Ruben Gamboa

Professor
Dept. of Electrical Engineering
and Computer Science

1000 E. University Ave.
Laramie, WY 82071
(307) 399-3637
ruben@uwyo.edu
www.rubengamboa.com

Education

1999 **Ph.D. in Computer Science**, *The University of Texas*, Austin, Texas.
Thesis: *Mechanically Verifying Real-Valued Algorithms in ACL2*
Advisor: Robert S. Boyer

2013 **Master of Science (Astronomy)**, *Swinburne Technical University*, Swinburne Astronomy Online.

1986 **M.C.S. in Computer Science, minor in Mathematics**, *Texas A&M University*, College Station, Texas.
Thesis: *Lower Bounds on Approximation Algorithms*
Advisor: Donald K. Friesen

1984 **B.S. in Computer Science, minor in Mathematics**, *Angelo State University*, San Angelo, Texas.
Magna cum Laude.

Experience

Academic Experience

2019–2022 **Department Head**.

2015– **Professor**.

2007–2015 **Associate Professor**.

2002–2007 **Assistant Professor**, *University of Wyoming*, Laramie, Wyoming.
Taught and developed a wide range of upper-division and graduate courses in computer science, as well as special courses for UW's honors program. Supervised graduate and undergraduate theses. Served in many different committees, including search committees, the tenure and promotion committee, the ABET certification committee, the graduate committee, and the academic planning committee. Led outreach efforts to foster computer science education throughout Wyoming schools.

2010–2011 **Visiting Associate Professor**, *University of Oklahoma*, Norman, Oklahoma.
During a sabbatical leave, worked with Dr. Rex Page in developing a textbook for and teaching an honors course in applications of logic to software and hardware systems.

2001 **Adjunct Professor**, *The University of Texas*, Austin, Texas.
Taught the sophomore course Analysis of Programs, which introduces students to formal reasoning about programs and common data structures.

1987 **Lecturer**, *Texas A&M University*, College Station, Texas.
Taught the senior course in Programming Languages.

1986–1987 **Graduate Assistant, Non-Teaching**, *Texas A&M University*, College Station, Texas.
System Administrator for the Computer Science Department.

1984–1985 **Graduate Assistant, Teaching**, *Texas A&M University*, College Station, Texas.
Taught various introductory programming courses.

Industrial Experience

2021– **Consultant**, *Kestrel Institute*, Palo Alto, CA.
Apply formal methods in ACL2 to various projects, including network protocols, blockchain, and program transformations.

2010–2011 **Member, Technical Advisory Group**, *Morningstar, Inc.*.
Assessed trends and new developments in technology to inform Morningstar's global technology strategy.

2010–2011 **Consultant**, *HappyJack Software, Inc.*, Laramie, Wyoming.
Collaborated on the design of a distributed system that stores patient data. Provided advice on the transition of existing web services and databases to a new architecture that takes advantage of cloud computing and NoSQL.

2009–2010 **Sr. Technical Consultant**, *Logical Information Machines, Inc. (LIM)*.
Designed and implemented a new data warehouse to handle terabytes of financial and energy data and distribute updates to LIM customers. Designed the architecture of the next-generation time-series and metadata server, LIM's flagship product.

2000–2010 **Member, Technical Advisory Board**, *Logical Information Machines, Inc. (LIM)*.
Provide continuing advice in the technical direction of LIM, including new technologies and new products that use LIM's existing technologies.

Summers 2000–2009 **Training Consultant**, *InferData, Ltd.*.
Develop training materials and deliver courses in a wide range of topics, including J2EE, Ruby on Rails, PHP, Python, Ajax, Dojo, XML, SOA, Flex, mashups, and other Web 2.0 technologies.

2000–2001 **V.P. of Engineering**, *Loop One, Inc.*, Austin, Texas.
Led the design and implementation of Loop One's web service offering, which was based on mod_perl, Java, HTML, JavaScript, and Oracle's PL/SQL.

1990–2000 **Founder and Member, Board of Directors**, *Logical Information Machines, Inc. (LIM)*, Austin, Texas.
Founder, first employee, and member of the board of directors of LIM, a leading supplier of time-series databases, applications, and data for the financial and energy markets.

1990–2000 **Senior Architect and Fellow**, *Logical Information Machines, Inc. (LIM)*, Austin, Texas.
Designed and developed LIM's time-series database server and execution engine, based on linear temporal logic. LIM's time-series database technology, ranked as the best in the world by the Gartner Group, was developed in C++, Java, Lisp, Perl, and Oracle.

1988–1989 **Junior Member, Technical Staff**, *MCC, Deductive Computing Laboratory*, Austin, Texas.
Designed and implemented an in-memory database system for $\mathcal{SALAD}$, an implementation of the deductive database $\mathcal{LDL}$.

Courses Taught

Undergraduate Courses in Computer Science

- Discrete Structures
- Functional Programming*
- Programming Languages
- Database Systems I
- Senior Design (capstone course)
- Algorithms and Data Structures
- Software Design*
- Software Engineering
- Computer Graphics
- Computer Networks
- Compiler Construction
- Game Programming*
- Enterprise Programming*
- Distributed Computing for Cryptography*

Graduate Courses in Computer Science

- Automated Reasoning*

- Introduction to ACL2*
- Database Systems II*
- Automated Programming*
- Grid Computing for Scientific Applications*

Honors Courses

- Understanding the Digital Society*
- Silicon Artists: Machines Who Paint, Compose, Perform, and Write*
- How Computers Work: Logic in Action*
- What Computers Can Do*

Engineering Honors Courses

- Introduction to Programming for Data Science*

Professional Development Courses

- Visualization Basics: Introduction to Computational Thinking & Robotics. Team taught with Jacqueline Leonard and Paul Escoto
- Visualization Basics: Game Programming
- Professional Development for AP Computer Science Principles

High School Outreach Courses

- AP Computer Science Principles*

Student Advising

Ph.D. Students

Spring 2023 **Jagadish Bapanapally**.
Thesis: *Formalizations of the Tonelli-Shanks Algorithm in ACL2, Integration by Substitution and the Banach-Tarski Theorem in ACL2(r).*

Spring 2011 **Anthony Wallace**.
Thesis: *A Secure Framework for Information Sharing and Structured Search of Distributed Research Resources.*

*Course was completely designed and developed by instructor.

Fall 2009 **Nadezda Kuzmina**.
Thesis: *Discovery of Likely Program Constraints via Static and Dynamic Analysis*.
Partially supported by NSF CNS-0613919.

