Name

Michael Soltys-Kulinicz

Address

Department of Computer Science
California State University Channel Islands
One University Drive, Camarillo, CA 93012, USA

Email: michael.soltys@csuci.edu and Web: http://prof.msoltys.com

Educational Background

Ph.D.	University of Toronto, Computer Science/Mathematics, 2001 Thesis title: *Complexity of Derivations of Matrix Identities* Adviser: Professor Stephen A. Cook Area: Computational Complexity and Logic
M.Sc.	University of Toronto, Mathematics, 1996
Hon. B.Sc.	University of Toronto, Mathematics, 1995

Current Status

- Professor & Chair of Computer Science at CSU Channel Islands.
- Software Engineer / Principal Scientist at GBL Systems Corp.

Areas of Interest

- Algorithms, e.g., my *Introduction to the Analysis of Algorithms* textbook.
- Cybersecurity, e.g., my work with the *Office of Naval Research* and the *SoCal High Technology Task Force*.
- Cloud Computing, especially in the *AWS Cloud*.
- Software Engineering, for instance leading software development projects at *GBL Systems*.

Academic Employment History

August 2014	**Professor and Chair** California State University at Channel Islands Chair of Computer Science
August 2014	**Adjunct Professor** McMaster University, Computing and Software
July 2013	**Professor** McMaster University, Computing and Software
July 2006	**Associate Professor** McMaster University, Computing and Software
July 2012–December 2012	**Visiting Professor** Department of Mathematics, University of California at San Diego
August 2007–June 2008	**Visiting Ulam Professor** Department of Mathematics, University of Colorado at Boulder
February 2008	**Visiting Scholar** *XV Escuela de Verano de Ciencias Infromáticas* Departamento de Computación, Universidad Nacional de Río Cuarto
May and June 2007	**Visiting Scholar** Algorithmics Research Group, Jagiellonian University
July 2001–July 2006	**Assistant Tenure-track Professor** McMaster University, Computing and Software
1999–2001	**Lecturer**, University of Toronto, Computer Science

Teaching

See: http://prof.msoltys.com/teaching

Supervision of Graduate Students

1. **M.Sc.** Kelly Armstrong, completed November 2021.
   Thesis title: *Applying Machine Learning to predict symmetric encryption algorithm inputs.*

2. **M.Sc.** Kyle Robert Crockett, completed August 2021.

Thesis title: *Toward Efficient Clustering of Time Series Automotive Signal Data.*

3. **M.Sc.** Monica Tandel, completed August 2021.
   Thesis title: *Refactoring a Web Application using Microservices.*

4. **M.Sc.** Kaveh Arashvand, completed May 2021.
   Thesis title: *AWS NoAuto Scaling Group.*

5. **M.Sc.** Zane Gittins, completed December 2020.
   Thesis title: *Malware Persistence Mechanisms.*

6. **M.Sc.** Samuel Decanio, completed December 2020.
   Thesis title: *Voyager: Tracking Via a Click.*

7. **M.Sc.** Christopher Devlin, completed December 2019.
   Thesis title: *Voting Systems: From Method to Algorithm.*

8. **M.Sc.** Rihan Stephen Pereira, completed December 2019.
   Thesis title: *WHIRLPOOL: Data Acquisition using N-node Distribution Web Crawler.*

9. **M.Sc.** Hang Zhang, completed December 2019.
   Thesis title: *Turing machine simulation and its underlying mechanism.*

10. **M.Sc.** Jack BJ Bension, completed December 2019.
    Thesis title: *The Importance of NBA Box Score Statistical Outbursts.*

11. **M.Sc.** Eric Gentry, completed May 2019.
    Thesis title: *SEAKER: A Mobile Digital Forensic Triage Device.*

12. **M.Sc.** Geetanjali Agarwal, completed December 2018.
    Thesis title: *Aneka: Detecting various forms of the same wavelet image hashing algorithm.*

13. **M.Sc.** Ryan McIntyre, completed May 2018.
    Thesis title: *Bounding the size of minimal clique covers.*

14. **M.Sc.** Deepa Suryawanshi, to be completed May 2018.
    Thesis title: *Image Recognition.*

15. **M.Sc.** Chris Kuske, completed May 2018.
    Thesis title: *Derivation of consistent pairwise matrices.*

16. **M.Sc.** Dhruv Pandya, completed December 2017.
    Thesis title: *Voyager: Identifying IPs from Online Clicks.*

