Names: Jonathan Julián
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Position: Assistant Professor
Institution: Aalborg University

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Research interests

Deductive verification: Development of mathematical proofs guaranteeing that software, hardware, or complex human-designed systems adhere to a formal specification. Mostly applied to increasing systems' security and safety.
Interactive theorem proving (ITP): Use of interactive theorem provers to mechanically certify mathematical claims; with applications in deductive verification, compliance checking, and formalisation of mathematics.
Automated reasoning: Application of computer science methods (machine learning and generative AI) to enhance a machine's ability to reason logically. Mainly interested in its applications to ITPs and deductive verification.

Positions

01/12/2025 – Current *Assistant Professor* Aalborg University in CPH, DK
Research outputs: 4 articles (CICM 2026, AIPV 2026, SEFM 2026, CPP 2027), 1 preprint, 3 proof artefacts
Achievements: Co-organized the AI, Proof and Verification workshop co-located with FM2026
Co-taught a course on Models and Tools for Cyber-Physical Systems (CPSs)
Taught the course Industrial Test and Verification (autumn 2026)
Carried out 3 project supervisions on implementing compilers
Supervising 3 first-semester project groups on small C programs

01/10/2023 – 01/12/2025 *MSCA fellow: Machine learning on ITPs* Czech Technical University, CZ
Research outputs: 3 conference articles, 1 journal article, 3 proof artefacts
Achievements: Organized 2 workshops, 1 on CPSs in Seoul and 1 on GenAI and ITPs in Brasilia
Created data-extraction, REPLs, and proof-repair algorithms for the Isabelle ITP
Trained generative AI models on Isabelle data for predicting users' next steps
Integrated foundation models into the Isabelle proof assistant (video)
Continued previous research on runtime and cyber-physical systems verification

01/07/2023 – 29/02/2024 *Assistant Professor* Aalborg University in CPH, DK
Achievements: Co-designed the course on Interactive Theorem Provers for 2024 MSc students
Carried out 2 project supervisions for 3rd semester software engineering students
Participated in 10 exam evaluations for software engineering students

22/02/2023 – 01/07/2023 *Teaching Assistant* University of Copenhagen, DK
Achievements: Carried out the Applied Programming (APP) module introducing the C++ programming language to non-computer science students.

22/02/2021 – 21/02/2023 *Postdoc: runtime verification* University of Copenhagen, DK
Research outputs: 2 conference articles, 1 competition report
Achievements: Improved a runtime monitoring tool by generalising its input specifications.
Formally verified in a proof assistant the correctness of my generalisation.

26/09/2016 – 28/05/2021 *PhD with integrated MSc in Computer Science* University of Sheffield, UK
Research outputs: 3 conference articles, 1 journal article, 1 competition report, 2 artefacts
Achievements: Created a cyber-physical systems verification tool in a proof assistant.
Improved the tool with increased automation and program-refinement capabilities.

19/02/2018 – 25/10/2018 *Data scientist: machine learning* Twinkl Educational Publishing, UK
Achievements: Performed SQL data analysis and created Python-based machine learning models to predict subscription upgrades based on users' website behaviour.
Created Tableau dashboards to track the progress of various metrics for the ESL/EAL department, the Chief Customer Officer, and the BBC Children project.

27/02/2015 – 24/09/2016 *High school and undergraduate educator* BUAP-B5M, MX
Achievements: Prepared a mathematical logic course for high-school students.
Led the students to participate and win the International 12th and 13th Logic Olympiad.

27/08/2014 – 03/01/2015 *Data analyst and consultor* Krisálida, MX
Achievements: Did various analyses for 2 small businesses including SWOT, MS Excel-based data cleansing and ANOVA analysis of their products' mean prices.

15/01/2011 – 17/10/2011 *English as a foreign language facilitator* Angloamericano, MX
Achievements: Taught over 15 English courses from basic (A1) to advanced level (B2).
Capacitated Volkswagen professionals in business-English skills.

07/06/2010 – 07/07/2010 *Assistant language facilitator* Harmon Hall, MX
Achievements: Completed training to be a teacher of English as a foreign language.
Assisted in the teaching of a basic (A1) course.

07/06/2010 – 07/07/2010 *Sales researcher* Lexmark, MX

Achievements: Searched for printer and multifunctional distributors, printing managed services, and document digitalisation companies, and created a database for the sales dept.

21/03/2009 – 30/04/2009 *Document translator* Hewlett Packard, MX

Achievements: Translated publicity and information leaflets, brochures and posters for the sales dept.

