Cristian Martín Fernández

Current Position	Assistant Professor at University of Malaga, Spain
Google Scholar	https://scholar.google.es/citations?user=ZqCrYqoAAAAJ
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Professional Experience

19/07/2022 – current	**Assistant Professor**, University of Málaga, Málaga, Spain
18/12/2018 – 18/07/2022	**Post-doctoral Researcher**, University of Málaga, Málaga, Spain
06/04/2015 – 17/12/2018	**PhD Candidate**, University of Málaga, Málaga, Spain
01/11/2014 – 5/04/2015	**Research Assistant**, University of Málaga, Málaga, Spain
01/10/2013 – 31/01/2014	**Software Engineering Intern,** University of Málaga – Software for Critical Systems, Málaga, Spain
01/03/2012 – 31/12/2013	**Software Engineer and Independent Contractor,** Aida Centre S.L, Málaga, Spain

International Research Stays

01/08/2022-31/08/2022	**Incheon National University (INU)** Incheon, South Korea. Result: Federated learning with data streams in *Kafka-ML*
07/06/2021 – 06/08/2021	**Innovations for High Performance Microelectronics (IHP)** research institute, Frankfurt Oder, Germany. Result: *Kafka-ML applied to structural health monitoring*
27/01/2020 – 26/06/2020	**Innovations for High Performance Microelectronics (IHP)** research institute, Frankfurt Oder, Germany. Result: *Kafka-ML: a framework for the management of AI/ML applications through data streams*.
15/09/2016 – 15/12/2016	**IDLab research group,** Ghent University-IMEC, Ghent, Belgium. Result: *Appdaptivity: a framework for the development of IoT applications*.

Education

06/04/2015– 17/12/2018	**Ph.D. in Computer Science,** University of Málaga, Málaga, Spain Advisors: Manuel Díaz and Bartolomé Rubio Thesis: *IntegraDos: facilitating the adoption of the Internet of Things through the integration of technologies*
30/09/2014 – 16/12/2015	**MS in Software Engineering and Artificial Intelligence,** University of Málaga, Málaga, Spain Advisors: Manuel Díaz and Bartolomé Rubio Thesis: *λ-CoAP: An Internet of Things and Cloud Computing Integration Based on the Lambda Architecture and CoAP*
30/09/2009 – 17/07/2014	**BS in Computer Science,** University of Málaga, Málaga, Spain Advisor: Enrique Soler Thesis: *A Management, Monitoring and Control System for RFID*

Teaching

01/02/2016 – current **Teaching Assistant/Teaching Fellow** Department of Languages and Computer Science, University of Málaga, Málaga, Spain.

Fall 2021	Programming Fundamentals (Practice) Software for Embedded Systems and Mobile Devices (Practice)
Fall 2020	System programming and concurrency (Practice)
Spring 2020	Operating Systems Management (Theory + Practice) Computer Basics (Practice) Software for Embedded Systems and Mobile Devices (Practice)
Fall 2019	Programming Fundamentals (Practice) Computer Basics (Practice) Software for Embedded Systems and Mobile Devices (Practice)
Fall 2018	Programming I (Theory) Software for Embedded Systems and Mobile Devices (Practice)
Spring 2017	Introduction to Software Engineering (Practice) Programming II (Practice)
Spring 2016	Programming II (Practice) Computing Applied to Public Management (Practice)

07/05/2017 – current **Instructor,** University of Málaga, Málaga, Spain
Real-time and Internet of Things Module – Master's in Advanced Analytics on Big Data.

01/02/2020 – current **Instructor,** Fundación General de la Universidad de Málaga, Málaga, Spain
Introduction to the Internet of Things with Arduino, Online course.

01/05/2018–08/10/2019 **Instructor,** University of Málaga – Samsung Tech Institute, Málaga, Spain
Wireless Communication Technologies Module - Development of Internet of Things Applications Course.