17. **M.Sc.** Hita Gambheer, completed December 2016.
    Thesis title: *Design Safety Verification of Medical Device Models using Automata Theory.*

18. **M.Sc.** Joel Helling, completed May 2017.
    Thesis title: *Constructing an Indeterminate String from its Associated Graph.*

19. **Ph.D.** Neerja Pophli, completed August 2016.
    Thesis title: *A Generalization of Square-Free Strings.*

20. **Ph.D.** Mohamed Sabry, in progress, expected to finish 2018.
    Subject: *Complexity/Cryptography.*

21. **Ph.D.** Ariel Fernández, completed August 2013.
    Thesis title: *Formalizing combinatorial matrix theory.*

22. **M.Eng.** Filip Jeremic, completed May 2013. Project title: *Parallel Lattice Basis Reduction.*

23. **M.Sc.** Dragan Rakas, completed May 2013.
    Thesis title: *A Proof of Concept for Homomorphically Evaluating an Encrypted Assembly Language.*

24. **M.Eng.** Mohamed Sabry, completed May 2011.
    Thesis title: *An implementation of the GGH cryptosystem.*

25. **Ph.D.** Greg Herman, completed March 2009.
    Thesis title: *Unambiguous functions in logarithmic space.*

26. **M.Sc.** Craig Wilson, completed May 2008.
    Thesis title: *Computing winning strategies for poset games.*

27. **M.Sc.** Tim Paterson, completed April 2006.
    Thesis title: *A propositional proof system with permutation quantifiers.*

28. **M.Sc.** Yu-Tong HE, co-supervised with Dr. Janicki, completed June 2003.
    Thesis title: *Verification of the WAP Transaction Layer using Model Checker SPIN.*

Publications

Books

1. Michael Soltys, *An introduction to the analysis of algorithms*, World Scientific Publishing, 3rd edition, 328 pages, 2018.

2. Michael Soltys, *An introduction to computational complexity*, Jagiellonian University Press, 143 pages (ISBN: 978-83-233-2864-3), 2009.

Peer reviewed journal papers

3. Hung Dang, Ginger Reyes, Katharine Soltys, and Michael Soltys *Enrollment predictions with machine learning*, Accepted for publication in AACRAO Journal, 2021

4. Konrad Kułakowski, Jiří Mazurek, Jaroslav Ramík and Michael Soltys, *When is the condition of order preservation met?*, European Journal of Operational Research, 277:248–254, 2019

5. Eric Gentry, Frank Lyu, Ryan McIntyre and Michael Soltys, *SEAKER: A tool for fast digital forensic triage*, Advances in Information and Communication, Springer 2019. (Journal version of paper 52.)

6. Ryan McIntyre and Michael Soltys *An improved upper bound and algorithm for clique covers*, Journal of Discrete Algorithms, 48:42–56, 2018.

7. Joel Helling, P.J. Ryan, W.F. Smyth, Michael Soltys, *Constructing an Indeterminate String from its Associated Graph*, Journal of Theoretical Computer Science, 710:88–96, February 2018.

8. Neerja Mhaskar and Michael Soltys *A formal framework for stringology*, Journal of Discrete Applied Mathematics, 274:141–151, March 2020. (Long journal version of 38.)

9. Ariel Fernández, Ryszard Janicki and Michael Soltys, *Computing covers from matchings with permutations*, accepted for publication in the International Journal of Computer Applications, 2017. (Long journal version of 36.)

10. Waldemar W. Koczkodaj and Dominik Strzalka and Jean-Pierr Magnot and Jiri Mazurek and James Peters and Michael Soltys and Jacek Szybowski and Arturo Tozzi and Hojjat Rakhshani, *On normalization of inconsistency indicators in pairwise comparisons*, International Journal of Approximate Reasoning, 86:73–79, July 2017.

11. Waldemar W. Koczkodaj, Ludmil Mikhailov, Grzegorz Redlarski, Jacek Szybowski, Gaik Tamazian, Michael Soltys, Elisa Wajch and Kevin Kam Fung Yuen, *Important Facts and Observations about Pairwise Comparisons*, Special Issue on Pairwise Comparisons in Fundamenta Informaticae, 144(3-4):291–307, 2016.

12. Barbara Sandrasagra and Michael Soltys, *Complex Ranking Procedures*, Special Issue on Pairwise Comparisons in Fundamenta Informaticae, 144(3-4):223–240, 2016.

