

# Miguel Hernández-Cabronero

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## *Curriculum Vitae* – September 2019

### Contact

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Google Scholar <https://scholar.google.com/citations?user=yqowuH8AAAAJ>

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### Profile

I am a postdoctoral computer scientist with over 7 years of full-time research experience and more than 25 publications.

I have strong analytical, programming and communication skills (both oral and written). I have proved my autonomy and proficiency collaborating in multiple international, geographically disperse teams.

I am passionate about learning, and I adapt fast to new subjects and environments. My current research focuses on the following topics:

- Coding of visual content, including remote-sensing and biomedical image data.
- Perceptual and task-oriented data compression.
- Adaptation of coding architectures to domain-specific needs and constraints.
- Compression and image format standards.

### Education

2011–2015 **Ph.D. (Excellent Cum Laude) in Computer Science.**  
Awarded the UAB Special Award for Doctoral Studies ([certificate](#)).  
University: Universitat Autònoma de Barcelona, Spain  
Thesis title: “DNA Microarray Image Compression”  
Director: Joan Serra-Sagristà  
Co-Director: Michael W. Marcellin (University of Arizona)

2010–2011 **MSc Computer Science**, *Universitat Autònoma de Barcelona, Spain.*

2005–2010 **BSc Computer Science**, *Universidad Autónoma de Madrid, Spain.*

2005–2010 **BSc Mathematics**, *Universidad Autónoma de Madrid, Spain.*

## Employment

- Sep. 2019– Jun. 2020 **Associate Professor**, *Universitat Autònoma de Barcelona, Spain.*
- Apr. 2019– Apr. 2020 **Postdoctoral Research Assistant**, *Universitat Autònoma de Barcelona, Spain.*

### Previous:

- Jan. 2017– Dec. 2018 **Postdoctoral Research Associate**, *University of Arizona, Tucson, USA.*
- Jul. 2015– Dec. 2016 **Postdoctoral Research Assistant**, *University of Warwick, Coventry, UK.*
- Jan. 2015– Mar. 2015 **Visiting Scholar**, *University of Aveiro, Aveiro, Portugal.*
- Sep. 2014– Dec. 2014 **Visiting Scholar**, *University of Arizona, Tucson AZ, USA.*
- Sep. 2011– Jun. 2015 **Ph.D. Student**, *Universitat Autònoma de Barcelona, Barcelona, Spain.*
- Jul. 2008– Sep. 2008 **Student Research Assistant**, *Universidad Politécnica de Madrid, Madrid, Spain.*
- Jul. 2006– Sep. 2006 **Student Research Assistant**, *Universidad Politécnica de Madrid, Madrid, Spain.*

## Teaching Experience

### Courses

- Feb. 2020– Jun. 2020 **Course Coordinator**<sup>1</sup>, 104349 Graphs, topology and discrete mathematics, BSc, Data Engineering, *Universitat Autònoma de Barcelona.*
- Feb. 2020– Jun. 2020 **Course Coordinator**<sup>1</sup>, 44028 Security and Compression in IoT, MSc, Internet of Things for e-Health, *Universitat Autònoma de Barcelona.*
- Sep. 2019– Feb. 2020 **Course Coordinator**<sup>1</sup>, 44020 Standards in e-Health and Interoperability, MSc, Internet of Things for e-Health, *Universitat Autònoma de Barcelona.*
- Feb. 2020– Jun. 2020 **Seminar Tutor**<sup>2</sup>, 102772 Discrete Mathematics, BSc, Computer Science, *Universitat Autònoma de Barcelona.*
- Feb. 2015– Jun. 2015 **Seminar Tutor**<sup>2</sup>, 102772 Discrete Mathematics, BSc, Computer Science, *Universitat Autònoma de Barcelona.*
- Feb. 2014– Jun. 2014 **Seminar Tutor**<sup>2</sup>, 102772 Discrete Mathematics, BSc, Computer Science, *Universitat Autònoma de Barcelona.*
- Feb. 2013– Jun. 2013 **Seminar Tutor**<sup>2</sup>, 102772 Discrete Mathematics, BSc, Computer Science, *Universitat Autònoma de Barcelona.*

<sup>1</sup>The duties of Course Coordinator involved material curation and teaching of a majority of all theory lectures. Depending on the course, laboratory materials and teaching were also part of the Course Coordinator duties.

<sup>2</sup>The duties of Seminar Tutor included choosing the seminars' syllabus contents, curating materials, conducting sessions and evaluating the students.

