JAROSLAW **Z O L A**

University at Buffalo, SUNY
Department of Computer Science and Engineering
Davis Hall, Buffalo, NY, 14260-2500

jzola@buffalo.edu
http://www.jzola.org/
http://www.score-group.org/

Research Interests

My research focus is on algorithms and software systems to enable fast and accurate exploration of large-scale biomedical and engineering data collections using advanced cyberinfrastructure.

Education

2002 – 2005: Ph.D. in Computer Science (these en cotutelle)
Grenoble Institute of Technology, Grenoble, France

2001 – 2005: Ph.D. in Computer Science
Czestochowa University of Technology, Czestochowa, Poland

2000: Study abroad (Computer Science, Erasmus Program)
Grenoble Institute of Technology, Grenoble, France

1996 – 2001: M.Sc. in Computer Science
Czestochowa University of Technology, Czestochowa, Poland
Specialization: Software Engineering and Information Systems

Professional Experience

Jun 2020 – present: Associate Professor
Department of Computer Science and Engineering
University at Buffalo, Buffalo, NY

Aug 2014 – Jun 2020:	Assistant Professor Department of Computer Science and Engineering Department of Biomedical Informatics University at Buffalo, Buffalo, NY
Oct 2012 – Aug 2014:	Associate Research Professor Department of Electrical and Computer Engineering Rutgers Discovery Informatics Institute Rutgers University, Piscataway, NJ
Aug 2010 – Oct 2012:	Research Assistant Professor Department of Electrical and Computer Engineering Iowa State University, Ames, IA
Jun 2006 – Aug 2010:	Postdoctoral Research Associate Department of Electrical and Computer Engineering Iowa State University, Ames, IA
Nov 2001 – Jun 2006:	Research Assistant Institute of Computer and Information Sciences Czestochowa University of Technology, Czestochowa, Poland

Honors and Awards

2024:	IEEE TPDS Award for Editorial Excellence
2022:	IEEE TPDS Award for Editorial Excellence
2021:	President Emeritus and Mrs. Meyerson Award for Distinguished Undergraduate Teaching and Mentoring, University at Buffalo
2019:	2019 Early Career Teacher of the Year, School of Engineering and Applied Sciences, University at Buffalo
2018:	Early Career Faculty Teaching Award, Department of Computer Science and Engineering, University at Buffalo
2012:	IEEE Senior Member
2007:	Best paper award nomination, ACM/IEEE Supercomputing Conference
2002:	Ph.D. scholarship award of the French government

Research Grants

Current

1. PI, NSF, "CNS Core: Small: Rethinking the Software Architecture for Mobile DNA Analysis." Starting date: 10/01/2019. Amount: $496,816 plus $16,000 REU Supplement.

2. PI, NSF, "CAREER: Scalable Software and Algorithmic Infrastructure for Probabilistic Graphical Modeling." Starting date: 02/15/2019. Amount: $487,569.

3. PI, NSF, "Mentoring the Next Generation of Parallel Processing Researchers at IEEE-CSTCPP Sponsored Conferences." Starting date: 09/01/2019. Amount $50,000.

Completed

1. Co-PI, NSF, "Collaborative Research: QRM: Microstructure Manifold Analysis Using Hierarchical Set of Morphological, Topological, and Process Descriptors." Starting date: 08/15/2019. Amount: $318,369.

2. Co-PI, NSF, "OAC Core: Small: Scalable Non-linear Dimensionality Reduction Methods to Accelerate Scientific Discovery." Starting date: 05/01/2019. Amount: $499,814.

3. PI, NSF, "Collaborative Research: Mentoring the Next Generation of Parallel Processing Researchers at IPDPS and other IEEE-CSTCPP Sponsored Conferences." Starting date 05/01/2018. Amount $25,000.

4. Co-I, NIH, "Buffalo Clinical and Translational Research Center." Starting date: 08/12/2015. Amount: $13,151,902.

5. Co-PI, VA, "SOLOR: SNOMED CT, LOINC and RxNorm." Starting date: 11/01/2018 Amount: $24,040.

6. Co-PI, VA, "Precision Oncology Tumor Board." Starting date: 09/01/2017. Amount: $985,630.

7. PI, UB IMPACT, "OneBioStore: Distributed Smart Storage and Scalable Algorithms for Collaborative Biomedical Discovery." Starting date: 09/01/2016. Amount: $18,560.

