



Jorge Mario CRUZ-DUARTE

Research Professor, Scopus h-index: 15

Skills

Artificial Intelligence 10+ yrs.



Science Writing 10+ yrs.



Heuristics 10+ yrs.



Applied Mathematics 8+ yrs.



Electronics and Control 6+ yrs.



Spanish Native



English Fluent



French Basic



Interests

- 🌲 Running & Hiking
- 📖 Reading & Learning
- 🎨 Painting, Dancing & Video Games

Contact/Info

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📄 github.com/jcrvz



Biography

Jorge M. Cruz-Duarte is a Postdoctoral Researcher (since 2025) at the Équipe de Recherche Bonus, Centre Inria de l'Université de Lille. Previously, he was a Research Professor (2021–2024) in the Research Group on Advanced Artificial Intelligence at the Tecnológico de Monterrey (TEC). He is a Level I member of the SECIHTI Mexican National System of Researchers, an IEEE Senior Member, and a member of the Mexican Academy of Computer Sciences (AMEXCOMP).

Jorge chairs the IEEE Computational Intelligence Society's Task Force on Automated Algorithm Design, Configuration, and Selection (TFAADCS). He actively serves as a reviewer for several scientific journals, including IEEE TEVC, IEEE Access, ASOC, SW-EVO, and ATE. Jorge collaborates with researchers in Automated Algorithm Design, AI/ML, Metaheuristics, Neuromorphic Computing, Mathematical Methods, Electronics, Thermal Management, and Fractional Calculus. His passion for knowledge drives him to enhance his fundamental science skills and use them in practical scenarios.

Education

Ph.D. in Electrical Engineering

May/2015 - Dec/2018

Universidad de Guanajuato, DICIS, Salamanca, Guanajuato, México

Thesis: *Calorimetry in the Thermal Analysis of Microelectronic Circuits*

Topics: *Electronics, Signal Processing, Thermal Management, Optimisation, and Machine Learning*

Master of Digital Project Management

Apr/2024 - Apr/2025

Inesdi Business Techschool, Barcelona, Spain

Project: *Intelligent Solar Optimisation*

Topics: *Digital Transformation, Agile Methodologies, Project Planning, Team Coordination, Risk Assessment, Quality Control, Stakeholder Communication, AI and Digital Tools Integration*

M.Sc. in Electronic Engineering

Jan/2013 - Jun/2015

Universidad Industrial de Santander, Bucaramanga, Santander, Colombia

Thesis: *Optimal Designing of Heat Sinks using the Entropy Generation Min. Criterion and Metaheuristic Algorithms*

Topics: *Electronics, Signal Processing, Thermal Management, and Optimisation*

B.Sc. in Electronic Engineering

Jan/2007 - Dec/2012

Universidad Industrial de Santander, Bucaramanga, Santander, Colombia

Thesis: *Solution of the mathematical model of a DC nonlinear electronic circuit using an optimisation strategy*

Topics: *Electronics, Optimisation, Metaheuristics, Machine Learning*

Awards

- 🏆 **Honour:** Chair of the IEEE CIS Task Force on Automatic Algorithm Design, Configuration, and Selection (AADCS), 2024.
- 🏆 **Award:** IEEE Senior Member, 2023.
- 🏆 **Award:** Intellectual Vitality, Service and Leadership, and Special Projects, Tecnológico de Monterrey, 2021.
- 🏆 **Award:** National Researcher Level 1, (CONACyT), 2019.
- 🏆 **Honor:** Ph.D. with *Summa Cum Laude*, Universidad de Guanajuato, 2018.

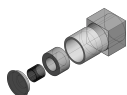
Achievements



NeurOptimiser: A Python framework on top of Intel's Lava-NC Framework for studying and implementing spiking neural dynamics with heuristic search principles. [[Home Page](#)].



CUSTOMHyS: A Python framework for studying and customising optimisation heuristic-based algorithms via hyper-heuristic search. [[Repository](#)] [[PyPI](#)].



Non-conventional Calorimeter: A low-cost operating system for measuring the net heat power of microelectronic devices in thermal management studies. [[Article](#)].