M.S. Students

Summer 2017 **Sirisha Kunchala**.
Project: *Magazine Editor—A Web Application to Create and Manipulate Graphical Objects*.

Summer 2017 **Jagadish Bapanapally**.
Thesis: *A Mechanized Proof of the Curve Length of a Rectifiable Curve*.

Spring 2015 **Mayura Worlikar**.
Thesis: *Developing a Scheme Environment in BOINC FOR Computationally Expensive Algorithms*.

Fall 2011 **Travis Bolinger**.
Thesis: *Non-relational Astronomical Databases*.

Spring 2007 **Andrey Nifatov**.
Project: *Training of Neural Networks on a Grid Architecture*.

Fall 2006 **Divya Sethi**.
Thesis: *Using Data Access Objects to Achieve Database Independence*.

Spring 2006 **Todd Bolinger**.
Thesis: *Scientific Visualization of Galaxy Behavior using Grid Architecture*.

Fall 2004 **Edouard Havugimana**.
Project: *Analysis of Online Transaction Security*.

Honors Program Projects

2021 **Leonardo Garcia**.
Project: *Web Event Aggregator*.

2017 **Caleb Carlson**.
Project: *Socket Golf: A Game in Virtual Reality*.

2016 **Adam Kacmarsky**.
Project: *Neural Interfacing with Keyboard Output*.

2015 **Siena Richard, Taylor Legg, and Matthew William Gern**.
Project: *KeyFree: A Secure and Reliable Way to Store Passwords or Any Sensitive Information*.

2012 **Spencer Buda**.
Project: *Updating the UTEXAS2 Engineering Modeling Software*.

2005 **Matt Williams and Tyler Clayton**.
Project: *Falsity: A Multiplayer Game Engine*.

2005 **Benjamin Ketron**.
Project: *Tool to Aid in Learning Phrase Structure Parsing Trees*.

Undergraduate Research

2011 **Odion Oisamoje**.
Project: *Using NoSQL to Query Astronomical Databases,* funded by NSF EPSCoR.

2008–2009 **Melissa Wiederrecht and Christopher MacLellan**.
Project: *Formal Reasoning About Programs in Scheme*.

2008–2009 **Carla Elder, Drew Hauser, Karl Heimbuck, Maurisa Jensen, Kelley O'Toole, Heather Robinson**.
Cryptography Cohort, funded by NSF DMS-0639325.

2007–2008 **Tyler Branyan, Andrew Kreeger, Christopher MacLellan, Brian Moler, Daniel Peterson, Melissa Wiederrecht**.
Cryptography Cohort, funded by NSF DMS-0639325.

2007–2008 **Heather Aust and Yuki Kawabe**.
Comprehensibility of Design, funded by NSF CNS-0752944.

Patents

2011 **No. 8,086,471**.
Computer-Implemented System and Method for Electronic Medication Administration Records.

1998 **No. 5,778,357**.
Market Information Machine.

1996 **No. 5,590,325**.
System for Forming Queries to a Commodities Trading Database Using Analog Indicators.

1995 **No. 5,414,838**.
System for Extracting Historical Market Information with Condition and Attributed Windows.

Honors

2017 **Outstanding ITEST Instruction Award**, *University of Wyoming*.

2000 **Dissertation nominated for the ACM Dissertation Award**, *University of Texas*.

1992 **Selected for the MCD Fellowship**, *University of Texas*.

1985–1986 **Recipient of the Forsythe Graduate Fellowship**, *Texas A&M University*.

Memberships

2010– **Upsilon Pi Epsilon**, *National Computer Science Honor Society*.

1994– **Phi Kappa Phi**, *National Honor Scholarship Society*.

1984– **Pi Mu Epsilon**, *National Mathematics Honor Society*.

1983– **Alpha Chi**, *National Computer Science Honor Society*.

1983– **ACM**, *Association for Computing Machinery*.
Special interest groups SIGLOG, SIGPLAN, SIGCSE, and SIGWEB

1983– **IEEE/CS**, *IEEE Computer Science Society*.

Publications

Books and Book Chapters

Gamboa, R. (In Preparation). *Formalizing Mathematics in ACL2*.

Page, R. and R. Gamboa (2019). *Essential Logic for Computer Science*. MIT Press.

Buss, A. and R. Gamboa (2017). "Teacher Transformations in Developing Computational Thinking: Gaming and Robotics Use in After-School Settings." In: *Emerging Research, Practice, and Policy on Computational Thinking*. Ed. by P. Rich and C. Hodges. Springer.

Gamboa, R. (2006a). "ACL2". In: *The Seventeen Provers of the World*. Ed. by F. Wiedijk. Lecture Notes in Artificial Intelligence (LNAI). Springer.

– (2000). "Continuity and Differentiability in ACL2". In: *Computer-Aided Reasoning: ACL2 Case Studies*. Ed. by M. Kaufmann, P. Manolios, and J Moore. Kluwer Academic Press.

Chimenti, D. and R. Gamboa (1989a). "Inventory Control". In: *A Logical Language for Data and Knowledge Bases*. Ed. by S. Naqvi and S. Tsur. Computer Science Press.

– (1989b). "Resource Allocation and Deallocation". In: *A Logical Language for Data and Knowledge Bases*. Ed. by S. Naqvi and S. Tsur. Computer Science Press.

Edited Proceedings

Passmore, G. and R. Gamboa, eds. (2020). *Proceedings of the Sixteenth International Workshop on the ACL2 Theorem Prover and its Applications*. Vol. 327. Electronic Proceedings in Theoretical Computer Science (EPTCS).

Klein, G. and R. Gamboa, eds. (July 2014). *Interactive Theorem Proving: Held as Part of the Vienna Summer of Logic, VSL 2014*. Vol. 8558. Theoretical Computer Science and General Issues. Springer.

Gamboa, R. and J. Davis, eds. (2013). *Proceedings of the Eleventh International Workshop on the ACL2 Theorem Prover and its Applications*. Vol. 114. Electronic Proceedings in Theoretical Computer Science (EPTCS).

Gamboa, R., J. Cowles, and J. Sawada, eds. (2007). *Proceedings of the Seventh International Workshop on the ACL2 Theorem Prover and its Applications*.

