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Research Statement

My expertise lies in integrating IoT technologies in Structural Health Monitoring (SHM) applications, with a specific emphasis on bridge monitoring. I have actively participated in two projects that required the development of applications for data acquisition, processing, and visualization within an SHM-based system. The developed software was deployed into lab environments and real-world scenarios. My current research interest is to explore the intersection of the edge-cloud continuum and the IoT fields, focusing on proactive edge caching and interoperability. The first aims to optimize latency and reduce data volume transferred to cloud infrastructures, while the second addresses IoT device heterogeneity. My experience with interoperability involves the development and implementation of distributed IoT architectures, accommodating various sensor types and acquisition protocols. I have tackled these challenges by leveraging emerging approaches for IoT interoperability, such as the W3C Web of Things standard.

Education

- 2020 – Current 📖 **Ph.D. "Engineering and Information Technology for Structural and Environmental Monitoring and Risk Management - EIT4SEMM"** in University of Bologna
Thesis title: *Deploying Adaptive and Interoperable IoT-based Platforms for Structural Health Monitoring* - Supervised by Prof. Marco Di Felice.
Approved for Final Ph.D. Defence on 14/09/2023
- 2017 – 2019 📖 **M.Sc. Information Engineering** in Federal University of ABC.
Thesis title: *Fog-Aware Computing: Automated Fog Computing Support for The Internet of Things* - Supervised by Prof. Carlos Kamienski.
Grade Point Average: 4 (max 4)
- 2013 – 2017 📖 **B.Sc. Computer Science** in Federal University of ABC.
- 2013 – 2016 📖 **B.Sc. Science and Technology** in Federal University of ABC.

Research Publications

Scopus citation count: **201** with H-index **7**

Google Scholar citation count: **326** with H-index **10**

Journal Articles

- 1 Gigli, L., **Zyrjanoff, I.**, Montori, F., Aguzzi, C., Roffia, L., & Di Felice, M. (2023). A decentralized oracle architecture for a blockchain-based iot global market. *IEEE Communications Magazine*, 61(8), 86–92.
[🔗 doi:10.1109/MCOM.007.2200906](https://doi.org/10.1109/MCOM.007.2200906)
- 2 Montori, F., **Zyrjanoff, I.**, Gigli, L., Calvio, A., Venanzi, R., Sindaco, S., ... Cinotti, T. S. (2023). An iot toolchain architecture for planning, running and managing a complete condition monitoring scenario. *IEEE Access*, 11, 6837–6856. [🔗 doi:10.1109/ACCESS.2023.3237971](https://doi.org/10.1109/ACCESS.2023.3237971)
- 3 Silva, D., Heideker, A., Zyrjanoff, I. D., Kleinschmidt, J. H., Roffia, L., Soinenen, J.-P., & Kamienski, C. A. (2022). A management architecture for iot smart solutions: Design and implementation. *Journal of Network and Systems Management*, 30(2), 35. [🔗 doi:10.1007/s10922-022-09648-6](https://doi.org/10.1007/s10922-022-09648-6)

- 4 **Zyrianoff, I.**, Trotta, A., Sciuillo, L., Montori, F., & Di Felice, M. (2022). Iot edge caching: Taxonomy, use cases and perspectives. *IEEE Internet of Things Magazine*, 5(3), 12–18. [doi:10.1109/IOTM.001.2200112](https://doi.org/10.1109/IOTM.001.2200112)
- 5 **Zyrianoff, I.**, Heideker, A., Silva, D., Kleinschmidt, J., Soininen, J.-P., Salmon Cinotti, T., & Kamienski, C. (2020). Architecting and deploying iot smart applications: A performance-oriented approach. *Sensors*, 20(1). [doi:10.3390/s20010084](https://doi.org/10.3390/s20010084)
- 6 Kamienski, C. A., Borelli, F. F., Biondi, G. O., Pinheiro, I., **Zyrianoff, I.**, & Jentsch, M. (2018). Context design and tracking for iot-based energy management in smart cities. *IEEE Internet of Things Journal*, 5(2), 687–695. [doi:10.1109/JIOT.2017.2748037](https://doi.org/10.1109/JIOT.2017.2748037)