Publications

JCR Peer-Reviewed Journal Publications

[J10] **Martín, C**., Garrido, D., Llopis, L., Rubio, B., & Díaz, M. (2022). Facilitating the monitoring and management of structural health in civil infrastructures with an Edge/Fog/Cloud architecture. *Computer Standards & Interfaces*, *81*, 103600.
doi: 10.1016/j.csi.2021.103600

[J9] Carnero, A., **Martín, C.,** Torres, D. R., Garrido, D., Díaz, M., & Rubio, B. (2021). Managing and Deploying Distributed and Deep Neural Models Through Kafka-ML in the Cloud-to-Things Continuum. *IEEE Access*, *9*, 125478-125495.
doi: 10.1109/ACCESS.2021.3110291

[J8] **Martín, C**., Langendoerfer, P., Zarrin, P. S., Díaz, M., & Rubio, B. (2022). Kafka-ML: connecting the data stream with ML/AI frameworks. *Future Generation Computer Systems*, *126*, 15-33.
doi: 10.1016/j.future.2021.07.037

[J7] Torres, D. R., **Martín, C.,** Rubio, B., & Díaz, M. (2021). An open source framework based on Kafka-ML for DDNN inference over the Cloud-to-Things continuum. *Journal of Systems Architecture*, 102214. doi: 10.1016/j.sysarc.2021.102214

[J6] Cañete, E., Gallego-Martínez, J.J., **Martín, C.,** Brox, M., Luna-Rodríguez, J.J., and Moreno, J. A Low-Cost IoT Device to Monitor in Real-Time Wine Alcoholic Fermentation Evolution through CO2 emissions. *IEEE Sensors Journal*, 2020. doi: 10.1109/JSEN.2020.2975284 IF: 3.076. 7 cites.

[J5] Reyna, A., **Martín**, **C.,** Chen, J., Soler, E., and Díaz, M. On blockchain and its integration with IoT. Challenges and opportunities. *Future Generation Computer Systems*. vol. 88, p. 173-190, 2018. doi: 10.1016/j.future.2018.05.046 IF: 5.768. **Highly cited:** 1098 cites.

[J4] **Martín**, **C.,** Hoebeke, J., Rossey, J., Díaz, M., Rubio, B., and Van den Abeele, F. Appdaptivity: An Internet of Things Device-Decoupled System for Portable Applications in Changing Contexts. *Sensors*, vol. 18(3), 1345, 2018. doi: 10.3390/s18051345 IF: 3.031. 2 cites.

[J3] Cañete, E., Chen, J., **Martín, C.,** and Rubio, B. Smart Winery: A Real-Time Monitoring System for Structural Health and Ullage in Fino Style Wine Casks. *Sensors*, vol. 18(3), 803, 2018. doi: 10.3390/s18030803 IF: 3.031. 14 cites.

[J2] **Martín, C.**, Díaz, M., and Rubio, B. Run-time deployment and management of CoAP resources for the Internet of Things. *International Journal of Distributed Sensor Networks*, vol. 13(3), 2017. doi: 10.1177/ 1550147717698969 IF: 1,787. 2 cites.

[J1] Diaz, M., **Martín, C.,** and Rubio, B. State-of-the-art, challenges, and open issues in the integration of Internet of Things and Cloud Computing. *Journal of Network and Computer Applications,* vol. 67, p. 99-117, 2016. doi: 10.1016/j.jnca.2016.01.010. **Best 2017 Survey Paper in JNCA** IF: 3,5. **Highly cited:** 685 cites.

International Conferences and Workshops Publications

[C6] Zarrin, P. S., **Martin, C**., Langendoerfer, P., Wenger, C., & Diaz, M. (2021, October). Vibration Analysis of a Wind Turbine Gearbox for Off-cloud Health Monitoring through Neuromorphic-computing. In *IECON 2021–47th Annual Conference of the IEEE Industrial Electronics Society* (pp. 1-5). IEEE. doi: 10.1109/IECON48115.2021.9589879

[C5] **Martín, C.**, Torres, D.R., Díaz, M., and Rubio, B. FogPi: A Portable Fog Infrastructure through Raspberry Pis. *9th Mediterranean Conference on Embedded Computing MECO'2020* IEEE, June 8-11, Budva, Montenegro, 2019. doi: 10.1109/MECO49872.2020.9134320. 0 cites.

[C4] **Martín, C.**, Garrido, D., Díaz, M., and Rubio, B. From the Edge to the Cloud: Enabling Reliable IoT Applications. *7th International Conference on Future Internet of Things and Cloud (FiCloud 2019)*, IEEE, August 26-28, Istanbul, Turkey. p. 17-22, 2019
doi: 10.1109/FiCloud.2019.00011. 0 cites.