13. Michael Soltys, *A formal approach to ranking procedures*, International Journal of Knowledge-based and Intelligent Engineering Systems, 19(4): 225-234, 2015.

14. Neerja Mhaskar and Michael Soltys, *String Shuffle: Circuits and Graphs*, Journal of Discrete Algorithms, 31:120-128, March 2015.

15. Sam Buss and Michael Soltys, *Unshuffling a Square is NP-Hard*, Journal of Computer and System Sciences, 80(4):766-776, 2013.

16. Michael Soltys, *Proving properties of matrices over* $\mathbb{Z}_2$, Archive for Mathematical Logic, 51(5):535–551, 2012.

17. Grzegorz Herman and Michael Soltys, *Unambiguous functions in logarithmic space*, Fundamenta Informaticae, 114(2):129–147, 2012.

18. Michael Soltys, *Feasible proofs of Szpilrajn's theorem: A proof-complexity framework for concurrent automata*, Journal of Automata, Languages and Combinatorics, 16(1):27–38, 2011.

19. Michael Soltys and Craig Wilson, *On the complexity of computing winning strategies for finite poset games*, Theory of Computing Systems, 48(3):680–692, 2011.

20. Grzegorz Herman and Michael Soltys, *On the Ehrenfeucht-Mycielski sequence*, Journal of Discrete Algorithms, 7(4):500–508, 2009.

21. Grzegorz Herman, Tim Paterson and Michael Soltys, *A propositional proof system with quantification over permutations of variables*, Fundamenta Informaticae, 79(1–2):71–83, 2007.

22. Michael Soltys, *The proof theoretic strength of the Steinitz Exchange Theorem*, Discrete Applied Mathematics, 155(1):53–60, 2007.

23. Michael Soltys, *LA, Permutations, and the Hajos Calculus*, Theoretical Computer Science, 348(2–3):321–333, December 2005.

24. Neil Thapen and Michael Soltys, *Weak Theories of Linear Algebra*, Archive for Mathematical Logic, 44(2):195–208, 2005.

25. Michael Soltys and Stephen Cook, *The complexity of derivations of matrix identities*, Annals of Pure and Applied Logic, 130(1–3):207–275, December 2004.

26. Michael Soltys and Alasdair Urquhart, *Matrix Identities and the Pigeonhole Principle*, Archive for Mathematical Logic, 43(3):351–358, April 2004.

27. Michael Soltys, *Extended Frege and Gaussian Elimination*, Bulletin of the Section of Logic, 31(4):1–17, 2002.

28. Michael Soltys, *Berkowitz's Algorithm and Clow Sequences*, Electronic Journal of Linear Algebra, 9:42–54, 2002.

29. Stephen Cook and Michael Soltys, *Boolean Programs and Quantified Propositional Proof Systems*, Bulletin of the Section of Logic, 28(3):119–129, 1999.

Peer reviewed conference proceedings

30. Michael Soltys, *Cloudifying the Curriculum with AWS*, Frontiers in Engineering (FiE) 2021, October 2021, Lincoln, Nebraska.

31. Samuel Decanio, Michael Soltys and Kimo Hildreth *Voyager: Tracking with a click*, Procedia Computer Science, Knowledge-Based and Intelligent Information & Engineering Systems: Proceedings of the 24th International Conference KES2020, Volume 176, 2020, Pages 98–107. General Track session G3b: Cybersecurity, Verony, Italy, September 2020.

32. Zane Gittins and Michael Soltys, *Malware persistence mechanisms*, Procedia Computer Science, Knowledge-Based and Intelligent Information & Engineering Systems: Proceedings of the 24th International Conference KES2020, Volume 176, 2020, Pages 88–97. General Track session G3b: Cybersecurity, Verony, Italy, September 2020.

33. Eric Gentry and Michael Soltys, *SEAKER: A mobile digital forensics triage device*, Procedia Computer Science, Knowledge-Based and Intelligent Information & Engineering Systems: Proceedings of the 23rd International Conference KES2019, Volume 159, 2019, Pages 1652-1661. Invited Session IS13: Cybercrime Investigation and Digital Forensics, Budapest, Hungary, September 2019.

