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Research Interests

Geospatial Databases, Big Data Management, Recommender Systems, Data Science

Education

Ph.D. in Computer Science and Engineering — 2016 - 2020, *University of Bologna, Italy*

- **Supervisor**: Prof. **Rebecca Montanari**
- **Thesis**: Quality of Service Aware Data Stream Processing for Highly Dynamic and Scalable Applications. **[PDF]**

M.Sc. in Information Technology — 2006 - 2008, *Universiti Utara Malaysia, Malaysia*

BSc. in Computer Science — 1999 - 2005, *Al Al-Bayt University, Jordan*

Employment History

University of Bologna — *Bologna, Italy*

Postdoctoral Researcher, Department of Computer Science and Engineering (DISI), Mobile Middleware Research Group — April 2020 - present

Research Fellow, CIRI ICT — April 2017 – February 2020

Teaching Assistant — 2017 – 2018

University of Business and Technology — *Jeddah, Saudi Arabia*

Lecturer — 2009 - 2016

Publications [**J:** Journal, **C:** Conference, **B**: Book Chapter]

Summary * 19 publications (14 as a lead & corresponding author, 5 as a senior co-author) * 14 conference & workshop papers (2 IEEE GLOBECOM, 2 IEEE ICC, 2 IEEE ISCC, 3

IEEE CAMAD, and others) * 5 journal papers (1 IEEE transactions, 1 MDPI sensors, 1 IEEE Access, and others) * 1 book chapter

As of 13/03/2022, Google Scholar citation: 177, h-index: 9

N.B. *a star (*) to the left of my name indicates being the lead & corresponding author*

Peer-reviewed Journal publications (Indexed in Thomson Reuters ISI)

[j5] * ***I. M. Al Jawarneh***, P. Bellavista, A. Corradi, L. Foschini, and R. Montanari. QoS-Aware Approximate Query Processing for Smart Cities Spatial Data Streams. *Sensors* 2021, *21*, 4160. Journal ***Impact Factor*** (indexed in *ISI Thomson Reuters*): **3.576**

[j4] * ***I. M. Al Jawarneh***, P. Bellavista, A. Corradi, L. Foschini, and R. Montanari, "Efficient QoS-Aware Spatial Join Processing for Scalable NoSQL Storage Frameworks," IEEE Transactions on Network and Service Management, 2020. Journal ***Impact Factor*** (indexed in *ISI Thomson Reuters*): **3.878. [PDF]**

[j3] * ***I. M. Al Jawarneh***, P. Bellavista, A. Corradi, L. Foschini and R. Montanari, "Big Spatial Data Management for the Internet of Things: A Survey," Journal of Network and Systems Management, pp. 1-46, 2020. **DOI**: 10.1007/s10922-020-09549-6. Journal ***Impact Factor*** (indexed in *ISI Thomson Reuters*): **2.250**

[j2] * ***I. M. Al Jawarneh,*** P. Bellavista, A. Corradi, L. Foschini, R. Montanari, J. Berrocal and J. M. Murillo, *"A Pre-Filtering Approach for Incorporating Contextual Information Into Deep Learning Based Recommender Systems,"* IEEE Access, vol. 8, pp. 40485-40498, 2020. **DOI:** 10.1109/ACCESS.2020.2975167. Journal ***Impact Factor*** (indexed in *ISI Thomson Reuters*): **3.745. [PDF]**

[j1] * ***I. M. Aljawarneh,*** *"Design of a data warehouse model for decision support at higher education: A case study,"* Information Development, vol. 32, (5), pp. 1691-1706, 2016. **DOI:** 10.1177/0266666915621105. Journal ***Impact Factor*** (indexed in *ISI Thomson Reuters*): **1.440**

Peer-reviewed conference and workshop publications

[C13] * ***I. M. Al Jawarneh***, P. Bellavista, A. Corradi, L. Foschini, and R. Montanari, "Efficiently Integrating Mobility and Environment Data for Climate Change Analytics," in 2021 IEEE 26th International Workshop on Computer Aided Modeling and Design of Communication Links and Networks (CAMAD), 2021: IEEE, pp. 1-5

[C12] * ***I. M. Al Jawarneh***, P. Bellavista, A. Corradi, L. Foschini and R. Montanari, "Context Incorporation Techniques for Social Recommender Systems," ICC 2021 - IEEE International Conference on Communications, 2021, pp. 1-6. **(IEEE ICC 2021)[1]. [PDF]**