Projects

Neuromorphic-based optimisation algorithms

2025 - 2026

ERC Generator program of the University of Lille and the framework of the PEPR (Programme et Equipement Prioritaire de Recherche IA project devoted to Artificial Intelligence. Supervised by El-Ghazali Talbi, INRIA & University of Lille.

Participation: Postdoctoral Researcher

Cajero Automático Bancario

2022 - 2023

Institutional Technological Development Program named "Borregos Tecnológicos 3, ciclo 2022-2023", Tecnológico de Monterrey

Participation: Development of Tests for Internal Technology Subsystems

Synergistic Integration of Data Science and Optimisation for Tailoring Metaheuristics to Solve Continuous Problems

2022 - 2023

Joint project between Tecnológico de Monterrey and Chinese Academy of Sciences

Participation: Postdoctoral Researcher

Feature transformation for improving characterisation of combinatorial optimisation problems

2018 - 2023

Funded by CONACyT under the grant Ciencia Básica

Participation: Researcher

Proposal for designing and building optimal prototypes of microchannel heat sinks for electronic devices via the entropy generation minimisation criterion

2013 - 2014

Funded by VIE, Universidad Industrial de Santander, Colombia

Participation: Researcher

Work Experience

Postdoctoral Researcher

Jan/2025 - Present

Université de Lille (France), Équipe de Recherche Bonus, CNRS, Inria, Centrale Lille, CRISAL.

Project: *Neuromorphic-based optimisation algorithms*.

Research Professor

Jul/2021 - Dec/2024

Tecnológico de Monterrey (México), Research Group on Advanced Artificial Intelligence, Department of Computer Sciences

Activities include research and development in the fields of artificial intelligence, automated algorithm design, and practical engineering applications; writing and submitting research proposals to both internal and external funding entities; advising undergraduate and graduate students on their research activities; and teaching courses related to artificial intelligence and computer science.

Chair of the Task Force on AADCS

Jan/2024 - Present

IEEE CIS Task Force on Automated Algorithm Design, Configuration, and Selection (AADCS)

This task force focuses on the use of evolutionary computation for automated algorithm design, configuration, and selection of machine learning techniques.

Postdoctoral Researcher (2 years)

Jul/2019 - Jun/2021

Tecnológico de Monterrey (México), Research Group with a Strategic Focus on Intelligent Systems

Chinese Academy of Sciences (China), Research Centre on Fictitious Economy and Data Science

Project: *Synergistic Integration of Data Science and Optimisation for Tailoring Metaheuristics to Solve Continuous Problems*.

Lecturer (2 courses)

Jul/2019 - Jun/2021

Tecnológico de Monterrey (México), Department of Computer Sciences, Campus Monterrey

B.Eng. Courses on *Concentration of Intelligent Systems* (2nd Sem., 2019), and *Laboratory of Microcontrollers* (1st Sem., 2021).

Lecturer (7 courses)

Sep/2015 - Aug/2018

Universidad de Guanajuato (México), Department of Electrical Engineering, Engineering Division, Campus Irapuato-Salamanca

M.Eng. Courses on *Analysis of Electrical and Electronic Circuits* (1st and 2nd Trim., 2018), *Mathematical Methods* (3rd Trim., 2015 and 2016), and *Optimisation Methods* (3rd Trim., 2015, and 1st Trim., 2016); and B.Eng. Courses on *Digital Signal Processing* (2nd Sem., 2017).

Lecturer (2 courses)

Jul/2013 - Jun/2014

Universidad Industrial de Santander, (Colombia), School of Electrical, Electronics, and Telecommunication Engineering

B.Eng. Course on *Thermodynamics* (2nd Sem., 2013, and 1st Sem., 2014).


Academic Advising

 **José Anastacio Hernández Saldaña**

2024 - Present

Thesis: "*Genetic Programming for Automatically Designing Heuristic-based Intelligent Algorithms for Continuous Optimisation Problems*"

Ph.D. in Computer Sciences Program at Tecnológico de Monterrey | Co-adviser with Jesús Guillermo Falcon Cardona

 **Daniel Fernando Zambrano Gutierrez**

2022 - Present

Thesis: "*Automatic Design of Population-based Evolutionary Algorithms for Solving Practical Engineering Problems on Renewable Energies Scenarios*"

Ph.D. in Computer Sciences Program at Tecnológico de Monterrey | Co-adviser with Juan Gabriel Aviña Cervantes (University of Guanajuato)