34. Christopher Kuske, Konrad Kułakowski and Michael Soltys, *Approximating consistency in pairwise comparisons*, Procedia Computer Science, Knowledge-Based and Intelligent Information & Engineering Systems: Proceedings of the 23rd International Conference KES2019, Volume 159, 2019, Pages 814-823. Invited Session IS18: Decision modeling with and without pairwise comparisons, Budapest, Hungary, September 2019.

35. Noelle Abe and Michael Soltys, *Deploying Health Campaign Strategies to Defend Against Social Engineering Threats*, Procedia Computer Science, Knowledge-Based and Intelligent Information & Engineering Systems: Proceedings of the 23rd International Conference KES2019, Volume 159, 2019, Pages 824-831. Invited Sessions IS24: Knowledge-based Learning and Education Support System: Design and Function, Budapest, Hungary, September 2019.

36. Ariel Fernández, Ryszard Janicki and Michael Soltys, *A permutation-based algorithm for computing covers from matchings*, in 32nd International Conference on Computers and Their Applications (CATA2017), March 2017.

37. Waldemar Koczkodaj and Michael Soltys, *Consistency-driven Pairwise Comparisons Approach to Abandoned Mines Hazard Rating*, in the 7th International Conference on Computational Methods (ICCM2016), August 2016.

38. Neerja Mhaskar and Michael Soltys, *A formal framework for Stringology*, in the Proceedings of the 21st Prague Stringology Conference, 2016.

39. Neerja Mhaskar and Michael Soltys, *A formal framework for Stringology*, Proceedings of the 20th Prague Stringology Conference, 2015.

40. Neerja Mhaskar and Michael Soltys, *Non-repetitive strings over alphabet lists*, WALCOM: Algorithms and Computation, volume 8973 of Lecture Notes in Computer Science, pages 270–281, February 2015.

41. Michael Soltys, *Fair ranking in competitive bidding procurement: A case analysis*, 18th International Conference in Knowledge Based and Intelligent Information and Engineering Systems (KES), volume 35 of Procedia Computer Science, pages 1138–1144, Pomorski Park Naukowo-Techniczny (PPNT), Gdynia, September 2014. **Best Paper Award.**

42. Ariel Fernández and Michael Soltys, *Feasible combinatorial matrix theory*, 38th International Symposium on Mathematical Foundations of Computer Science (MFCS), volume 8087 of Lecture Notes in Computer Science, pages 777–788, IST, Klosterneuburg, Austria, August 2013.

43. Michael Soltys, *Circuit complexity of shuffle*, the International Workshop on Combinatorial Algorithms (IWOCA), volume 8288 of the Lecture Notes in Computer Science, pages 402–411, Rouen, France, July 2013.

44. Katharine Blanchard and Michael Soltys, *Perceptions of foundational knowledge by computer science students*, 17th Western Canadian Conference on Computing

Education (WCCCE), pages 19–23, University of British Columbia, Vancouver, May 2012.

45. Michael Soltys, *The proof theoretic strength of the Steinitz exchange theorem*, 10th Meeting on Computer Algebra and Applications (EACA), pages 174–177, Seville, September 2006.

46. David L. Parnas and Michael Soltys, Basic Science for Software Developers, in: eds. R. T. Boute and J. N. Oliveira, Formal Methods in the Teaching Lab Workshop (Workshop at 14th International Symposium on Formal Methods), pp. 15-20, 2006.

47. Michael Soltys, *Feasible Proofs of Matrix Properties with Csanky's Algorithm*, 19th International Workshop Computer Science Logic (CSL), volume 3634 of Lecture Notes in Computer Science, pages 493–508, Oxford, August 2005.

48. Michael Soltys, *LA, Permutations, and the Hajos Calculus*, 31st International Colloquium on Automata, Languages and Programming (ICALP), volume 3142 of Lecture Notes in Computer Science, pages 1176–1187, Turku, July 2004.

49. Michael Soltys, *Matrix algebra with quantification over permutations*, 9th Meeting on Computer Algebra and Applications (EACA), pages 301–305, Santander, July 2004.

50. Michael Soltys, *Finite Fields and Propositional Proof Systems*, The 7th World Multiconference on Systemics, Cybernetics and Informatics, pages 141–146, Orlando, Florida, July 2003.

51. Michael Soltys and Stephen Cook, *The Proof Complexity of Linear Algebra*, 17th Annual IEEE Symposium on Logic in Computer Science (LICS), pages 335–344, Copenhagen, July 2002.

