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 Department of Biomedical Informatics  
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#### APPOINTMENTS HELD

- 2018- Assistant Professor, Department of Biomedical Informatics, University of Arkansas for Medical Sciences
- 2016-2018 Postdoctoral Fellow, Department of Biomedical Informatics, University of Arkansas for Medical Sciences
- 2017 Adjunct Lecturer, School of Information Sciences, University of Illinois at Urbana-Champaign
- 2015-2016 NIH/NCI BD-STEP Fellow, Veterans Health Administration
- 2015-2016 Postdoctoral Associate, Department of Biomedical Informatics, University at Buffalo
- 2013-2015 Postdoctoral Associate, Department of Oral Diagnostic Sciences, University at Buffalo
- 2013-2014 Adjunct Professor, Department of Computer Science, Canisius College

#### PUBLICATIONS

- 2019 Jonathan P. Bona, Mathias Brochhausen, and William R. Hogan. Enhancing the drug ontology with semantically-rich representations of national drug codes and rxnorm unique concept identifiers. *BMC bioinformatics* 20.21 (2019): 1-14. [PMID: 31865907](#)
- 2019 Jonathan P. Bona, Joseph Utecht, and Mathias Brochhausen. Providing a User-oriented Interface to Enable Semantic Queries in PRISM. American Medical Informatics Association 2019 (AMIA) Annual Symposium, Poster session, Washington, DC, November 16 - 20, 2019.
- 2019 Aaron S. Kemp, Jonathan P. Bona, Tracy S. Nola, Linda Larson-Prior, Tuhin Virmani, Lakshmi Pillai, Mathias Brochhausen, Lawrence Tarbox, and Fred Prior. Semantic Representations of Multi-Modal Data, NeuroInformatic Processing Pipelines, and Derived Neuroimaging Results in the Arkansas Image Enterprise System (ARIES). American Medical Informatics Association 2019 (AMIA) Annual Symposium, Poster session, Washington, DC, November 16 - 20, 2019.
- 2019 Corey J. Hayes, Jonathan P. Bona, and Mathias Brochhausen. Using Semantic Representations for Urine Drug Tests in the Veterans Health Administration. American Medical Informatics Association 2019 (AMIA) Annual Symposium, Poster session, Washington, DC, November 16 - 20, 2019.
- 2019 Jonathan P. Bona, Joseph Utecht, Sarah Bost, Corey Hayes, and Mathias Brochhausen. Building a Shared Ontology Use Patterns Repository. Forthcoming in *Proceedings of the International Conference on Biomedical Ontology (ICBO) 2019*, Buffalo, NY, July 30 - August 2, 2019.
- 2019 Jonathan P. Bona, Aaron S. Kemp, Tracy Nolan, Linda Larson-Prior, Aparna Das, Tuhin Virmani, Lakshmi Pillai, Mathias Brochhausen, and Fred Prior. Semantic Integration of Neuroinformatics Data in the Arkansas Image Enterprise System with Open Biomedical Ontologies. Poster abstract forthcoming in *Proceedings of the International Conference on Biomedical Ontology (ICBO) 2019*, Buffalo, NY, July 30 - August 2, 2019.
- 2019 Jonathan P. Bona, Fred W. Prior, Meredith N. Zozus, and Mathias Brochhausen. Enhancing Clinical and Clinical Research Data with Biomedical Ontologies - Insights from the Knowledge Representation Perspective. *Yearbook of Medical Informatics* 28 (2019): 140-151. [PMID: 31419826](#)

