Alberto García-García

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Interests and Objectives

My main interests are *High Performance Computing* and *Machine Learning*. I am currently active in areas like *3D Deep Learning* and *General-Purpose Computation on Graphics Processing Units (GPGPU)*. My motivation lies on applying all that computing knowledge to solve cross-disciplinary problems. In fact, my current projects involve parallel computing and 3D computer vision problems. My other related passions are physics, scientific simulations, 3D computer graphics, robotics and AI.

Being conscious of my limited knowledge in all those fields, I strive for seizing all the opportunities to learn and improve my skills in those fields and also discover current and future challenges to find my true passion and contribute where I can.

Work/Research Experience

2015-Today
Technician/Research Assistant
Department of Computer Technology, University of Alicante
Working on the SIRMAVED national project (DPI2013-40534-R) which aims to promote the health and welfare of society from the design, development and evaluation of a novel therapy of cognitive rehabilitation for people with acquired brain injury or dependent people. This therapy will be based on the design and use of an intelligent and active monitoring environment system and a social autonomous robot providing interactive stimulation at home.

2015 (Summer)
PRACE Summer Of High Performance Computing Student
Jülich Supercomputing Centre, Forschungszentrum Jülich
Worked on parallel computing on GPUs. The goal was to accelerate, using CUDA, certain parts of the Fast Multipole Method (FMM) used to speed up the calculation of long-range forces in the N-body problem. The work was supervised by Ivo Kabadshow and Andreas Beckmann. Jiri Kraus, from NVIDIA, offered valuable support for the development.

2014–2015
Research Internship
Department of Computer Technology, University of Alicante
Worked on 3D vision algorithms related to object recognition under time constraints using technologies like Kinect 2.0 and CUDA with the Jetson TK1 platform. The research was performed under the direction of José García-Rodríguez and Sergio Orts-Escolano.

2013–2014
Research Internship
Department of Computer Technology, University of Alicante
Worked on computer vision and computational geometry algorithms. Our efforts were directed towards the development of an accelerated variant of the Iterative Closest Point method. The research was supervised by Higinio Mora-Mora and Jerónimo Mora-Pascual.

Educational Background

2015–2016 (Expected) **Master's Degree in Automation and Robotics**
University of Alicante
Master's Thesis: TBD (Deep Learning and 3D Object Recognition)
Supervisors: José García-Rodríguez and Jorge Pomares-Baeza

2011–2015 **Bachelor's Degree in Computer Engineering**
University of Alicante
High Academic Performance Group – Average grade : 9.75/10
Bachelor's Thesis (with Honors): "*Towards a real-time 3D object recognition pipeline on mobile GPGPU computing platforms using low-cost RGB-D sensors*".
Supervisors: José García-Rodríguez and Sergio Orts-Escolano

2014 **Erasmus Intensive Programme: Big Data**
The University of Salford

Honors and Awards

2015 **Best Academic Record in Technology Degrees Award**
Awarded for achieving the best academic record among the students of all technology degrees (University of Alicante, 2011-2015).

2015 **Degree in Computer Engineering Extraordinary Award**
Awarded for achieving the best academic record of the Degree in Computer Engineering (University of Alicante, 2011-2015) with an average grade of 9.75 over 10 points.

2015 **Summer of HPC Ambassador Award**
Awarded with the Best HPC Ambassador Award of the Summer of High Performance Computing programme by PRACE for: "producing excellent blog posts with good writing and a huge reach on a variety of social media including doubling the SoHPC YouTube views. Also for presenting his results in a unique and interesting way that is clear, concise and entertaining for the target audience. His overall work on leading edge technology was of a very high quality."

2014 **CUDA Programming Contest**
Winner of the CUDA Programming Contest organized by the Department of Computer Technology (DTIC) during the IV Workshop of scientific applications and computer vision on graphics processors (JGPU14) for the work entitled "*CUDA Implementation of Kohonen maps*".

