**Jeff Edmonds** **Curriculum Vitae**

**Oct 2018**


**Personal Data:** *Professor*
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**Education:**

- Faculty, York University, Toronto, 1995-present
- Postdoctoral-Fellow, International Comp. Sci. Inst., Berkeley CA, 1993-1995.
- Ph.D., Computer Science, Univ. of Toronto, 1993.
  "Time-Space Lower Bounds for Undirected and Directed *st*-Connectivity on JAG Models." Thesis adviser: *Dr. Faith Ellen.*
- M.S., Computer Science, Univ. of Toronto, 1990.
  "Element Distinctness on COMMON." Thesis adviser: *Dr. Faith Ellen.*
- B.Math, Co-op Bachelor of Mathematics, Univ. of Waterloo, 1987.

**Research Interests:**

- scheduling multi-processor jobs
- secure data transmission over networks for multi-media applications
- complexity theory
- probability theory
- parallel lower bounds and algorithms
- graph theory, combinatorics, and optimization

**Scholarly and Professional Activities (Invited Talks and/or I invited myself):**

- Machine Learning Courses
  - *Deep Learning and Reinforcement Learning Summer School* CIFAR Vector Institute, Toronto, July 25th August 3rd, 2018
  - *Neural Networks for Machine Learning,* by Geofrey Hinton, on line course in coursera, 2018
  - *Understanding Machine Learning from Theory to Algorithms* by Shalev-Shwartz and Ben-David. Cambridge press
  - *Neural Networks and Deep Learning* by Michael Nielsen 2017, http://neuralnetworksanddeeplearning.com.
  - *Understanding LSTM Networks* by Christopher Olah http://colah.github.io/posts/2015-08-Understanding-LSTMs/
- African Institute of Mathematical Sciences (AIMS): Taught 2-7 hours a day masters level courses in Ghana, Senegal, Tanzania, and Cameroon, 2015-2016.
- Workshop on Proof Complexity: Banff International Research Station 2011
- Workshop on Scheduling: Dagstule 2010.
- Workshop on Cake Cutting: Dagstule 2008.
- Workshop on Scheduling: France 2007.
- Univ. of Toronto: Every year or two at the theory colloquium
- York Univ.: Every five years or so at the theory colloquium (too hard to get people to come).
- Univ. of California at San Diego or Princeton Inst. for Advanced Studies: Every two years or so visiting R. Impagliazzo
- Planning for my first Sabbatical 2001: CWI Amsterdam, Chennai, Bangalore, TIFR Bombay, IIT Bombay.
- Early years at York ($\approx$ 1996) Univ. of Waterloo, Hong Kong, McMaster.
- Late Graduate School or Postdoc (1994): Carnegie Mellon, Univ. of Pittsburgh, Univ. of Washington, Simon Fraser Univ., Univ. of California at Santa Cruz, Emory in Atlanta, Georgia State University.

**Graduate Supervision:**

- Venkatesh Medabalimi, Doctorate (joint with Cook) 2018
- Oscar Gonzalez, Post Doc (joint with Tsotsos) 2017
- Toni Kunic, Masters (joint with Tsotsos) 2017
- Feng Gao, Masters (joint with Tourlakis), "A Short and Readable Proof of Cut Elimination for Two First-Order Modal Logics", 2016
- Stephen Voland, Masters, "Random Scene Generator", 2015
- Kowsar Hossain, Masters, "An Efficient MAC protocol for Wireless Sensor and Ad Hoc Networks," 2014
- Tasos Sidiropoulos, Post Doc 2008-2009.
- Nassim Nasser, Masters 2008.
- James Hyukjoon Kwon, Masters 2008.
- Jaisingh Solanki, Masters 2007.
- I took an advisory role with the University of Toronto graduate students I. Mertz, V. Medabalimi, D. Achlioptas, C.K. Poon, and G. Barnes. I wrote papers with each of these people.
- Donald Chinn, postdoctoral fellowship: Co-supervisor

**Under Graduate Supervision:**

- Goharanpour Bardia, 4070 project 2018
- Alexandra Zaslavsky, 4070 project 2018
- CJ D'Alimonte, 4080 project 2017
- Jake Peters, 4080 project 2015
- Chang-Han Chiang, 4080 project 2013
- Rubin Sung Hoon Yoo, 4080 project 2012
- Oren Shemesh, 4080 project 2012
- Doug Scheurich, 4080 project 2011
- Kian Shokouhi, Undergrad Thesis 2008.
- Daniel Natapov, Undergrad Thesis 2007.
- Geri Grolinger, Undergrad Thesis 2006.

