Boris Leonardo Almonacid Gutiérrez

1 Contact

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Marital status : Married **Nationality** : Chilean

Google Scholar : `https://scholar.google.cl/citations?user=Ck_ouu4AAAAJ&hl=en`
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Publons : `http://publons.com/a/1543677/`

2 Education

Pontifical Catholic University of Valparaíso, Valparaíso, Chile.

2015–2018	**PhD in Computer Engineering** Emphasis on combinatorial optimisation, evolutionary algorithms, metaheuristics, heuristics, simulation, evolutionary algorithms, swarm intelligence, local search, exploration-exploitation, and industrial problems. Thesis: Andean Condor Algorithm: A new metaheuristic inspired by nature to solve cell formation problems. Internship: Research Internship in MiniZinc Group, University of Melbourne, Melbourne, Australia, September to December 2017.
2015–2016	**Master in Computer Science**
2011–2013	**Master in Engineering Informatics** Emphasis on open-pit mining, planning, constraint programming, and optimisation. Thesis: Resolve long-term mining planning problems in open-pit mines with constraint programming.
2013	**Diploma in Management Control**
2006-2010	**Degree in Engineering Informatics**

3 Scientific Activities

3.1 Fields of Interest

- Metaheuristic Generation, Evolutionary Algorithms, Metaheuristics, Swarm Intelligent, Stochastic Algorithms, Constraint programming, Optimisation problems, Industrial problems.

- Artificial Intelligence, Machine Learning, Cellular Automaton, Agent systems, Prey-Predator Models.

- Biodiversity Conservation Problems, Global Change problems, Sustainable Development Goals.

- Music Generation, Digital Art, Info-graphics, Scientific communication.

3.2   Research Awards

2016   **Developing Nations Research Awards**   Animal Behavior Society 2016
                Research: Predict flight patterns of the Andean Condor (Vultur gryphus).
                Url: www.animalbehaviorsociety.org/NEWSLETTERS/61-2/awardees.php.

3.3   Competitions

2024   **First Place**   Genetic and Evolutionary Computation Conference
                Competition: Star Discrepancy Competition.
                Results: https://gecco-2024.sigevo.org/Competition-Awards

2024   **Second Place**   Genetic and Evolutionary Computation Conference
                Competition: Anytime Algorithms for Many-affine BBOB Functions.
                Results: https://gecco-2024.sigevo.org/Competition-Awards

2023   **First Place**   Genetic and Evolutionary Computation Conference
                Competition: Star Discrepancy Competition.
                Track: High-Dimensional Numerical Track,
                Results: https://gecco-2023.sigevo.org/Competition-Awards

3.4   Research Projects

2020-2022   **Principal Investigator**
                Project name: Automatically Create Evolutionary Metaheuristic Algorithms Using Reinforcement Learning.
                One published scientific article.

2016-2018   **Principal Investigator**
                Project name: Selection of a biodiversity conservation area.
                One published scientific article.

2017-2019   **Principal Investigator**
                Project name: Metaheuristic algorithms with cellular automaton in discrete worlds.
                One published scientific article and one published scientific conference.

2016-2018   **Responsible Researcher - Thesis Project**
                Project name: Behaviour patterns of the Andean Condor.
                One published scientific article.

3.5   Voluntary Activities

2020 - 2021   **Voluntary Research for Covid-19**   CoronaWhy
                I have worked as a volunteer researcher at the CoronaWhy group (www.coronawhy.org), which is a globally distributed research organisation that attempts to answer key questions related to COVID-19. List of contributions currently made:

                - Hackaton EUvsVirus: Control panel to show bed indicators at the country level. Case study: Switzerland.
                Project description:
                https://devpost.com/software/dashboard-for-displaying-bed-indicators-at-the-country-level.
                Available online: https://switzerlandbedsdashboard.herokuapp.com/

                - Show Covid-19 research on Twitter.
                Project description:
                https://devpost.com/software/show-covid19-research-on-twitter.
                Available online: https://twitter.com/covid19articles

4   Academic Experience

2015–2017   **Co-Advisor (Co-Supervisor)** Pontifical Catholic University of Valparaíso, Valparaíso, Chile
Duties and responsibilities: Support students' supervision in the evolutionary meta-heuristic algorithm projects, both in the conceptual and technical parts.