Grants

2015 **Research Initiation Grant**
Research collaboration grant to foster the initiation in research tasks to gain knowledge about current scientific and technical problems and possible solution methods during a six month stay (January, 2016 – June, 2016) at the Department of Computer Technology at the University of Alicante co-funded by the *Industrial Informatics and Computer Networks (I2RC)* research group and the *Vicerrectorado de Investigación, Desarrollo e Innovación* of the *University of Alicante*.

2014 **Research Collaboration Grant**
Research collaboration grant for initiation in research tasks during an eight month stay (November, 2014 – June, 2015) at the Department of Computer Technology at the University of Alicante funded by the *Ministerio de Educación, Cultura y Deporte* (MECD) from Spain.

Research

I am currently an intern at the *Industrial Informatics and Computer Networks (I2RC)* research group which belongs to the *Department of Computer Technology (DTIC)* of the University of Alicante. The research collaboration is being supervised by the professor José García-Rodríguez.

Projects Participation

2015 – Today | **SPPEXA/GROMEX** (German Priority Programme 1648)
"Priority Programme Software for Exascale Computing."/"Unified Long-range Electrostatics and Dynamic Protonation for Realistic Biomolecular Simulations on the Exascale"

2014 – Today | **SIRMAVED** (Spanish National Project DPI2013-40534-R)
"Development of a comprehensive robotic system for monitoring and interaction for people with acquired brain damage and dependent people."

Publications

Journals

[j7] **Evaluation of Sampling Method Effects in 3D Non-rigid Registration**. Marcelo Saval-Calvo, Jorge Azorin-Lopez, Andres Fuster-Guillo, Jose Garcia-Rodriguez, Sergio Orts-Escolano, Alberto Garcia-Garcia. Neural Computing and Applications (2016). *(Under review, minor changes).*

[j6] **Multi-sensor 3D Object Dataset for Object Recognition with Full Pose Estimation**. Alberto Garcia-Garcia, Sergio Orts-Escolano, Sergiu Oprea, Jose Garcia-Rodriguez, Jorge Azorin-Lopez, Marcelo Saval-Calvo, Miguel Cazorla. Neural Computing and Applications (2016). *doi:10.1007/s00521-016-2224-9.*

[j5] **Bioinspired Point Cloud Representation: 3D Object Tracking**. Jose Garcia-Rodriguez, Sergio Orts-Escolano, Miguel Cazorla, Vicente Morell, Jorge Azorin, Marcelo Saval, Alberto Garcia-Garcia. Neural Computing and Applications (2015). *(Under review).*

[j4] **Predicción de Solubilidad de Fármacos usando Máquinas de Soporte Vectorial sobre Unidades de Procesamiento Gráfico**. Gaspar Cano, Jose Garcia-Rodriguez, Sergio Orts-Escolano, Alberto Garcia-Garcia, Jorge Peña-Garcia, Alfonso Perez-Garrido, Horacio Perez-Sanchez. Revista Internacional de Métodos Numéricos para Cálculo y Diseño en Ingeniería (2016). *doi:10.1016/j.rimni.2015.12.001.*

[j3] **Interactive 3D object recognition pipeline on mobile GPGPU computing platforms using low-cost RGB-D sensors**. Alberto Garcia-Garcia, Sergio Orts-Escolano, Jose Garcia-Rodriguez, Miguel Cazorla. Journal of Real-Time Image Processing (2015). *(Under review, Major changes).*

[j2] **3D Model Reconstruction using Neural Gas Accelerated on GPUs**. Sergio Orts-Escolano, Jose Garcia-Rodriguez, Jose Antonio Serra-Perez, Antonio Jimeno, Vicente Morell-Gimenez, Miguel Cazorla, Alberto Garcia-Garcia. Applied Soft Computing Journal (2015). *doi:10.1016/j.asoc.2015.03.042.*

