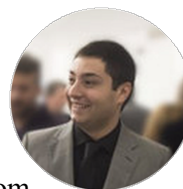


Curriculum Vitae

Carlos Cetina

Associate Professor



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EDUCATION

- 2010 PhD in Computer Science, Excellent Cum Laude, Universitat Politècnica de València (UPV), Spain. Supervisors: Prof. Vicente Pelechano and Dr. Joan Fons
- 2009 MSc in Unassailable IT-systems, University of Oslo, Norway.
- 2008 MSc in Software Engineering, UPV, Spain.
- 2006 Computer Science, **best in his promotion**, UPV, Spain.

POSITIONS & GRANTS

- 2010 – 2021 Assistant Prof. → Tenure-track → Associate Prof., Universidad San Jorge (USJ), Spain.
- 2010 European Research Consortium for Informatics (ERCIM) Fellowship for Institut National de Recherche en Informatique et en Automatique (INRIA), France. Accepted other position.
- 2007 – 2010 PhD student, FPU Grant (the most competitive grant in Spain to pursue a PhD), UPV, Spain.
- 2004 – 2006 Collaborator in PROS Research Center, Excellence Grant for top-notch students, UPV, Spain.

RESEARCH STAYS WITH LIVE COLLABORATIONS

- 2019 Sorbonne Université, Paris, France, 1 month, Dr. T. Ziadi.
- 2018 University College London, UK, 7 months, Prof. E. T. Barr, Prof. F. Sarro, Prof. M. Harman.
- 2009 University of Oslo, Norway, 4 months, Prof. Ø. Haugen.
- 2008 University of Oslo, Norway, 3 months, Prof. Ø. Haugen.

SUPERVISION OF STUDENTS

- PhD 5 past + 4 ongoing at University College London, University of Oslo, and UPV.
- Master 10 past + 1 ongoing at USJ and KU Leuven. Degree 31 past + 3 ongoing at USJ and UPV.

INSTITUTIONAL RESPONSIBILITIES

- 2012-2016 & 2019-2021 Designer and Director of the MSc in Advanced Software Engineering, USJ.
- 2017 – 2019 Director of the BSc in Computer Science, USJ.

TEACHING ACTIVITIES

- 2012 – 2021 Model Driven Engineering I and II, MSc in Advanced Software Engineering, USJ.
- 2012 – 2021 Software Product Lines, MSc in Advanced Software Engineering, USJ.
- 2010 – 2017 Software Engineering, Databases, and Operating Systems, BSc Computer Science, USJ.

EUROPEAN PATENTS LICENSED TO INDUSTRY

- 2013 EP2575085A1 (B1), System, method, and product for managing interactions of a person with objects, licensed to Hiberus Tecnología (Software development industry) www.hiberus.com/en.
- 2020 20382150.9 – 1210, Method and system for automatic synthesis of videogame assets, licensed to Kraken Empire (Video game development industry) <http://www.krakenempire.com> Extended to PCT.

RESEARCH LEADERSHIP

Founder and PI of the SVIT Research Group (15 researchers) classified as a 'Reference' (maximum level) by the Spanish research agency. Research team website: svit.usj.es

REVIEWING ACTIVITIES

Journal Reviewer (Public Publons profile available: <https://publons.com/researcher/1522745/carlos-cetina/>)
IEEE Transactions on Evolutionary Computation • Information and Software Technology • Journal of Systems and Software • Data & Knowledge Engineering • Empirical Software Engineering • IEEE Transactions on Software Engineering • Software and Systems Modeling • Business & Information Systems Engineering • Computer Standards and Interfaces • IEEE Access • Journal of Software: Evolution and Process • Expert Systems with Applications • Journal of Software Engineering Research and Development • Software Practice and Experience • Transactions on Service Computing

Program Committee of Conferences (technical papers, workshops, tutorials, or artifacts)

Search-based Software Engineering • Model Driven Engineering Languages and Systems • Automated Software Engineering • Software Engineering in Society • Software Product Line Conference • Reverse Variability Engineering • Modelling Foundations and Applications • Feature Oriented Software Development • Models@run-time • Ibero-american Software engineering Conference • Spanish Software Eng. Conference