List of thesis projects:

- Research:
  Using African Buffalo Optimization for solving cell formation problems.
  Student: Alberto Felipe Cabrera Morales.

- Research:
  Using Wolf Search Algorithm for solving cell formation problems.
  Student: Patricio Antonio Fonseca López.

- Research:
  Using Egyptian Vulture for solving cell formation problems.
  Student: Fabian Andrés Aspée Encina.

- Research:
  Using Flower Pollination Algorithm for solving cell formation problems.
  Students: Michele Marco De Conti Rivara and Ronald Andrés Rubio Hurtado.

- Research:
  Using Cuckoo Search to solve cell formation problems.
  Students: Ana Elizabeth Jaime Bernal and Maykol Andrés Ramírez González.

- Research:
  Using Artificial Bee Colony for solving cell formation problems.
  Students: Leandro Alexander Vásquez Mora and Roberto Zulantay Arias.

- Research:
  Using Big Bang–Big Crunch for solving cell formation problems.
  Student: Edgardo Andres Zelada Segovia.

Achievements:
- Based on the results of the research projects, it has been possible to publish a scientific article and present four international peer-review conferences.

2008   **Teaching Assistant**   Pontifical Catholic University of Valparaíso, Valparaíso, Chile
Carry out support activities for undergraduate teachers for the different activities that are developed in the courses.

Duties and responsibilities:

- Teaching Assistant of Logic Programming course, 2008.
- Teaching Assistant of Logic Programming course, Students exchange program, 2008.
- Teaching Assistant of Computer Architecture course, 2008.

5   Publications

Article in Peer-Reviewed Journal

[1] **Almonacid, Boris**. "AutoMH: Automatically Create Evolutionary Metaheuristic Algorithms Using Reinforcement Learning". In: Entropy 24.7 (2022), p. 957.

[2] **Almonacid, Boris**, Fabián Aspée and Francisco Yimes. "Autonomous Population Regulation Using a Multi-Agent System in a Prey−Predator Model That Integrates Cellular Automata and the African Buffalo Optimization Metaheuristic". In: Algorithms 12.3 (2019), p. 59.

[3] **Almonacid, Boris** and Ricardo Soto. "Andean Condor Algorithm for cell formation problems". In: Natural Computing 18.2 (2019), pp. 351−381.

[4] **Almonacid, Boris**, Juan Reyes-Hagemann, Juan Campos-Nazer and Jorge Ramos-Aguilar. "Selecting a biodiversity conservation area with a limited budget using the binary African buffalo optimisation algorithm". In: IET Software 12.2 (2017), pp. 96−111.

[5] **Almonacid, Boris**, Fabián Aspée, Ricardo Soto, Broderick Crawford and Jacqueline Lama. "Solving the manufacturing cell design problem using the modified binary firefly algorithm and the egyptian vulture optimisation algorithm". In: IET Software 11.3 (2016), pp. 105−115.

[6] Ricardo Soto, Broderick Crawford, **Almonacid, Boris** and Fernando Paredes. "Efficient parallel sorting for migrating birds optimization when solving machine-part cell formation problems". In: Scientific Programming 2016 (2016), p. 21.

International Peer-Reviewed Conferences-Proceedings

[1] **Almonacid, Boris**. "Simulation of a Dynamic Prey-Predator Spatial Model Based on Cellular Automata Using the Behavior of the Metaheuristic African Buffalo Optimization". In: International Work-Conference on the Interplay Between Natural and Artificial Computation. Springer, Cham. 2017, pp. 170−180.

[2] **Almonacid, Boris**, Ricardo Soto and Broderick Crawford. "Comparing three simple ways of generating neighboring solutions when solving the cell formation problem using two versions of migrating birds optimization". In: 2017 17th International Conference on Computational Science and Its Applications (ICCSA). IEEE. 2017, pp. 1−9.