Education

26/09/2016 – 28/05/2021 *PhD with integrated MSc in Computer Science* University of Sheffield, UK

MSc projects: iOS app | OpenGL animations | MATLAB agent-based model | Python ML models

PhD thesis topic: Algebraic Verification of Hybrid Systems in Isabelle/HOL (link)

Supervisor | Examiners: Prof. Georg Struth | Prof. Ana Cavalcanti and Lect. Andrei Popescu

01/08/2011 – 28/04/2016 *BSc Mathematics* BUAP, MX

Thesis: Studying the Foundations of Mathematics comparing some of its Axiomatizations (link)

01/08/2010 – 30/06/2012 *BSc Physics and Industrial Engineering* ITESM, MX

01/08/2007 – 30/04/2010 *International Baccalaureate (IB)* ITESM, MX

Funding

01/10/2023 – 30/09/2025	MSCA Postdoctoral Fellowship (DeepIsaHOL 101102608)	Horizon, EU
01/10/2016 – 01/10/2020	CONACYT PhD + MSc scholarship (440404)	CONCYTEP, MX

Conference Organiser

18/05/2026 – 19/05/2026	AI, Proof and Verification workshop (co-located with FM) (link)	Tokyo, JP

Invited presentations and tutorials

20/10/2026 – 20/10/2026	DTU webinar: GenAI agents: model, harness, environment (slides)	Online, DK
06/10/2025 – 10/10/2025	Machine learning for the Isabelle proof assistant (link)	Brasilia, BR
16/06/2025 – 20/06/2025	Verifying Cyber-Physical Systems with IsaVODEs (link)	Seoul, KR
19/10/2020 – 23/10/2020	2020 National Congress of Mathematics (SMM): Differential Hoare Logic (link) (slides)	Online, MX
03/12/2018 – 13/12/2019	Isabelle courses (1st and 3rd in Puebla; 2nd Isabelle Tutorial Week in Oslo): Verifying Hybrid Systems with Modal Kleene Algebra (link) (slides)	Puebla, MX & Oslo, NO

Supervising and mentoring

02/09/2026 – 29/01/2027	Semester 1, Software Eng. 3 groups	Semester project	Small C programs	CPH, DK
12/02/2026 – 15/05/2026	Semester 4, Software Eng. 3 groups	Semester project	Compiler	CPH, DK
12/02/2024 – 15/05/2024	Semester 3, Software Eng. 2 groups	Semester project	Well Design App	CPH, DK
01/08/2021 – 01/12/2021	Esaú A. Pérez Rosales	BSc project	Isabelle tactics	BUAP, MX
01/08/2016 – 21/10/2016	Ana L. Abarca Gerasymenko	Competition	Logic Olympiad	B5M, MX
01/08/2016 – 21/10/2016	Esaú A. Pérez Rosales	Competition	Logic Olympiad	B5M, MX

Teaching

07/09/2026 – 04/01/2027	Industrial Test and Verification (materials)	Aalborg University in CPH, DK
10/02/2026 – 08/06/2026	Models and Tools for Cyber-Physical Systems (DSNSWCB535) (materials)	Aalborg University in CPH, DK
24/04/2023 – 01/07/2023	Selected Topics in Programming (DSNSWFK212)	Aalborg University in CPH, DK
24/04/2023 – 01/07/2023	Applied Programming (NDAK14007U)	University of Copenhagen, DK
12/09/2022 – 10/10/2022	Teaching assistant Isabelle/HOL (NDAA09026U)	University of Copenhagen, DK
06/09/2021 – 12/11/2021	Teaching assistant Isabelle/HOL (NDAA09026U)	University of Copenhagen, DK
24/02/2020 – 15/05/2020	Teaching assistant Verification (COM4507)	University of Sheffield, UK
24/02/2020 – 15/05/2020	Teaching assistant Logic in CS (COM2107)	University of Sheffield, UK
25/02/2019 – 17/05/2019	Teaching assistant Logic in CS (COM2107)	University of Sheffield, UK
25/09/2017 – 24/11/2017	Teaching assistant Machine Learning (COM6509)	University of Sheffield, UK
27/02/2015 – 24/09/2016	High-school Propositional and Predicate Logic	BUAP-B5M, MX
27/08/2014 – 12/12/2014	Teaching assistant Differential Calculus (MAT90)	BUAP, MX