- Jonathan P. Bona, Tracy S. Nolan, Dillon Gibson, and Mathias Brochhausen. Ontologies Enabling Non-image Data Queries in The Cancer Imaging Archive. *American Medical Informatics Association 2018 Annual Symposium* Poster session, San Francisco, CA, November 3 - 7, 2018.
- Jonathan P. Bona, Tracy S. Nolan, and Mathias Brochhausen. Ontology-Enhanced Representations of Non-image Data in The Cancer Imaging Archive. *Proceedings of the International Conference on Biological Ontology 2018*, Corvallis, OR, August 7 - 10, 2018.  
CEUR-WS.org, online [http://ceur-ws.org/Vol-2285/ICBO\\_2018\\_paper\\_37.pdf](http://ceur-ws.org/Vol-2285/ICBO_2018_paper_37.pdf)
- Corey J. Hayes, Jonathan P. Bona, and Mathias Brochhausen. Towards the Development of an Opioid Misuse Ontology. Poster abstract in *Proceedings International Conference on Biological Ontology 2018*, Corvallis, OR, August 7 - 10, 2018.  
CEUR-WS.org, online [http://ceur-ws.org/Vol-2285/ICBO\\_2018\\_paper\\_56.pdf](http://ceur-ws.org/Vol-2285/ICBO_2018_paper_56.pdf)
- Mathias Brochhausen, Jonathan Bona, and Bernd Blobel. The Role of Axiomatically-Rich Ontologies in Transforming Medical Data to Knowledge. *Studies in Health Technology and Informatics* 249 (2018): 38-49. PMID: 29866954
- Jonathan P. Bona and Werner Ceusters. Mismatches between major subhierarchies and semantic tags in SNOMED CT. *Journal of Biomedical Informatics* 81 (2018): 1-15. PMID: 29462668
- Jonathan P. Bona. Does Semantic Tag Usage in SNOMED CT Match its Concept Hierarchy? *American Medical Informatics Association 2017 Annual Symposium* Poster session, Washington, DC, November 4 - 8, 2017; 1973.
- Joseph R. Utecht, Jonathan P. Bona, and Mathias Brochhausen. Creating RDF Data on Trauma Care Organizations from Questionnaires. *American Medical Informatics Association 2017 Annual Symposium* Poster session, Washington, DC, November 4 - 8, 2017.
- Jonathan Bona and Werner Ceusters. Scrutinizing the relationships between SNOMED CT concepts and semantic tags. *Proceedings of the 8th International Conference on Biomedical Ontology (ICBO 2017)*, Newcastle-upon-Tyne, United Kingdom, September 13th - 15th, 2017.
- Jonathan Bona, John Grohol, Meredith Zozus, Robert Zozus, and Mathias Brochhausen. Toward using ontologies to improve results in searches for mental health information. (Awarded best poster) *Proceedings of the 8th International Conference on Biomedical Ontology (ICBO 2017)*, Newcastle-upon-Tyne, United Kingdom, September 13th - 15th, 2017.
- Werner Ceusters and Jonathan Bona. Pain in SNOMED CT: is there an anesthetic? In *Zaibert, Leo (ed.) The Theory and Practice of Ontology*. Palgrave MacMillan, 2016:157-185.
- Darren A. Natale, Cecilia N. Arighi, Judith A. Blake, Jonathan Bona, Chuming Chen, Sheng-Chih Chen, Karen R. Christie, Julie Cowart, Peter D'Eustachio, Alexander D. Diehl, Harold J. Drabkin, William D. Duncan, Hongzhan Huang, Jia Ren, Karen Ross, Alan Ruttenberg, Veronica Shamovsky, Barry Smith, Qinghua Wang, Jian Zhang, Abdelrahman El-Sayed, Cathy H. Wu. Protein Ontology (PRO): enhancing and scaling up the representation of protein entities. *Nucleic Acids Research* 2016; 45 (D1): D339-D346.
- Werner Ceusters and Jonathan Bona. Analyzing SNOMED CT's Historical Data: Pitfalls and Possibilities. *American Medical Informatics Association 2016 Annual Symposium Proceedings*, Chicago IL, November 12-16, 2016;361-370.
- Jonathan Bona and Werner Ceusters. Identifying Missing Finding Site Relations in SNOMED CT. *American Medical Informatics Association 2016 Annual Symposium Proceedings*, Chicago IL, November 12-16, 2016;1347.
- Jonathan Bona, Selja Seppälä, and Werner Ceusters. Analysis of SNOMED 'Bleeding' Concepts & Terms. *Proceedings of the Joint International Conference on Biological Ontology and BioCreative (ICBO-BioCreative 2016)*, Corvallis, Oregon, United States, August 1-4, 2016.
- William Duncan, Travis Allen, Jonathan Bona, Olivia Helfer, Barry Smith, Alan Ruttenberg, Alexander D. Diehl. The ImmPort Antibody Ontology. *Proceedings of the Joint International Conference on Biological Ontology and BioCreative (ICBO-BioCreative 2016)*, Corvallis, Oregon, United States, August 1-4, 2016.

