Narad Rampersad

Assistant Professor
Department of Mathematics and Statistics
University of Winnipeg
515 Portage Ave.
Winnipeg, MB, R3B 2E9
CANADA

narad.rampersad@gmail.com
http://ion.uwinnipeg.ca/~nrampers/

Citizenship: Canadian.

Research interests:

- Combinatorics on words.
- Formal languages and automata.
- Number theory.
- Ramsey theory.

Education:

- Ph.D., Computer Science, University of Waterloo, June 2008. Thesis subject: *Overlap-Free Words and Generalizations*. Advisor: Jeffrey Shallit.
- M.Math., Computer Science, University of Waterloo, June 2004. Thesis subject: *Infinite Sequences and Pattern Avoidance*. Advisor: Jeffrey Shallit.
- B.Sc., Summa cum laude, Computer Science, University of Ottawa, June 2002.

Languages: English (native speaker), French (fluent).

Academic employment:

- University of Winnipeg, Dept. of Mathematics and Statistics, Assistant Professor, Sept. 2011–Current.
- University of Liège, Discrete Mathematics Group, Postdoctoral Researcher, Jan. 2010–Aug. 2011.
- University of Winnipeg, Dept. of Mathematics and Statistics, NSERC Postdoctoral fellow, Jan. 2008–Dec. 2009.

Other employment:

- EMS Technologies, Engineering Assistant, Jun. 2000–Aug. 2001.

Teaching:

- Instructor, Basic Calculus (1st year course), Winter 2012.
- Instructor, Number Theory (2nd year course), Fall 2011.
- Instructor, Discrete Mathematics (1st year course), Spring 2008, Fall 2009, Fall 2011.
- Instructor, Formal Languages and Parsing (4th year course), Fall 2005.

Journal publications in press:

1. E. Charlier, N. Rampersad, J. Shallit, "Enumeration and decidable properties of automatic sequences". To appear in *Internat. J. Found. Comp. Sci.*
2. M. Domaratzki, N. Rampersad, "Abelian primitive words". To appear in *Internat. J. Found. Comp. Sci.*
3. N. Rampersad, J. Shallit, Z. Xu, "The computational complexity of universality problems for prefixes, suffixes, factors, and subwords of regular languages". To appear in *Fundamenta Informaticae*.
4. A. Lacroix, N. Rampersad, M. Rigo, E. Vandomme, "Syntactic complexity of ultimately periodic sets of integers and application to a decision procedure". To appear in *Fundamenta Informaticae*.

Journal publications:

1. E. Charlier, A. Lacroix, N. Rampersad, "Multi-dimensional sets recognizable in all abstract numeration systems", *Theor. Inform. Appl.* **46** (2012), 51–65.
2. J. Currie, N. Rampersad, "Fixed points avoiding Abelian k-powers", *J. Combin. Theory Ser. A.* **119** (2012), 942–948.
3. E. Charlier, N. Rampersad, "The growth function of S-recognizable sets", *Theoret. Comput. Sci.* **412** (2011), 5400–5408.
4. E. Charlier, N. Rampersad, M. Rigo, L. Waxweiler, "The minimal automaton recognizing $m\mathbb{N}$ in a linear numeration system", *INTEGERS* **11B** (2011), A4.
5. N. Rampersad, "Further applications of a power series method for pattern avoidance", *Electron. J. Combinatorics* **18**(1) (2011), #P134.

6. J. Currie, N. Rampersad, "Recurrent words with constant Abelian complexity", *Adv. Appl. Math.* **47** (2011), 116–124.

7. J. Currie, N. Rampersad, "A proof of Dejean's conjecture", *Math. Comp.* **80** (2011), 1063–1070.

8. N. Rampersad, J. Shallit, M.-w. Wang, "Inverse star, borders, and palstars", *Inform. Process. Lett.* **111** (2011), 420–422.

9. B. Blakeley, F. Blanchet-Sadri, J. Gunter, N. Rampersad, "On the complexity of deciding avoidability of sets of partial words", *Theoret. Comput. Sci.* **411** (2010), 4263–4271.