CAREER RECORD

- **TOP 1** author on the subtopic of feature location (one of the most frequent maintenance tasks undertaken by software developers [1]), **TOP 23** author on the topic of software and models (the topic includes 6138 papers). The TOP 1-22 authors are older than me, according to Web of Science in the last five years. See the queries and the results at http://carloscetina.com/erc/wos_cetina.png
- Nominated (March 2021) for **Honorary Member** of Computer Science Department of University College London (tenth position of QS World University Rankings 2021).
- **22 publications in high relevance journals** (JCR Q1 and Q2), which include IST, JSS, TSE, AUSE, SoSyM, TEVC, and COMPUTER. **Eight of these publications are in the TOP 3** of the Google Scholar Ranking of Software Systems [2], and **twelve are in the TOP 15**.
 - TEVC (IEEE Transactions on Evolutionary Computation) was in the **first position** of the Computer Science, Theory & Methods category of JCR when I submitted the paper.
 - SoSyM (Software and Systems Modeling) is the **flagship** journal of the modelling community.
 - IST (Information and Software Technology) and JSS (Journal of Software and Systems) are in the **best positions** of software journal publications in CRISTin [3] and Google Scholar Ranking of Software Systems.
 - TSE (IEEE Transactions on Software Engineering) and AUSE (Automated Software Engineering) are recognized as **excellent journals in the field**. TSE is usually the software journal in the best position of the JCR ranking.
 - The IEEE Computer Society describes COMPUTER as “the monthly **flagship** publication of the IEEE Computer Society”.
- I am also adopting the **Journal-First model**. As a matter of fact, some instances of my journal-first papers have already been accepted at TOP software engineering conferences such as ASE and ICSE.
- My publications also include the following **27 relevant papers**: 3 JCR Q3, 13 GII-GRIN-SCIE C2, 6 CORE A, and 6 Qualis A2. Also included are leading conferences (on key topics): SPLC (on Software Product Lines), MODELS (on Software Models), and CAISE (on Information Systems).
- **Number of citations = 1108 and h-index = 17** according to Google Scholar.
- Most of the publications have been produced **during my time as PI**. More precisely, this is the case for 81.4% of my journal papers (including the best impact factors) and 65.3% of my conference papers (including the best classified).
- My publication record is in the **98th percentile** for researchers of the venues of Software Systems of the Google Scholar Ranking. Learn more at http://carloscetina.com/erc/easy_scholar_ranking.png
- The **world-class industry leaders** of Bosch/Siemens (induction hob division) and CAF (train manufacturer) have adopted results of my research.
- My research attracted the attention of (and I was interviewed by) national [4] and regional news [5].
- My research received awards from large entities: Microsoft, Telefonica, KNX, and HERALDO.
- I was Program Co-chair of ICSR 2018, Workshop Co-chair of SPLC 2019, and Tutorial Co-chair of SPLC 2020.
- I am the General Co-chair of the CAISE conference in 2023, which will be held in the city of my current university with an estimate of 500 participants.

PROJECTS

As a PhD student, I participated in one project (SESAMO) of the Spanish Research Council and one European project (OSAMI COMMONS). With my own research group, **I have been the PI of the following projects:**

REENGINERING 12-14	Bosch/Siemens (Private body)	≈70K	Kickstarted my own research group. Radical new approach for software feature location.
VARIAMOS 14-16	Spanish Research Council (National)	≈50K	Broaden localization to bugs and requirements. First approach that locates bugs in models.
VAR-MINING 14-15	CAF (Private body)	≈60K	Unprecedented use of long-living architecture traits as guidance for multi-objective feature location.
ReVaMP² 16-19	ITEA (European)	≈320K	First open framework to bridge evolutionary computation and model driven engineering in the context of model fragment location.
COLLABOR 17-19	Aragon Agency (Regional)	≈50K	In complex scenarios, no expert knows the whole feature. First time collaborative feature location.
ALPS 19-21	Spanish Research Council (National)	≈33K	Groundbreaking work on bridging Machine Learning and software models.
PHOENIX 20-22	ITEA (European)	≈300K	Approved in Europe, funding problems in Spain, might reapply in the future.