8. PI, NSF/CCF, "Student Travel Support: ACM International Workshop on Big Data in Life Sciences, Seattle, WA, October 2, 2016." Starting date: 07/01/2016. Amount: $10,000.

9. PI, NSF/CBET, "Collaborative Research: CDS&E: Sculpting Fluid Flow Using a Programmed Sequence of Micro-pillars." Starting date: 09/01/2013. Amount: $59,842 plus $8,000 REU Supplement.

10. PI, AWS Cloud Credits for Research, "Long DNA reads analysis in Amazon cloud." Amazon Cloud Resource Allocation, Starting date: 04/01/2016. Amount: $10,000.

11. Co-PI, NSF/IIS, "BIGDATA: Mid-Scale: DA: Collaborative Research: Genomes galore – Core Techniques, Libraries, and Domain Specific Languages for High-throughput DNA Sequencing." Starting date: 01/01/2013. Amount: $1,300,000.

12. PI, Argonne Leadership Computing Facility, "ELaSTIC – Similarity Graphs from Large-scale Biological Sequence Collections." Mira Supercomputer Resource Allocation, Starting date: 01/01/2015. Amount: 2M core-hours.

13. PI, NSF/CCF, "Collaborative Research: Student travel support: International Workshop on Big Data in Life Sciences, Newport Beach, CA, September 20, 2014." Starting date: 09/01/2014. Amount: $10,000.

14. PI, NSF/IIP (sub-award from Optimal Solutions, Inc.), "STTR Phase I: Using Big Data to Support Supply Chain Analytics and Optimization." Starting date: 01/01/2014. Amount: $112,500.

Publications and Talks

Please visit **https://cse.buffalo.edu/~jzola/papers.php** for the most up-to-date list.

Edited Proceedings

1. A. Kalyanaraman, **J. Zola**, D.A. Bader, S. Aluru (eds.): "Proceedings of the Fifteenth IEEE International Workshop on High Performance Computational Biology (HiCOMB 2016)," IEEE Computer Society, 2016.

2. **J. Zola**, D.A. Bader, S. Aluru (eds.): "Proceedings of the Twelfth IEEE International Workshop on High Performance Computational Biology (HiCOMB 2013)," IEEE Computer Society, 2013.

3. D.A. Bader, D. Trystram, **J. Zola** (eds.): "Proceedings of the Parallel Bio-Computing Workshop (PBC 2005)," Springer Verlag, 2005.

Invited Talks and Lectures

1. "Towards Fully Mobile and Real-time Metagenomics." Presented at Workshop on Microbiomics, Metagenomics, and Metabolomics in Niagara Falls, September 2019.

2. "Big Data Analytics." Presented at UB CTSI Biomedical Informatics Workshop Series, October 2017.

3. "Sketching Biological Sequences for Storage and Computation." Presented at Workshop on Parallel Software Libraries for Sequence Analysis (pSALSA) in Seattle, October 2016.

4. "Parallel Computing for Large-scale Computational Biology." Presented at Pharmacology and Toxicology Seminar Series at University at Buffalo, October 2015.

5. "Similarity Detection in Large Sequence Collections." Presented at Workshop on Parallel Software Libraries for Sequence Analysis (pSALSA) in Atlanta, September 2015.

6. "How to Find Who Lives in Your Belly Button: Not Too Short Introduction to Metagenomics." Presented at DIMACS Center for Discrete Mathematics and Theoretical Computer Science, June 2014.

7. "Constructing Similarity Graphs from Large-scale Biological Sequence Collections." Presented at Drexel University, March 2013.

8. Panelist: "Big Data Standards and the Potential Long Term Benefits for Research and Clinical Development." Webinar organized by NGSLeaders, December 2012.

9. "Large Scale Metagenomic Clustering." Presented at International Conference on the Bioinformatics of Genome Regulation and Structure/Systems Biology in Novosibirsk, Russia, June 2012.

10. Tutorial: "Not Too Short Introduction to Metagenomics." Presented at Czestochowa University of Technology, Poland, December 2011.