[j1] **3D Surface Reconstruction of noisy Point Clouds using Growing Neural Gas: Object/Scene Reconstruction**. Sergio Orts-Escolano, Jose Garcia-Rodriguez, Vicente Morell-Gimenez, Miguel Cazorla, Jose Antonio Serra-Perez, Alberto Garcia-Garcia. Neural Processing Letters (2015). *doi:10.1007/s11063-015-9421-x.*

Conferences and Congresses

[c6] **Towards a Unified CPU/GPU Codebase for Linear Scaling FMM Coulomb Solver.** Alberto Garcia-Garcia, Ivo Kabadshow, Andreas Beckmann. GPU Technology Conference (GTC 2016). *(Accepted talk).*

[c5] **PointNet: A 3D Convolutional Neural Network for Real-Time Object Class Recognition.** Alberto Garcia-Garcia, Francisco Gomez-Donoso, Jose Garcia-Rodriguez, Sergio Orts-Escolano, Miguel Cazorla, Jorge Azorin-Lopez. International Joint Conference on Neural Networks (IJCNN 2016). *(Under review).*

[c4] **Accelerating an FMM-based Coulomb Solver with GPUs.** Alberto Garcia-Garcia, Ivo Kabadshow, Andreas Beckmann. SPPEXA Symposium proceedings, Lecture Notes in Computational Science and Engineering (LNCSE 2016). (Under review, minor changes).

[c3] **Efficient Matching for the Iterative Closest Point Algorithm by using Low Cost Distance Metrics.** Higinio Mora-Mora, Jeronimo Mora-Pascual, Pablo Martinez-Gonzalez, Alberto Garcia-Garcia. International Conference on Applied Mathematics and Computational Methods in Engineering (AMCME 2015).

[c2] **Optimized Representation of 3D Sequences using Neural Networks**. Sergio Orts-Escolano, Jose Garcia-Rodriguez, Vicente Morell, Miguel Cazorla, Alberto Garcia-Garcia, Sergiu Ovidiu-Oprea. International Work-conference on the Interplay between Natural and Artificial Computation (IWINAC 2015).

[c1] **Convergence Analysis and Validation of low Cost Distance Metrics for Computational Cost Reduction of the Iterative Closest Point algorithm**. Higinio Mora-Mora, Jerónimo Mora-Pascual, Pablo Martínez-González, Alberto García-García. Mathematical Modelling in Engineering & Human Behaviour (MMEHB 2014).

Poster Presentations

[p1] **One Kernel To Rule Them All. Performance-Portable FMM for CPUs and GPUs.** Ivo Kabadshow, Andreas Beckmann, Alberto Garcia-Garcia. GPU Technology Conference (GTC 2016). *(Accepted poster).*

Societies/Memberships

- **IV&L Net**: Member of the European Network on Integrating Vision and Language, ICT COST Action IC1307.
- **HiPEAC**: Member of the European Network of Excellence on High Performance and Embedded Architecture and Compilation.
- **AERFAI**: Member of the Spanish Association on Pattern Recognition and Image Analysis.
- **DTIC**: Member of the Council of the Department of Computer Technology, University of Alicante (Student representative).

Courses and training

- **Deep Learning**
  Online at Udacity, 2016.
- **Machine Learning (Ongoing)**
  Online at Coursera, 2016.

- **Summer course on scientific applications and computer vision on graphics processors**
  at the University of Alicante, 2013.
- **Workshop on scientific applications and computer vision on graphics processors**
  at the University of Alicante, 2013.
- **Interactive 3D Graphics (Highest Distinction)**
  Online at Udacity, 2013.
- **Functional Programming Principles in Scala (Highest Distinction)**
  Online at Coursera, 2013.

Languages

English	**Fluent (B2+)**
Spanish	Native

Reference List

- **Jose Garcia-Rodriguez** (Current supervisor)
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  Department of Computer Technology and Computation
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