10. P. Gawrychowski, D. Krieger, N. Rampersad, J. Shallit, "Finding the growth rate of a regular or context-free language in polynomial time", *Internat. J. Found. Comp. Sci.* **21** (2010), 597–618.

11. J. Currie, N. Rampersad, "Cubefree words with many squares", *Discrete Math. and Theoret. Comput. Sci.* **12** (2010), 29–34.

12. J. Currie, N. Rampersad, "Infinite words containing squares at every position", *Theor. Inform. Appl.* **44** (2010), 113–124.

13. N. Rampersad, J. Shallit, "Detecting patterns in finite regular and context-free languages", *Inform. Process. Lett.* **110** (2010), 108–112.

14. J. Currie, N. Rampersad, "Dejean's conjecture holds for $n \geq 27$", *Theor. Inform. Appl.* **43** (2009), 775–778.

15. T. Anderson, J. Loftus, N. Rampersad, N. Santean, J. Shallit, "Detecting palindromes, patterns, and borders in regular languages", *Inform. and Comput.* **207** (2009), 1096–1118.

16. J.-Y. Kao, A. Malton, N. Rampersad, J. Shallit, "On NFA's where all states are final, initial, or both", *Theoret. Comput. Sci.* **410** (2009), 5010–5021.

17. J. Currie, N. Rampersad, "Dejean's conjecture holds for $n \geq 30$", *Theoret. Comput. Sci.* **410** (2009), 2885–2888.

18. J.-P. Allouche, N. Rampersad, J. Shallit, "Periodicity, repetitions, and orbits of an automatic sequence", *Theoret. Comput. Sci.* **410** (2009), 2795–2803.

19. J. Currie, N. Rampersad, "There are k-uniform cubefree binary morphisms for all $k \geq 0$", *Discrete Appl. Math.* **157** (2009), 2548–2551.

20. N. Rampersad, B. Ravikumar, N. Santean, J. Shallit, "A study on unique rational operations", *Theoret. Comput. Sci.* **410** (2009), 2431–2441.

21. D. Krieger, A. Miller, N. Rampersad, B. Ravikumar, J. Shallit, "Decimations of languages and state complexity", *Theoret. Comput. Sci.* **410** (2009), 2401–2409.

22. N. Rampersad, "Avoiding sufficiently large binary patterns", *Bull. Europ. Assoc. Theoret. Comput. Sci.* **95** (2008), 241–245.

23. J. Currie, N. Rampersad, "For each $\alpha > 2$ there is an infinite binary word with critical exponent α", *Electron. J. Combinatorics* **15** (2008), #N34.

24. P. Ochem, N. Rampersad, J. Shallit, "Avoiding approximate squares", *Internat. J. Found. Comp. Sci.* **19** (2008), 633–648.

25. B. Adamczewski, N. Rampersad, "On patterns occurring in binary algebraic numbers", *Proc. Amer. Math. Soc.* **136** (2008), 3105–3109.

26. J.-Y. Kao, N. Rampersad, J. Shallit, M. Silva, "Words avoiding repetitions in arithmetic progressions", *Theoret. Comput. Sci.* **391** (2008), 126–137.

27. N. Rampersad, "On the context-freeness of the set of words containing overlaps", *Inform. Process. Lett.* **102** (2007), 74–78.

28. J. Currie, N. Rampersad, J. Shallit, "Binary words containing infinitely many overlaps", *Electron. J. Combinatorics* **13** (2006), #R82.

29. N. Rampersad, "The state complexity of L^2 and L^k", *Inform. Process. Lett.* **98** (2006), 231–234.

30. S. Brown, N. Rampersad, J. Shallit, T. Vasiga, "Squares and overlaps in the Thue–Morse sequence and some variants", *Theor. Inform. Appl.* **40** (2006), 473–484.

31. N. Rampersad, "Words avoiding 7/3-powers and the Thue-Morse morphism", *Internat. J. Found. Comp. Sci.* **16** (2005), 755–766.