[3] Ricardo Soto, Broderick Crawford, Rodrigo Olivares, Héctor Ortega and **Almonacid, Boris**. "An Imperialist Competitive Algorithm to Solve the Manufacturing Cell Design Problem". In: Proceedings of the Computational Methods in Systems and Software. Springer, Cham. 2017, pp. 102−113.

[4] Ricardo Soto, Broderick Crawford, Leandro Vásquez, Roberto Zulantay, Ana Jaime, Maykol Ramírez and **Almonacid, Boris**. "Solving the Manufacturing Cell Design Problem Using the Artificial Bee Colony Algorithm". In: International Workshop on Multi-disciplinary Trends in Artificial Intelligence. Springer, Cham. 2017, pp. 473−484.

[5] Ricardo Soto, Broderick Crawford and **Almonacid, Boris**. "Efficient leader exchange for migrating birds optimization when solving machine-part cell formation problems". In: 2016 11th Iberian Conference on Information Systems and Technologies (CISTI). IEEE. 2016, pp. 1−7.

[6] Ricardo Soto, Broderick Crawford, **Almonacid, Boris**, Stefanie Niklander and Eduardo Olguín. "Optimization for UI Design via Metaheuristics". In: International Conference on Human-Computer Interaction. Springer, Cham. 2016, pp. 150−154.

[7] Ricardo Soto, Broderick Crawford, César Carrasco, **Almonacid, Boris**, Victor Reyes, Ignacio Araya, Sanjay Misra and Eduardo Olguín. "Solving manufacturing cell design problems by using a dolphin echolocation algorithm". In: international conference on computational science and its applications. Springer, Cham. 2016, pp. 77−86.

[8] Ricardo Soto, Broderick Crawford, Ana Jaime, Maykol Ramírez, **Almonacid, Boris**, Leandro Vásquez and Roberto Zulantay. "Solving the Manufacturing Cell Design Problem Using the Cuckoo Search". In: 2016 Fifteenth Mexican International Conference on Artificial Intelligence (MICAI). IEEE. 2016, pp. 123−129.

[9] Ricardo Soto, Broderick Crawford, Jacqueline Lama and **Almonacid, Boris**. "A firefly algorithm to solve the manufacturing cell design problem". In: 2016 11th Iberian Conference on Information Systems and Technologies (CISTI). IEEE. 2016, pp. 1−7.

[10] Ricardo Soto, Broderick Crawford, Rodrigo Olivares, Michele De Conti, Ronald Rubio, **Almonacid, Boris** and Stefanie Niklander. "Resolving the manufacturing cell design problem using the flower pollination algorithm". In: International Workshop on Multi-disciplinary Trends in Artificial Intelligence. Springer, Cham. 2016, pp. 184−195.

[11] Ricardo Soto, Broderick Crawford, Carolina Zec, Andrés Alarcón and **Almonacid, Boris**. "A bat algorithm to solve the manufacturing cell design problem". In: 2016 11th Iberian Conference on Information Systems and Technologies (CISTI). IEEE. 2016, pp. 1−7.

[12] Ricardo Soto, Broderick Crawford, **Almonacid, Boris** and Fernando Paredes. "A migrating birds optimization algorithm for machine-part cell formation problems". In: Mexican International Conference on Artificial Intelligence. Springer, Cham. 2015, pp. 270−281.

[13] Ricardo Sotoyz, Broderick Crawford, **Almonacid, Boris**, Fernando Paredes and Ernesto Loyola. "Machine-part cell formation problems with constraint programming". In: 2015 34th International Conference of the Chilean Computer Science Society (SCCC). IEEE. 2015, pp. 1−4.

[14] Ricardo Soto, Broderick Crawford, **Almonacid, Boris**, Franklin Johnson and Eduardo Olguín. "Solving Open-Pit Long-Term Production Planning Problems with constraint programming a performance evaluation". In: 2014 9th International Conference on Software Engineering and Applications (ICSOFT-EA). IEEE. 2014, pp. 70−77.

Posters

[1] **Almonacid, Boris**. "Conceptualization of hummingbird maneuvers into a bio-inspired algorithm to solve optimization problems". The 58th Annual Conference of the Animal Behavior Society. 2021. URL: `https://www.animalbehaviorsociety.org/virtual/?page=presentation&session_id=76&presentation_id=803`.