 **Gustavo de Jesús Machado Guillén**

2022 - 2024

Thesis: "*Harnessing Machine Learning for short-to-long Range Weather Forecasting: A Monterrey Case Study*"

M.Sc. in Computer Sciences Program at Tecnológico de Monterrey | Co-adviser with Santiago Enrique Conant-Pablos

 **Guillermo Pérez Espinosa**

2022 - 2023

Thesis: "*Tailoring Metaheuristics for Designing Thermodynamic-Optimal Water Based Cooling Devices for Microelectronic Thermal Management Applications*"

M.Sc. in Computer Sciences Program at Tecnológico de Monterrey | Co-adviser with Hugo Terashima Marín

 **José Manuel Tapia Avitia**

2021 - 2022

Thesis: "*Hyper-heuristic Model Based on Neural Networks for Solving the Metaheuristic Composition Optimisation Problem in Continuous Domains*"

M.Sc. in Computer Sciences Program at Tecnológico de Monterrey | Co-adviser with Hugo Terashima Marín

 **Martha Cecilia Arellano Alamilla**

2019 - 2020

Thesis: "*Reconfiguración incremental de sensores en la instrumentación de un calorímetro no-convencional*"


M.Sc. in Electrical Engineering Program at Universidad de Guanajuato | Co-adviser with Juan Gabriel Aviña Cervantes

 **Nathaly Murcia Sepúlveda**

2017 - 2018

Thesis: "*Metodología alternativa para la detección de fallos en motores a través del cálculo fraccionario*"


M.Sc. in Electrical Engineering Program at Universidad de Guanajuato | Co-adviser with Juan Gabriel Aviña Cervantes

 **Jhonar Orlando Acevedo Vásquez**

2015 - 2016

Thesis: "*Diseño óptimo de un disipador de calor mediante el uso del algoritmo del murciélago virtual*"

B.Sc. in Electronic Engineering Program at Universidad Industrial de Santander | Co-adviser with Rodrigo Correa

 **Cesar Augusto Salazar Centeno and Hernán Leonel Porras Melgarejo**

2014 - 2015

Thesis: "*Filtrado y segmentado de una imagen de electroforesis en gel de una dimensión aplicando el algoritmo de la luciérnaga virtual*"

B.Sc. in Electronic Engineering Program at Universidad Industrial de Santander | Co-adviser with Rodrigo Correa


 **Kilmar Manuel Guerra Fernández**


2012 - 2013


Thesis: "*Cálculo de valores propios en sistemas masa-resorte-amortiguador mediante el algoritmo de la luciérnaga virtual*"

B.Sc. in Electronic Engineering Program at Universidad Industrial de Santander | Co-adviser with Rodrigo Correa

Service










 **Special Session Co-organiser:** "*Automating Computational Intelligence Systems: Trends, Challenges, and Future Directions*" at the IEEE Congress on Evolutionary Computation (CEC), 2024.

 **Special Session Co-organiser:** "*Exploring Multi-Objective Hyper-Heuristics in the context of Sustainable Transformation*" at the IEEE Congress on Evolutionary Computation (CEC), 2024.

 **Guest Co-Editor:** MDPI Fractal and Fractional, SI: "*Modeling and Control of Fractal and Fractional Dynamical Systems in Neurological Disorders*," 2024.

 **Guest Editor:** MDPI Fractal and Fractional, SI: "*Inverse Problems for Fractional Differential Equations*," 2024.

 **Workshop Co-Organiser:** "*1st Workshop on Evolutionary Computation in Practical Engineering Applications*" at the Encuentro Nacional de Computación (ENC), 2023.