Early achievements track-record

At the beginning of 2010, like many other fresh PhD graduates, I faced the ‘now what’ dilemma. This dilemma included the dichotomy between continuing to work for my PhD supervisors (in the strongest research center for software models in Spain), or starting a postdoc at INRIA (one of the most prestigious research centers for computer science in Europe) thanks to the ERCIM fellowship grant that I had just achieved.

What sets me apart is that I rejected both alternatives. At the time, it was a high-risk bet. During my PhD work, I came to the conclusion that software models needed to be combined with computational intelligence to truly reshape software development. Nevertheless, software models and computational intelligence seemed worlds apart, and very few researchers had flirted with that idea. My resolution was to go for a position that allowed me to do research on that topic. After I got a position with research freedom at a young university (Universidad San Jorge), the first thing I did was to identify an open problem where the combination of software models and computational intelligence could make the difference: initiating industrial software product lines [6]. Software product lines promote planned reuse to achieve 10x gains in time-to-market time (in comparison to opportunistic reuse), but the prohibitive price to pay is locating the software features for systematic reuse by reviewing years of software projects in a predominantly manual fashion. I pitched my idea to world-class industry leaders and **got the attention of Bosch/Siemens**. As a result, the company decided to **provide me with funding for kickstarting my own research group**. I also applied for and achieved funding through the highly competitive research program of the Spanish Research Council. I was told that it was the first time ever that a new team consisting of a young PI and two Master’s students accomplished this feat. In the subsequent years, my research has attracted world-class industry leaders (CAF trains, Teltronic onboard communication devices, and Taim Weser tower cranes, among others). I have received more research grants, including a second national project, a regional project, and two European projects. I was the PI in all cases, while the rest of the members of my group were my PhD students.

With regard to PhD students, I did not consider the lack of a PhD program at my university as an obstacle, on the contrary, I saw it as an opportunity. First, for a period of six years, **I designed and directed a Master’s program** that included my research interests. Then, I contacted key research groups and started collaborations in the form of thesis co-supervisions in their PhD programs (and research stays in the second and fourth cases):

- University of Oslo with Ø. Haugen. A TOP software model researcher who is deeply involved in OMG modelling standards (CVL, UML, SysML) but without considering computational intelligence.
- University College London with M. Harman. One of the strongest software engineering researchers. He leads the work on Search-based Software Engineering, but without considering software models.
- My alma mater, Universitat Politècnica de València with O. Pastor. He leads work on conceptual modelling but without considering computational intelligence.
- Sorbonne University with T. Ziadi. He was leading work on information retrieval to locate features on source code but without considering either software models or computational intelligence.

There is no doubt that the above giants influenced my work, but it is also true that it was my leadership that shaped how to bridge software models with computational intelligence. In fact, all of my PhD students worked shoulder to shoulder with me in the context of my projects, and so far five have already finished their PhD studies (two at the University of Oslo). Three more should finish soon, and the ninth was recently accepted to the PhD program of University College London. It is worth mentioning that **my group is the only brand-new group created in the context of software engineering research in the last ten years in Spain** (according to the Spanish Computer Science Society [7]). Despite the fact that the economic crisis hit the Spanish research ecosystem very badly, my group managed to grow to 15 researchers and was evaluated by the research agency of my region as a **‘reference’** (the maximum possible distinction for a research group). All of this was achieved without any involvement on the part of my PhD supervisors.

In the end, the research goal was accomplished. My **feature location approaches** [8]–[11] **obtained much better results than previous works** [12], [13] (excellent vs unacceptable according to the Hayes *et al.* scale [14], [15]). I produced groundbreaking contributions to bridge software models and computational intelligence (e.g., the first metamodel-level encodings for computational intelligence [16], [17]). My work successfully reengineered decades of software of world-class industry leaders (Bosch/Siemens and CAF) [8], [10], [11]. As a result, I was invited to give the keynote address at the most relevant forum for feature location (REVE) [18].

Recently, **I made a breakthrough** on what I coined **‘genetic modelling’** [19] (again at the intersection of software models and computational intelligence) where I turned ten months of developer work into five hours of unattended time in a case study in the video games domain. This research was covered by national news [4]. I applied for a **European patent** (actually, it is my second European patent), and extended it to a **PCT patent**.

