Sergio Barrachina-Muñoz **PhD in ICT**

CONTACT INFORMATION

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RESEARCH INTERESTS

Wireless networks, Machine learning, Data science, Cloud computing, Spectrum access, Wi-Fi

SHORT BIO

I hold a PhD in Information and Communication Technologies (2021) by Universitat Pompeu Fabra (UPF), Barcelona, Spain. Previously, I received my BSc Degree in Telematics Engineering (2015) and MSc in Intelligent Interactive Systems (2016), also from UPF. I joined the Wireless Networking research group in 2015, where I worked under the supervision of Dr. Boris Bellalta. My research focuses on autonomous learning for improving next-generation Wi-Fi networks through efficient spectrum access.

EDUCATION & ACADEMIC EXPERIENCE

PhD in the Wireless Networking research group (UPF) Oct 2016 - Jan 2021

- Thesis: *Responsive Spectrum Management for Wireless Local Area Networks: from Heuristic-based Policies to Model-Free Reinforcement Learning*
  - Mention ***cum laude***.
- Research stay: Nov 2018 - Feb 2019
  - Rice Networks Group in Rice University (Houston, United States)
  - Under the supervision of Prof. Edward Knightly
  - Design and development of WACA

MSc, Intelligent and Interactive Systems at UPF Sep 2015 - Jul 2016

- Research intern in the Network Technologies and Strategies research group (NeTS)

B.S., Telematics Engineering at UPF Sep 2011 - Jul 2015

- Top of class, 10+ courses with honors

PROFESSIONAL EXPERIENCE

- Centum Solutions. QA engineer, Wi-Fi expert Jan 2021 - *currently*
- Ricoh Spain. Software developer engineer intern Feb 2015 - Oct 2015
- Vendo Services. Quality Assurance (QA) intern Jun 2014 - Oct 2014

JOURNAL PUBLICATIONS

1. Wilhelmi, F., Barrachina-Muñoz, S., Cano, C., Selinis, I. & Bellalta, B. Spatial Reuse in IEEE 802.11ax WLANs. Computer Communications (2021).
2. Barrachina-Muñoz, S., Bellalta, B., & Knightly, E. (2020). Wi-Fi channel bonding: an all-channel system and experimental study from urban hotspots to a sold-out stadium. *Under minor revision in IEEE Transactions on Networking*
3. Wilhelmi, F., Barrachina-Muñoz, S., Bellalta, B., Cano, C., Jonsson, A., & Ram, V. (2020). A Flexible Machine-Learning-Aware Architecture for Future WLANs. IEEE Communications Magazine, 58(3), 25-31.
4. Barrachina-Muñoz, S., Wilhelmi, F., & Bellalta, B. (2019). Online Primary Channel Selection for Dynamic Channel Bonding in High-Density WLANs. IEEE Wireless Communications Letters, 9(2), 258-262.
5. Barrachina-Muñoz, S., Wilhelmi, F., & Bellalta, B. (2019). To overlap or not to overlap: Enabling channel bonding in high-density WLANs. Computer Networks, 152, 40-53.

6. Barrachina-Muñoz, S., Wilhelmi, F., & Bellalta, B. (2019). Dynamic channel bonding in spatially distributed high-density WLANs. IEEE Transactions on Mobile Computing, 19(4), 821-835.
7. Wilhelmi, F., Barrachina-Muñoz, S., Bellalta, B., Cano, C., Jonsson, A., & Neu, G. (2019). Potential and pitfalls of multi-armed bandits for decentralized spatial reuse in WLANs. Journal of Network and Computer Applications, 127, 26-42.
8. Adame Vázquez, T., Barrachina-Muoz, S., Bellalta, B., & Bel, A. (2018). HARE: Supporting efficient uplink multi-hop communications in self-organizing LPWANs. Sensors, 18(1), 115.
9. Wilhelmi, F., Cano, C., Neu, G., Bellalta, B., Jonsson, A., & Barrachina-Muñoz, S. (2019). Collaborative Spatial Reuse in Wireless Networks via Selfish Multi-Armed Bandits. Ad Hoc Networks 88 (2019): 129-141.
10. Barrachina-Muñoz, S., Bellalta, B., Adame, T., & Bel, A. (2017). Multi-hop communication in the uplink for LPWANs. Computer Networks, 123, 153-168.