[C11] * ***I. M. Al Jawarneh***, P. Bellavista, A. Corradi, L. Foschini and R. Montanari, "Locality-Preserving Spatial Partitioning for Geo Big Data Analytics in Main Memory Frameworks," GLOBECOM 2020 - 2020 IEEE Global Communications Conference, 2020, pp. 1-6. **(IEEE GLOBECOM 2020)[1] [PDF]**

[C10] * ***I. M. Al Jawarneh***, P. Bellavista, A. Corradi, L. Foschini, and R. Montanari, "Spatially Representative Online Big Data Sampling for Smart Cities," in 2020 IEEE 25th International Workshop on Computer Aided Modeling and Design of Communication Links and Networks (CAMAD), 2020: IEEE, pp. 1-6. **[PDF]**

[1] IEEE ICC and IEEE GLOBECOM are flagship conferences in Computer Science

[C9] * ***I. M. Al Jawarneh***, P. Bellavista, L. Foschini and R. Montanari, *"Spatial-aware approximate big data stream processing,"* in 2019 IEEE Global Communications Conference (GLOBECOM), 2019, pp. 1-6. **(IEEE GLOBECOM 2019)** [1.] **[PDF]**

[C8] * ***I. M. Al Jawarneh***, P. Bellavista, F. Bosi, L. Foschini, G. Martuscelli, R. Montanari and A. Palopoli, *"Container orchestration engines: A thorough functional and performance comparison,"* in ICC 2019-2019 IEEE International Conference on Communications (ICC), 2019, pp. 1-6. **(IEEE ICC 2019)** [1.] **[PDF]**

[C7] * ***I. M. Al Jawarneh***, P. Bellavista, L. Foschini, G. Martuscelli, R. Montanari, A. Palopoli and F. Bosi, *"Qos and performance metrics for container-based virtualization in cloud environments,"* in Proceedings of the 20th International Conference on Distributed Computing and Networking, 2019, pp. 178-182.

[C6] * ***I. M. Al Jawarneh***, P. Bellavista, A. Corradi, L. Foschini, R. Montanari and A. Zanotti, *"In-memory spatial-aware framework for processing proximity-alike queries in big spatial data,"* in 2018 IEEE 23rd International Workshop on Computer Aided Modeling and Design of Communication Links and Networks (CAMAD), 2018, pp. 1-6. **[PDF]**

[C5] * ***I. M. Al Jawarneh***, P. Bellavista, F. Casimiro, A. Corradi and L. Foschini, *"Cost-effective strategies for provisioning NoSQL storage services in support for industry 4.0,"* in 2018 IEEE Symposium on Computers and Communications (ISCC), 2018, pp. 1227. **[PDF]**

[C4] *S. Bertacchi*, **I. M. Al Jawarneh**, F. I. Apollonio, G. Bertacchi, M. Cancilla, L. Foschini, C. Grana, G. Martuscelli and R. Montanari, *"SACHER project: A cloud platform and integrated services for cultural heritage and for restoration,"* in Proceedings of the 4th EAI International Conference on Smart Objects and Technologies for Social Good, 2018, pp. 283-288.

[C3] * ***I. M. Al Jawarneh***, P. Bellavista, L. Foschini, R. Montanari, J. Berrocal and J. M. Murillo, *"Toward privacy-aware healthcare data fusion systems,"* in International Workshop on Gerontechnology, 2018, pp. 26-37.

[C2] * ***I. M. Aljawarneh***, P. Bellavista, C. R. De Rolt and L. Foschini, *"Dynamic identification of participatory mobile health communities,"* in Cloud Infrastructures, Services, and IoT Systems for Smart CitiesAnonymous Springer, 2017, pp. 208-217.

[C1] * ***I. M. Aljawarneh***, P. Bellavista, A. Corradi, R. Montanari, L. Foschini and A. Zanotti, *"Efficient spark-based framework for big geospatial data query processing and analysis,"* in 2017 IEEE Symposium on Computers and Communications (ISCC), 2017, pp. 851-856. **[PDF]**

Peer-reviewed Book Chapters

[B1] *P. Bellavista*, J. Berrocal, A. Corradi, S. K. Das, L. Foschini, **I. M. Al Jawarneh** and A. Zanni, *"How Fog Computing Can Support Latency/Reliability sensitive IoT Applications: An Overview and a Taxonomy of State-of-the-art Solutions,"* Fog Computing: Theory and Practice, pp. 139-213, 2020. **[BOOK]**

Research Experience & Software Artifacts

2021 — **Efficient processing of big mobility and meteorological data** — *University of Bologna, Italy*

MeteoMobil

- Designed MeteoMobil: an interactive system for combined analytics of integrated information representing mobility and environment conditions.