11. "Computational Biology: Can We Do Without Parallel Computing?" Presented at Corporacion Universitaria para el Desarrollo de Internet meeting in Puebla, Mexico, April 2009.

12. Lectures: "Introduction to Bioinformatics." and "High Performance Computational Biology." Presented at Pannon University, Hungary, May 2006.

Teaching

Curriculum Development

1. CSE 477 "Processing of Strings and Sequences," University at Buffalo.
2. CSE 577 "Processing of Strings and Sequences," University at Buffalo.
3. CSE 470/570 "Introduction to Parallel and Distributed Processing," University at Buffalo.
4. BMI 503 "Biomedical Informatics Systems, Databases and Software Methods," University at Buffalo.

Courses Taught

1. CSE 477 "Processing of Strings and Sequences," University at Buffalo, Spring 2024.
2. CSE 470/570 "Introduction to Parallel and Distributed Processing," University at Buffalo, Fall 2017-2024.
3. CSE 603 "Parallel and Distributed Processing," University at Buffalo, Fall 2015, Spring 2021-2024.
4. CSE/BMI 577 "Processing of Strings and Sequences," University at Buffalo, Spring 2019-2022.

5. BMI 503 "Biomedical Informatics Systems, Databases and Software Methods,"
   University at Buffalo, Fall 2015-2021.

6. CSE 250 "Data Structures in C++,"
   University at Buffalo, Spring 2015, Fall 2016, Spring 2018.

7. CprE 426/526 "Introduction to Parallel Algorithms and Programming" (co-instructor),
   Iowa State University, Spring 2011 and 2012.

8. CS Graduate Level "Introduction to High Performance Computing,"
   Czestochowa University of Technology, Spring 2006.

9. CS Undergraduate Level "Computer Languages and Programming Methods,"
   Czestochowa University of Technology, Spring 2001-2005.

10. CS Undergraduate Level "Selected Topics in Combinatorial Optimization,"
    Czestochowa University of Technology, Fall 2001.

Mentoring

Postdoctoral Supervisor

1. Vamsi Krishna Potluru (co-supervised with Manish Parashar), Rutgers University, 2014.

Ph.D. Advisor

2. Trevor Schneggenburger, University at Buffalo, 2022-present.

3. Andrew Mikalsen, University at Buffalo, 2021-present.

4. Zainul Abideen Sayed, University at Buffalo, 2021-present.

5. Vicky Zheng, University at Buffalo, 2016-2021.
   Thesis: "Real-time DNA Streams Processing on Mobile Devices"

6. Subhadeep Karan, University at Buffalo, 2015-2019.
   Thesis: "High Performance Algorithms for Learning Exact Bayesian Networks"

7. Frank Schoeneman, University at Buffalo, 2015-2019.
   Thesis: "High Performance Approaches for Large-scale Non-linear Spectral Dimensionality
   Reduction of Scientific Data"

M.Sc. Advisor

8. Aman Khurana, Thesis: "Cost Aware and Efficient Bayesian Optimization,"
   University at Buffalo, 2021.

9. Mohammad Umair, independent study,
   University at Buffalo, 2019.

10. Marc Greenbaum, Thesis: "GPGPU–Based Fast Counting in Machine Learning Applications," University at Buffalo, 2018-2019.

11. Vinay Ashokkumar, independent study,
University at Buffalo, 2016.

12. Kushal Bhandari, independent study,
University at Buffalo, 2016.

13. Jeban Ephrim Gnanaraj Kanagarajan, independent study,
University at Buffalo, 2016.

14. Ajay Sudhakar Deshpande, independent study,
University at Buffalo, 2015-2016.

15. Dhanasekar Karuppasamy, independent study,
University at Buffalo, 2015-2016.

16. Piotr Dziubecki, Thesis: "A User-Oriented Grid Portal For Large Scale Multiple Sequence Alignment," Czestochowa University of Technology, 2005-2006.

17. Adrian Rospondek, Thesis: "Parallel-*-Coffee: Parallel Implementation of 3D/T-Coffee Method," Czestochowa University of Technology, 2005-2006.