Conferences & Workshops

1. Barrachina-Muñoz, S., Bellalta, B., & Knightly, E. (2020). Wi-Fi All-Channel Analyzer. In Proceedings of the 14th International Workshop on Wireless Network Testbeds, Experimental evaluation & Characterization (pp. 72-79). **Runner-up, best paper award**.
2. Wilhelmi, F., Barrachina-Muñoz, S., & Bellalta, B. (2019). On the Performance of the Spatial Reuse Operation in IEEE 802.11ax WLANs. In 2019 IEEE Conference on Standards for Communications and Networking (CSCN) (pp. 1-6). IEEE.
3. Barrachina-Muñoz, S., Wilhelmi, F., Selinis, I., & Bellalta, B. (2019, April). Komondor: a wireless network simulator for next generation high density WLANs. In 2019 Wireless Days (WD) (pp. 1-8). IEEE.
4. Barrachina-Muñoz, S., Adame, T., Bel, A., & Bellalta, B. (2019). Towards energy efficient LPWANs through learning-based multi-hop routing. In 2019 IEEE 5th World Forum on Internet of Things (WF-IoT) (pp. 644-649). IEEE.
5. López-Raventós, Á., Wilhelmi, F., Barrachina–Muñoz, S., & Bellalta, B. (2019). Combining software defined networks and machine learning to enable self organizing WLANs. In 2019 International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob) (pp. 1-8). IEEE.
6. Barrachina-Muñoz, S., & Bellalta, B. (2017). Learning optimal routing for the uplink in LPWANs using similarity-enhanced e-greedy. In Personal, Indoor, and Mobile Radio Communications (PIMRC), 2017 IEEE 28th Annual International Symposium on (pp. 1-5). IEEE.
7. Barrachina-Muñoz, S., Adame, T., Bel, A., & Bellalta, B. (2015). GOAT: A Tool for Planning Wireless Sensor Networks. In International Workshop on Multiple Access Communications (pp. 147-158). Springer, Cham.

Teaching Experience

Teaching Assistant

- TIC bachelor degrees at UPF: *Networks* 2016 - 2020
- TIC bachelor degrees at UPF: *Networks Laboratory* 2017

Teaching Staff

- Campus Junior (UPF) - Descobrint l'IoT a través d'Arduino 2017, 2018
- Yomo (Mobile World Congress) - Taller d'Arduino 2018
- Girls Hack Day (UPF) - Introducció a l'IoT i Arduino 2018

Service activities

Technical program committees

- Second international workshop on Data science for Internet of Things (DS-IoT) 2017

Review of publications

- IEEE Communications Letters
- Elsevier's Pervasive and Mobile Computing
- IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM)
- IEEE International Conference on Network and Service Management CSNM
- IEEE Transactions on Communications
- IEEE Systems Journal
- IEEE Transactions on Wireless Communications

Research projects

- WINDMAL - ML for wireless networking in highly dynamic scenarios 2020
- Cisco - Performance Evaluation of IEEE 802.11ax WLANs 2017 – 2020
- Maria de Maeztu (MdM) - Wireless Networking through Learning 2017 – 2020
- ENTOMATIC - Novel automatic and stand-alone integrated pest management tool for remote count and bioacoustic identification of the Olive Fly (Bactrocera oleae) in the field. 2015 – 2018

Software

- **Programming skills**:
  - *Languages*: Java, C/C++, Contiki, Python, Matlab, LaTex
  - *OS/Engines/Libraries*: Shell, Keras, Jupyter, TensorFlow, Spark, AWS, WARPLab
  - *Management/DDBB*: Git, Jira, SQL
- **Software projects** (available in GitHub):
  - WACA: Wi-Fi All-Channel Analyzer
  - Komondor IEEE 802.11ax wireless network simulator
  - Spatial-Flexible Continuous Time Markov Network (SFCTM) framework
  - Distance-Ring Exponential STA Generator (DRESG)

Other courses

- Getting Started with AWS Machine Learning *by AWS (Coursera)* 2020
- Deep Learning fundamentals with Keras *by IBM (edX)* 2020
- Fundamentals of Scalable Data Science *by IBM (Coursera)* 2020
- Introduction to stock investing *by Univ. Politècnica de València (edX)* 2020
- Machine Learning *by Stanford University (Coursera)* 2018

Grants & awards

- Runner-up, best paper award in WINTECH (@Mobicom) 2020 2020
- FI grant from AGAUR (Generalitat de Catalunya) 2016-2020