Journal Articles

Leonard, J., A. Buss, et al. (2016). "Using Robotics and Game Design to Enhance Children's Self-Efficacy, STEM Attitudes, and Computational Thinking Skills". In: *Journal of Science Education and Technology* 25.6, pp. 860–876. ISSN: 1573-1839. DOI: 10.1007/s10956-016-9628-2. URL: http://dx.doi.org/10.1007/s10956-016-9628-2.

Gamboa, R. (2009). "A Formalization of Powerlist Algebra in ACL2". In: *Journal of Automated Reasoning* 43.2, pp. 139–172. ISSN: 1573-0670. DOI: 10.1007/s10817-009-9140-y. URL: http://dx.doi.org/10.1007/s10817-009-9140-y.

Gamboa, R. and J. Cowles (2007). "Theory Extension in ACL2(r)". In: *Journal of Automated Reasoning* 38.4, pp. 273–301. ISSN: 1573-0670. DOI: 10.1007/s10817-006-9043-0. URL: http://dx.doi.org/10.1007/s10817-006-9043-0.

Gamboa, R. (2002). "The Correctness of the Fast Fourier Transform: A Structured Proof in ACL2". In: *Formal Methods in System Design* 20.1, pp. 91–106. ISSN: 1572-8102. DOI: 10.1023/A:1012912614285. URL: http://dx.doi.org/10.1023/A:1012912614285.

Gamboa, R. and M. Kaufmann (2001). "Nonstandard Analysis in ACL2". In: *Journal of Automated Reasoning* 27.4, pp. 323–351. ISSN: 1573-0670. DOI: 10.1023/A:1011908113514. URL: http://dx.doi.org/10.1023/A:1011908113514.

Chimenti, D., R. Gamboa, R. Krishnamurthy, et al. (Mar. 1990). "The LDL System Prototype". In: *IEEE Trans. on Knowl. and Data Eng.* 2.1, pp. 76–90. ISSN: 1041-4347. DOI: 10.1109/69.50907. URL: http://dx.doi.org/10.1109/69.50907.

Refereed Conference Publications

Gamboa, R., P. Manolios, et al. (2023). "Using Counter-Example Generation and Theory Exploration to Suggest Missing Hypotheses". In: *Proceedings of the Eighteenth International Workshop on the ACL2 Theorem Prover and its Applications, Austin, Texas, USA, November 13–14, 2023*. Ed. by A. Coglio and S. Swords.

Bapanapally, J. and R. Gamboa (2022a). "A Complete, Mechanically-Verified Proof of the Banach-Tarski Theorem in ACL2(r)". In: *Interactive Theorem Proving - Thirteenth International Conference, ITP 2022, Haifa, Israel, July 31–Aug 12, 2022. Proceedings*.

– (2022c). "A Free Group of Rotations of Rank 2". In: *Proceedings of the Seventeenth International Workshop on the ACL2 Theorem Prover and its Applications, Austin, Texas, USA, May 26–27, 2022*. Ed. by R. Sumners and C. Chau. Electronic Proceedings in Theoretical Computer Science.

Gamboa, R. and W. Gamboa (2022). "All Prime Numbers Have Primitive Roots". In: *Proceedings of the Seventeenth International Workshop on the ACL2 Theorem Prover and its Applications, Austin, Texas, USA, May 26–27, 2022*. Ed. by R. Sumners and C. Chau. Electronic Proceedings in Theoretical Computer Science.

Gamboa, R. and A. Thoney (2022). "Using ACL2 To Teach Students About Software Testing". In: *Proceedings of the Seventeenth International Workshop on the ACL2 Theorem Prover and its Applications, Austin, Texas, USA, May 26–27, 2022*. Ed. by R. Sumners and C. Chau. Electronic Proceedings in Theoretical Computer Science.

Gamboa, R., J. Cowles, and W. Gamboa (2020). "Quadratic Extensions in ACL2". In: *Proceedings of the Sixteenth International Workshop on the ACL2 Theorem Prover and its Applications, Worldwide, Planet Earth, May 28–29, 2020*. Ed. by G. Passmore and R. Gamboa. Electronic Proceedings in Theoretical Computer Science.

Gamboa, R. and J. Cowles (2018). "The Fundamental Theorem of Algebra in ACL2". In: *Proceedings 15th International Workshop on the ACL2 Theorem Prover and its Applications, Austin, Texas, USA, November 5–6, 2018*. Ed. by S. Goel and M. Kaufmann. Electronic Proceedings in Theoretical Computer Science.

Cowles, J. and R. Gamboa (2017). "The Cayley-Dickson Construction in ACL2". In: *Proceedings 14th International Workshop on the ACL2 Theorem Prover and its Applications, Austin, Texas, USA, May 22-23, 2017*. Ed. by A. Slobodova and Jr. W. Hunt. Vol. 249. Electronic Proceedings in Theoretical Computer Science. Open Publishing Association, pp. 18–29. DOI: 10.4204/EPTCS.249.2.

– (2015). "Perfect Numbers in ACL2". In: *Proceedings Thirteenth International Workshop on the ACL2 Theorem Prover and Its Applications, Austin, Texas, USA, 1-2 October 2015.* Pp. 53–59. DOI: 10.4204/EPTCS.192.5. URL: https://doi.org/10.4204/EPTCS.192.5.

– (2014). "Equivalence of the Traditional and Non-Standard Definitions of Concepts from Real Analysis". In: *Proceedings Twelfth International Workshop on the ACL2 Theorem Prover and its Applications, Vienna, Austria, 12-13th July 2014.* Pp. 89–100. DOI: 10.4204/EPTCS.152.8. URL: https://doi.org/10.4204/EPTCS.152.8.

Gamboa, R. and J. Cowles (2014a). "Formal Verification of Medina's Sequence of Polynomials for Approximating Arctangent". In: *Proceedings Twelfth International Workshop on the ACL2 Theorem Prover and its Applications, Vienna, Austria, 12-13th July 2014.* Pp. 101–110. DOI: 10.4204/EPTCS.152.9. URL: https://doi.org/10.4204/EPTCS.152.9.

Helms, L. and R. Gamboa (2013). "An Interpreter for Quantum Circuits". In: *Proceedings International Workshop on the ACL2 Theorem Prover and its Applications, ACL2 2013, Laramie, Wyoming, USA, May 30-31, 2013.* Pp. 85–94. DOI: 10.4204/EPTCS.114.7. URL: https://doi.org/10.4204/EPTCS.114.7.