[2] Ricardo Soto, Broderick Crawford, Leandro Vásquez, Roberto Zulantay, Ana Jaime, Maykol Ramirez and **Almonacid, Boris**. "Solving the Manufacturing Cell Design Problem using Artificial Bee Colony with Adaptive Population". 2017.

Preprints

[1] Boris Almonacid. Towards an automatic optimisation model generator assisted with generative pre-trained transformer. 2023.

[2] **Almonacid, Boris**. AutoMH: Automatically Create Evolutionary Metaheuristic Algorithms Using Reinforced Learning. Jan. 2021. DOI: `10.20944/preprints202101.0048.v1`. URL: `https://www.preprints.org/manuscript/202101.0048/v1`.

[3] **Almonacid, Boris**. Preliminary experiments with the Andean Condor Algorithm to solve problems of Continuous Domains. Apr. 2019. DOI: `10.7287/peerj.preprints.27678v1`. URL: `https://doi.org/10.7287/peerj.preprints.27678v1`.

[4] **Almonacid, Boris**. Resolve the cell formation problem in a set of three manufacturing cells. Apr. 2019. DOI: `10.7287/peerj.preprints.27692v1`. URL: `https://doi.org/10.7287/peerj.preprints.27692v1`.

[5] **Almonacid, Boris**. Resolving the optimal selection of a natural reserve using the particle swarm optimisation by applying transfer functions. May 2018. DOI: `10.7287/peerj.preprints.26941v2`. URL: `https://doi.org/10.7287/peerj.preprints.26941v2`.

Peer Review Activities

2016-2019	**Scientific Committee**
	• IWINAC 2019 - International Work-Conference on the Interplay between Natural and Artificial Computation
	• CISTI 2020, 2019, 2018, 2017, and 2016 - Iberian Conference on Information Systems and Technologies.
2015-2016	**Evaluator of research projects.**
	• Animal Behavior Society 2020, 2016, 2015, and 2022.

2016-2021	**Journal Referee (Peer Review)**

- Applied Science (ISSN 2076-3417) - MDPI, May 2022.
- Cognitive Computation - Springer, January 2022.
- IJERPH International Journal of Environmental Research and Public Health (ISSN 1660-4601) - MDPI, May 2021.
- Molecules (ISSN 1420-3049) - MDPI, May 2021.
- ISPRS International Journal of Environmental Research and Public Health (ISSN 1660-4601), April 2021.
- Remote Sensing (ISSN 2072-4292), April 2021.
- IJGI International Journal of Geo-Information (ISSN 2220-9964), March 2021.
- Cancers (ISSN 2072-6694), March 2021.
- IJGI International Journal of Geo-Information (ISSN 2220-9964), March 2021.
- Informatics (ISSN 2227-9709), February 2021.
- IJGI International Journal of Geo-Information (ISSN 2220-9964), February 2021.
- IJGI International Journal of Geo-Information (ISSN 2220-9964), January 2021.
- IJGI International Journal of Geo-Information (ISSN 2220-9964), December 2020.
- Diversity (ISSN 1424-2818). November 2020.
- Remote Sensing (ISSN 2072-4292) - MDPI, November 2020.
- Remote Sensing (ISSN 2072-4292) - MDPI, October 2020.
- Sensors - MDPI, September 2020.
- Remote Sensing (ISSN 2072-4292) - MDPI, August 2020.
- Remote Sensing (ISSN 2072-4292) - MDPI, June 2020.
- Sustainability (ISSN 2071-1050), April 2020.
- Information - MDPI, March 2020.
- Energies - MDPI, February 2020.
- IEEE Access, September 2019.
- Journal of Advances in Mathematics and Computer Science, Science Domain International, September 2019.
- Current Science, April 2019.
- Journal of Engineering and Technological Sciences, Institut Teknologi Bandung, 2019.
- Scientific Programming, Hindawi, 2018.
- Current Journal of Applied Science and Technology, Science Domain International, 2018.
- Mathematical Problems in Engineering, Hindawi, 2017.
- British Journal of Mathematics & Computer Science, Science Domain International, 2017.
- Computers & Operations Research, Elsevier, 2017.
- Computational Intelligence, Willey.
- Journal of Scientific Research and Reports, Science Domain International, 2016.