**Teaching Experience:**

- COSC 1030 – Intro to Computer Science II - Course Director (6 times 95-98)
- CSE 2001 – Intro to the Theory of Computation (4 times)
- CSE 2011 – Intro to Data Structures (1 time)
- CSE 3510 – Data Structures (F95)
- CSE 3101 – Intro to Algorithms (22 times 99-)
- CSE 4022 – Advanced Theory (W99)
- CSE 4111 – Computability & Complexity (2 times W11-)
- COSC 5115,6115 – Grad Course in Complexity Theory (W96,F98)
- COSC 6121,6111 – Grad Algorithms (8 times W04-)

**Service:**

- Hiring (two years)
- T & P (a few years)
- undergrad advising (many years)
- high school visits (five times)
- executive committee (one year)
- graduate admissions (many years)
- ACM (two years)
- Curriculum (three years)
- Internship Coordinator (two years)

**Reviewing Conferences and Journals:**

- I have never been on a committee but I help review about six papers a year.

**Awards:**

- York's Merit Award [2000,2001,2002,2009]

**External Research Funding:**

- NSERC ('11-'16) [$15,000/yr × 5]
- NSERC ('05-'10) [$32,000/yr × 5]
- NSERC ('00-'04) [$32,000/yr × 5]
- CITO (13 people), Fundamental Issues in Computing, (1998-2000), [$90,000/yr × 2]
- A NCE grant called MITACS (co-applicant with 200 others).
- NSERC ('95-'99) [$25,000]
- NSF Postdoctoral Scholarship, (1993–1995) [$33,000 US/yr × 2]
- NSERC Postdoctoral Scholarship, (1993–1995) [$30,000/yr × 2]
- Ontario Graduate Scholarship (OGS), (1991–1993)
- NSERC Graduate Scholarship, (1989–1991)

**Papers in Refereed Journals (and Refereed Conferences):**

- S. Davis, J. Edmonds, and R. Impagliazzo, "Power of Free Branching in a General Model of Backtracking and Dynamic Programming Algorithms," Submitted to *Algorithmica.*
- J. Edmonds and Alex Edmonds, "Search Time when Solving Random Jigsaw Puzzles with a Planted Solution," Submitted to *Algorithmica.*
- M. Solbach, S. Voland, J. Edmonds, and J. Tsotsos, "Random Polyhedral Scenes: An Image Generator for Active Vision System Experiments," *arXiv:1803.10100*, 2018
- J. Edmonds and M. Luby, "Erasure Codes with a Hierarchical Bundle Structure" *IEEE Transactions on Information Theory,* 2017.
- K. Hossain, S. Datta, I. Hossain, and J. Edmonds, "ResVMAC: A Novel Medium Access Control Protocol for Vehicular Ad hoc Networks," *Procedia Computer Science*, 109, p. 432-439, 2017.
- S. Dobreva, J. Edmonds, D. Komm, R. Kralovic, R. Kralovic, S. Krug, and T. Momke, "Improved Analysis of the Online Set Cover Problem with Advice" *Journal of Theoretic Computer Science* 2017.
- A. Chattopadhyay, J. Edmonds, F. Ellen, and T. Pitassi, "A Little Advice Can Be Very Helpful," or "Upper and Lower Bounds on the Power of Advice,"
  - *SODA, ACM Symp. on Discrete Algorithms*, 2012.
  - SIAM Journal on Computing (SICOMP), 2016
- J. Edmonds and K. Pruhs, "Scalably Scheduling Processes with Arbitrary Speedup Curves,"
  - *ACM Transactions on Algorithms* 8(3): 28 (2012)
  - *SODA, ACM Symp. on Discrete Algorithms*, 2009, p. 685-692.
- J. Edmonds, "On the Competitiveness of AIMD-TCP within a General Network,"
  - *Journal Theoretical Computer Science*, 2012
  - *Lecture Notes in Computer Science*, Volume 2976/2004.
  - *LATIN, Latin American Theoretical Informatics,* pp. 577-588, 2004.
- J. Edmonds and K. Pruhs, "Cake Cutting Really is Not a Piece of Cake,"
  - *ACM Transactions on Algorithms* 7(4): 51 (2011)
  - *SODA, ACM Symp. on Discrete Algorithms*, pp. 271-278 2006.
- H. Chan, J. Edmonds, T. Lam, L. Lee, A. Marchetti-Spaccamela, and K. Pruhs, "Nonclairvoyant Speed Scaling for Flow and Energy,"
  - *Algorithmica* 61(3): 507-517 (2011)
  - *STACS, The 26th International Symposium on Theoretical Aspects of Computer Science*, pp. 255-264, 2009.
  - CoRR abs/0902.1260: (2009)