- Supervised prototyping & implementation of MeteoMobil[2] in Apache Spark. *Collaborators*: Denis Pereira.
- Authored and presented a conference paper for IEEE CAMAD 2021 (C13).

2020 - 2021 **Geospatial Approximate Query Processing** *University of Bologna, Italy*

ApproxSSPS

- Designed ApproxSSPS: a system for approximate processing of geo-referenced mobility data, at scale, with quality-of-service guarantees.
- Authored a research paper and published in MDPI sensors (J5).
- Prototyped and implemented ApproxSSPS [3] atop SparkSQL & Apache Kafka and authored a blog explaining how to run the system.

SpatialSPE

- Designed SpatialSPE, which is a system that incorporates a novel geospatial online sampling method that I have designed known as SAOS.
- Authored conference papers, presented and published in IEEE CAMAD 2020 (C10) and IEEE GLOBECOM 2019 (C9).
- Prototyped and implemented SpatialSPE[4] over Spark Structured Streaming & open-sourced it on GitHub.

SpatialSSJP

- Designed SpatialSSJP, which is a novel adaptive stream-static geospatial join processing system.
- Authored a journal research paper and submitted for publication in an IEEE transactions journal.
- Prototyped and Implemented SpatialSSJP atop Spark Structured Streaming.

2019 - 2020 **Context-Aware Deep Learning based Recommender Systems** *University of Bologna, Italy*

CA-NCF & US-NCF

- Designed CA-NCF: CA-NCF is a Pre-Filtering Approach for Incorporating Contextual Information into Deep Learning Based Recommender Systems.
- Authored research papers, one published in IEEE Access (J2), and one presented and published in IEEE ICC 2021 (C12).
- Prototyped and Implemented CA-NCF[5] & US-NCF in BigDL (a framework for scalable deep leaning over Apache Spark). I also open-sourced CA-NCF in GitHub.

2017 – 2018 **Geospatial big data management** *University of Bologna, Italy*

SpatialBPE

- Designed SpatialBPE: a novel scalable distributed geospatial batch query processing system.
- Authored conference papers, presented and published in IEEE ISCC 2017 (C1), IEEE CAMAD 2018 (C6) & IEEE GLOBECOM 2020 (C11).
- Prototyped & implemented SpatialBPE atop Apache Spark.

SpatialNoSQL

- Designed SpatialNoSQL: a novel system for the scalable storage and static processing of big geospatial data in the Cloud.
- Authored research papers, one published in IEEE Transactions (J4), and one presented and published in IEEE ISCC 2018 (C5).
- Prototyped and implemented SpatialNoSQL in MongoDB.

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[2] https://github.com/denper1/MeteoMobilityIntegration
[3] https://github.com/IsamAljawarneh/ApproximateStream
[4] https://github.com/IsamAljawarneh/SpatialSPE
[5] https://github.com/IsamAljawarneh/CA-NCF

2017 - 2018 **Data warehousing & Data lakes** *University of Bologna, Italy*

SACHER MuSE CH

- Designed SACHER Multidimensional Search Engine for Cultural Heritage service (SACHER MuSE CH): an advanced multi-dimensional search system for cultural heritage (CH) data coming from heterogeneous sources.
- Prototyped & Implemented SACHER MuSE CH in MongoDB.
- Co-authored a conference paper (C4).
- Presented our work in two exhibitions in Italy.