Conference speaker

21/09/2026 – 25/09/2026	A project report on proof data extraction, interaction, and evaluation in Isabelle (slides)	CICM 2026	Ljubljana, SI
18/05/2026 – 18/05/2026	Automated Sketching and Repairing of Large Mechanised Proofs	AIPV 2026	Tokyo, JP
31/08/2025 – 05/09/2025	Reaping the fruits of the Isabelle/RL project (slides)	AITP 2025	Aussois, FR
07/04/2025 – 08/04/2025	DeepIsaHOL progress report: current machine learning for the Isabelle proof assistant (slides)	EuroProofNet workshop	Edinburgh, SCT
01/09/2024 – 14/09/2024	Project proposal: Reinforcement learning on the Isabelle proof assistant (slides)	Isabelle Workshop 2024	Tbilisi, GE
01/09/2024 – 14/09/2024	Isabelle/RL Project Proposal: Reinforcement learning on the Isabelle proof assistant (slides)	AITP 2024	Aussois, FR
28/09/2022 – 30/09/2022	Relaxing safety for metric first-order temporal logic (MFOTL) via dynamic free variables (slides)	RV 2022	Tbilisi, GE
20/11/2021 – 26/11/2021	Hybrid Systems Verification with Isabelle/HOL: Simpler Syntax, Better Models, Faster Proofs (slides)	FM 2021	Beijing, CN (online)
14/09/2020 – 17/09/2020	Affine Systems of ODEs in Isabelle/HOL for Hybrid-program Verification (slides)	SEFM 2020	Amsterdam, NL (online)
08/04/2020 – 11/04/2020	Differential Hoare logics and refinement calculi for hybrid systems with Isabelle/HOL (slides)	RAMiCS 2020	Palaiseau, FR (online)
29/10/2018 – 02/11/2018	Verifying hybrid systems with MKA (slides)	RAMiCS 2018	Groningen, NL
07/12/2015 – 09/12/2015	Topos and some of their applications (slides)	4ELC	Zacatlán, MX
31/08/2015 – 04/09/2015	Type theory (HoTT): Homotopy type theory	2CIMA & XLVII SMM Congress	Hermosillo, MX
26/10/2014 – 31/10/2014	Descriptive set theory: a model for empiric reasoning	XLVII SMM Congress	Durango, MX
03/09/2013 – 07/09/2013	Many-valued logics	9th week of mathematics	Puebla, MX

Attended events

06/10/2025 – 10/10/2025	18th Conference on Intelligent Computer Mathematics (link)	Brasilia, BR
04/09/2022 – 09/09/2022	7th Conference on Artificial Intelligence and Theorem Proving (link)	Aussois, FR
14/04/2019 – 18/04/2019	Midlands Graduate School (link)	Birmingham, UK
19/03/2019 – 22/03/2019	CyPhyAssure Spring School (link)	York, UK
09/04/2018 – 13/04/2018	Midlands Graduate School (link)	Nottingham, UK
11/12/2017 – 15/12/2017	School and Workshop on Univalent Mathematics (link)	Birmingham, UK
09/04/2017 – 13/04/2017	Midlands Graduate School (link)	Leicester, UK
24/09/2016 – 24/09/2016	XIII Logic Olympiad	Guadalajara, MX
22/05/2015 – 22/05/2015	XII Logic Olympiad	Guanajuato, MX
02/06/2014 – 20/06/2014	Carnegie Mellon University Logic Summer School	Pittsburgh, US
27/10/2013 – 01/11/2013	XLVI SMM National Congress of Mathematics (link)	Mérida, MX
25/06/2013 – 15/07/2013	21st Annual Wolfram Summer School (link)	Waltham, US
25/11/2011 – 27/11/2011	Startup Weekend	Puebla, MX

Extracurricular and social responsibility activities

22/05/2017 – 19/05/2019 *Treasurer* — Lishi Tai Chi Society, UK

Achievements: Managed the society's accounting maintaining a break-even point for the period which was consistent with the policy of full reinvestment of all generated revenue.
Contributed to tripling the number of memberships during the period.

01/09/2015 – 01/09/2016 *State representative* — Mensa, México

Achievements: Increased membership in the state by 50%.
Organized monthly meetings and applied the admission test to interested candidates.
Promoted the city of Puebla by organising gastronomic and architectonic tours.

05/02/2013 – 05/02/2014 *National secretary* — Mensa, México

Achievements: Moved the national committee's files to a cloud service.
My committee votes favoured transparency and growth for the society.

21/03/2011 – 05/02/2013 *Mensa member in good standing* Mensa, México
Achievements: Reforested ecologically damaged zones of Malintzi National Park in Puebla.
Organized symposia and popular science events.