2015-2016	**Conference Referee**

- ICEIS 2016 - 18th International Conference on Enterprise Information Systems.
- CLEI 2016 - 35th International Conference of the Chilean Computer Science Society.
- ICEIS 2016 - 18th International Conference on Enterprise Information Systems.
- ELA-ES 2015 - The Second Latin-American School on Software Engineering.

2019-2020	**Scientific Newspaper**

- RISTI - Iberian Journal of Information Systems and Technologies, ISSN: 1646-9895. Edition 24, 26, 27, 28, 29, 30, 34, and 35.

6 Professional Experience

2012–2014   **Software Engineer South America, in Maptek**   Viña del Mar, Chile

Maptek is an Australian software technology company focused on design, spatial analysis and 3D modelling for the global mining industry.

Duties and responsibilities:
- Work with Project Team leaders of Australia, USA and Chile in Technical Services to implement product enhancements in geological, spatial design, execution and measurement details of a mining operation and the business outcomes and profitability of our customers.
- Provide estimates and schedules for developing improvements and correcting defects.
- Perform analysis, design, and estimates for various requirements for different International Customers to be included in the Mining Software.
- Implement new technologies and architecture in C++ language specified by the team.

Achievements:
- Develop basic documentation to be used by the different technical writers of the Mining Software.
- More than 20 mid-range improvements and more than 150 defects resolved for the Mining Software Vulcan.

2011–2012   **Software Engineer, in Solem S.A**   Viña del Mar, Chile

Solem is company focused on retail, transportation, government and public services, public and private security, banking and financial services.

Duties and responsibilities:
- Software analyst in the project "Civil Registry and Identification Service SRCeI - Identification System, Identity and Travel Documents", Chile-France, 2011.
- Software analyst in the project "MetroBus - System of mass mobilisation of passengers in the metropolitan area of Panama", Chile-Panama, 2010.

Achievements:
- Formalisation of software designs in critical delivery times.
- Formalisation of a procedure to deliver Software components to the Customer.

2009–2010   **Professional Internship, in Pontifical Catholic University of Valparaíso**   Valparaíso, Chile

Duties and responsibilities:
- Design, development and Administration of the Website of the School of Computer Engineering (Url: http://inf.ucv.cl), AMADeUs-Chile website and UseCV website.

2009–2013   **Other Projects**

- Development of a spatial-geographic system for sports routes in Google Maps, 2009.
- Development of a system for entering crimes in geo-reference maps, 2009.
- Development of apiaries management system, 2009.

7   Courses, Certifications and Skills

Ulster University, Northern Ireland.

October 2023   **Computational Neuroscience, Neurotechnology and Neuro-inspired Artificial Intelligence**
ISRC-CN3, Autumn School.

University of the Arts London, England.

Apr. - May, 2018   **Information Design and Data Visualisation**
A visualisation course for Science Communication.

The University of Melbourne & The Chinese University of Hong Kong, Online.

October 2017   **Basic Modelling for Discrete Optimization.**
Certificate:
https://www.coursera.org/account/accomplishments/certificate/
VRWZFJT89462

The Regional Office of Sciences for Latin America and the Caribbean of UNESCO and
the University for International Cooperation.

Oct. - Nov. 2015   **Introduction to Biosphere Reserves.**

Federico Santa María Technical University, Valparaíso, Chile.

Jan. 2013   **C++ Language**
License CC-INF-1205009-1

Work Safety Institute (IST, Instituto de Seguridad del Trabajo), Chile.

Jun 2014   **First aid course**
Basic first aid workshop, 2.5 hours.

May 2013   **Fire prevention**
Fire prevention and use of portable fire extinguishers, 4 hours.

April 2013   **First aid course**
Basic first aid workshop, 3 hours.