Teaching Experience

2017/2018	**Teaching Assistant**	37085 - Principles, Models and Applications for Distributed Systems M – LAB, **(postgraduate level)**, *I have redesigned the course lab materials.* [**COURSE**]	*University of Bologna, Italy*
2009 - 2016	**University Lecturer**	- COE 201 - Computer Programming 1 (Undergraduate, UG) - IT203 Object-Oriented Computer Programming (UG) - IT204 Data Structures & Algorithms (UG) - IT240 databases 1 (UG) - IT251 Software Engineering 1 (UG) - IT499 Graduation Project (UG)	*University of Business and Technology, Saudi Arabia*

Advising Experience

Undergraduate Researchers *University of Bologna, Italy*

Denis Pereira

- QoS-aware Cloud-based Meteo and Mobility Data Processing at Scale *2021*

I supervised several undergraduate final year graduation projects in several CS areas *University of Business and Technology, Saudi Arabia*

2009 - 2016

Academic Services

Technical Program Committee (TPC) member

- IEEE ICC 2022
- IEEE BlackSeaCom 2021

Invited journal reviewer (publons certificate)

- IEEE transactions on emerging topics of computing
- ACM computing surveys
- IEEE Internet of Things Journal
- MDPI applied sciences
- MDPI Sensors
- IEEE Transactions on Emerging Topics in Computing **[2021 reviewers list]**
- IEEE Computer Magazine
- International Journal of Distributed Sensor Networks
- Information Development
- Concurrency and Computation: Practice and Experience

- Wireless Networks

Invited conference reviewer

- IEEE GLOBECOM 2020 (2020 **reviewers list**)
- IEEE ISCC 2020

Awards & Fellowships

2020 - current	Research Fellowship, merit-based	*DISI, University of Bologna, Italy*
2017 - 2020	Research Fellowship, merit-based	*CIRI ICT, University of Bologna, Italy*
2016 – 2019	PhD@ISA Fellowship, merit-based	*Institute of Advanced Studies (ISA), University of Bologna, Italy*
Sep 2018 – Dec 2018	mobility of young researchers - Marco Polo Program, merit-based, *spent at the University of Extremadura, Spain*.	*DISI, University of Bologna, Italy*

Talks & Presentations

2021	*Cloud-based Geospatial open systems for mitigating climate change: research directions, challenges, and future perspectives.* **[PDF]** - FOSS4G2021 - *Invited by Microsoft* - [Presentation video]	*Buenos Aires, Argentina* *Virtual Conference, online*
2021	*Efficiently Integrating Mobility and Environment Data for Climate Change Analytics.* **[PDF]** - IEEE CAMAD 2021	*Virtual Conference, online*
2021	*Context Incorporation Techniques for Social Recommender Systems.* **[PDF]** - IEEE ICC 2021	*Montreal, Canada* *Virtual Conference, online*
2020	*Locality-Preserving Spatial Partitioning for Geo Big Data Analytics in Main Memory Frameworks.* **[PDF]** - IEEE GLOBECOM 2020	*Taipei, Taiwan* *Virtual Conference, online*
2020	*Spatially Representative Online Big Data Sampling for Smart Cities.* **[PDF]** - IEEE CAMAD 2020	*Virtual Conference, online*

Funding

Funding Agency	Project Title	Description	Role
Microsoft: AI for Earth Fund 07/30/2020 - 07/30/2022	Supporting Highly-Efficient Machine Learning Applications for Reducing the Impact of Climate Change on Human Health in Metropolitan Cities	The research project targets the challenge of reducing the adverse effects of climate changes on human health. Applications of Artificial Intelligence (AI) on spatially-tagged time-series human and vehicle mobility data to help in the efforts for reducing potential impacts of climate change.	*Lead PI*

University of Business and Technology: Research Funding	A data warehouse for decision support at higher education	*Lead PI*

02/01/2015 - 12/30/2015

Professional Training

July 2019 3rd International **Summer School on Deep Learning** (DeepLearn 2019). Warsaw, Poland.

July 2017 Seventh European **Business Intelligence & Big Data Summer School** (eBISS 2017), Brussels, Belgium.

- Presented a poster titled "*QoS-Aware Big Geospatial Data Processing*". **[PDF]**

Language Competence

Arabic	native proficiency
English	full professional proficiency ([6]Level: C1)
Italian	average working proficiency ([6]Level: A2)

References

Prof. Rebecca Montanari	University of Bologna, Dept. Computer Science & Engineering (DISI)	rebecca.montanari@unibo.it
Prof. Paolo Bellavista	University of Bologna, DISI	paolo.bellavista@unibo.it
Prof. Antonio Corradi	University of Bologna, DISI	antonio.corradi@unibo.it
Prof. Luca Foschini	University of Bologna, DISI	luca.foschini@unibo.it

Professional Memberships

Institute of Electrical and Electronics Engineers (IEEE)

Institute of Advanced Studies (ISA), University of Bologna, Italy 2016 - 2020

[6] CERF levels, Common European Reference Framework