## Student Supervision

- Sep. 2019 – **Supervisor**, final BSc project in Computer Science.  
Feb. 2020 Diego Fraile Parra, Universitat Autònoma de Barcelona.
- Oct. 2016 – **Supervisory tasks**, PhD in Computer Engineering.  
Dec. 2018 Eze Ahanonu, University of Arizona.
- Oct. 2016 – **Supervisory tasks**, PhD in Computer Engineering.  
Dec. 2018 Yuzhang Lin, University of Arizona.
- Sep. 2016 – **Collaboration**, PhD in Computer Science.  
Jun. 2018 Lee Prangnell, University of Warwick.
- Feb. 2015 – **Co-supervisor**, final BSc project in Computer Science.  
Jun. 2015 Ivan Pueyo Navarro, Universitat Autònoma de Barcelona.
- Feb. 2014 – **Supervisor**, final BSc project in Computer Science.  
Jun. 2014 Manuel Ruibal Montoro, Universitat Autònoma de Barcelona.

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## Other Academical Appointments

- **Invited talks:**
  - “Effect of Lightweight Image Compression on CNN-based Image Segmentation”  
Grenoble NewSpace Week, France, April 2019
  - “Color transforms for the compression of Whole-Slide Images”  
University of Arizona, US, January 2017.
  - “Lossless Compression of Bayer Color Filter Arrays”  
University of Warwick, UK, June 2015.
  - “Relative Quantization and lossy compression of DNA microarray images”  
University of Aveiro, Portugal, January 2015.
  - “DNA microarray image compression”  
University of Valencia, Spain, January 2013
- **Reviewer for** (selection):
  - IEEE Data Compression Conference  
CORE Ranking A\*
  - IEEE Transactions on Medical Imaging  
Impact Factor 6.13, Q1
  - IEEE Transactions on Image Processing  
Impact Factor 4.83, Q1
  - IEEE Access  
Impact Factor 4.098, Q1
  - IEEE Transactions on Multimedia  
Impact Factor 1.776, Q1

(Impact factors computed using Clarivate Analytic's JCR  
<https://clarivate.com/products/journal-citation-reports/>)

## Publications

### Journal Papers

1. I. Blanes, **M. Hernández-Cabronero**, J. Serra-Sagristà and M.W. Marcellin, "Lower Bounds on the Redundancy of Huffman Codes with Known and Unknown Probabilities," IEEE Access, 2019, In press.
2. J. Bartrina-Rapesta, J. Serra-Sagristà, M.W. Marcellin and **M. Hernández-Cabronero**, "A Novel Rate-Control for Predictive Image Coding with Constant Quality," IEEE Access, 2019, In press.
3. I. Blanes, A. Kiely, **M. Hernández Cabronero**, J. Serra-Sagristà, "Performance Impact of Parameter Tuning on the CCSDS-123.0-B-2 Low-Complexity Lossless and Near-Lossless Multispectral and Hyperspectral Image Compression Standard", MDPI Remote Sensing, vol. 11, no. 11, art. 1390, 2019.
4. **M. Hernández-Cabronero**, V. Sanchez, I. Blanes, F. Aulí-Llinàs, M. W. Marcellin, J. Serra-Sagristà. "Mosaic-Based Color Transform Optimization for Lossy and Lossy-to-Lossless Compression of Pathology Whole-Slide Images," IEEE Transactions on Medical Imaging, vol.38, no.1, pp 21-32, 2019. [Impact Factor 6.13, Q1]
5. V. Sanchez, **M. Hernández-Cabronero**, "Graph-based Rate Control in Pathology Imaging with Lossless Region of Interest Coding," IEEE Transactions on Medical Imaging, vol.37, no. 10, pp. 2211-2223, 2018. [Impact Factor 6.13, Q1]
6. **M. Hernández-Cabronero**, M. W. Marcellin, I. Blanes, J. Serra-Sagristà, "Lossless Compression of Color Filter Array Mosaic Images with Visualization via JPEG 2000," IEEE Transactions on Multimedia, vol. 20, no. 2, pp. 257-270, 2018. [Impact Factor 3.51, Q1]
7. F. Aulí-Linàs, M. W. Marcellin, V. Sanchez, J. Bartrina-Rapesta, **M. Hernández-Cabronero**, "Dual Link Image Coding for Earth Observation Satellites," IEEE Transactions on Geoscience and Remote Sensing, vol. 56, no. 9, pp. 5083-5096, 2018. [Impact Factor 4.94, Q1]
8. F. Liu, **M. Hernández-Cabronero**, V. Sanchez, M. W. Marcellin, A. Bilgin, "The Current Role of Image Compression Standards in Medical Imaging," MDPI Information, vol. 8, no. 4, 2017.
9. S. Álvarez-Cortés, N. Amrani, **M. Hernández-Cabronero**, J. Serra-Sagristà, "Progressive Lossy-to-Lossless Coding of Hyperspectral Images through Regression Wavelet Analysis," Taylor & Francis International Journal of Remote Sensing, vol. 39, no. 7, pp. 1-21, 2017. [Impact Factor 1.782, Q1]
10. **M. Hernández-Cabronero**, I. Blanes, A. J. Pinho, M. W. Marcellin, J. Serra-Sagrista, "Progressive Lossy-to-Lossless Compression of DNA Microarray Images," IEEE Signal Processing Letters, vol. 23, no. 5, pp. 698-702, May 2016. [Impact Factor 2.53, Q1]
11. **M. Hernández-Cabronero**, I. Blanes, A. J. Pinho, M. W. Marcellin, J. Serra-Sagrista, "Analysis-Driven Lossy Compression of DNA Microarray Images," IEEE Transactions on Medical Imaging, vol. 35, no. 2, pp. 654-664, February 2016. [Impact Factor 3.94, Q1]
12. I. Blanes, **M. Hernández-Cabronero**, F. Aulí-Llinàs, J. Serra-Sagrista and M.W. Marcellin,