March 2012   **Suitable for high altitude labour jobs (ELA)**
Certifications PRO N° 03.31.009773/2012.

Skills.   **Programming Language**
Java SE, Python 3.x, C/C++ basic.

Programming Tools
RStudio, IntelliJ Idea, PyCharm, Source Tree (GIT).

Design Tools
Affinity Designer, Affinity Photo, draw.io.

Editorial Tools
Overleaf, authorea.com.

Text Processing
MS Word (advanced), LaTeX (advance).

8   Memberships

2018 - current	**Association for Constraint Programming** http://cp2014.a4cp.org/about/members	Australia
2020 - current	**EURO Working Group on Metaheuristics** https://www.euro-online.org/websites/eume/users/	EURO
2014 - current	**Animal Behavior Society** https://www.animalbehaviorsociety.org/web/index.php	Glenview, Illinois, 60025 USA
2018 - current	**Figshare** https://figshare.com/authors/Boris_Almonacid/4110337	
2018	**eLife** https://elifesciences.org/inside-elife/912b0679/early-career-advisory-group-elife-welcomes-150-ambassadors-of-good-practice-in-science	Cambridge CB4 1YG, United Kingdom
2017 - current	**National Association of Postgraduate Researchers** https://anip.cl/	Chile

9   Awards

| 2011-2018 | **Honors** | Pontifical Catholic University of Valparaíso, Valparaíso, Chile |

- Summa Cum Laude (First Class), PhD in Computer Engineering, 2018.
- Summa Cum Laude (First Class), Master in Computer Science, 2016.
- Summa Cum Laude (First Class), Master in Engineering Informatics, third place in ranking of graduates, 2013.
- First Class, third place in ranking of graduates, Engineering Informatics, 2011.

| 2006-2017 | **Scholarship and Fellowships** | |

- Partial Research Internship Grant by Computer Engineering School 2017, Pontifical Catholic University of Valparaíso, Chile.
- VRIEA Grant 2016-2017, Pontifical Catholic University of Valparaíso, Chile.
- PhD Scholarship 2015, Pontifical Catholic University of Valparaíso, Chile.
- Master Scholarship 2011-2012, Pontifical Catholic University of Valparaíso, Chile.
- Bicentennial Partial Scholarship 2006-2009, Government of Chile.

10   Others

2015   **Speaker**

- Speaker at the Chilean Computing Conference 2015. Held on November 9, 10, 11, 12, and 13, 2015 in Santiago de Chile. Organizers, SCCC, IEEE and Universidad Mayor.

2006-2017   **Attendee**

- Predator-Prey Systems: the Wolves in Yellowstone. The Royal Society of Victoria, 21 September 2017, Melbourne, Australia.
- The challenges of management in the coming years. School of Commerce, Pontifical Catholic University of Valparaíso. Activity was given by the rapporteur Mr. Miguel Rivas Roces, in Valparaíso, on January 21, 2014, with a total of 3 chronological hours.
- Multiculturalism and internationalisation seminar. School of Computer Engineering, Pontificia Universidad Católica de Valparaíso, Valparaíso, Chile. Seminar was given on October 12, 13 and 14, 2010, by Dr. César Collazos, Professor at the University of Cauca, Colombia.

11   References

- **Juan Campos Nazer**
  - General Director, Vallenar Campus, University of Atacama. Geologist, Master in Water Management. Email: juan.campos@uda.cl

- **Juan Carlos Reyes Hagemann**
  - Marine biologist. MSc. Water and Coastal Management (Candidate), Universität Oldenburg, Germany. Phone: +4915770900816. Email: juan.carlos.reyes.hagemann@uni-oldenburg.de

- **Fabián Aspée Encina**
  - Master Informatics Engineer, University of Bologna, Italy. Email: fabian.aspeeencina@studio.unibo.it

- **Jorge Ramos Aguilar**
  - Biologist, Mention Natural Resources and Environment, Santiago, Chile. Email: jsramos@uc.cl

- **Cristian Rusu**
  - Research in the Pontifical Catholic University of Valparaíso, Chile. Doctor of Science Engineering. Email: cristian.rusu@pucv.cl