[C3] **Martín, C.**, Díaz, M., and Rubio, B. An edge computing architecture in the Internet of Things. *20th IEEE International Symposium on Real-Time Computing. IEEE ISORC 2018.* June 29-31. Singapore. p. 99-102, 2018.
doi: 10.1109/ISORC.2018.00021. 40 cites.

[C2] **Martín, C.**, Chen, J., Díaz, M., Reyna, A., and Rubio, B. SocICoAP: Social Interaction with Supplementary Sensors and Actuators through CoAP in Smartphones.
2017 IEEE 41st Annual Computer Software and Applications Conference (COMPSAC), July 4-8, Turin, Italy, vol. 2, p. 672-677, 2017.
doi: 10.1109/COMPSAC.2017.217. 0 cites.

[C1] Díaz, M., **Martín, C.**, and Rubio, B. λ-CoAP: An Internet of Things and Cloud Computing Integration based on the Lambda Architecture and CoAP. *11th International Conference on Collaborative Computing: Networking, Applications and Worksharing (CollaborateCom 2015).* November 10-11, Wuhan, China, 2015. Collaborative Computing: Networking, Applications, and Worksharing, vol. 163, p. 195–206, 2016.
doi: 10.1007/978-3-319-28910-6. 19 cites.

Grants

25/01/2021 – 24/01/2024	3-year postdoc grant founded by the Andalusian Government, Spain
10/07/2019 – 09/07/2020	1-year postdoc grant founded by the Andalusian Government, Spain
15/01/2016 – 14/01/2019	3-year scholarship founded by the Andalusian Government, Spain, to obtain a PhD in the project MIsTIca "Critical Infrastructure Monitoring based on Wireless Technologies"

Service

- Reviewer
  - Sensors
  - Applied Sciences
  - Future Generation Computer Systems
  - Journal of Network and Computer Applications
  - Journal of Systems Architecture
  - Simulation Modelling Practice and Theory
  - Concurrency and Computation: Practice and Experience
  - International Journal of Information Technology & Decision Making
  - IEEE Internet of Things Magazine
  - IEICE Transactions on Information and Systems

- Program Committee
  - XIX Spanish Real Time Conference, 2016
  - 1st Demo Session on Visualizing Embedded Systems Solutions (VESS), 2019
  - 3rd International Conference on Futuristic Trends in Networks and Computing Technologies FTNCT-2020

Awards

- Journal of Network and Computer Applications 2017 Best Survey Paper

- Best PhD thesis in Computer Science at the University of Malaga in 2018

Research Lines

1. Open Digital Twins Platforms

Although digital twins have recently emerged as a clear alternative for reliable asset representations, most of the solutions and tools available for the development of digital twins are tailored to specific environments. Furthermore, achieving reliable digital twins often requires the orchestration of technologies and paradigms such as machine learning, the Internet of Things, and 3D visualisation, which are rarely seamlessly aligned. In this research line, we aim at developing a generic framework for the development of effective digital twins combining some of the aforementioned areas. In this open framework, digital twins can be easily developed and orchestrated with 3D-connected visualisations, IoT data streams, and real-time machine learning predictions.

2. Streaming Deep and Distributed Neural Networks over the IoT/Edge/Fog/Cloud

Deep neural networks have been widely used in applications such as image and video recognition and classification and anomaly detection, generally designed to be used in large processing systems such as Cloud solutions. Currently, there is a trend to implement and distribute these networks in the computing that goes from the IoT to the Cloud in order to facilitate the generation of critical actions, the reduction of bandwidth, and the improvement of their precision, among other aspects. we investigate how to integrate these networks with message distribution systems to enable their distribution in Edge, Fog and Cloud Computing frameworks, and manage their deployment on these paradigms. Our clear example is our framework Kafka-ML which manages the whole pipeline of ML/AI models through data streams.

3. Middleware and Platforms for the Development and Deployment of Applications over the IoT/Edge/Fog/Cloud

Edge and Fog Computing are paradigms that have a place between Cloud Computing and the IoT and aim to move the computing capacity as close as possible to where the information is produced in order to reduce response time and bandwidth and increase security in critical and distributed applications. This paradigm has special application in environments that generate a large amount of information and whose latency requirements and/or existing network limitations do not allow this information to be processed in cloud environments. In this research line, we focus on the development of middleware and platforms that allow managing and deploying the life cycle of these applications to meet the established requirements and their perfect adaptation to the IoT, in addition to adapting current solutions to this type of environments to optimize their computing cycle.