01/08/2011 – 30/06/2012 *Founder and vice-president of SAIFI* ITESM, Mexico
Achievements: Founded the first Physics and Industrial Engineering Student Board in Puebla.
Organized the first physics day allowing college students to learn from researchers.

01/08/2007 – 26/09/2016 *Diverse tutoring and volunteering activities* Independently, México
Achievements: Paid and unpaid tutoring in high-school-level logic, mathematics, physics, chemistry and sexual health.
Volunteer in nursing houses, orphanages, farms and schools in rural regions of Puebla.

Publications

PhD Thesis: Algebraic Verification of Hybrid Systems in Isabelle/HOL https://etheses.whiterose.ac.uk/28886/

Journal Articles

1. Jonathan Julián Huerta y Munive, Simon Foster, Mario Gleirscher, Georg Struth, Christian Pardillo Laursen, Thomas Hickman. *IsaVODEs: Interactive Verification of Cyber-Physical Systems at Scale*. JAR 68(21), 2024. https://doi.org/10.1007/s10817-024-09709-2 (preprint)
2. Jonathan Julián Huerta y Munive, Georg Struth. *Predicate Transformer Semantics for Hybrid Systems: Verification Components for Isabelle/HOL*. JAR 66(1), 2022. https://doi.org/10.1007/s10817-021-09607-x (preprint)

Competition Reports

1. Stefan Mitsch, Huanhuan Sheng, Bohua Zhan, Shuling Wang, Simon Foster, Jonathan Julián Huerta y Munive. *ARCH-COMP23 Category Report: Hybrid Systems Theorem Proving*. ARCH 2023, online. https://doi.org/10.29007/57g4
2. Stefan Mitsch, Bohua Zhan, Huanhuan Sheng, Alexander Bentkamp, Xiangyu Jin, Shuling Wang, Simon Foster, Christian Pardillo Laursen, Jonathan Julián Huerta y Munive. *ARCH-COMP22 Category Report: Hybrid Systems Theorem Proving*. ARCH 2022, online. https://doi.org/10.29007/4lxf
3. Stefan Mitsch, Jonathan Julián Huerta y Munive, Xiangyu Jin, Bohua Zhan, Shuling Wang, Naijun Zhan. *ARCH-COMP20 Category Report: Hybrid Systems Theorem Proving*. ARCH 2020, online. https://doi.org/10.29007/bdq9

Artefacts

1. Jonathan Julián Huerta y Munive. *DeepIsaHOL*. Software and CICM 2026 artefact. https://doi.org/10.5281/zenodo.15080048 (GitHub)
2. Asta Halkjær Boserup, Jonathan Julián Huerta y Munive, Anders Schlichtkrull. *Completeness of the Q0 Higher-Order Logic*. Archive of Formal Proofs 2026. https://isa-afp.org/entries/Q0_Completeness.html
3. Dustin Bryant, Jonathan Julián Huerta y Munive, Simon Foster. *Numerical Methods in Isabelle*. SEFM 2026 artefact. https://doi.org/10.5281/zenodo.17679525
4. Chengsong Tan, Jonathan Julián Huerta y Munive. *Supersketch and Superfix*. Software. https://github.com/ChengsongTan/super_sketch_and_super_fix
5. Chengsong Tan, Alastair Donaldson, Jonathan Julián Huerta y Munive, John Wickerson. *Artefact for "The Burden of Proof: Automated Tooling for Rapid Iteration on Large Mechanised Proofs"*. FormaliSE 2025 artefact. https://doi.org/10.5281/zenodo.14273541
6. Andrei Herasimau, Jonathan Julián Huerta y Munive, Leonardo Lima, Martin Raszyk, Dmitriy Traytel. *A Verified Proof Checker for Metric First-Order Temporal Logic*. Archive of Formal Proofs 2024. https://www.isa-afp.org/entries/MFOTL_Checker.html
7. Simon Foster, Frank Zeyda, Kangfeng Ye, Jonathan Julián Huerta y Munive, Pedro Ribeiro, James Baxter, Burkhart Wolff, Chung-Kil Hur, Christian Pardillo Laursen, Fang Yan. *Isabelle/UTP*. Software. https://github.com/isabelle-utp
8. Jonathan Julián Huerta y Munive. *Matrices for ODEs*. Archive of Formal Proofs 2020. https://isa-afp.org/entries/Matrices_for_ODEs.html
9. Jonathan Julián Huerta y Munive. *Verification Components for Hybrid Systems*. Archive of Formal Proofs 2019. https://isa-afp.org/entries/Hybrid_Systems_VCs.html