Conference Proceedings



- 1 Sciuillo, L., Montori, F., **Zyrianoff, I.**, Gigli, L., Tinti, D., & Di Felice, M. (2023). Designing a hybrid push-pull architecture for mobile crowdsensing using the web of things. In *2023 IEEE International Conference on Smart Computing (SmartComp)* (pp. 332–337). [doi:10.1109/SMARTCOMP58114.2023.00081](https://doi.org/10.1109/SMARTCOMP58114.2023.00081)
- 2 Kamienski, C., Cavalcanti, D., Batista, D., **Zyrianoff, I.**, & Viridis, A. (2022). The 1st international workshop on the internet of time-critical things (iotime 2022). In *2022 IEEE 8th World Forum on Internet of Things (WF-IoT)* (pp. 1–2). [doi:10.1109/WF-IoT54382.2022.10152076](https://doi.org/10.1109/WF-IoT54382.2022.10152076)
- 3 Ottolini, D., **Zyrianoff, I.**, & Kamienski, C. (2022). Interoperability and scalability trade-offs in open iot platforms. In *2022 IEEE 19th Annual Consumer Communications Networking Conference (CCNC)* (pp. 1–6). [doi:10.1109/CCNC49033.2022.9700622](https://doi.org/10.1109/CCNC49033.2022.9700622)
- 4 Puliafito, C., Gigli, L., **Zyrianoff, I.**, Montori, F., Viridis, A., Di Pascoli, S., ... Di Felice, M. (2022). Joint power control and structural health monitoring in industry 4.0 scenarios using eclipse arrowhead and web of things. In *2022 IEEE 5th International Conference on Industrial Cyber-Physical Systems (ICPS)* (pp. 1–6). [doi:10.1109/ICPS51978.2022.9816975](https://doi.org/10.1109/ICPS51978.2022.9816975)
- 5 **Zyrianoff, I.**, Gigli, L., Montori, F., Aguzzi, C., Kaebisch, S., & Di Felice, M. (2022a). Artifact: C3po - converter of open api specification to wot objects. In *2022 IEEE International Conference on Pervasive Computing and Communications Workshops and Other Affiliated Events (PerCom Workshops)* (pp. 185–186). [doi:10.1109/PerComWorkshops53856.2022.9767293](https://doi.org/10.1109/PerComWorkshops53856.2022.9767293)
- 6 **Zyrianoff, I.**, Gigli, L., Montori, F., Aguzzi, C., Kaebisch, S., & Di Felice, M. (2022b). Seamless integration of restful web services with the web of things. In *2022 IEEE International Conference on Pervasive Computing and Communications Workshops and Other Affiliated Events (PerCom Workshops)* (pp. 427–432). [doi:10.1109/PerComWorkshops53856.2022.9767531](https://doi.org/10.1109/PerComWorkshops53856.2022.9767531)
- 7 Montori, F., **Zyrianoff, I.**, Gigli, L., Venanzi, R., Sindaco, S., Aguzzi, C., ... Cinotti, T. S. (2021). A toolchain architecture for condition monitoring using the eclipse arrowhead framework. In *Iecon 2021 – 47th Annual Conference of the IEEE Industrial Electronics Society* (pp. 1–6). [doi:10.1109/IECON48115.2021.9589532](https://doi.org/10.1109/IECON48115.2021.9589532)
- 8 Prati, R. C., Borelli, F., **Zyrianoff, I.**, Silva, D., Togneri, R., & Kamienski, C. (2021). Irrigasim: An irrigation simulation, processing, and animation environment. In *2021 IEEE International Workshop on Metrology for Agriculture and Forestry (MetroAgriFor)* (pp. 305–309). [doi:10.1109/MetroAgriFor52389.2021.9628455](https://doi.org/10.1109/MetroAgriFor52389.2021.9628455)
- 9 Sciuillo, L., **Zyrianoff, I.**, Trotta, A., & Felice, M. D. (2021). Wot micro servient: Bringing the w3c web of things to resource constrained edge devices. In *2021 IEEE International Conference on Smart Computing (SmartComp)* (pp. 161–168). [doi:10.1109/SMARTCOMP52413.2021.00042](https://doi.org/10.1109/SMARTCOMP52413.2021.00042)
- 10 **Zyrianoff, I.**, Gigli, L., Montori, F., Kamienski, C., & Felice, M. D. (2021). Two-way integration of service-oriented systems-of-systems with the web of things. In *Iecon 2021 – 47th Annual Conference of the IEEE Industrial Electronics Society* (pp. 1–6). [doi:10.1109/IECON48115.2021.9589619](https://doi.org/10.1109/IECON48115.2021.9589619)