18. Malgorzata Sikorska, Thesis: "A Practical Comparison of 2PC and 3PC Mechanisms for Distributed Databases," Czestochowa University of Technology, 2005-2006.

19. Monika Zagala, Thesis: "Rational Arithmetic of High Precision for C++," Czestochowa University of Technology, 2005-2006.

Undergraduate Mentoring

1. Nicholas Pratt, Research Internship, University at Buffalo, 2024.

2. Trevor Schneggenburger, NSF REU, University at Buffalo, 2021.
(admitted to Ph.D. program at UB CSE)

3. Rin Krivokrysenko, NSF REU, University at Buffalo, 2021.

4. You Wu, Research Internship, University at Buffalo, 2020-2021.

5. Andrew Mikalsen, NSF REU, University at Buffalo, 2020.
(admitted to Ph.D. program at UB CSE)

6. Hussein Hamdan, NSF REU, University at Buffalo, 2020.

7. Charles Wood, NSF REU, University at Buffalo, 2020.

8. Aryan Pandey, Research Internship, University at Buffalo, 2020.

9. Michael Piskozub, Research Internship, University at Buffalo, 2019-2020.

10. Timothy Chase, Research Internship, University at Buffalo, 2019.
(admitted to Ph.D. program at UB CSE)

11. Patrick Iwaszko, Research Internship, University at Buffalo, 2019.

12. Michael Klein, Research Internship, University at Buffalo, 2019.

13. Manmeet Singh, Research Internship, University at Buffalo, 2019.

14. John Demetros, Research Internship, University at Buffalo, 2018.

15. Feng-Mao Tsai, Research Internship, University at Buffalo, 2018.
    (admitted to Ph.D. program at UB CSE)

16. Daniel Bosah, Research Internship, University at Buffalo, 2018.
    (admitted to Ph.D. program at CUNY CS)

17. Jon Goodrum, Research Internship, University at Buffalo, 2017.

18. Matthew Eichhorn, Research Internship, University at Buffalo, 2016-2017.
    (admitted to Ph.D. program in applied math at Cornell)

19. Blake Hurlburt, Research Internship, University at Buffalo, 2016-2017.

20. Grant Iraci, Research Internship, University at Buffalo, 2016-2017.
    (admitted to Ph.D. program at UB CSE, NSF GRFP awardee)

21. Jacob Ekstrum, Research Internship, University at Buffalo, 2016-2017.

22. Adithya Narayanan, Research Internship, University at Buffalo, 2016.

23. Ashish Tyagi, Research Internship, University at Buffalo, 2015-2016.

24. Paul Kowalski, NSF REU, University at Buffalo, 2015-2016.
    (CSE Undergraduate Research Award, 2016)

25. Vicky Zheng, Research Internship, University at Buffalo, 2015-2016.
    (CSE Undergraduate Research Award, 2016, admitted to Ph.D. program at UB CSE)

26. William Spoth, Research Internship, University at Buffalo, 2015.
    (admitted to Ph.D. program at UB CSE)

27. David Bryant, Research Internship, University at Buffalo, 2015.

28. Hannah Graesser, Summer Research Internship, Canisius College, 2015.

29. Manikandan Sundararajan, Research Internship, University at Buffalo, 2015.

30. Vidita Gawade, Aresty Summer Research Program, Rutgers University, 2014.

31. Kush Oza, NSF REU, Rutgers University, 2014.

32. Dylan Quinta, NSF REU, Carnegie Mellon University, 2014.

33. Mariam Tsilosani, NSF REU, Rutgers University, 2014.

34. Walter Hummel, Aresty Research Assistant Program, Rutgers University, 2013-2014.

35. Alexio Mota, Aresty Research Assistant Program, Rutgers University, 2013-2014.

Outreach Activities

1. Presenter, The Eric Pitman Annual Summer Workshop in Computational Science, Center for Computational Research, 2015-2018.

2. Instructor, Liberty Partnerships Program, University at Buffalo, 2015-2018.

3. Group Leader, "Science is Elementary" Outreach Program Westminster Community Charter School, Buffalo, 2014-2015.

4. Advisor, Chaitanya Aluru, "Research Internship in Bioinformatics and Computational Biology," Ames High School, IA (Extended Learning Program), 2011-2012.