Page, R. and R. Gamboa (2013). "A more formal approach to "computer science: principles"". In: *The 44th ACM Technical Symposium on Computer Science Education, SIGCSE '13, Denver, CO, USA, March 6-9, 2013*, pp. 257–262. DOI: 10.1145/2445196.2445274. URL: http://doi.acm.org/10.1145/2445196.2445274.

Gamboa, R. and J. Cowles (2012). "A Cantor Trio: Denumerability, the Reals, and the Real Algebraic Numbers". In: *Interactive Theorem Proving - Third International Conference, ITP 2012, Princeton, NJ, USA, August 13-15, 2012. Proceedings*, pp. 51–66. DOI: 10.1007/978-3-642-32347-8_5. URL: https://doi.org/10.1007/978-3-642-32347-8_5.

Page, R. and R. Gamboa (2012). "How Computers Work: Computational Thinking for Everyone". In: *Proceedings First International Workshop on Trends in Functional Programming in Education, TFPIE 2012, University of St. Andrews, Scotland, UK, 11th June 2012.* Pp. 1–19. DOI: 10.4204/EPTCS.106.1. URL: https://doi.org/10.4204/EPTCS.106.1.

Cowles, John R. and Ruben Gamboa (2011). "Verifying Sierpiński and Riesel Numbers in ACL2". In: *Proceedings 10th International Workshop on the ACL2 Theorem Prover and its*

Applications, ACL2 2011, Austin, Texas, USA, November 3-4, 2011. Pp. 20–27. DOI: 10.4204/EPTCS.70.2. URL: https://doi.org/10.4204/EPTCS.70.2.

Reid, P. and R. Gamboa (2011a). "Automatic Differentiation in ACL2". In: *Interactive Theorem Proving - Second International Conference, ITP 2011, Berg en Dal, The Netherlands, August 22-25, 2011. Proceedings*, pp. 312–324. DOI: 10.1007/978-3-642-22863-6_23. URL: https://doi.org/10.1007/978-3-642-22863-6_23.

– (2011b). "Implementing an Automatic Differentiator in ACL2". In: *Proceedings 10th International Workshop on the ACL2 Theorem Prover and its Applications, ACL2 2011, Austin, Texas, USA, November 3-4, 2011*. Pp. 61–69. DOI: 10.4204/EPTCS.70.5. URL: https://doi.org/10.4204/EPTCS.70.5.

Cowles, J. and R. Gamboa (2010). "Using a First Order Logic to Verify That Some Set of Reals Has No Lesbegue Measure". In: *Interactive Theorem Proving, First International Conference, ITP 2010, Edinburgh, UK, July 11-14, 2010. Proceedings*, pp. 25–34. DOI: 10.1007/978-3-642-14052-5_4. URL: https://doi.org/10.1007/978-3-642-14052-5_4.

– (2009). "Solving $\triangle = \square$". In: *Proceedings of the Eighth International Workshop on the ACL2 Theorem Prover and Its Applications*. ACL2 '09. Boston, Massachusetts, USA: ACM, pp. 79–81. ISBN: 9781-60558-742-4. DOI: 10.1145/1637837.1637850. URL: http://doi.acm.org/10.1145/1637837.1637850.

Gamboa, R. and J. Cowles (2009a). "Inverse Functions in ACL2(R)". In: *Proceedings of the Eighth International Workshop on the ACL2 Theorem Prover and Its Applications*. ACL2 '09. Boston, Massachusetts, USA: ACM, pp. 57–61. ISBN: 9781-60558-742-4. DOI: 10.1145/1637837.1637846. URL: http://doi.acm.org/10.1145/1637837.1637846.

Kuzmina, N., J. Paul, et al. (2008). "Extending dynamic constraint detection with disjunctive constraints". In: *Proceedings of the 2008 International Workshop on Dynamic Analysis: held in conjunction with the ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA 2008), WODA 2008, Seattle, Washington, USA, July 21, 2008*, pp. 57–63. DOI: 10.1145/1401827.1401839. URL: http://doi.acm.org/10.1145/1401827.1401839.

Paul, J. et al. (2008). "Toward a Formal Evaluation of Refactorings". In: *Proceedings of the Sixth NASA Langley Formal Methods (LFM) Workshop 2008, Newport News, Virginia, USA, Apr 30, 2008*, pp. 33–35.

Kuzmina, N. and R. Gamboa (2007). "Extending Dynamic Constraint Detection with Polymorphic Analysis". In: *Fifth International Workshop on Dynamic Analysis, WODA@ICSE 2007, Minneapolis, MN, USA, 20-26 May, 2007*, p. 1. DOI: 10.1109/WODA.2007.3. URL: http://dx.doi.org/10.1109/WODA.2007.3.

Cowles, J. and R. Gamboa (2006). "Unique factorization in ACL2: Euclidean domains". In: *Proceedings of the Sixth International Workshop on the ACL2 Theorem Prover and its Applications, ACL2 2006, Seattle, Washington, USA, August 15-16, 2006*, pp. 21–27. DOI: 10.1145/1217975.1217980. URL: http://doi.acm.org/10.1145/1217975.1217980.

Gamboa, R. and J. Cowles (2006). "Implementing a cost-aware evaluator for ACL2 expressions". In: *Proceedings of the Sixth International Workshop on the ACL2 Theorem Prover and its Applications, ACL2 2006, Seattle, Washington, USA, August 15-16, 2006*, pp. 71–80. DOI: 10.1145/1217975.1217991. URL: http://doi.acm.org/10.1145/1217975.1217991.

Cowles, J. and R. Gamboa (2004). "Contributions to the Theory of Tail Recursive Functions". In: *Proceedings of the Fifth International Workshop on the ACL2 Theorem Prover and its Applications, ACL2 2004, Austin, Texas, USA, November 18-19, 2004*.

Gamboa, R. and J. Cowles (2004). "A Mechanical Proof of the Cook-Levin Theorem". In: *Theorem Proving in Higher Order Logics, 17th International Conference, TPHOLs 2004, Park City, Utah, USA, September 14-17, 2004, Proceedings*, pp. 99–116. DOI: 10.1007/978-3-540-30142-4_8. URL: https://doi.org/10.1007/978-3-540-30142-4_8.

Gamboa, R., J. Cowles, and N. Kuzmina (2004). "Axiomatic Events in ACL2(r): A Story of defun, defun-std, and encapsulate". In: *Proceedings of the Fifth International Workshop on the ACL2 Theorem Prover and its Applications, ACL2 2004, Austin, Texas, USA, November 18-19, 2004*.

