

# Silvia Rodríguez Alcaraz

Postdoctoral researcher at ETH Zürich (Systems Group)



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## Research Interests

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My scientific interests focus on the field of High-Performance Computing (HPC), more specifically on heterogeneous computing and distributed HPC systems. During my PhD, I developed portable heterogeneous applications using SYCL, a unified programming model, evaluating their performance on CPU, GPU and FPGA platforms hosted on cloud and cluster systems. In addition, I have experience in the efficient processing of 3D point clouds, both aerial and terrestrial, obtained through photogrammetry techniques or LiDAR sensors.

**Keywords:** High-Performance Computing (HPC); heterogeneous computing; performance portability; distributed systems; High-Level Synthesis (HLS); 3D point clouds

## Education

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2020–2025	<b>PhD Cum Laude in Computer Science</b> , specialised in High-Performance Computing, University of Santiago de Compostela. Thesis: “Portable heterogeneous computing on distributed HPC systems”.
2019–2020	<b>MSc in High-Performance Computing</b> , University of Santiago de Compostela. Thesis: “Parallelization and optimization of the Prometheus model using LiDAR point clouds”.
2014–2019	<b>BSc in Computer Science</b> , University of Santiago de Compostela. Thesis: “FlinkBWA: Big Data technologies for genetic sequence alignment”.

## Research Experience

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2026–now	<b>Systems Group, ETH Zürich</b> Postdoctoral researcher
2021–2025	<b>Singular Research Center for Intelligent Technologies (CiTIUS)</b> Predoctoral researcher — PhD student (FPI scholarship, Spanish Ministry)
2020–2021	<b>Singular Research Center for Intelligent Technologies (CiTIUS)</b> Research assistant
2019–2020	<b>Singular Research Center for Intelligent Technologies (CiTIUS)</b> Collaboration scholarship holder

## Research Visits

Fall 2024	<b>Systems Group, ETH Zürich</b> Guest researcher
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Spring 2023 **ESRG Group, University of Minho**  
Guest researcher

## Industry Experience

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Spring 2019 **Galicia Supercomputing Center (CESGA)**  
Graduated intern

Summer 2018 **Hewlett-Packard Enterprise (HPE)**  
Undergraduated intern

## Publications

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- 2026 Pablo D. Viñambres, Miguel Yermo, **Silvia R. Alcaraz**, Oscar G. Lorenzo, Francisco F. Rivera, José C. Cabaleiro (2026). “Efficient Neighbourhood Search in 3D Point Clouds Through Space-Filling Curves and Linear Octrees”. In: Preprint (under submission). DOI: [10.48550/arXiv.2603.06771](https://doi.org/10.48550/arXiv.2603.06771)
- 2026 Alberto M. Esmorís, Miguel Yermo, **Silvia R. Alcaraz**, Samuel Soutullo, Francisco F. Rivera (2026). “Deep Learning for Ultra-Large-Scale Semantic Segmentation of Geographic 3D Point Clouds With Missing Labels”. In: *IEEE Access* 14, pp. 485–501. DOI: [10.1109/ACCESS.2025.3647154](https://doi.org/10.1109/ACCESS.2025.3647154)
- 2025 **Silvia R. Alcaraz**, Ruben Laso, David L. Vilariño, Francisco F. Rivera (2025). “SYCL for CPU+GPU Heterogeneous Computing: A Study on Integrated and Discrete GPUs”. In: *2025 IEEE International Conference on Cluster Computing Workshops (CLUSTER Workshops)*, pp. 1–2. DOI: [10.1109/CLUSTERWorkshops65972.2025.11164210](https://doi.org/10.1109/CLUSTERWorkshops65972.2025.11164210)
- 2025 Pablo Liste, **Silvia R. Alcaraz**, Oscar G. Lorenzo, José C. Cabaleiro, Francisco F. Rivera (2025). “Evaluación de modelos de DL en nubes de puntos LiDAR para aplicaciones de automoción en tiempo real”. es. In: *Avances en arquitectura y tecnología de computadores. Actas de las Jornadas SARTECO 2025*. Sevilla, Spain: Zenodo, pp. 43–51. ISBN: 978-84-09-74530-2. DOI: [10.5281/ZENODO.16633724](https://doi.org/10.5281/ZENODO.16633724)
- 2024 **Silvia R. Alcaraz**, Ruben Laso, Oscar G. Lorenzo, David L. Vilariño, Tomás F. Pena, Francisco F. Rivera (2024). “Assessing Intel OneAPI capabilities and cloud-performance for heterogeneous computing”. In: *The Journal of Supercomputing* 80, pp. 13295–13316. ISSN: 1573-0484. DOI: [10.1007/s11227-024-05958-5](https://doi.org/10.1007/s11227-024-05958-5)
- 2023 **Silvia R. Alcaraz**, Ruben Laso, Oscar G. Lorenzo, David L. Vilariño, Tomás F. Pena, Francisco F. Rivera (2023). “Performance evaluation of heterogeneous CPU+iGPU and CPU+FPGA schemes using Intel OneAPI on the cloud”. In: *International Conference Computational and Mathematical Methods in Science and Engineering (CMMSE)*. Rota (Spain)

## Teaching Experience

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### University of Santiago de Compostela

Spring 2025 **Teaching assistant**  
Operating Systems II, Computer Science Degree.

Fall 2023 **Teaching assistant**  
Networks, Computer Science Degree.

Fall 2022 **Teaching assistant**

Operating Systems I, Computer Science Degree.

## Tutoring Experience

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### University of Santiago de Compostela

- Master thesis
  - 2023/2024 Evaluation of the SYCLomatic tool.
  - 2021/2022 Parallelization of a graph-based 3D point cloud segmentation algorithm using heterogeneous programming.
- Bachelor thesis
  - 2024/2025 Real-time processing of terrestrial LiDAR point clouds.
  - 2023/2024 Digital audio signal processing over programmable logic.
  - 2022/2023 Multieffect system for electric guitar on programmable logic.
  - 2022/2023 FPGA image and video processing using high-level languages.
  - 2021/2022 Edge computing of LiDAR data on heterogeneous systems.
  - 2021/2022 Semi-automatic vegetation classification tool using LiDAR.

## Awards & Fellowships

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- 2023 **IACOBUS Scholarship**  
European Grouping of Territorial Cooperation - Galicia-Northern Portugal (GNP-ECTC) Grant for a short research stay at the Universidade do Minho (Portugal).
- 2021 **FPI Scholarship**  
Scholarship supported by the Spanish Ministry of Science, Innovation and Universities for pursuing a PhD in the field of Computer Science at CiTIUS.
- 2019 **Collaboration Scholarship**  
Scholarship supported by the Spanish Ministry of Education and Professional Training for collaborating during 8 months in research activities at the Department of Electronics and Computing of the University of Santiago de Compostela.
- 2019 **Altia Award Finalist**  
Top 5 best Bachelor Theses in Computer Science at the University of Santiago de Compostela in the 2019 Altia Premia program.

## Languages

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Spanish (native), Galician (native), English (advanced).

## Certificates

- 2023 **English Level C1 Certificate (CEFR).**  
Centre for Modern Languages, University of Santiago de Compostela.
- 2014 **Galician CELGA 4a Certificate. Council of Europe C1.**  
Obtained after completing official secondary education in Galicia (Spain).

## Open-source projects

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- 2023 (v1)  [ihp-sycl](#)
- 2025 (v2)
- 2018 (v1)  [FlinkBWA](#)