Below, I highlight ten of my papers (gray = work as PhD student; white = work as PI; TOP n = position on Google Scholar Ranking of Software Systems; Qn = JCR quartile).

 <p>TOP -, Q1</p>	<p>C. Cetina, P. Giner, Joan (Jo) Fons, V. Pelechano, “Autonomic Computing through Reuse of Variability Models at Runtime: The Case of Smart Homes,” <i>Computer</i> 42(10): 37-43, 2009.</p>	<p>The weaving between the MAPE loop from autonomic computing and models. According to a recent survey [20], this was adopted by subsequent works in the field. (Representative of my PhD work)</p>
 <p>TOP -, Q1</p>	<p>Jaime (Ja) Font, L. Arcega, Ø. Haugen, C. Cetina, “Achieving feature location in families of models through the use of search-based software engineering,” <i>IEEE Transactions Evolutionary Computation</i>, 22(3): 363-377, 2018.</p>	<p>Information retrieval guiding the search of different evolutionary strategies. This was fundamental for locating relevant model fragments.</p>
 <p>TOP 2, Q1</p>	<p>C. Cetina, Ja. Font, L. Arcega, F. Pérez, “Improving feature location in long-living model-based product families designed with sustainability goals,” <i>J. Syst. Softw.</i> 134: 261-278, 2017.</p>	<p>Multi-objective search. A new research direction for architecture sustainability: exploiting sustainability traits as objectives.</p>
 <p>TOP 3, Q1</p>	<p>F. Pérez, R. Lapeña, Ja. Font, C. Cetina, “Fragment retrieval on models for model maintenance: Applying a multi-objective perspective to an industrial case study,” <i>Inf. Softw. Technol.</i> 103: 188-201, 2018.</p>	<p>Differences among maintenance activities. Despite the fact that all of the analyzed maintenance documents use natural language, they should be treated differently.</p>
 <p>TOP 12, Q2</p>	<p>L. Arcega, Ja. Font, Ø. Haugen, C. Cetina, “An approach for bug localization in models using two levels: model and metamodel,” <i>Softw. Syst. Model.</i> 18(6): 3551-3576, 2019.</p>	<p>Search that leverages the metamodel level for bug localization. According to a survey on Bug Localization [21], no precedent work considered models as the source of bugs.</p>
 <p>TOP -, Q2</p>	<p>F. Pérez, Ja. Font, L. Arcega, C. Cetina, “Collaborative feature location in models through automatic query expansion,” <i>Automated Software Engineering</i>, 26(1): 161-202, 2019.</p>	<p>In-home crowdsourcing for location. Reviewers acknowledged that this paper opened a new dimension for feature location: collaboration.</p>
 <p>TOP 2, Q2</p>	<p>A. C. Marcén, R. Lapeña, O. Pastor, C. Cetina, “Traceability Link Recovery between Requirements and Models using an Evolutionary Algorithm Guided by a Learning to Rank Algorithm,” <i>J. Syst. Softw.</i> 163: 110519, 2020.</p>	<p>Machine learning to guide the search. One of the first works on bridging machine learning and software models.</p>
 <p>TOP 6, Q1</p>	<p>F. Pérez, T. Ziadi, C. Cetina, “Utilizing automatic query reformulations as genetic operations to improve feature location in software models,” <i>IEEE Transactions on Software Engineering</i>, 2021.</p>	<p>The first time that genetic operations exploit models instead of using widespread crossover and mutation. To the research community: We can do better with models!</p>
 <p>TOP 2, Q2</p>	<p>D. Blasco, Ja. Font, M. Zamorano, C. Cetina, “An evolutionary approach for generating software models: The case of Kromaia in Game Software Engineering,” <i>J. Syst. Softw.</i> 171: 110804, 2021.</p>	<p>Genetic modelling was coined. Limited to the peculiarities of the video game domain, we significantly accelerated development.</p>
 <p>TOP 12, Q2</p>	<p>Ja. Font, L. Arcega, Ø. Haugen, C. Cetina, “Handling nonconforming individuals in search-based model-driven engineering,” <i>Softw. Syst. Model.</i>, 2021.</p>	<p>Open framework for manipulating model fragments in searches. We proved that “broken” model fragments can be part of the solution.</p>

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