José Abel Castellanos Joo

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Research Interests

Formal Verification

Archimedean Quadratic Modules

Gröebner basis algorithms

Quantifier-free interpolation algorithms for decidable logics

Non-classical logics

Education

University of New Mexico	Albuquerque, New Mexico
Ph.D. in Computer Science, Advisor: Prof. Deepak Kapur	2020–Current

University of New Mexico	Albuquerque, New Mexico
M.S. in Computer Science, Advisor: Prof. Deepak Kapur	2016–2020

- Thesis: Implementation of Uniform Interpolation Algorithms

Universidad de las Americas Puebla	Cholula, Puebla
B.S. in Electronics Engineering, Advisor: Prof Maurio Javier Osorio Galindo	2010–2015

- Thesis: Revisiting C_1

Experience

University of New Mexico	Albuquerque, New Mexico
Research Assistant; Advisor: Prof. Deepak Kapur	Fall 2020 -

- Research on Verification and Formal methods

- Assisted with research on symbolic computation and its application to program analysis.

Microsoft Research	Redmond, Washington
Research Intern; Mentor: Principal RSDE Mark Marron	Summer 2019

- Verification in Bosque

- Developed a prototype of the verification engine for the Bosque programming language in F^*. Bosque is a language that does not implement loops but offers to programmers transformers and functional programming constructions (limited fold operation) to do their programming tasks.

Universidad de las Americas Puebla	Cholula, Puebla
Research Student; Advisor: Prof. Mauricio J. Osorio Galindo	2015-2017

- Research on Paraconsistent Logics

- Collaborated with a group of researchers on Paraconsistent Logics. My activities included working on some theorems and generate models using the answer set solver Clasp.

Universidad de las Americas Puebla	Cholula, Puebla
Intern; Advisor: Prof. Ofelia Cervantes Gutierrez	Summer 2015

- Innova4D

- Analysed and implemented graph algorithms to compute Freeman centralities for the development of a recommendation system.

Publications

[1] **J. Castellanos Joo**, S. Ghilardi, A. Gianola, and D. Kapur, "AXDInterpolator: A tool for computing interpolants for arrays with maxdiff", in *19th International Workshop on Satisfiability Modulo Theories co-located with 33rd International Conference on Computer Aided Verification (CAV 2021)*, CEUR-WS.org, vol. 2908, 2021, pp. 40–52.

[2] M. Osorio and **J. Castellanos Joo**, "Equivalence among *RC*-type paraconsistent logics", *Logic Journal of IGPL*, jzw065, Jan. 2017, ISSN: 1368-9894. DOI: 10.1093/jigpal/jzw065.

[3] M. Osorio, J. L. Carballido, C. Zepeda, and **J. Castellanos Joo**, "Weakening and extending $\mathbb{Z}$", *Logica Universalis*, vol. 9, no. 3, pp. 383–409, Aug. 2015, ISSN: 1661-8300. DOI: 10.1007/s11787-015-0128-6.

[4] M. Osorio and **J. Castellanos Joo**, "A single proof of classical behaviour in da Costa's C_n systems", *Electronic Notes in Theoretical Computer Science*, vol. 315, pp. 3–16, Sep. 2015, ISSN: 1571-0661. DOI: 10.1016/j.entcs.2015.06.002.

Conference Talks

AXDInterpolator: A Tool for Computing Interpolants for Arrays with MaxDiff   July, 2021
19th International Workshop on Satisfiability Modulo Theories.