"Isorange Pairwise Orthogonal Transform," IEEE Transactions on Geoscience and Remote Sensing, vol. 53, no. 6, pp. 3361-3372, June 2015. [Impact Factor 4.94, Q1]

13. **M. Hernández-Cabronero**, I. Blanes, M. W. Marcellin, J. Serra-Sagristà, "Standard and specific compression techniques for DNA microarray images," MDPI Algorithms, pp. 30-49, 2012.

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(Impact factors computed using Clarivate Analytic's JCR

<https://clarivate.com/products/journal-citation-reports/>)

### Book Chapters

1. **M. Hernández-Cabronero**, M. W. Marcellin, J. Serra-Sagristà, "Compression of DNA Microarray Images," In Book "Microarray Image and Data Analysis: Theory and Practice", CRC Press, ISBN 9781466586826, pp. 193-222, 2014.

### Conference Contributions

1. **M. Hernández-Cabronero**, David Vilaseca, Guillermo Becker, Emilio Tylson, Joan Serra-Sagristà, "Effect of Lightweight Image compression on CNN-based Image Segmentation", Grenoble NewSpace Week (GNSW), April 2019.
2. A. Kiely, M. Klimesh, I. Blanes, J. Ligo, E. Magli, N. Aranki, M. Burl, R. Camarero, M. Cheng, S. Dolinar, D. Dolman, G. Flesch, H. Ghassemi, M. Gilbert, **M. Hernández-Cabronero**, D. Keymeulen, M. Le, H. Luong, C. McGuinness, G. Moury, T. Pham, M. Plintovic, F. Sala, L. Santos, A. Schaar, J. Serra-Sagristà, S. Shin, B. Sundlie, D. Valsesia, R. Vitulli, E. Wong, W. Wu, H. Xie, H. Zhou, "The new CCSDS Standard for Low-Complexity Lossless and Near-Lossless Multispectral and Hyperspectral Image Compression", In Proceedings of the ESA On-Board Payload Data Compression Workshop, OBPDC, September 2018.
3. J. Portell, I. Blanes, **M. Hernández-Cabronero**, J. Serra-Sagristà, R. Iudica, A. G. Villafranca, "Prepending Spectral Decorrelating Transforms to FAPEC: A competitive High-Performance approach for Remote Sensing Data Compression", In Proceedings of the ESA On-Board Payload Data Compression Workshop, OBPDC, September 2018.
4. I. Blanes, A. Kiely, **M. Hernández-Cabronero**, J. Serra-Sagristà, "Performance Impact of Parameter Tuning on the Emerging CCSDS-123.0-B-2 Low-Complexity Lossless and Near-Lossless Multispectral and Hyperspectral Image Compression Standard", In Proceedings of the ESA On-Board Payload Data Compression Workshop, OBPDC, September 2018.
5. F. Liu, Y. Lin, **M. Hernández-Cabronero**, E. Ahanonu, M. W. Marcellin, A. Ashok, A. Bilgin, "A Visual Discrimination Model for JPEG2000 Compression", In Proceedings of the IEEE Data Compression Conference, DCC, pp. 424-424, March 2018. [CORE Ranking A\*]
6. L. Prangnell, **M. Hernández-Cabronero**, V. Sanchez, "Coding Block-Level Perceptual Video Coding for 4:4:4 Data in HEVC", In Proceedings of the IEEE International Conference on Image Processing, ICIP, pp. 2488-2492, September 2017. [CORE Ranking B]
7. L. Prangnell, **M. Hernández-Cabronero**, V. Sanchez, "Cross-Color Channel Perceptually Adaptive Quantization for HEVC", In Proceedings of the IEEE Data Compression Conference, DCC, pp. 456-456, April 2017. [CORE Ranking A\*]
8. **M. Hernández-Cabronero**, F. Aulí-Llinàs, V. Sanchez, and J. Serra-Sagristà, "Fast MCT Optimization for the Compression of Whole-Slide Images," in Proc. IEEE International Conference