Yu, B., S. Kim, et al. (2004). "Curve-Based Representation of Moving Object Trajectories". In: *8th International Database Engineering and Applications Symposium (IDEAS 2004), 7-9 July 2004, Coimbra, Portugal*, pp. 419–425. DOI: 10.1109/IDEAS.2004.18. URL: http://doi.ieeecomputersociety.org/10.1109/IDEAS.2004.18.

Gamboa, R. (2003). "Writing Literate Proofs with XML Tools". In: *Proceedings of the Fourth International Workshop on the ACL2 Theorem Prover and its Applications, ACL2 2003, Boulder, Colorado, USA, July 13-14, 2003*.

Gamboa, R., J. Cowles, and J. Van Baalen (2003a). "On the Verification of Synthesized Kalman Filters". In: *Proceedings of the Fourth International Workshop on the ACL2 Theorem Prover and its Applications, ACL2 2003, Boulder, Colorado, USA, July 13-14, 2003*.

– (2003b). "Using ACL2 Arrays to Formalize Matrix Algebra". In: *Proceedings of the Fourth International Workshop on the ACL2 Theorem Prover and its Applications, ACL2 2003, Boulder, Colorado, USA, July 13-14, 2003*.

Gamboa, R. and M. Patterson (2003). "Polymorphism in ACL2". In: *Proceedings of the Fourth International Workshop on the ACL2 Theorem Prover and its Applications, ACL2 2003, Boulder, Colorado, USA, July 13-14, 2003*.

Gamboa, R. and B. Middleton (2002). "Taylor's Formula with Remainder". In: *Proceedings of the Third International Workshop on the ACL2 Theorem Prover and its Applications, ACL2 2002, Grenoble, France, April 8-9, 2002*.

Sawada, J. and R. Gamboa (2002). "Mechanical Verification of a Square Root Algorithm Using Taylor's Theorem". In: *Formal Methods in Computer-Aided Design, 4th International Conference, FMCAD 2002, Portland, OR, USA, November 6-8, 2002, Proceedings*, pp. 274–291. DOI: 10.1007/3-540-36126-X_17. URL: https://doi.org/10.1007/3-540-36126-X_17.

Gamboa, R. (1998). "Mechanically Verifying the Correctness of the Fast Fourier Transform in ACL2". In: *IPPS/SPDP Workshops*, pp. 796–806. DOI: 10.1007/3-540-64359-1_743. URL: https://doi.org/10.1007/3-540-64359-1_743.

Chimenti, D., R. Gamboa, and R. Krishnamurthy (1990). "Abstract Machine for LDL". In: *Advances in Database Technology - EDBT'90. International Conference on Extending Database Technology, Venice, Italy, March 26-30, 1990, Proceedings*, pp. 153–168. DOI: 10.1007/BFb0022169. URL: https://doi.org/10.1007/BFb0022169.

Chimenti, D., R. Gamboa, and R. Krishnamurthy (1989a). "Towards on Open Architecture for LDL". In: *Proceedings of the Fifteenth International Conference on Very Large Data Bases, August 22-25, 1989, Amsterdam, The Netherlands*. Pp. 195–203. URL: http://www.vldb.org/conf/1989/P195.PDF.

Presentations and Other Publications

Bapanapally, J. and R. Gamboa (2022b). *A Formal Proof of the Banach-Tarski Theorem in ACL2(r)*. Presented at the *International Symposium on Artificial Intelligence and Mathematics (ISAIM)*.

– (2022d). *Integration by Substitution in ACL2(r)*. Presented at the *17th International Workshop on the ACL2 Theorem Prover and its Applications*, Austin, Texas.

– (2022e). *Towards Partial Differentiation in ACL2(r)*. Presented at the *17th International Workshop on the ACL2 Theorem Prover and its Applications*, Austin, Texas.

Gamboa, R. (2022a). *A Computer-Checked Proof that All Prime Numbers Have Primitive Roots*. Algebra, Combinatorics, and Number Theory (ACNT) Seminar. Department of Mathematics and Statistics, University of Wyoming.

– (2022b). *Accessing ACL2 through Jupyter Notebooks*. Presented at the *17th International Workshop on the ACL2 Theorem Prover and its Applications*, Austin, Texas.

– (2021). *Reasoning About Quadratic Extension Fields with the Aid of a Computer*. Invited Talk for the Math, Computer Science, and Physics Conversation Series at Roanoke College.

Banic, A. and R. Gamboa (2019). *Visual Design Problem-based Learning in a Virtual Environment Improves Computational Thinking and Programming Knowledge*. Presented at the *Fourth Workshop on K-12+ Embodied Learning through Virtual & Augmented Reality (KELVAR), a Workshop of IEEE VR 2019*, Osaka, Japan.

Borowczak, M. and R. Gamboa (2018). *Understanding Blockchain: Beyond the Buzzwords*. Keynote presentation at the *e2e Laramie* event, April.

Gamboa, R. (2018). *What Can Machines Learn?* Presented at the *71st Westercon*, Denver, Colorado.

Bapanapally, J. and R. Gamboa (2017). *A Mechanized Proof of the Curve Length of a Rectifiable Curve*. Presented at the *14th International Workshop on the ACL2 Theorem Prover and its Applications*, Austin, Texas.

Leonard, J., J. Johnson, and R. Gamboa (2015). *Gaming to Learn Computational Thinking*. Presented at *Texas Computer Education Association Annual Convention (TCEA)*, Austin, Texas.

Gamboa, R. and J. Cowles (2014b). *On Vickrey's Theorem and the Use of ACL2 for Formal Reasoning in Economics (Extended Abstract)*. Presented at the *12th International Workshop on the ACL2 Theorem Prover and its Applications*, Vienna, Austria.

– (2014c). *Raising (Ir)rationals to (Ir)rational Exponents*. Presented at the *12th International Workshop on the ACL2 Theorem Prover and its Applications*, Vienna, Austria.

Kuzmina, N., T. Tashi, and R. Gamboa (2012). *Distributed Architecture for Storing Non-Relational Data*. Presented at the *International Conference on Information Technologies (ICIT)*, Saratov, Russia.

Gamboa, R. (2011). *ACL2(r): Got Reals?* Invited presentation at the *10th International Workshop on the ACL2 Theorem Prover and its Applications*, Austin, Texas.