Peer reviewed presentations at meetings

52. Eric Gentry, Frank Lyu, Ryan McIntyre and Michael Soltys, *SEAKER: A tool for fast digital forensic triage*, Future of Information and Communications Conference (FICC), 2019, San Francisco.

53. Carlos Adrián Gomez, Michael Soltys and Adam Sędziwy, *iSprinkle: when education, innovation and application meet*, 5th International Conference on Educational Innovation in Technical Careers, INDOTEC 2017, Granada, Spain.

54. Ariel Fernández and Michael Soltys, *Feasible combinatorial matrix theory: polytime proofs for König's Min-Max and related theorems*, short presentation at LICS 2013, New Orleans, Tulane University (same paper as 42).

55. Michael Soltys and Greg Herman, *Unambiguous functions in logarithmic space*, 5th Conference on Computability in Europe (CiE), (pages 162–175 in booklet of presented papers), Heidelberg, August 2009.

56. Michael Soltys and Craig Wilson, *On the complexity of computing winning strategies for finite poset games*, 4th Conference on Computability in Europe (CiE), (pages 415–424 in booklet of presented papers), Athens, June 2008.

57. Michael Soltys, *Feasible proofs of matrix identities with Csanky's algorithm*, The 7th International Workshop on Logic and Computational Complexity, LCC, affiliated with the 20th Annual IEEE Symposium on Logic in Computer Science (LICS), Chicago, June 2005.

Technical reports

58. Tyler King and Michael Soltys, *Minimum Path Star Topology Algorithms for Weighted Regions and Obstacles*, https://arxiv.org/abs/2109.06944

59. Socrates Frangis, Jorge Lacoste, and Michael Soltys, *Cybersecurity: a Navy and CSUCI collaboration*, Technical report AD1124752, US Navy, January 2021.

60. Michael Soltys, *Proving correctness of Machine Learning procedures*, Technical report, US Navy, December 2020.

61. Michael Soltys, *WordPress on AWS: a Communication Framework*, https://arxiv.org/abs/2007.01823

62. Michael Soltys, *Cybersecurity in the AWS Cloud*, https://arxiv.org/abs/2003.12905

63. Michael Soltys, *Cloudifying the curriculum with AWS*, https://arxiv.org/abs/2002.04020

64. Michael Soltys, *Gaussian lattice reduction algorithm terminates in polynomial time*, McMaster Computing and Software Technical Report (CAS-11-10-MS), 2011.

65. Michael Soltys, *A note on finding a rational symmetric matrix for a given separable polynomial*, McMaster Computing and Software Technical Report (CAS-08-12-MS), 2008.

66. Greg Herman and Michael Soltys, *A polytime proof of correctness of the Rabin-Miller algorithm from Fermat's little theorem*, arXiv (CoRR `abs/0811.3959`), 2008.

67. David L. Parnas and Michael Soltys, *Basic Science for Software Developers*, McMaster SQRL Technical Report (7), 2002.

68. Michael Soltys, *A Model-Theoretic Proof of the Completeness of LK Proofs*, McMaster Computing and Software Technical Report (CAS-06-05-MS), 1999.

Other

69. Joshua C. Nwokeji, Myra Roldan, Michael Soltys and Terry Holmes, *A Hands-on Approach to Cloudifying Curriculum in Computing and Engineering Education*, Panel, Frontiers in Engineering (FiE) 2021, Lincoln Nebraska, October 13, 2021.

70. David Bremner, Antoine Deza and Michael Soltys, *Foreword: selected papers from the Franco-Canadian workshop on combinatorial algorithms*, Editorial Board, Journal of Combinatorial Optimization, 16(4):323, 2008.

For a list of selected talks see my web page.

Honors and Awards

1. The Kościuszko Foundation Collegium of Eminent Scientists of Polish Origin and Ancestry, 2018.

2. CSU Channel Islands, 2016 Business & Technology Partnership Leadership Award.

3. Best Paper award at KES'2014 conference (see *Peer reviewed conference proceedings* paper number 41).

4. The Best Prof Award on April 10, 2013, from the Software Engineering Club.

5. McMaster Student Union teaching award for the faculty of Engineering, 2010/2011.

6. Ulam Visiting Professor Fellowship, University of Colorado at Boulder, 2007/2008

7. University of Toronto, Computer Science Student Union, award for teaching excellence 1999/2000.