Professional Service and Activities

Advisory Functions

1. Panelist, Gryphon Scientific/AAAS/FBI Roundtable on Enhancing the Research and Educational Environment at U.S. Universities, 2015.

2. Member, AAAS/FBI Working Group on Big Data in Life Sciences and National Security, 2014.

Editorial Boards

1. Associate Editor, IEEE Transactions on Parallel and Distributed Systems, 2020-present.

2. Associate Editor, Journal of Parallel and Distributed Processing, 2020-present.

Organizing Committees

1. Workshops vice-chair, IEEE International Parallel and Distributed Processing Symposium (IPDPS), 2018-2021.

2. Founding co-chair, ACM International Workshop on Big Data in Life Sciences (BigLS).

3. Founding co-chair, Parallel Bio-Computing Workshop (PBC).

4. Poster co-chair, ACM Conference on Bioinformatics, Computational Biology and Biomedical Informatics (ACM BCB), 2020.

5. Advancing Algorithms and Methods track co-chair, ACM Conference on Bioinformatics, Computational Biology and Biomedical Informatics (ACM BCB), 2017.

6. Student travel award co-chair, ACM Conference on Bioinformatics, Computational Biology and Biomedical Informatics (ACM BCB), 2016.

7. Program chair, IEEE International Workshop on High Performance Computational Biology (HiCOMB), 2013 and 2016.

8. Co-organizer, ACM/IEEE Supercomputing workshop: Computational and Data Challenges in Genomic Sequencing, 2015.

9. Publicity chair, IEEE International Conference on Computational Advances in Bio and Medical Sciences (ICCABS), 2013.

10. Publicity co-chair, ISCA International Conference on Bioinformatics and Computational Biology (BICoB), 2013.

11. Co-organizer, IEEE Cluster Workshop: Parallel Programming and Applications on Accelerator Clusters (PPAAC), 2010.

Program Committees

1. IEEE International Parallel and Distributed Processing Symposium (IPDPS), 2015, 2016, 2018, 2022, 2023 and 2024.

2. IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing (CCGrid), 2024.

3. International Conference on Parallel Processing (ICPP), 2012, 2014, 2020, 2021 and 2023.

4. ACM Conference on Bioinformatics, Computational Biology and Biomedical Informatics (ACM BCB), 2013, 2015, 2016, 2020, 2021 and 2022.

5. International Conference on Parallel Processing and Applied Mathematics (PPAM), 2013, 2015, 2017 and 2019.

6. IEEE International Conference on High Performance Computing (HiPC), 2015, 2017 and 2018.

7. International Symposium on Computer Architecture and High Performance Computing (SBAC-PAD), 2013, 2016, 2017 and 2018.

8. ISCA International Conference on Bioinformatics and Computational Biology (BICoB), 2012 and 2018.

9. Workshop on Accelerator-Enabled Algorithms and Applications in Bioinformatics (WACEBI), 2016.

10. International Workshop on Data Intensive Distributed Computing (DIDC), 2016.

11. ACM/IEEE Supercomputing, Posters Committee, 2015.

12. IEEE Cluster 2015.

13. IEEE International Workshop on Foundations of Big Data Computing, 2015.

14. ASE/IEEE International Conference on Big Data, 2013 and 2014.

15. International Conference on Contemporary Computing (IC3), 2011 and 2014.

16. IEEE International Conference on Parallel and Distributed Systems (ICPADS), 2012 and 2013.

17. Workshop on Using Emerging Parallel Architectures (WEPA) 2009, 2010 and 2012.

18. ACM/IEEE Supercomputing, 2008.

Referee

1. Swiss National Science Foundation (SNSF), 2024.

2. National Science Foundation, 2016-2020.

3. Great Lakes Consortium for Petascale Computation, 2015-2018.

4. Israeli Ministry of Science, 2018.

5. AAAS Peer Review Committee for King Abdulaziz City for Science and Technology, 2014.

6. Austrian Science Fund, 2013.

7. Polish National Science Centre, 2013.

Professional Societies Membership

1. Institute of Electrical and Electronics Engineers (IEEE), 2006-present
   (senior member since 2012).

2. IEEE Computer Society, 2006-present.

3. Association for Computing Machinery (ACM), 2007-present.

4. ACM Special Interest Group on High Performance Computing (SIGHPC), 2014-present.

5. ACM Special Interest Group on Bioinformatics, Computational Biology, and Biomedical Informatics (SIGBio), 2014-present.