- 11 **Zyrianoff, I.**, Heideker, A., Sciallo, L., Kamienski, C., & Di Felice, M. (2021). Interoperability in open iot platforms: Wot-fiware comparison and integration. In *2021 ieee international conference on smart computing (smartcomp)* (pp. 169–174). [doi:10.1109/SMARTCOMP52413.2021.00043](https://doi.org/10.1109/SMARTCOMP52413.2021.00043)
- 12 **Zyrianoff, I.**, Neto, A. T., Silva, D., Cinotti, T. S., Di Felice, M., & Kamienski, C. (2021). A soil moisture calibration service for iot-based smart irrigation. In *2021 ieee international workshop on metrology for agriculture and forestry (metroagrifor)* (pp. 315–319). [doi:10.1109/MetroAgriFor52389.2021.9628393](https://doi.org/10.1109/MetroAgriFor52389.2021.9628393)
- 13 Augusto Sales Dantas, R., Vasconcelos da Gama Neto, M., **Zyrianoff, I.**, & Alberto Kamienski, C. (2020). The swamp farmer app for iot-based smart water status monitoring and irrigation control. In *2020 ieee international workshop on metrology for agriculture and forestry (metroagrifor)* (pp. 109–113). [doi:10.1109/MetroAgriFor50201.2020.9277588](https://doi.org/10.1109/MetroAgriFor50201.2020.9277588)
- 14 Heideker, A., Ottolini, D., **Zyrianoff, I.**, Neto, A. T., Salmon Cinotti, T., & Kamienski, C. (2020). Iot-based measurement for smart agriculture. In *2020 ieee international workshop on metrology for agriculture and forestry (metroagrifor)* (pp. 68–72). [doi:10.1109/MetroAgriFor50201.2020.9277546](https://doi.org/10.1109/MetroAgriFor50201.2020.9277546)
- 15 Queté, B., Heideker, A., **Zyrianoff, I.**, Ottolini, D., Kleinschmidt, J. H., Soininen, J.-P., & Kamienski, C. (2020). Understanding the tradeoffs of lorawan for iot-based smart irrigation. In *2020 ieee international workshop on metrology for agriculture and forestry (metroagrifor)* (pp. 73–77). [doi:10.1109/MetroAgriFor50201.2020.9277566](https://doi.org/10.1109/MetroAgriFor50201.2020.9277566)
- 16 Heideker, A., **Zyrianoff, I.**, & Kamienski, C. A. (2018). Profiling service function chaining behavior for nfv orchestration. In *2018 ieee symposium on computers and communications (iscc)* (pp. 01020–01025). [doi:10.1109/ISCC.2018.8538657](https://doi.org/10.1109/ISCC.2018.8538657)
- 17 **Zyrianoff, I.**, Borelli, F., Biondi, G., Heideker, A., & Kamienski, C. (2018). Scalability of real-time iot-based applications for smart cities. In *2018 ieee symposium on computers and communications (iscc)* (pp. 00688–00693). [doi:10.1109/ISCC.2018.8538451](https://doi.org/10.1109/ISCC.2018.8538451)
- 18 **Zyrianoff, I.**, Heideker, A., Silva, D., & Kamienski, C. (2018). Scalability of an internet of things platform for smart water management for agriculture. In *2018 23rd conference of open innovations association (fruct)* (pp. 432–439). [doi:10.23919/FRUCT.2018.8588086](https://doi.org/10.23919/FRUCT.2018.8588086)