on Image Processing, ICIP, pp. 2370-2374, September 2016. [CORE Ranking B]

9. S. Álvarez-Cortés, N. Amrani, **M. Hernández-Cabronero**, J. Serra-Sagristà, "Progressive-Lossy-to-Lossless Coding of Hyperspectral Images," in Proc. On-Board Payload Data Compression Workshop, OBPDC, September 2016.
10. **M. Hernández-Cabronero**, V. Sanchez, F. Aulí-Llinàs, J. Serra-Sagristà, "Lossy Compression of Natural HDR Content Based on Multi-Component Transform Optimization," in Proc. IEEE Digital Media Industry and Academy Forum, DMIAF, pp. 23-28, July 2016.
11. **M. Hernández-Cabronero**, F. Aulí-Llinàs, V. Sanchez, and J. Serra-Sagristà, "Transform Optimization for the Lossy Coding of Pathology Whole-Slide Images," in Proc. IEEE Data Compression Conference, DCC, pp. 131-140 March 2016. [CORE Ranking A\*]
12. N. Amrani, J. Serra-Sagristà, **M. Hernández-Cabronero**, and M. Marcellin, "Regression Wavelet Analysis for Progressive-Lossy-to-Lossless Coding of Remote-Sensing Data," in Proc. IEEE Data Compression Conference, DCC, pp. 121-130, March 2016. [CORE Ranking A\*]
13. V. Sanchez, **M. Hernández-Cabronero**, F. Aulí-Llinàs, and J. Serra-Sagristà, "Fast Lossless Compression Of Whole Slide Pathology Images Using HEVC Intra-Prediction," in Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), pp. 1456-1460 March 2016. [CORE Ranking B]
14. **M. Hernández-Cabronero**, V. Sanchez, M. W. Marcellin, J. Serra-Sagristà, "A distortion metric for the lossy compression of DNA microarray images," In proceedings of the IEEE Data Compression Conference, DCC, pp. 171-180, 2013. [CORE Ranking A\*]
15. **M. Hernández-Cabronero**, F. Aulí-Llinàs, J. Bartrina-Rapesta, I. Blanes, L. Jiménez-Rodríguez, M. W. Marcellin, Juan Muñoz-Gómez, V. Sanchez, J. Serra-Sagristà, Zhongwei Xu, "Multi-component compression of DNA microarray images," In Proceedings of the CEDI Workshop on Multimedia Data Coding and Transmission, WMDCT, 2012.
16. **M. Hernández-Cabronero**, Juan Muñoz-Gómez, I. Blanes, J. Serra-Sagristà, M. W. Marcellin, "DNA microarray image coding," In proceedings of the IEEE Data Compression Conference, DCC, pp. 32-41, 2012. [CORE Ranking A\*]
17. **M. Hernández-Cabronero**, I. Blanes, M. W. Marcellin, J. Serra-Sagristà, "A review of DNA microarray image compression," In Proceedings of the International Conference on Data Compression, Communication and Processing, CCP, pp. 139-147, June 2011.

