence for Cultural Heritage. Accepted for publication, October 2023.
4. Saccomanno N., Brunello A., and Montanari A., "Towards Learning an Optimal Metric for Fingerprint-based Localisation". Proceedings of the 29th Annual International Conference on Mobile Computing and Networking (ACM MobiCom), October 2023, DOI:10.1145/3570361.3615739.
5. Brunello A., Montanari A., and Saccomanno* N., "Towards Interpretability in Fingerprint-based Indoor Positioning: May Attention Be With Us". *Expert Systems with Applications*, 2023, DOI:10.1016/j.eswa.2023.120679.
6. Brunello A., Della Monica D., Montanari A., Saccomanno N., and Urgolo A., "Monitors that Learn from Failures: Pairing STL and Genetic Programming". *IEEE Access*, 2023, DOI:10.1109/ACCESS.2023.3277620.
7. Brunello A., Dalla Torre A., Gallo P., Gubiani D., Montanari A., and Saccomanno* N., "Crowdsourced Reconstruction of Cellular Networks to serve Outdoor Positioning: Modeling and Analysis". *Sensors*, 2023, DOI:10.3390/s23010352.
8. Brunello A., Montanari A., and Saccomanno* N., "A Framework for Indoor Positioning including Building Topology". *IEEE Access*, 2022, DOI:10.1109/ACCESS.2022.3218301.
9. Brunello A., Montanari A., and Saccomanno* N., "A genetic programming approach to WiFi fingerprint meta-distance learning". *Pervasive and Mobile Computing*, 2022, DOI:10.1016/j.pmcj.2022.101681.
10. Bernardini A., Brunello A., Gigli G. L., Montanari A., and Saccomanno* N., "OSASUD: A dataset of stroke unit recordings for the detection of Obstructive Sleep Apnea Syndrome". *Scientific Data*, 2022, DOI:10.1038/s41597-022-01272-y.
11. Brunello A., Civilini M., De Martin S., Felice A., Franchi M., Icaumin L., Saccomanno* N., Vitacolonna N., "Machine learning-assisted environmental surveillance of Legionella: A retrospective observational study in Friuli-Venezia Giulia region of Italy in the period 2002–2019". *Informatics in Medicine Unlocked*, 2022, DOI:10.1016/j.imu.2021.100803.
12. Bernardini A., Brunello A., Gigli G. L., Montanari A., and Saccomanno* N., "AIOSA: An approach to the automatic identification of obstructive sleep apnea events based on deep learning". *Artificial Intelligence in Medicine*, 118, 102133. 2021, DOI:10.1016/j.artmed.2021.102133
13. Saccomanno N., Brunello A. and Montanari A., "What You Sense Is Not Where You Are: On the Relationships between Fingerprints and Spatial Knowledge in Indoor Positioning," *IEEE Sensors Journal*, 2021, DOI: 10.1109/JSEN.2021.3070098.
14. Saccomanno N., Brunello A., and Montanari A., "Let's Forget About Exact Signal Strength: Indoor Positioning based on Access Point Ranking and Recurrent Neural Networks". *Proceedings of the 17th EAI International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services (MobiQuitous '20)*. Association for Computing Machinery, New York, NY, USA, 215–224. DOI:10.1145/3448891.3448940
15. Gallo P., Gubiani D., Montanari A., and Saccomanno* N., "A new similarity measure for low-sampling cellular fingerprint trajectories". *Proceedings of the 21st IEEE International Conference on Mobile Data Management (MDM)*, Versailles, France, June - July, 2020. DOI:10.1109/MDM48529.2020.00022

## HONORS, AWARDS, AND GRANTS

· Google Cloud Research Grant Award, $ 5000
· Allowance to visit Centro ALGORITMI of the Universidade do Minho, PT. Provided by University of Udine.
· Allowance to visit the Computer Science Department of the University College London, UK. Provided by University of Udine.
· Scholarship for the Ph.D. program of the University of Udine. Provided by University of Udine and funded by u-blox AG.
· Allowance to visit Alpen-Adria-Universitat Kalgenfurt, AT. Provided by University of Udine, and ERASMUS+ Project.