Pending Publications

- 1 Aguzzi, C., Gigli, L., **Zyrianoff, I.**, & Roffia, L. (2024). *Zion: A scalable w3c thing description directory*. submitted in CCNC 2024: 3rd International workshop on IoT interoperability and the web of things (IIWOT'24).
- 2 Brunelli, C., Pappacoda, G., **Zyrianoff, I.**, Bononi, L., & Felice, M. D. (2024). *Water wastage detection in smart homes through iot and machine learning*. accepted for publication in the CCNC 2024 proceedings as a work-in-progress.
- 3 Gigli, L., **Zyrianoff, I.**, Zonzoni, F., Bogomolov, D., Testoni, N., Marchi, L. D., ... Felice, M. D. (2024). *Proactive caching in the edge-cloud continuum with federated learning*. accepted for publication in the CCNC 2024 proceedings.
- 4 Gigli, L., **Zyrianoff, I.**, Zonzoni, F., Bogomolov, D., Testoni, N., De Marchi, L., ... Di Felice, M. (2023). *Next generation edge-cloud continuum architecture for structural health monitoring*. under review in IEEE Transactions on Industrial Informatics.
- 5 Kamienski, C., **Zyrianoff, I.**, Bittencourt, L. F., & Felice, M. D. (2023). *Iotinium: The iot computing continuum*. under revision on the IEEE Communications Magazine.
- 6 **Zyrianoff, I.**, Gigli, L., Montori, F., Sciallo, L., Kamienski, C., & Di Felice, M. (2023). *Cache-it: A distributed architecture for proactive edge caching in heterogeneous iot scenarios*. under review in Elsevier Ad Hoc Networks.



Project Participation

- 2021 – Current **Digital Smart Structures - DS2**
BRIC INAIL 2021
Create innovative methods for smart maintenance, monitoring, and prediction of structural conditions in various types of buildings and infrastructure.
- 2020 – 2021 **Smart Maintenance of Industrial Plants and Civil Works through 4.0 Monitoring Technologies and Prognostic Approaches - MAC4PRO**
BRIC INAIL 2018
Developing integrated Industry 4.0 monitoring with advanced models for cost-effective, safety-driven maintenance of components and infrastructure.
 <https://site.unibo.it/mac4pro/it>
- 2020 – 2022 **Arrowhead Tools**
H2020-EU.2.1.1.7.#826452
Digitalization and automation solutions for the European industry.
 <https://www.arrowhead.eu/arrowheadtools>
- 2016 – 2021 **Smart Water Management Platform (SWAMP)**
H2020-EU.2.1.1.#777112
Develop IoT-based methods and approaches for smart water management.
 <http://swamp-project.org/>
- 2022 – 2023 **My3Sec: The Ultimate PM & HR Suite by Smart Workers for Smart Workers**
H2020-EU #957338/ONTOCHAIN
Enable the production of a trusted and verified profile of workers' transferable soft and hard skills.
 <https://ontochain.ngi.eu/content/my3sec-ultimate-pm-hr-suite-smart-workers-smart-workers>
- 2016 – 2020 **INCT of the Future Internet for Smart Cities**
CNPq (grant #465446/2014-0), CAPES (grant #88887.136422/2017-00), and FAPESP (grants #2014/50937-1, #2015/24485-9, and #2018/23908-1).
 <https://interscity.org/>
- 2016 – 2019 **Fog Computing Support for Smart Societies Based on Internet of Things**
Master's Project Funded by FAPESP

Editorial Roles

Review Editor  **Frontiers in the Internet of Things**  <https://loop.frontiersin.org/people/2015065>

Conference Organization

- 2023  **General Chair** for 2nd IEEE International Workshop on the Internet of Time-Critical Things (*IoTime*) in IEEE 9th World Forum on Internet of Things, Aveiro (Portugal), 17 Oct 2023.  <https://wfiot2023.iot.ieee.org/2nd-international-workshop-internet-time-critical-things-iotime-2023>

Conference Organization (continued)