**Papers in Refereed Journals (and Refereed Conferences) Cont.:**

- H. L. Chan, J. Edmonds, and K. Pruhs, "Speed Scaling of Processes with Arbitrary Speedup Curves on a Multiprocessor,"
  - *Theory of Computing Systems*, 2011
  - *SPAA, ACM Symp. of Parallelism in Algorithms and Architectures*, 2009, p. 1-10.
- J. Edmonds, S. Datta, and P. Dymond, "TCP is Competitive with Resource Augmentation (Against a Limited Adversary),"
  - *Theory of Computing Systems*, Vol 47 pp. 137-161, 2010.
  - *SPAA, ACM Symp. of Parallelism in Algorithms and Architectures*, pp. 174-183, 2003.
- J. Edmonds, "Embedding into $l_\infty^2$ is Easy Embedding into $l_\infty^3$ is NP-Complete",
  - *The Journal of Discrete and Computational Geometry,* pp.747-765 2008.
  - *SODA, ACM Symp. on Discrete Algorithms,* 2007
- J. Edmonds and K. Pruhs, "A Maiden Analysis of Longest Wait First,"
  - *ACM Transactions on Algorithms,* Volume 1 Issue 1, pp. 14-32, 2005
  - *SODA, ACM-SIAM Symposium on Discrete Algorithms,* 2004
- J. Edmonds and K. Pruhs, "Multicast Pull (Broadcast) Scheduling: When Fairness Is Fine,"
  - *Special Issue Algorithmica on Online Algorithms*, Volume 36, pg. 315-330, 2003.
  - *SODA, ACM-SIAM Symposium on Discrete Algorithms,* 2002, p. 421-430.
- J. Edmonds, J. Gryz, D. Liang, R. Miller, "Mining for Empty Rectangles in Large Data Sets",
  - *Journal Theoretical Computer Science*, Vol 296, No 3, pp. 435-452, 2003.
  - Patented.
  - *International Conference on Database Theory*, 2001, pg 174-188.
  - Technical Report CSRG-410 Dept. of Comp. Sci., University of Toronto.
- J. Edmonds, D. Chinn, T. Brecht, X. Deng, "Non-clairvoyant Multiprocessor Scheduling of Jobs with Changing Execution Characteristics",
  - *Special Issue of Journal of Scheduling on "Online Problems"*, #6:3, pp 231-250, 2003.
  - *STOC, ACM Symp. on Theory of Computing*, pp. 120-129, 1997.
- J. Edmonds, R. Impagliazzo, S. Rudich, and J. Sgall, "Communication Complexity Towards Lower Bounds on Circuit Depth,"
  - *Journal of Computational Complexity,* 10: pp 210-246, 2001.
  - *FOCS, Symp. Foundations of Computer Science*, pp. 249-257, 1991.
- J. Edmonds "Scheduling in the Dark",
  - Improved results: manuscript 2001.
  - *Blum's Special Issue of the Journal of Theoretic Computer Science,* 235:109-141, 2000.
  - *STOC, ACM Symp. on Theory of Computing*, pp. 179-188, 1999.
- P. Beame, S. Cook, J. Edmonds, R. Impagliazzo, and T. Pitassi, "The relative complexity of NP search problems,"
  - *Journal of Computer and System Sciences,* 57:3-19, 1998. Special issue of invited papers from 1995 STOC.
  - *STOC, ACM Symp. on Theory of Computing*, pp. 315-324, 1995.
- G. Barnes, J. Edmonds, "Time–Space Lower Bounds for Directed ST-Connectivity on Graph Automata Models (JAG),"
  - *SIAM Journal on Computing*; Volume 27, Number 4, pp. 1190-1202, 1998.
  - *FOCS, Symp. on Foundations of Comp. Sci.*, pp. 228–237, 1993.