– (2008, 2009, 2011). *Computing in Astronomy*. Presented at the *Launch Pad Workshop for Writers of Science Fiction*, Laramie, Wyoming.

– (2010a). *An Entrepreneur's Education from the School of Hard Knocks*. Keynote presentation at the *e2e Laramie* event, January. Also presented at the *StartWest* summer meeting, Sheridan, Wyoming.

– (2010b). *Tales from the Front: How to Survive as a Software Entrepreneur*. Invited presentation at the University of Oklahoma *Center for the Creation of Economic Wealth (CCEW) Speaker Series*, Norman, Oklahoma.

Gamboa, R. and J. Cowles (2010). *A Mechanical Verification of Vitali's Theorem in an Unlikely Logic*. Invited presentation at the University of Oklahoma, Norman, Oklahoma.

Mui, C., R. Gamboa, and J. Parkinson (2010a). *Disruptive Change*. Panel discussion at the *Morningstar North American Tech Conference*, Chicago, Illinois.

– (2010b). *Recent Models for Distributed and Multicore Programming*. Invited presentation at the *Morningstar North American Tech Conference*, Chicago, Illinois.

Wiederrecht, M., C. MacLellan, and R. Gamboa (2010). *Reasoning About DrScheme Programs in ACL2*. Presented at the *11th Symposium on Trends in Functional Programming (TFP)*, Norman, Oklahoma.

Gamboa, R. and J. Cowles (2009b). *The Chain Rule and Friends in ACL2(r)*. Presented at the *8th International Workshop on the ACL2 Theorem Prover and its Applications*, Boston, Massachusetts.

J. Caldwell, R. Gamboa and J. Cowles (2009). *Enumerating Rationals Without Repetitions*. Presented at the *8th International Workshop on the ACL2 Theorem Prover and its Applications*, Boston, Massachusetts.

Gamboa, R. (2007). *Red-Black Trees for DrACuLa*. Presented at the *7th International Workshop on the ACL2 Theorem Prover and its Applications*, Austin, Texas.

– (2006b). *Mechanical Verification of Elementary Calculus Theorems in ACL2*. Presented at University of Northern Colorado, Greeley, Colorado.

Kuzmina, N. and R. Gamboa (2006). *Dynamic Constraint Detection for Polymorphic Behavior*. Poster presented at the *ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA)*, Portland, Oregon.

Yu, B. and R. Gamboa (2006). *Designing Spatio-Temporal Portals to Continuously Changing Network Nodes*. Encyclopedia of Portal Technology and Applications.

Gamboa, R. (2005). *Building Truly Database-Independent Applications*. Presented at Software Development Conference & Expo, San Jose, California.

– (1999). *Proving Elementary Calculus Theorems in ACL2*. Presented at Texas A&M University, College Station, Texas.

– (1997). *Defthms About Zip and Tie: Reasoning About Powerlists in ACL2*. Tech. rep. TR97-02. University of Texas Computer Sciences.

– (1996). *Square Roots in ACL2: A Study in Sonata Form*. Tech. rep. TR96-34. University of Texas Computer Sciences.

Chimenti, D. and R. Gamboa (1989c). *The SALAD Cookbook: A User's/Programmer's Guide*. Tech. rep. ACA-ST-346-89. MCC.

Chimenti, D., R. Gamboa, and R. Krishnamurthy (1989b). *Using Modules and Externals in LDL*. Tech. rep. ACA-ST-036-89. MCC.

Service

University Service

2023 **Digital Literacy Subcommittee of the Next-Generation General Education Committee**, *University of Wyoming*.

2022 **Head of Petroleum Engineering Search Committee**, *College of Engineering and Applied Science*.

2021–2022 **Blue Sky Group, UW Strategic Scenario Planning**, *University of Wyoming*.

2020–2022 **Software Engineering Degree Working Group**, *University of Wyoming*.

2020–2022 **Developing and Deploying at Scale Disruptive Technologies Working Group**, *Council on Competitiveness*.

2020– **HLC Assessment Academy**, *University of Wyoming*.

2020– **Assessment Coordinator**, *College of Engineering and Applied Science*.

2018 **Head of Petroleum Engineering Search Committee**, *College of Engineering and Applied Science*.

2018 **Professor of Practice in Entrepreneurship Search Committee**, *College of Engineering and Applied Science*.

2017–2018 **Strategic Enrollment Data Group**, *University of Wyoming*.

2016–2017 **Ad-Hoc Committee for the Engineering Honors Program**, *College of Engineering and Applied Science*.

2015–2018 **Tenure & Promotion Committee (Chair)**, *College of Engineering and Applied Science*.

2015 **Honors Program Review Committee**, *University of Wyoming*.

2014–2020 **Faculty Development Committee**, *University of Wyoming*.

2014– **Computer Science ABET Accreditation Committee (Chair)**, *Department of Computer Science*.

2013– **Academic Dishonesty Appeals Committee**, *College of Engineering and Applied Science*.

2013–2015 **Academic Planning Committee**, *College of Engineering and Applied Science*.

2013–2019 **Undergraduate Committee**, *Department of Computer Science*.

2012–2015 **Graduate Examination Committee**, *Department of Computer Science*.

2009, 2012–2015 **Graduate Curriculum Committee**, *Department of Computer Science*.

2008–2011 **Academic Planning Committee**, *University of Wyoming*.

2008–2009 **Graduate Committee**, *Department of Computer Science*.

2008–2010 **Computer Science ABET Accreditation Committee**, *Department of Computer Science*.

2008 **APL Search Committee (Chair)**, *Department of Computer Science*.

2007-2010, 2012 **Tenure & Promotion Committee**, *College of Engineering and Applied Science*.

2003–2005 **Faculty Search Committee**, *Department of Mathematics*.

2002–2004, 2009, 2018 **Faculty Search Committee**, *Department of Computer Science*.

2003–2004 **Equipment Committee**, *Department of Computer Science*.

2006–2007 **Developer Faculty Search Software**, *University of Wyoming*.
Developed a web application designed to simplify the process of applying for faculty jobs and managing the internal search. This became the commercial application www.EZFacultySearch.com.

2004 **Volunteer Software Developer**.
Developed a LaTeX stylesheet for writing letters in the style of the Department of Computer Science stationery.

2003 **Volunteer Software Developer**.
Developed a graphical gradebook application for the department and others in the university.

Professional Service

2020 **Conference Co-Chair**, *16th International Workshop on the ACL2 Theorem Prover and its Applications*, Austin, Texas.