-  **Session Co-Organizer:** “*Evolutionary Computation for Automated Algorithm Design*” at the IEEE Congress on Evolutionary Computation (CEC), 2023.
-  **Workshop Co-Organiser:** “*5th Mexican Workshop on Fractional Calculus*” (5MWFC), Monterrey, México, 2022.
-  **Co-Editor:** MDPI Computer Sciences and Mathematics Forum, “*The 5th Mexican Workshop on Fractional Calculus*,” 2023.
-  **Guest Co-Editor:** MDPI Axioms, SI: “*Automatic Design of Optimisation Algorithms and Their Practical Applications*,” 2023.
-  **Peer-Reviewer** for Elsevier journals including Applied Soft Computing Journal, Applied Thermal Engineering, Atmospheric Pollution Research, Engineering Applications of Artificial Intelligence, Expert Systems With Applications, International Journal of Heat and Mass Transfer, Knowledge-Based Systems, Swarm and Evolutionary Computation.
-  **Peer-Reviewer** for MDPI journals including Algorithms, Applied Science, Computation, Electronics, Fractal and Fractional, International Journal of Environmental Research and Public Health, Machines, Mathematics, Molecules, Multimodal Technologies and Interaction, Processes, Sensors.
-  **Peer-Reviewer** for Taylor & Francis - Automatika: Journal for Control, Measurement, Electronics, Computing and Communications, Smart Science
-  **Peer-Reviewer** for IEEE - Access, Computational Intelligence Magazine, Transactions on Systems, Man and Cybernetics: Systems.
-  **Peer-Reviewer** for Springer - Applied Intelligence, Journal of the Brazilian Society of Mechanical Sciences and Engineering; ACM - Computing Surveys; PeerJ - Computer Science; Emerald - Engineering Computations; IWA - Water Reuse

Selected Publications

1. **Jorge M. Cruz-Duarte** and El-Ghazali Talbi, *NeurOptimisation: The Spiking Way to Evolve*, *arXiv*, 2025.
2. Garza-Santisteban, **Cruz-Duarte**, Amaya, Ortiz-Bayliss, Conant-Pablos, and Terashima-Marin, *Selection Hyper-Heuristics and Job Shop Scheduling Problems: How Does Instance Size Influence Performance?*, *Journal of Scheduling*, 2024.
3. Tapia-Avitia, **Cruz-Duarte**, Amaya, Ortiz-Bayliss, Terashima-Marin, and Pillay, *Analysing Hyper-Heuristics based on Neural Networks for the Automatic Design of Population-based Metaheuristics in Continuous Optimisation Problems*, *Swarm and Evolutionary Computation*, 2024.
4. Zambrano-Gutierrez, **Cruz-Duarte**, Avina-Cervantes, Ortiz-Bayliss, Yanez-Borjas, and Amaya, *Automatic Design of Metaheuristics for Practical Engineering Applications*, *IEEE Access*, 2023.
5. **Cruz-Duarte**, Avina-Cervantes, Garcia-Perez, Andrade-Lucio, Correa, and Morega, *Novel Calorimetric Approach for Thermal Analysis of Microelectronic Devices*, *IEEE Transactions on Components, Packaging and Manufacturing Technology*, 2021.
6. **Cruz-Duarte**, Amaya, Ortiz-Bayliss, Conant-Pablos, Terashima-Marin, and Shi, *Hyper-Heuristics to customise metaheuristics for continuous optimisation*, *Swarm and Evolutionary Computation*, 2021.
7. **Cruz-Duarte**, Ortiz-Bayliss, Amaya, and Pillay, *Global Optimisation through Hyper-Heuristics: Unfolding Population-Based Metaheuristics*, *Applied Sciences*, 2021.
8. **Cruz-Duarte**, Ortiz-Bayliss, Amaya, Shi, Terashima-Marin, and Pillay, *Towards a generalised metaheuristic model for continuous optimisation problems*, *Mathematics*, 2020.
9. Bastidas-Rodriguez, **Cruz-Duarte**, Correa, *Mismatched Series-Parallel Photovoltaic Generator Modeling: An Implicit Current-Voltage Approach*, *IEEE Journal of Photovoltaics*, 2019.
10. **Cruz-Duarte**, Rosales-Garcia, Correa-Cely, Garcia-Perez, and Avina-Cervantes, *A closed form expression for the Gaussian-based Caputo-Fabrizio fractional derivative for signal processing applications*, *Comm. in Nonlinear Sci. and Num. Sim.*, 2018.
11. **Cruz-Duarte**, Garcia-Perez, Amaya-Contreras, and Correa-Cely, *Designing a microchannel heat sink with colloidal coolants through the entropy generation minimisation criterion and global optimisation algorithms*, *Applied Thermal Engineering*, 2016.

*A detailed list of the 50+ publications can be found in jcrvz.co/publications/.