**Papers in Refereed Journals (and Refereed Conferences) Cont.:**

- J. Edmonds, "Time–Space Tradeoffs for Undirected ST-Connectivity on a Graph Automata (JAG),"
  - *SIAM Journal on Computing*; Volume 27, Number 5, pp. 1492-1513, 1998.
  - *STOC, ACM Symp. on Theory of Computing*, pp. 718-727, 1993.
- J. Edmonds, and C.K. Poon, D. Achlioptas, "Tight lower bounds for *st*-connectivity on NN-JAGs",
  - *SIAM Journal on Computing,* 1997.
- J. Edmonds, "Fundamental study removing Ramsey theory: lower bounds with smaller domain size,"
  - *Journal of Theoretical Computer Science,* 172, pp. 1-41, 1997.
  - *Structures in Complexity Theory*, pp. 322-332, 1991.
- A. Albanese, J. Blömer, J. Edmonds, M. Luby, and M. Sudan, "Prioritized Encoding Transmission,"
  - *IEEE Transactions on Information Theory*, Vol. 42, No. 6, 1996.
  - *FOCS, Symp. on Foundations of Comp. Sci.*, pp. 604–612, 1994.
  - *ICSI Technical Report TR94-058.*

**Papers in Refereed Conference Proceedings (Submitted to Journals):**

- J. Edmonds, V. Medabalimi, and T. Pitassi, "Hardness of Function Composition for Semantic Read once Branching Programs," *Computational Complexity Conference*, 2018.
- S. Cook, J. Edmonds, V. Medabalimi, and T. Pitassi, "Lower Bounds for Nondeterministic Semantic Read-Once Branching," *International Colloquium on Automata, Languages and Programming (ICALP)*, 2016.
- S. Datta, J. Edmonds, and K. Hossain, "An Efficient MAC protocol for Wireless Sensor and Ad Hoc Networks" *ANT, Int. Conf. on Ambient Systems, Networks and Technologies*, 2015.
- J. Edmonds, S. Im and B. Moseley, "Online Scalable Scheduling for the $\ell_k$-norms of Flow Time Without Conservation of Work," *SODA, ACM Symp. on Discrete Algorithms*, 2011.
- S. Chakraborty and J. Edmonds, "Bounding Variance and Expectation of Longest Path Lengths in DAGs from Variance and Expectation of Edge Lengths," *SODA, ACM Symp. on Discrete Algorithms*, 2010.
- J. Edmonds, A. Sidiropoulos, and A. Zouzias, "Hardness of Embedding into $\mathcal{R}^2$ with Constant Distortion," *SODA, ACM Symp. on Discrete Algorithms*, 2010.
- J. Edmonds, K. Pruhs, and J. Solanki, "Confidently Cutting a Cake into Approximately Fair Pieces,"
  - *AAIM, Conference on Algorithmic Aspects in Information and Management*, 2008, p. 155-164.
  - Masters thesis under my supervision, 68 pages, 2007.