32. N. Rampersad, J. Shallit, M.-w. Wang, "Avoiding large squares in infinite binary words", *Theoret. Comput. Sci.* **339** (2005), 19–34.

33. J.-P. Allouche, N. Rampersad, J. Shallit, "On integer sequences whose first iterates are linear", *Aequationes Math.* **69** (2005), 114–127.

34. N. Rampersad, J. Shallit, "Words avoiding reversed subwords", *J. Combin. Math. Combin. Comput.* **54** (2005), 157–164.

35. A. Aberkane, J. Currie, N. Rampersad, "The number of ternary words avoiding abelian cubes grows exponentially", *J. Integer Sequences* **7** (2004), Article 04.2.7.

Conference publications:

1. E. Charlier, N. Rampersad, M. Rigo, L. Waxweiler, "Structure of the minimal automaton of a numeration language and applications to state complexity". In *Proceedings of Journées Montoises D'Informatique Théorique 2010*.

2. E. Charlier, N. Rampersad, M. Rigo, L. Waxweiler, "State complexity of testing divisibility". In *Proceedings of DCFS'10*.

3. F. Blanchet-Sadri, B. Blakeley, J. Gunter, N. Rampersad, "On the complexity of deciding avoidability of sets of partial words". In *Proceedings of DLT'09*, LNCS 5583, pp. 113–124, Springer-Verlag, 2009.

4. J. Currie, N. Rampersad, "Infinite words containing squares at every position". In *Proceedings of Journées Montoises D'Informatique Théorique 2008*.

5. P. Gawrychowski, D. Krieger, N. Rampersad, J. Shallit, "Finding the growth rate of a regular or context-free language in polynomial time". In *Proceedings of DLT'08*, LNCS 5257, pp. 339–358, Springer-Verlag, 2008.

6. T. Anderson, N. Rampersad, N. Santean, J. Shallit, "Finite automata, palindromes, patterns, and borders". In *Proceedings of LATA'08*, LNCS 5196, pp. 52–63, Springer-Verlag, 2008.

7. D. Krieger, P. Ochem, N. Rampersad, J. Shallit, "Avoiding approximate squares". In *Proceedings of DLT'07*, LNCS 4588, pp. 278–289, Springer-Verlag, 2007.

8. S. Brown, N. Rampersad, J. Shallit, T. Vasiga, "Squares and overlaps in the Thue–Morse sequence and some variants". In *Proceedings of WACAM'04*, LaRIA Technical Report 2004-07, pp. 15–20, 2004.

9. N. Rampersad, "Words avoiding 7/3-powers and the Thue-Morse morphism". In *Proceedings of DLT'04*, LNCS 3340, pp. 357–367, Springer-Verlag, 2004.

10. N. Rampersad, J. Shallit, M.-w. Wang, "Avoiding large squares in infinite binary words". In *Proceedings of WORDS'03*, TUCS General Publication No. 27, pp. 185–197, 2003.

Preprints:

1. D. Henshall, N. Rampersad, J. Shallit, "Shuffling and unshuffling". Submitted.

2. A. Lacroix, N. Rampersad, "Automaticity of primitive words and irreducible polynomials". Submitted.

Invited conference talks:

- Decidable Properties of Automatic Sequences, Summer Meeting of the Canadian Mathematical Society 2011, Edmonton, Alberta, 4 June 2011.
- Abstract Numeration Systems. LATA 2011, Tarragona, Spain, June 2011.
- Repetitions in Words: Classical and Recent Results. 13èmes Journées Montoises D'Informatique Théorique, Amiens, France, 9 September 2010.
- Recent Progress on Dejean's Conjecture. CORS/INFORMS 2009, Toronto, Ontario, June 2009.
- Combinatorics on Words: Applications to Number Theory and Ramsey Theory. Conference of the Prairie Network for Research in Mathematical Sciences, Brandon University, May 2008.