6. American Association for the Advancement of Science (AAAS), 2013-2018.

Professional Societies Service

1. IEEE Computer Society Technical Committee on Parallel Processing, Student Travel Awards Chair, 2016-2024.

University at Buffalo Service

1. Graduate Fellowship Committee, 2019.

2. Faculty Advisory Committee, Center for Computational Research, 2014-present.

Media Coverage

1. "Middle schoolers say I Can! to college" – "UB SEAS News," A story summarizing "I Can!" program run by the UB's Liberty Partnership Program in which I participate as an instructor.

2. "Kudos: Zola member of 'big data' working group" – "UB Reporter," A short story highlighting my participation in the AAAS/FBI Working Group on Big Data in Life Sciences and National Security.

3. "Big Biological Impacts From Big Data" – "Science Magazine," A story about how big data impacts life sciences, featuring my comments on the subject.

4. "Our Bodies, Our Data" – "Quanta Magazine" and "Wired.com," A story about the current status of big data in life sciences, featuring my comments on the topic.

5. "Sculpting Flow" – "NSF News From the Field" and "Science 2.0," A brief report on the computational aspects of sculpting fluid flows in microfluidic channels. The report covers the HPC experiment I led at Rutgers. It has been featured on the main NSF News web page.

6. "Understanding Fluid Flow in Microchannels" – "Digital Manufacturing Report" and "HPC in the Cloud," Article about using a cloud-like federation of HPC resources to solve pressing engineering problems. The story is based on the experiment I led at Rutgers to analyze a parameter space in microfluidic flow.

Software Development

All projects are open source.

1. **SMARTEn**: Programming model and runtime environment for mobile DNA analytics. Developed together with Andrew Mikalsen (Ph.D. student) – http://www.jzola.org/smarten.

2. **SCoOL**: Programming model and runtime system for expressing (combinatorial) optimization problems. Developed together with Zainul Abideen Sayed (Ph.D. student) – https://gitlab.com/SCoRe-Group/scool.

3. **SABNA**: High performance, exact structure learning of Bayesian networks under different scoring criteria. The framework implements several novel algorithms and data structures to enable BN learning on large data. Developed together with Subhadeep Karan (Ph.D. student) – https://gitlab.com/SCoRe-Group/SABNA-Release.

4. **SABNAtk**: Efficient library for fast counting in Machine Learning applications. Developed together with Subhadeep Karan (Ph.D. student) and Matthew Eichhorn, Blake Hurlburt and Grant Iraci (undergraduate students) – https://gitlab.com/SCoRe-Group/SABNAtk.

5. **ELaSTIC**: Similarity graphs construction from massive biological sequence collections. The method is design to detect pairwise similarities in data sets with millions of DNA/RNA or protein sequences without aligning all sequences against each other – http://www.jzola.org/elastic.

6. **CLOSET**: Cloud-enabled framework based on map-reduce for large scale metagenomic data clustering. The software handles data sets consisting of millions of reads and can be used to classify data at different taxonomic levels – http://www.jzola.org/closet.

7. **TINGe**: Systems biology parallel framework for gene networks inference. The software can handle whole genome microarray expression data, and it has been successfully used to reconstruct the largest to date gene network of *Arabidopsis thaliana* – http://www.jzola.org/tinge.

8. **GeNA**: Cytoscape plugin and standalone application for analysis of gene regulatory networks using approach akin to the PageRank algorithm – http://www.jzola.org/tinge.

9. **Parallel T-Coffee**: Parallel multiple sequence aligner able to align thousands of sequences using the T-Coffee scoring method (more than 400 downloads, web portal built by researchers from Spain and England) – http://www.jzola.org/ptc.

10. **Libpnorm**: A C/C++ high performance library for scheduling pairwise computations on Cell processors taking into account local memory limitations – http://www.jzola.org/libpnorm.