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(Conference rankings provided by CORE, <http://portal.core.edu.au/conf-ranks/>)

## Participation in Projects

1. **Centre National d'Études Spatiales. Invitation to Tender (Reference: Robust Compression of Fixed Length Housekeeping Data)**  
PI: Miguel Hernández-Cabronero (Universitat Autònoma de Barcelona)  
Funded by: CNES  
Position: PI  
Applicability: Sep 2019 – Nov 2019
2. **High-Speed Integrated Satellite Data Systems For Leading EU IndustrY (Hi-FLY)**

Funded by: European Commission  
PI: Joan Serra-Sagrístà  
Position: Researcher  
Applicability: 1/1/2018 – 30/6/2021

3. **Visually Lossless Compression of Whole-Slide Images**

Funded by: NIH, USA  
PI: Dr. Ali Bilgin (University of Arizona)  
Position: Postdoctoral Research Associate  
Applicability: 9/1/2017 – 31/12/2018

4. **Centre National d'Etudes Spatiales. Invitation to Tender  
(Reference: Low-Complexity Near-Lossless Multispectral  
& Hyperspectral Data Compression)**

PI: Ian Blanes, Joan Serra-Sagrístà (Universitat Autònoma de Barcelona)  
Funded by: CNES  
Position: Postdoctoral Associate  
Applicability: 01/10/2017 – 31/12/2018

5. **Coding for Earth Observation Satellites (ICEOS)**

Funded by: Spanish Government  
PI: Dr. Francesc Aulí-Llinàs and Dr. Joan Serra-Sagrístà (Universitat Autònoma de Barcelona)  
Applicability: 1/1/2016 - 31/12/2018

6. **Centre National d'Etudes Spatiales. Technical Study.  
(Reference: Writing of the books for the standard CCSDS-122.1)**

PI: Ian Blanes, Joan Serra-Sagrístà (Universitat Autònoma de Barcelona)  
Funded by: CNES  
Position: Postdoctoral Associate  
Applicability: 01/04/2016 – 31/03/2018

7. **EPSRC First Grant Nov 2013**

Funded by: EPSRC  
PI: Dr. Victor Sanchez (University of Warwick)  
Position: Postdoctoral Research Fellow  
Applicability: 1/7/2015 – 30/09/2016

8. **Santander Bank Iberoamerican Grants for Young Professors and Researchers 2014**

Funded by: Santander Bank  
PI: Dr. Miguel Hernández-Cabronero  
Position: Visiting Researcher  
Applicability: 12/1/2015 – 16/3/2015

9. **FPU 2013 Short Research Stays Grants**

Funded by: Spanish Government  
PI: Dr. Miguel Hernández-Cabronero  
Position: Visiting Researcher  
Applicability: 1/9/2014 – 30/11/2014

10. **Learning Image Features To Encode Visual Information (LIFE-VISION),**

### **TIN2012-38102-C03-03**

Funded by: Spanish Government and FEDER

PI: Dr. Joan Serra-Sagristà (Universitat Autònoma de Barcelona)

Position: Researcher

Applicability: 1/1/2013 – 31/12/2015

#### 11. **FPU PhD Studentships**

Funded by: Spanish Government

PI: Dr. Miguel Hernández-Cabronero

Position: Main Researcher

Applicability: 19/12/2011 – 30/6/2015

#### 12. **Scalable compression and interactive transmission and processing of massive images, TIN2009-14426-C02**

Funded by: Spanish Government and FEDER

PI: Dr. Joan Serra-Sagristà (Universitat Autònoma de Barcelona)

Position: Assistant Researcher

Applicability: 1/1/2010 - 31/12/2012

### Grants and Awards

2018 “Special Award for Doctoral Studies”. Universitat Autònoma de Barcelona. ([certificate](#))

2014 “Iberoamerican Young Teachers and Researchers scholarship for short research stays”. Santander Bank. 5,000€.

2013 “FPU 2013 short research stays program”. Spanish Government. 5,000€.

2011–2015 “FPU 2010 studentship for Ph.D. studies”. Spanish Government. 60,252€.

2009–2010 “Excelent Academic Performance 2009”. Madrid Regional Government. 4,500€.

2008–2009 “Excelent Academic Performance 2008”. Madrid Regional Government. 4,500€.

2007–2008 “Excelent Academic Performance 2007”. Madrid Regional Government. 4,500€.

2006–2007 “Excelent Academic Performance 2006”. Madrid Regional Government. 4,500€.

### Patents

March 2012 “GICI Compression Software Suite”.

Authors: E. Auge; F. Aulí-Llinàs; J. Bartrina-Rapesta; I. Blanes; C. Fernandez-Cordoba; F. García-Vilchez; J. Gonzalez-Conejero; **M. Hernández-Cabronero**; L. Jimenez-Rodriguez; J. L. Monteagudo; J. Muñoz-Gómez; J. E. Sanchez-Moral; J. Santalo-Jordana; J. Serra-Sagristà; Z. Xu.

### Languages

English Full professional proficiency – C2

Spanish Mother tongue – C2

German Fluent – C1

Catalan Fluent – B2