**Papers in Refereed Conference Proceedings (Submitted to Journals) Cont.:**

- J. Edmonds and K. Pruhs, "Balanced Allocations of Cake," *FOCS, Symp. Foundations of Computer Science*, pp. 623-634, 2006.
- S. Davis, J. Edmonds, and R. Impagliazzo, "Online Algorithms To Minimize Resource Reallocations and Network Communication,"
  - *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques,* Springer pp. 104-115, 2006.
  - *Approx: 9th International Workshop on Approximation Algorithms for Combinatorial Optimization Problems*, pp. 204-219, 2006.
- M. Adler, J. Edmonds, and J. Matoušek, "Towards Asymptotic Optimality in Probabilistic Packet Marking," *STOC, ACM Symp. on Theory of Computing*, pp. 450-459, 2005.
- M. Clegg, J. Edmonds, R. Impagliazzo, "Using the Groebner basis algorithm to find proofs of unsatisfiability," *STOC, ACM Symp. on Theory of Computing*, pp. 174-184, 1996.
- N. Alon, J. Edmonds, M. Luby, "Linear Time Erasure Codes with Nearly Optimal Recovery,"
  - Submitted to *IEEE Transactions on Information Theory.*
  - *FOCS, Symp. on Foundations of Comp. Sci.*, pp. 512-519, 1995.
- J. Edmonds, C. K. Poon, "A Nearly Optimal Time-Space Lower Bound for Graph Connectivity Problem on NNJAG Model," *STOC, ACM Symp. on Theory of Computing*, pp. 147-156, 1995.

**To be Submitted:**

- J. Edmonds, "Every Deterministic Nonclairvoyant Scheduler has a Suboptimal Load Threshold," This should not be included, because it is missing a lemma or two. But I have worked so hard on it.
- A. Borodin, J. Edmonds, and H. Kwon, "Improved Results on Models of Greedy and Primal-Dual Algorithms,"
  - To be submitted.
  - Masters thesis under my supervision, 63 pages, 2008.

**Books:**

- J. Edmonds, "How to Think About Algorithms",
  - Text for CSE 3101.
  - Cambridge University Press, 2008.
  - http://www.amazon.com/Think-About-Algorithms-Jeff-Edmonds/dp/0521614104
  - Glowing reviews in *SIGACT News* 2008, *Review in Times Higher Education* 2008, and *York Writes* 2009.
  - Translated into Greek 2016
  - Translated into Portuguese 2011
- Thousands of power point slides for algorithms class. They are getting very good reviews in the class and in the community.
- Chapter "Scheduling with Equipartition" in "Encyclopedia of Algorithms," Springer, Editor Ming-Yang Kao, 2008.

**Technical Reports and Abstracts:**

- J. Edmonds and K. Pruhs, "Cake Cutting Upper Bound," Wikipeida page, http://en.wikipedia.org/wiki/Edmonds-Pruhs_protocol, 2014
- J. Edmonds and K. Pruhs, "Cake Cutting Lower Bound," Taught at CMU 2014: http://www.cs.cmu.edu/ arielpro/15896/schedule.html, http://www.cs.cmu.edu/ arielpro/15896/docs/slides17.pdf pg 14.
- N. Nasser and J. Edmonds, "PBT Framework and BT Reductions," Masters project, 54 pages, 2008.
- J. Edmonds and A. Mirzaian, "Adding Made Easy," Manuscript
- J. Edmonds, S. Datta, P. Dymond, and K. Ali, "RQM: A new rate-based active queue management algorithm." York University Technical Report CSE-2006-09.

**Patents:**

- J. Gryz, R. Miller, J. Edmonds, D. Liang, "Efficient Determination of Homogeneous Rectangles in a Binary Matrix", 2000. Patented.
- Andres Albanese, Michael Luby, Johannes Blömer and Jeff Edmonds, "Message Encoding and Transmission System and Method for Multilevel Data Redundancy", *U.S. Patent Application*, Serial Number 08/361,802; 12-21-94, Assignment recorded February 27, 1995, Reel 7364, Frames 685-689.