Contributed conference talks:

- The State Complexity of Testing Divisibility, Descriptional Complexity of Formal Systems 2010, Saskatoon, Saskatchewan, 8 August 2010.
- Non-Constructive Methods in Combinatorics on Words, Numeration 2010, Lorentz Center, Leiden, The Netherlands, 9 June 2010.
- Infinite Words Containing Squares at Every Position. 12èmes Journées Montoises D'Informatique Théorique, Université de Mons-Hainaut, Mons, Belgium, August 2008.
- Automata, Palindromes, Powers, and Patterns. Language, Automata Theory and Applications 2008, Tarragona, Spain, March 2008.
- Avoiding Approximate Squares. Developments in Language Theory 2007, Turku, Finland, July 2007.
- Squares and Overlaps in the Thue-Morse Sequence and some Variants, Word Avoidability, Complexity, and Morphisms 2004, Turku, Finland, July 2004.
- Words Avoiding 7/3-powers and the Thue-Morse Morphism, Developments in Language Theory 2004, Auckland, New Zealand, December 2004.
- Avoiding Large Squares in Infinite Binary Words, WORDS 2003, Turku, Finland, September 2003.

Seminar and colloquium talks:

- The State Complexity of Testing Divisibility in Linear Numeration Systems, LIAFA, University of Paris 7, 4 June 2010.
- Non-repetitive Sequence Games, Computer Science and Communications Research Unit, University of Luxembourg, 10 May 2010.
- Synchronizing Automata, Louvain School of Engineering, Catholic University of Louvain, 30 April 2010.
- Abelian Repetitions and Related Topics, CIRM, University of Aix-Marseille II, 6 April 2010.
- Repetitions in Words, Mathematics Institute of Luminy, University of Aix-Marseille II, 9 March 2010.
- Combinatorics on Words and Noncommutative Algebra, Department of Mathematics, University of Liège, January 2010.
- Combinatorics on Words and Noncommutative Algebra, Department of Mathematics and Statistics, University of Winnipeg, November 2009.
- Proving Dejean's Conjecture, Department of Computer Science, University of Manitoba, October 2009.
- Černý's Conjecture. Department of Mathematics and Statistics, University of Winnipeg, October 2008.
- Avoiding Approximate Squares. Algorithms Seminar, School of Computer Science, University of Waterloo, June 2007.
- Paperfolding and Words Avoiding Repetitions. Algorithms Seminar, School of Computer Science, University of Waterloo, November 2006.

Journal/conference referee:

- Acta Informatica
- Crux Mathematicorum
- Discrete Applied Mathematics
- Discrete Mathematics
- Discrete Mathematics and Theoretical Computer Science
- Electronic Journal of Combinatorics

- Information and Computation
- Information Processing Letters
- International Journal of Foundations of Computer Science
- INTEGERS: Electronic Journal of Combinatorial Number Theory
- Journal of Combinatorial Theory, Series A
- Journal of Integer Sequences
- Mathematical Reviews
- Theoretical Computer Science
- International Colloquium on Automata, Languages and Programming (ICALP) 2011
- International Conference on Language and Automata Theory and Applications (LATA) 2009, 2011
- International Conference on Developments in Language Theory (DLT) 2006, 2009, 2010, 2012
- International Conference on Implementation and Application of Automata (CIAA) 2009, 2010, 2012
- International Symposium on Theoretical Aspects of Computer Science (STACS) 2011, 2012.
- International Symposium on Mathematical Foundations of Computer Science (MFCS) 2012.

Professional activities:

- Co-organizer of an invited minisymposium on "Combinatorics on Words" for the 2nd Canadian Discrete and Algorithmic Mathematics Conference 2009.

Grants:

- NSERC Discovery Grant ($85,000) 2012–2017.

Awards:

- Outstanding Achievement in Graduate Studies (Ph.D.), University of Waterloo, 2008.
- Best Student Paper, Developments in Language Theory 2004 (shared prize).
- Distinguished Teaching Assistantship Award, School of Computer Science, University of Waterloo, Winter 2004.
- University plaque for the highest standing in computer science, University of Ottawa, June 2002.