- 2022 🧑‍🤝‍🧑 **General Chair** for 1st *IEEE International Workshop on the Internet of Time-Critical Things (IoTime)* in IEEE 8th World Forum on Internet of Things, Yokohama (Japan), 11 Nov 2022. 🔗 <https://wfiot2022.iot.ieee.org/track-9/>
- 2024 🧑‍🤝‍🧑 **Publicity Chair** for 3rd *IEEE International Workshop on IoT Interoperability and the Web of Things (IIWOT)* in 21th *IEEE Consumer Communications & Networking Conference (CCNC)*, Las Vegas (USA), 6-9 Jan 2024. 🔗 <https://ccnc2024.ieee-ccnc.org/workshop/ws-2-iot-interoperability-and-web-things-iiwot>
- 2023 🧑‍🤝‍🧑 **Publicity and Web Chair** for 16rd *IEEE International Workshop on Wireless Sensing and Actuating Robotic Networks (WiSARN 2023)* in IEEE International Conference on Computer Communications (INFOCOM 2023), Las Vegas (USA), 20 May 2023. 🔗 <https://infocom2023.ieee-infocom.org/16th-international-workshop-wireless-sensing-and-actuating-robotic-networks-wisarn-2023>
- 2023 🧑‍🤝‍🧑 **Publicity Chair** for 2nd *IEEE International Workshop on IoT Interoperability and the Web of Things (IIWOT)* in 20th *IEEE Consumer Communications & Networking Conference (CCNC)*, Las Vegas (USA), 11 Jan 2023. 🔗 <https://ccnc2023.ieee-ccnc.org/workshop/iiwot23/>
- 2022 🧑‍🤝‍🧑 **Publicity Chair** for 1st *IEEE International Workshop on IoT Interoperability and the Web of Things (IIWOT)* in 19th *IEEE Consumer Communications & Networking Conference (CCNC)*, Las Vegas (USA), 11 Jan 2022. 🔗 <https://ccnc2022.ieee-ccnc.org/workshop/iiwot22.html>
- 2021 🧑‍🤝‍🧑 **Student Volunteer and Session Chair** for 18th *IEEE Consumer Communications & Networking Conference (CCNC)*, Las Vegas (USA), 9-12 Jan 2022. 🔗 <https://ccnc2021.ieee-ccnc.org>
- 2021 🧑‍🤝‍🧑 **Student Volunteer and Session Chair** for *IEEE International Conference on Computer Communications (INFOCOM 2021)*, Virtual, 10-13 May 2021. 🔗 <https://infocom2021.ieee-infocom.org/>

TCP Participation

- TCP 🧑‍🤝‍🧑 participation for the following conferences: SimBig 2023, SimBig 2024, IIWOT23, IIWOT24, ROBOCOM24, WISARN 2023, SIoT23, IECON22.

Teaching

Institutional Teaching

- Spring, 2023 📖 **Tutorship** for the Masters Course *Internet of Things (81683)* in University of Bologna, Italy.
- Spring, 2022 📖 **Tutorship** for the Masters Course *Internet of Things (81683)* in University of Bologna, Italy.


Supervised Students

- 2023 📖 [Co-Supervisor] Mytsavka, Oksana *WoT Arrowhead Bridge: Bridging Heterogenic IoT-based System*, University of Bologna, Bachelor in Computer Science [L-DM270]






Non-institutional Teaching

- 2020 📖 **Faculdades Metropolitanas Unidas (FMU)** Teacher in a private college in the following courses: Programming Logic, Game Engine, Data Structures for Game Development, and Technical Certification Fundamentals.





Teaching (continued)

- 2018-2020  **Grande Porte** Trainer in several IT courses, such as Front-end Developer (Angular), DevOps, Java Back-End Developer, Java, C/C++, and Embedded Programming for the Internet of Things.

Memberships

- 2020-Current  **IoTPrimsLab**, UNIBO Research laboratory directed by Prof. Marco Di Felice.  <https://iotprimslab.com/>
- 2024, 2022, 2018  **IEEE**, Membership number: #94926596
- 2024, 2022  **IEEE Young Professional**, Membership number: #94926596
- 2015-2020  **FutureNet**, UFABC Research laboratory directed by Prof. Carlos Kamienski.