Conference Articles

1. Asta Halkjær Boserup, Jonathan Julián Huerta y Munive, Anders Schlichtkrull. *Formalized Completeness of Peter B. Andrews' Higher-Order Logic in Isabelle/HOL*. CPP 2027 (accepted), Mexico City, MX. https://popl27.sigplan.org/home/CPP-2027 (preprint)
2. Dustin Bryant, Jonathan Julián Huerta y Munive, Simon Foster. *Verifying Numerical Methods with Isabelle/HOL*. SEFM 2026 (accepted), Malta, MT. https://sefm-conference.github.io/2026/ (preprint)
3. Jonathan Julián Huerta y Munive. *A Project Report on Proof Data Extraction, Interaction, and Evaluation in Isabelle*. CICM 2026, Ljubljana, SI. https://doi.org/10.1007/978-3-032-38214-6_10 (slides, preprint)
4. Chengsong Tan, Alastair F. Donaldson, John Wickerson, Jonathan Julián Huerta y Munive. *Automated Sketching and Repairing of Large Mechanised Proofs*. AIPV 2026, Tokyo, JP. https://aipvconf.org/ (preprint)
5. Dustin Bryant, Jonathan Julián Huerta y Munive, Cezary Kaliszyk, Josef Urban. *Munkres' General Topology Autoformalized in Isabelle/HOL*. arXiv 2026. https://arxiv.org/abs/2604.07455
6. Chengsong Tan, Alastair F. Donaldson, Jonathan Julián Huerta y Munive, John Wickerson. *The Burden of Proof: Automated Tooling for Rapid Iteration on Large Mechanised Proofs*. FormaliSE 2025, Ottawa, CA. https://doi.org/10.1109/FormaliSE66629.2025.00010
7. Leonardo Lima, Jonathan Julián Huerta y Munive, Dmitriy Traytel. *WhyMon: A Runtime Monitoring Tool with Explanations as Verdicts*. ATVA 2024, Kyoto, JP. https://doi.org/10.1007/978-3-031-78750-8_4

8. Leonardo Lima, Jonathan Julián Huerta y Munive, Dmitriy Traytel. *Explainable Online Monitoring of Metric First-Order Temporal Logic*. TACAS 2024, Luxembourg, LU. https://doi.org/10.1007/978-3-031-57246-3_16
9. David Basin, Thibault Dardinier, Nico Hauser, Lukas Heimes, Jonathan Julián Huerta y Munive, Nicolas Kaletsch, Srđan Krstić, Emanuele Marsicano, Martin Raszyk, Joshua Schneider, Dawit Legesse Tirore, Dmitriy Traytel, Sheila Zingg. *VeriMon: A Formally Verified Monitoring Tool*. ICTAC 2022, Tbilisi, GE. https://doi.org/10.1007/978-3-031-17715-6_1
10. Jonathan Julián Huerta y Munive. *Relaxing Safety for Metric First-Order Temporal Logic via Dynamic Free Variables*. RV 2022, Tbilisi, GE. https://doi.org/10.1007/978-3-031-17196-3_3 (slides, preprint)
11. Simon Foster, Jonathan Julián Huerta y Munive, Mario Gleirscher, Georg Struth. *Hybrid Systems Verification with Isabelle/HOL: Simpler Syntax, Better Models, Faster Proofs*. FM 2021, Beijing, CN (online). https://doi.org/10.1007/978-3-030-90870-6_20 (slides, preprint)
12. Jonathan Julián Huerta y Munive. *Affine Systems of ODEs in Isabelle/HOL for Hybrid-Program Verification*. SEFM 2020, Amsterdam, NL (online). https://doi.org/10.1007/978-3-030-58768-0_5 (slides, preprint)
13. Simon Foster, Jonathan Julián Huerta y Munive, Georg Struth. *Differential Hoare Logics and Refinement Calculi for Hybrid Systems with Isabelle/HOL*. RAMiCS 2020, Palaiseau, FR (online). https://doi.org/10.1007/978-3-030-43520-2_11 (slides, preprint)
14. Jonathan Julián Huerta y Munive, Georg Struth. *Verifying Hybrid Systems with Modal Kleene Algebra*. RAMiCS 2018, Groningen, NL. https://doi.org/10.1007/978-3-030-02149-8_14 (slides, preprint)