Jose Abel Castellanos Joo

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# 1 Research Interests

- Formal Verification
- Archimedean Quadratic Modules
- Groebner basis algorithms
- Quantifier-free interpolation algorithms for decidable logics
- Non-classical logics

# 2 Education

- 2020 - Present: University of New Mexico, Ph.D student advised by Prof. Deepak Kapur
- 2016 - 2020: University of New Mexico, M.S. student. GPA: 4.05/4.00
  - Master Thesis, University of New Mexico (Advisor: Prof. Deepak Kapur). Implementation of Novel Interpolation Algorithms for EUF and Octagonal Formulas.
- 2010 - 2015: Universidad de las Americas Puebla, Bachelor of Electronics Engineering. GPA: 9.7/10
  - Undergraduate Thesis, Universidad de las Americas (Advisor: Prof. Mauricio Osorio). Fall 2015. Revisiting $C_1$.

# 3 Work Experience

- Research Intern, Microsoft Research (Mentor: Principal RSDE Mark Marron).
  - I 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.

- Research Student, Universidad de las Americas Puebla (Advisor: Prof. Mauricio Osorio). 2015 - 2017.
  - Collaboration with a group or researchers on Paraconsistent Logics.
  - My activities included working on some theorems and generate models using the answer set solver Clasp.

- Intern, Universidad de las Americas Puebla (Advisor: Prof. Ofelia Cervantes Gutierrez).
  - I worked and analysed graph algorithms to compute Freeman centralities for the development of a recommendation system.

# 4 Publications


[1] J Castellanos Joo, Silvio Ghilardi, Alessandro Gianola, and Deepak Kapur. Axdinterpolator: A tool for computing interpolants for arrays with maxdif. In *19th International Workshop on Satisfiability Modulo Theories co-located with 33rd International Conference on Computer Aided Verification (CAV 2021)*, volume 2908, pages 40–52. CEUR-WS. org, 2021.

[2] Mauricio Osorio, J. L. Carballido, C. Zepeda, and J. A. Castellanos. Weakening and extending $\mathbb{Z}$. *Logica Universalis*, 9(3):383–409, Aug 2015.

[3] Mauricio Osorio and José Abel Castellanos. A single proof of classical behaviour in da costa's $C_n$ systems. *Electronic Notes in Theoretical Computer Science*, 315:3–16, Sep 2015.

[4] Mauricio Osorio and José Abel Castellanos Joo. Equivalence among rc-type paraconsistent logics. *Logic Journal of IGPL*, page jzw065, Jan 2017.


# 5 Conference Talks

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

- *Implementation of Uniform Interpolation Algorithm.* Master Thesis Defense. October, 2020.

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

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

# 6 Software Projects

TODO: Add descriptions for each project.

- AXDInterpolator: 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.
- Bosque Transpiler to $F^*$:
- EUFInterpolator: My master thesis presents the implementation of new interpolation algorithms for the theory of equality and uninterpreted functions (EUF), octagonal formulas, and its combination.

# 7 Workshops Attended

- Beyond Satisfiability: Satisfiability: Theory, Practice, and Beyond 2021 `https://simons.berkeley.edu/workshops/sat-2021-1`
- Theoretical Foundations of SAT/SMT Solving: Satisfiability: Theory, Practice, and Beyond 2021 `https://simons.berkeley.edu/workshops/tfcs2021-sat2021-joint`
- AMS Short Course. Sum of Squares: Theory and Applications - 2019. `http://www.ams.org/meetings/short-courses/short-course-general`

# 8 Skills and Competences

- Languages
  - English: Fluent
  - Spanish: Native
- Programming languages:
  - Imperative: C/C++, Java
  - Scripting: Python, Bash
  - Logical/Functional: Haskell, Ocaml, Scala
  - Verification: Z3, Mathsat, SMTInterpol, $F^*$, Prover9, Mace4

- Symbolic/Algebraic: Mathematica, Maple, Macaulay2, Singular
- Document typesetting: LaTeX, Pandoc, Madoko, Markdown
- Web design: HTML, CSS, Javascript, Typescript

# 9 Teaching Assistant Experience

- Fall 2022; [CS 241 - Data Organization using C] with Prof. Soraya Abad-Mota
- Fall 2019; CS 530 - Geometric and Probabilistic Methods in Computer Science with Prof. Lance Williams
- Spring 2022; CS 429/529 - Machine Learning with Prof. Trilce Estrada
- Fall 2019; CS 530 - Geometric and Probabilistic Methods in Computer Science with Prof. Lance Williams
- Spring 2019; CS 500 - Theory of Computation with Prof. Deepak Kapur
- Fall 2018; CS 561 - Algorithms and Data Structures with Prof. Jared Saia

# 10 Conference Refereeing

- Thirteen Latin America Workshop on New Methods of Reasoning 2020. `http://www.lanmr.unam.mx/`
- 35th International Conference on Logic Programming 2019. `https://www.cs.nmsu.edu/ALP/iclp2019/`
- PC member at the 11th Latin American Workshop on New Methods of Reasoning 2018. `https://lanmr.cs.buap.mx`
- 14th Annual Computer Science Student Conference 2018. `https://www.cs.unm.edu/~csgsa/2017-2018/papers.html`
- 17th Latin American Symposium on Mathematical Logic. `http://www.fcfm.buap.mx/SLALM2017/`
- 10th Latin American Workshop on Logic/Languages, Algorithms and New Methods of Reasoning. `http://ceur-ws.org/Vol-1659/`
- 8th Mexican Congress on Artificial Intelligence. `https://www.comia.org.mx/2016/`
- 12th International Colloquium on Theoretical Aspects of Computing. `http://www.ictac2015.co/`

## 11 Scholarships and Awards

- Scholarship to attend Oregon Programming Languages Summer School - 2017. `https://www.cs.uoregon.edu/research/summerschool/summer17/`
- AMIGO Scholarship: Scholarship for Graduate Studies at the University of New Mexico.
- Roberto Rocca Scholarship: Scholarship for Undergraduate Studies at Universidad de las Americas Puebla.
- ANFEI: Best student of the Electronics Engineering 2016 class.
- Magna Cum Lauda (BSc) Universidad de las Americas Puebla.

## 12 Society Memberships

- Women in Computing association at the University of New Mexico.

## 13 Extracurricular Activities

- CSGSA - Treasurer: I supported the organization with the development of the website for the Computer Science Student Conference 2018 at UNM, media and management of Internal Requisitions.
- Founder member of the Clique Student Organization: This organization provided students a proper environment to develop programming skills for programming competitions like the ACM ICPC.