Ph.D Schools

- 2023  **Mediterranean Machine Learning Summer School**, Thessaloniki (Greece), 28 Ago - 02 Sept 2023.  <https://www.m2lschool.org/>
- 2022  **5th Future-IoT Ph.D. School 2022 – IoT meets Autonomy**, Berlin (Germany), 29 Ago - 02 Sept 2022.  <https://school.future-iot.org/>

Events


- IEEE 9th World Forum on Internet of Things (Wf-IoT), Aveiro (Portugal), 12 October - 27 November 2023. *Session chair.*
- IEEE 8th World Forum on Internet of Things (Wf-IoT), Yokohama (Japan), 26 October - 11 November 2022. *Session chair.*
- IEEE ICPS 2022, Coventry (United Kingdom), 24-26 May 2022. *Speaker for Arrowhead Tools Project Demo and for a presented paper.*
- 20th International Conference on Pervasive Computing and Communications (PerCom 2022), Pisa, Italy, March 21-25, 2022. *Speaker for a presented paper.*
- Seminario - "MAC4PRO: manutenzione intelligente di impianti industriali e opere civili mediante tecnologie 4.0 e approcci prognostici," June 24, 2022. *Speaker for a software demonstration.*
- Society Notte Europea dei Ricercatori - "Edifici Sicuri: Intelligenza Artificiale E Internet Delle Cose Per Il Monitoraggio Strutturale," 30 Sept 2022. *Speaker for a software demonstration.*
- Made in INAIL - "Forum della ricerca" for the demo of MAC4PRO, Rome, Italy, November 24-26, 2022. *Speaker for a software demonstration.*
- SWAMP Project final review (January 26, 2021). *Speaker for a Work Package and for two software demonstrations.*
- IEEE International Conference on Smart Computing (SMARTCOMP), Virtual, 23-27 June 2021. *Speaker for a presented paper.*

- IEEE 47th Industrial Electronics Conference (IECON), Toronto (Canada), 13-16 October 2021. *Speaker for a presented paper.*
IEEE International Conference on Computer Communications (INFOCOM 2021), Virtual, 10-13 May 2021. Listener and Student Volunteer.
- IEEE Consumer Communications & Networking Conference (CCNC, Las Vegas (USA), 9-12 Jan 2021. *Listener and Student Volunteer.*
- Workshop on Advances in IoT based methods for Smart Water Distribution and Management in Agriculture (IMSA 2018), Bologna (Italy), 14-16 Nov 2018. *Speaker for a presented paper.*
- IEEE Symposium on Computers and Communications (ISCC 2018), Natal (Brazil), 25-28 June 2018. *Speaker for a presented paper.*
- IMPReSS Project final review, Recife (Brazil), 13-14 Apr 2016. *Speaker for a software demonstration.*





Journal Reviewer Portfolio

- IEEE Transactions on Industrial Informatics
- IEEE Internet of Things Journal
- IEEE Access
- ACM Computing Surveys
- Elsevier Computer Networks (COMNET)
- Elsevier Internet of Things
- Journal of Internet System and Applications (JISA)
- Frontiers in Plant Sciences
- CMC-Computers, Materials & Continua.

Non-Academic Employment History

- 2021 – 2023  **Developer at VAIMEE**
Developed front-end and back-end applications that intersected with research and industry, utilizing IoT technologies.

Skills

Languages	 Portuguese (mother tongue), English (C2 - self assessment) and Italian (B2/C1 - self assessment)
Technical Skills	 Programming languages (Java, C, C++, C#, Python), Relational and Non-Relational Databases (SQL and NoSQL), DevOps basics (CI/CD, Docker, Kubernetes, Ansible, Terraform), Git, Software Architecture.
Web Dev	 HTML, CSS, JavaScript, Typescript, NodeJS, Angular, NestJS.
Misc.	 Academic research, teaching and training.

Bologna, 31 October of 2023

Ioan Dumitru