2019– **Program Evaluator**, *ABET Computing Accreditation Commission*.

2015 **Guest Editor**, *Special issue of Journal of Automated Reasoning*.

2006-2010, 2013–2015, 2020–2022 **ACL2 Steering Committee Member**.

2014 **Conference Co-Chair**, *5th International Conference on Interactive Theorem Proving (ITP)*, Vienna, Austria.
In Federated Logic Conference (FLoC), part of the Vienna Summer of Logic.

2013	**Conference Co-Chair**, *11th International Workshop on the ACL2 Theorem Prover and its Applications*, Laramie, Wyoming.
2007	**Conference Co-Chair**, *7th International Workshop on the ACL2 Theorem Prover and its Applications*, Austin, Texas.
2006, 2009	**Publications Chair**, *6th/8th International Workshop on the ACL2 Theorem Prover and its Applications*, Austin, Texas.
2002, 2004, 2006, 2009, 2015, 2018, 2022, 2023	**PC Member**, *International Workshop on the ACL2 Theorem Prover and its Applications*.
2013	**PC Member**, *International Workshop on Developments in Computational Models*.
2013	**PC Member**, *International Conference on Automated Deduction*.
2010, 2013, 2014, 2015, 2017, 2019, 2023	**PC Member**, *International Conference on Interactive Theorem Proving*.
2012	**PC Member**, *Conferences on Intelligent Computer Mathematics, Calculemus Track*.
2010	**PC Member**, *Symposium on Trends in Functional Programming*.
2001,2004	**PC Member**, *Workshop on Strategies in Automated Deduction*.
	Review Panelist, *NSF Directorate of Computer and Information Science and Engineering*.
	Review Panelist, *NSF Directorate of Education and Human Resources*.
	Review Panelist, *Free Competition, sponsored by the Netherlands Organisation for Scientific Research*.
	Reviewer, *Journal of Automated Reasoning*.
	Reviewer, *Journal of Automated Reasoning Special Issue on Empirically Successful Automated Reasoning*.
	Reviewer, *IEEE Transactions on Computer-Aided Design*.
	Reviewer, *Annals of Mathematics and Artificial Intelligence*.
	Reviewer, *Journal of Functional Programming*.
	Reviewer, *Science of Computer Programming*.
	Reviewer, *Electronic Notes in Theoretical Computer Science*.
	Reviewer, *Journal of Systems and Software*.
	Reviewer, *Journal of Software and Systems Modeling*.
	Reviewer, *The Computer Journal*.

Reviewer, *Annual Meeting of the Society for Exact Philosophy*.

Reviewer, *European Journal of STEM Education*.

Service and Outreach to Community

2017–19, 2021– **Volunteer Teacher for AP CS Principles**, *Laramie and Cheyenne High Schools*.

2016– **AP Reader, Table Leader, Question Leader**, *AP Computer Science Principles Exam*.

2021– **Science Fair Judge**, *Regeneron International Science and Engineering Fair*.

2008–2009, 2015, 2021– **Science Fair Judge**, *Wyoming State Science Fair*.

2012–2021 **Professional Development**.
Developed and delivered professional development courses for computer science teachers in Wyoming schools.

2018 **Member**, *Computer Science Standards Review Committee*.
Determine K-12 standards for Computer Science education in Wyoming.

2018 **BCF Fellow**, *Business Creation Factory*.
Provided business and technical advice to Wyoming entrepreneurs.

2015–16 **Volunteer Teacher for AP CS Principles Pilot Course**, *Laramie High School*.

2013–15 **Volunteer Teacher and Co-Founder**, *Laramie Robotics Club*.

2013 **Member of the Board of Directors**, *Innerphase, a regional, non-profit organization devoted to helping youth develop into leaders through athletics*, Laramie, Wyoming.

2012 **Volunteer Teacher**, *Spring Creek Elementary*.
Led a learn-to-program after-school activity for 5th and 6th graders.

2011–2015 **High School Institute Teacher**, *University of Wyoming*.
Co-designed and delivered a programming course for high school students.

2011–2012 **Robotics Competition Coach**, *Wyoming FIRST Lego League*.

2008 **Robotics Competition Judge**, *Wyoming FIRST Lego League*.

2005–2007 **Science Fair Judge**, *Elementary and Middle Schools*, Laramie, Wyoming.

2008–2017 **Affiliate Faculty**, *University of Wyoming Science and Mathematics Teaching Center*.

2004–2006 **Computers and Astronomy Outreach**, *Laramie and Casper, Wyoming K-12 Schools*.

2005–2006 **Volunteer Instructor**, *St. Laurence Elementary School*.
Developed and delivered a course on computers and astronomy for 4th and 5th graders.

Grants

Grants Awarded

2018–2021 **The Bessie Coleman Project—Using Computer Modeling and Flight Simulation to Create STEM Pathways**, *J. Leonard, R. Gamboa, G. Verma, R. Ellington, B. Gellis*, NSF DRL-1757976, $1,199,884.

2015–2017 **CS 10K: Beauty and Joy, Adapted and Adopted: Building a Computational Teaching Cadre from within Wyoming Schools**, *Ipiña, L., R. Gamboa, and D. Stanescu*, NSF CNS-1441069, $587,947.

2014–2019 **Collaborative Research: Wyoming Interns to Teacher Scholars (WITS) Program**, *Leonard, J., S. Aryana, M. Chamberlin, S. Chamberlin, M. Clementz, and K. Wells*, NSF DUE-1439546, $1,449,116.
Listed under **Key Personnel**.

2013–2016 **Visualization Basics: Using Gaming to Improve Computational Thinking**, *Leonard, J., A. Buss, R. Gamboa, J. Hamaan, and F. Jafari*, NSF DRL-1311810, $1,199,963.

2009 **Electronic Medical Administration Record and Reminder System for Mobile Phones**, *Gamboa, M., R. Gamboa, and J. Van Baalen*, Wyoming SBIR/STTR Initiative (WSSI), $4,000.

2007–2008 **REU Supplement for NSF CNS-0613919**, *Gamboa, R. and J. Caldwell*, NSF CNS-0752944, $12,000.

2006–2008 **CSUMS: A Pilot Program to Train Cryptography Students in Computation**, *Müller, S. and R. Gamboa*, NSF DMS-0639325, $196,000.

2006–2009 **SoD-HCER: Comprehensibility as a Design Criterion**, *Gamboa, R. and J. Caldwell*, NSF CNS-0613919, $157,428.

