Sergio Barrachina-Muñoz **PhD in ICT**

CONTACT INFORMATION

Email: barachina.sergio@gmail.com Tel: +34 608108238
Website: https://sergiobarra.github.io/
Av. Carl Friedrich Gauss 7, B4 - 08860, Castelldefels (Spain)

RESEARCH INTERESTS

Wireless networks, 5G/6G, Machine learning, Spectrum access, Resource allocation

SHORT BIO

Sergio Barrachina-Muñoz (Barcelona, 1991) holds a PhD in ICT (2021) by Universitat Pompeu Fabra (UPF), Barcelona, Spain. Previously, he received his BSc Degree in Telematics Engineering (2015) and MSc in Intelligent Interactive Systems (2016), also from UPF. Sergio joined the Wireless Networking research group as an intern in 2015, where he worked under the supervision of Dr. Boris Bellalta. He was also a recipient of a FI grant from the Generalitat de Catalunya. His thesis research focused on developing autonomous learning techniques for improving next-generation Wi-Fi networks through efficient spectrum access.

Sergio is currently working as a postdoctoral researcher in the SMARTECH department at Centre Tecnològic de Telecomunicacions de Catalunya (CTTC) in the context of the MARSAL project (Machine Learning-Based, Networking and Computing Infrastructure Resource Management of 5G and Beyond Intelligent Networks). Apart from research, Sergio has been involved in teaching undergraduate courses since 2015, with subjects mainly related to computer networks both in UPF and Universitat Oberta de Catalunya (UOC).

EDUCATION & ACADEMIC EXPERIENCE

Postdoc researcher in SMARTECH at CTTC — Mar 2021 - currently

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

- Thesis (`cum laude`): *Responsive Spectrum Management for WLANs: from Heuristic-based Policies to Model-Free Reinforcement Learning.*
- Research stay:
  - Rice Networks Group in Rice University (Houston, United States)
  - Design and development of WACA
- Teaching assistant of computer networks related subjects

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

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

BSc, Telematics Engineering at UPF — Sep 2011 - Jul 2015

- Top of class, 10+ courses with honors

INDUSTRY PROFESSIONAL EXPERIENCE

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

JOURNAL PUBLICATIONS

1. Barrachina-Muñoz, S., Chiumento A., & Bellalta, B. (2021). Multi-Armed Bandits for Spectrum Allocation in Multi-Agent Channel Bonding WLANs. IEEE Access.
2. Wilhelmi, F., Barrachina-Muñoz, S., Cano, C., Selinis, I. & Bellalta, B. (2021) Spatial Reuse in IEEE 802.11ax WLANs. Computer Communications, 170, 65-83.
3. Barrachina-Muñoz, S., Bellalta, B., & Knightly, E. (2021). Wi-Fi channel bonding: an all-channel system and experimental study from urban hotspots to a sold-out stadium. IEEE/ACM Transactions on Networking.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

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. 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.

11. 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., Chiumento A., & Bellalta, B. (2021). Stateless Reinforcement Learning for Multi-Agent Systems: the Case of Spectrum Allocation in Dynamic Channel Bonding WLANs. In IEEE 2021 Wireless Days (WD).

2. 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 (ACM WiNTECH) (pp. 72-79). **Runner-up, best paper award**.

3. 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.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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

Course Instructor at UOC

- Networking fundamentals — 2020 - *currently*

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

- MARSAL - Machine Learning-Based, Networking and Computing Infrastructure Resource Management of 5G and Beyond Intelligent Networks — 2021 – 2024
- Cisco - Performance Evaluation of IEEE 802.11ax WLANs — 2017 – 2020
- 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*: Matlab, Python, Java, C/C++, Contiki, 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