Implementation of Uniform Interpolation Algorithms   October, 2020
Master Thesis Defense, University of New Mexico

A new interpolation algorithm for the theory of Equality with Uninterpreted Functions September, 2020
Computer Science Colloquium Series, University of New Mexico

A Single Proof of Classical Behaviour in da Costa's C_n systems   November, 2014
Ninth Latin American Workshop on Logic/Languages, Algorithms and New Methods of Reasoning LANMR

Teaching Assistant Experience

Teaching Assistant at University of New Mexico   Spring 2023
CS 357 - Declarative Programming with *Prof. Lance Williams*

Head Teaching Assistant at University of New Mexico   Fall 2022
CS 241 - Data Organization using C with *Prof. Soraya Abad-Mota*

Teaching Assistant at University of New Mexico   Spring 2022
CS 429/529 - Machine Learning with *Prof. Trilce Estrada*

Teaching Assistant at University of New Mexico   Fall 2019
CS 530 - Geometric and Probabilistic Methods in Computer Science with *Prof. Lance Williams*

Teaching Assistant at University of New Mexico   Spring 2019
CS 500 - Theory of Computation with *Prof. Deepak Kapur*

Teaching Assistant at University of New Mexico   Fall 2018
CS 561 - Algorithms and Data Structures with *Prof. Jared Saia*

Skills

- Programming languages
  - Imperative: C/C++, Java, Go
  - Scripting: Python, Bash, Makefile
  - Logical/Functional: Haskell, Ocaml, Scala
  - Verification: Z3, Mathsat, SMTInterpol, F^*, Prover9, Mace4
  - Symbolic/Algebraic: Mathematica, Maple, Macaulay2, Singular
  - Document typesetting: LaTeX, Pandoc, Madoko, Markdown, Org
  - Web design: HTML, CSS, Javascript, Typescript, Hugo

Languages

- **English:** Fluent
- **Spanish:** Native

Software Projects

AXDInterpolator   2021

This project implements an interpolation algorithm proposed in FoSSaCS 2021 using the Z3 API. The project allows the user to choose Z3, Mathsat, or SMTInterpol as interpolation engines. The tool returns a formula in SMTLIB2 format, which allows compatibility with model checkers and invariant generators using such a format.

EUFInterpolator   2020

Master thesis work implementing new interpolation algorithms for the theory of equality and uninterpreted functions (EUF), octagonal formulas, and its combination.

Bosque Transpiler to F^* 2019

Prototypical implementation of a transpiler embedding a subset of the Bosque semantics into the Proof-oriented programming language F^*.

Workshops Attended

Satisfiability: Theory, Practice, and Beyond   2021
Beyond Satisfiability

Satisfiability: Theory, Practice, and Beyond   2021
Theoretical Foundations of SAT/SMT Solving

AMS Short Course   2019
Sum of Squares: Theory and Applications

Conference Refereeing

Thirteen Latin America Workshop on New Methods of Reasoning   2020
Reviewer

35th International Conference on Logic Programming   2019
Reviewer

11th Latin American Workshop on New Methods of Reasoning   2018
PC member

14th Annual Computer Science Student Conference   2018
Reviewer

17th Latin American Symposium on Mathematical Logic   2017
Reviewer

10th Latin American Workshop on Logic/Languages, Algorithms and New Methods of Reasoning   2016
Reviewer

8th Mexican Congress on Artificial Intelligence   2016
Reviewer

12th International Colloquium on Theoretical Aspects of Computing   2015
Reviewer

Scholarships and Awards

Travel Scholarship for OPLSS   2017
Travel scholarship to attend Oregon Programming Languages Summer School

AMIGO Scholarship   2016 - 2018
Scholarship for Graduate Studies at the University of New Mexico

ANFEI   2015
Best student of the Electronics Engineering 2015 class

Magna Cum Laude (BSc)   2015
Universidad de las Americas Puebla.

Roberto Rocca Scholarship   2014
Scholarship for Undergraduate Studies at Universidad de las Americas Puebla

Society Memberships

Women in Computing association at the University of New Mexico.

Service

CS Advisory Board   University of New Mexico
Graduate Student Representative   2021 - 2022

- Participated in discussions about the state of the department and proposal of new initiatives. regarding graduate and undergraduate matters, as well as research and the position of the department within the university.

CS Graduate Student Association   University of New Mexico
Treasurer   2017 - 2018

- Developed website for the Computer Science Student Conference 2018 at UNM and keep track of Internal Requisitions.

Clique Student Organization   Universidad de las Américas Puebla
Founder Member   2014 - 2015

- This organization provided students a proper environment to develop programming skills for programming competitions like the ACM ICPC.