2007–2010 **Video Analysis and Content Exploitation (VACE)**, *Van Baalen, J. and R. Gamboa*, Disruptive Technology Office (DTO), $576,000.
Terminated 9/1/07 when the DTO decided to make all VACE-related work classified.

2005 **Course Development: Grid Computing for Scientific Applications**, *Gamboa, R.*, Wyoming Space Grant Consortium, $5,000.

2003–2006 **Logical Information Machines Next-Generation Time Series**, *Gamboa, R.*, LIM8277, $102,957.

2003–2005 **MIM software and SUN server, primarily intended for use by the College of Business**, *Gamboa, R.*, LIM8277, $65,000.

2002–2003 **Mechanical Verification of Synthesized Code**, *Cowles, J., R. Gamboa, and J. Van Baalen*, NASA NAG 2-1570, $26,387.

2002–2005 **MRI: Acquisition of a Network of Workstations Serving as a Platform for Distributed Automated Reasoning**, *Caldwell, J., R. Gamboa, and J. Van Baalen*, NSF EIA-0216592, $82,530.
Internal match MAJOREQUIP8327 for $25,000.

Grants Proposals Declined

2017 **EXP: Deepening College Students' Understanding of Molecular Processes Using Augmented Reality**, *Bowman, G., A. Buss, R. Gamboa, and J. Prather*, NSF Cyberlearning and Future Learning Technologies.

2016 **STRATEGIES: The Bessie Coleman Project—Using Computer Modeling, Robotics, and Flight Simulation to Create STEM Pathways**, *Leonard, J., J. Davis, A. Burrows, S. McBride, and R. Gamboa*, NSF ITEST.

2013 **The Quasarchive**, *Brotherton, M.*, NSF Division of Astronomical Sciences.
Listed under **Key Personnel**.

2012 **The Quasarchive**, *Brotherton, M.*, NASA.
Listed under **Key Personnel**.

2009 **Paul, J., R. Gamboa, and J. Van Baalen**, *Building a Verified Communication Stack for Medical Devices*, NIST SBIR.

2009 **Felleisen, M., R. Page, and R. Gamboa**, *CCLI-Phase 2: Collaborative Research: Theorem Proving for Practical Programmers*, NSF.

2006 **Müller, S. and R. Gamboa**, *TF: Advances in Deterministic Primality Testing*, NSF.

2005 **Gamboa, R. and J. Hamann**, *ITEST: Using Astronomy to Engage Student Learning of Information Technology*, NSF.

2005 **Van Baalen, J. and R. Gamboa**, *A Vulnerability Analysis Tool for Web Applications*, NSF.

2005 **Yu, B. and R. Gamboa**, *DDDAS-SMRP: The Development of a Spatiotemporal Grid*, NSF.

2004 **Van Baalen, J. and R. Gamboa**, *A Vulnerability Analysis Tool for Web Applications*, Cyber Security Research and Development (CSRD).

2004 **Gamboa, R.**, *Dynamic Detection of Program Constraints in Eclipse*, IBM Faculty Awards Program.

2004 **Gamboa, R.**, *CAREER: A Framework for Reasoning about Object-Oriented Programs*, NSF.

2004 **Caldwell, J. and R. Gamboa**, *Incorporating Formal Aspects of Design into the Computer Science Curriculum*, NSF.

2004 **Yu, B., T. Bailey, and R. Gamboa**, *A Database Server for Moving Object Trajectories*, NSF.

2003 **Gamboa, R.**, *Enhancing an Automated Theorem Prover to Support Analytic Number Theory*, NSA.
Young Investigator's Grant.

2003 **Yu, B., T. Bailey, R. Gamboa, and S.H. Kim**, *How to Deal With Large Sets of Data Objects that Move with Momentum*, ARL.

2003 **Gamboa, R., J. Van Baalen, J. Cowles, and J. Whittle**, *Verification of Automated Software*, NASA.

2002 **Yu, B., T. Bailey, R. Gamboa, and S.H. Kim**, *A Database Server for Moving Object Trajectories*, NSF.

2002 **Gamboa, R.**, *CAREER: Building Highly Reliable Object-Oriented Software*, NSF.

Continuing Education

2021 **PHYS-155: Mathematical and Computational Methods**, *Georgetown University*, edX.

2021 **CCE Core 1: Foundational Frameworks**, Canvas Certified Educator.

2020 **National Effective Teaching Institute 3 (NETI-3)**, American Society for Engineering Education.

2020 **CRA New Chairs Workshop**, Computing Research Association.

2019 **AWS Certified Cloud Practitioner**, Amazon Web Services.

2019 **Blockchain Specialization**, *4-Course Specialization by the State University of New York and University at Buffalo*, Coursera.

2019 **Data-Driven Astronomy**, *The University of Sydney*, Coursera.

2018 **Introduction to Swift Programming**, *University of Toronto*, Coursera.

2018 **Introduction to Complex Analysis**, *Wesleyan University*, Coursera.

2018 **Improving Deep Neural Networks**, *deeplearning.ai*, Coursera.

2017 **Neural Networks and Deep Learning**, *deeplearning.ai*, Coursera.

2017 **Global Financial Markets and Instruments**, *Rice University*, Coursera.

2017 **General Chemistry**, *Rice University*, Coursera.

2016 **Data Science Specialization**, *9-Course Specialization by Johns Hopkins University (not including the Capstone, course #10)*, Coursera.

2016 **Introduction to Differential Equations**, *Boston University*, edX.

2015 **Electricity & Magnetism**, *Rice University*, edX.

2014 **Big Data and Social Physics**, *Massachusetts Institute of Technology*, Online X Professional Education.

2014 **Tackling the Challenges of Big Data**, *Massachusetts Institute of Technology*, edX.

2014 **Street Fighting Mathematics**, *Massachusetts Institute of Technology*, edX.

2014 **Classical Mechanics**, *Massachusetts Institute of Technology*, edX.

2013 **Computational Investing I**, *Georgia Institute of Technology*, Coursera.

2012 **Quantum Mechanics and Quantum Computation**, *University of California, Berkeley*, Coursera.

2012 **Circuits and Electronics**, *Massachusetts Institute of Technology*, edX.

Personal Information

Born October 15, 1967, in Colombia, South America. Have lived in South America, Europe, and the United States. U.S. Citizen. Married, with two kids in college and industry.

Amateur astronomer, science fiction fan, space enthusiast, private pilot.