Helena Caminal

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EDUCATION

Ph.D. student
Computer Systems Laboratory, Cornell University, NY, USA — Aug. 2017- Currently
Major: Electrical and Computer Engineering
Advisor: Prof. José F. Martínez

M.S., Master in Innovation and Research in Informatics
Polytechnic University of Catalonia, BarcelonaTECH, Spain — Feb. 2015- Jul. 2017
Concentration: High Performance Computing
THESIS - Vector architectures for Exascale

B.S., Industrial Engineering
Polytechnic University of Catalonia, BarcelonaTECH, Spain — Sep. 2008- Dec. 2014
THESIS - A mobile robotic platform capable of stereo vision based on blob detection
Developed at: IRIDIA-CoDE, Université Libre de Bruxelles, Belgium

RESEARCH EXPERIENCE

Ph.D. student at Computer Systems Laboratory — *August 2017- Currently*
Cornell University, Ithaca, NY, US
Advised by: José F. Martínez

- Exploring novel processing-in-memory (PIM) architectures, using contemporary and emergent memory technologies
- Developing full-stack PIM systems to accelerate large-scale database workloads

Intern in the R&D dept. at ARM — *July- October 2016*
ARM, Cambridge, UK
Advised by: Rekai González-Alberquilla

- Study of the portability of stencil codes on the new ARM vector extension (SVE)
- Learn which semantics are challenging for the instruction set and recommend additions or modifications on the next generation of the instruction set

Research Assistant at Barcelona Supercomputing Center — *July 2015- July 2017*
Barcelona, Spain
Advised by: Mateo Valero, Marc Casas, Miquel Moretó, Juan M. Cebrián

- Master's Thesis: Vector architectures for Exascale
- Design of a microarchitectural solution for predicated vector instructions with sparse masks
- Study the benefits and challenges of a vector-length agnostic ISA
- Evaluation of the feasibility of user-directed vectorization in task-based applications, based on the OmpSs programming model for different Intel SIMD extensions (SSE, AVX2, IMCI and AVX-512)

Bachelor's Thesis *September 2012- September 2013*
IRIDIA-CoDE, Université Libre de Bruxelles, Belgium
Advised by: Carlo Pinciroli

- A Mobile Robotic Platform Capable of Stereo Vision Based on Blob Detection
- Implementation of both hardware and software of a robot with personalized 3D vision capabilities based on an innovative object detection algorithm

Intern at CITCEA-UPC *March-November 2014*
Barcelona, Spain
Advised by: Oriol Gomis

- Power electronics control systems simulation using MATLAB
- Co-design of a simulation environment that analyzes the charge of a DC micro-grid when connecting electric vehicles that charge and discharge the system
- Hardware verification of control circuits for analogue and digital power systems

Intern at The Dataverse *July-September 2014*
Data Science team at Harvard's Institute
for Quantitative Social Science, Cambridge (MA), US
Advised by: Gustavo Durand

- Assist on the development of The Dataverse, an open-source software application that serves as a flexible framework to build repositories to share research data.
- Support on the development of a wide variety of components of the project, using Java, SQL, JavaScript and CSS.
- Participate in brainstorming, technical design and code review meetings.

PUBLICATIONS

- **Helena Caminal**, Kailin Yang, Srivatsa Srinivasa, Akshay Ramanathan, Khalid Al-Hawaj, Tianshu, Wu, Vijay Narayanan, Christopher Batten, José Martínez, "CAPE: A Content-Addressable Processing Engine", (To appear in) The 27th IEEE International Symposium on High-Performance Computer Architecture (HPCA-27), February 2021, Seoul, South Korea.
- Adrià Armejach, **Helena Caminal**, Juan M. Cebrián, Rekai González-Alberquilla, Marc Casas, Miquel Moretó, Chris Adeniyi-Jones, Mateo Valero, "Stencil Codes on a Vector Length Agnostic Architecture", Parallel Architectures and Compilation Techniques (PACT18), November 2018, Limassol, Cyprus. https://doi-org.proxy.library.cornell.edu/10.1145/3243176.3243192
- Adrià Armejach, **Helena Caminal**, Juan M. Cebrián, Rubén Langarita, Rekai González-Alberquilla, Chris Adeniyi-Jones, Mateo Valero, Marc Casas, Miquel Moretó, "Using Arm's scalable vector extension on stencil codes", J Supercomput (2019). https://doi.org/10.1007/s11227-019-02842-5
- **Helena Caminal**, Diego Caballero, Juan M. Cebrián, Roger Ferrer, Marc Casas, Miquel Moretó, Xavier Martorell, Mateo Valero, "Performance and energy effects on task-based parallelized applications", J Supercomput (2018) 74: 2627. https://doi.org/10.1007/s11227-018-2294-9
- Juan M. Cebrián, Adrian Barredo-Ferreira, **Helena Caminal**, Miquel Moretó, Marc Casas, Mateo Valero, "Semi-automatic Validation of Cycle-Accurate Simulation Infrastructures: The Case for GEM5-x86", June 2020, Future Generation Computer Systems, https://doi.org/10.1016/j.future.2020.06.035
- Poster: **Helena Caminal,** "Tips for Improving Energy Efficiency through Task-based Parallelization and User-directed Vectorization", ACACES HiPEAC Summer School 2016, Fiuggi, Italy
- Poster: **Helena Caminal,** "User-Directed Vectorization versus Manual Vectorization on Scientific Applications", 3rd International BSC Doctoral Symposium 2015, Barcelona, Spain

HONORS AND AWARDS

- **Jacobs Scholar Fellowship**, Cornell University, 2017
- **Severo-Ochoa Fellowship**, MIRI, FIB, Polytechnic University of Catalonia, 2015-2017
- **HiPEAC ACACES Summer School Grant**, Fiuggi, Italy, 2016