- 2016 Thomas Bittner, Jonathan Bona, and Werner Ceusters. Ontologies of Dynamical Systems and Verifiable Ontology-based Computation: Towards a Haskell-based Implementation of Referent Tracking. *Ninth International Conference on Formal Ontology in Information Systems (FOIS 2016)*, Annecy, France, July 6th-9th, 2016.
- 2016 Werner Ceusters and Jonathan Bona. Ontological Foundations for Tracking Data Quality through the Internet of Things. *Special Topic Conference Transforming Healthcare with the Internet of Things (EFMI-STC2016)*, Paris, France, April 17-19, 2016.
- 2015 Jonathan P. Bona, Gunther Kohn and Alan Ruttenberg. An Ontology-Driven Patient History Questionnaire System. *American Medical Informatics Association (AMIA) 2015 Annual Symposium*, Poster session, San Francisco, California, November 14-18, 2015.
- 2015 Jonathan Bona and Werner Ceusters. Replacing EHR structured data with explicit representations. *International Conference on Biomedical Ontologies*, ICBO 2015, Early career track, Lisbon, Portugal, July 27-30, 2015.
- 2015 Jonathan Bona, Gunther Kohn and Alan Ruttenberg. Ontology-driven patient history questionnaires. *International Conference on Biomedical Ontologies*, ICBO 2015, Early career track, Lisbon, Portugal, July 27-30, 2015.
- 2014 Jonathan P. Bona, Jenny Rouleau, and Alan Ruttenberg. Representing Modification Sites in PRO. *Proceedings of the 5th International Conference on Biomedical Ontology (ICBO 2014)*, Houston, Texas.
- 2014 Mark Jensen, Alexander P. Cox, Jonathan P. Bona, William Duncan, Patrick L. Ray, Alexander D. Diehl Applications of OBI 'assay'. *Proceedings of the 5th International Conference on Biomedical Ontology (ICBO 2014)*, Houston, Texas.
- 2014 Patrick Beeson, David Kortenkamp, R. Peter Bonasso, Andreas Persson, Amy Loutfi, and Jonathan P. Bona. An Ontology-Based Symbol Grounding System for Human-Robot Interaction. *Proceedings of the 2014 AAAI Fall Symposium*, Washington, DC.
- 2013 Jonathan P. Bona and Stuart C. Shapiro. Specifying Modalities in the MGLAIR Architecture. *Proceedings of the Workshop on Formalizing Mechanisms for Artificial General Intelligence and Cognition (Formal MAGIC)*, Osnabrück, Germany.
- 2013 Albert Goldfain, Min Xu, Jonathan Bona, and Barry Smith. Ontology Based Annotation of Contextualized Vital Signs. *Proceedings of the International Conference on Biomedical Ontology (ICBO)*, Montreal, Quebec.
- 2013 Jonathan P. Bona and Stuart C. Shapiro. Modality in the MGLAIR Architecture. *Biologically Inspired Cognitive Architectures 2012: Proceedings of the Third Annual Meeting of the BICA Society*, 75-81, Berlin, 2013. Springer.
- 2010 Stuart C. Shapiro and Jonathan P. Bona. The GLAIR Cognitive Architecture. *International Journal of Machine Consciousness*, 2 (2010), 307-332.
- 2009 J. Anstey, A.P. Seyed, S. Bay-Cheng, D. Pape, S. Shapiro, J. Bona, and S. Hibit. The Agent Takes the Stage. *International Journal of Arts and Technology* 2, 4 (2009), 277-296.
- 2009 Stuart C. Shapiro and Jonathan P. Bona. The GLAIR Cognitive Architecture. In *Alexei Samsonovich, editor, Biologically Inspired Cognitive Architectures-II: Papers from the AAAI Fall Symposium*, 141-152, Menlo Park, CA, 2009. AAAI Press.
- 2009 Jonathan P. Bona and Stuart C. Shapiro. SNePS As An Ontological Reasoning Tool. *Proceedings of the International Conference on Biomedical Ontologies (ICBO)*, Buffalo, NY.
- Technical Reports
- 2011 Jonathan P. Bona and Stuart C. Shapiro. Creating SNePS/Greenfoot Agents and Worlds. SNeRG Technical Note 46, Department of Computer Science and Engineering, University at Buffalo, The State University of New York, Buffalo, NY.
- 2009 Jonathan Bona and Stuart C. Shapiro. Report on SNePS and RTS. SNeRG Technical Note 45, Department of Computer Science and Engineering, University at Buffalo, Buffalo, NY.

- 2009 Jonathan Bona and Michael Prentice. PyRovio: Python API for WowWee Rovia. Unpublished white paper. Department of Computer Science and Engineering, University at Buffalo, Buffalo, NY.
- 2008 Jonathan Bona. OWL Ontologies in SNePS. SNeRG Technical Note 41, Department of Computer Science and Engineering, University at Buffalo, Buffalo, NY.

### INVITED TALKS

- 2019 Semantic Integration of Non-Image Data in The Cancer Imaging Archive Collections with Biomedical Ontologies. Practical Big Data Workshop (PBDW 2019), Ann Arbor, MI, June 7, 2019.
- 2018 The Role of Axiomatically-Rich Ontologies in Transforming Medical Data to Knowledge. 15th International Conference on Wearable, Micro and Nano Technologies for Personalized Health (pHealth 2018), Gjøvik, Norway, June 14, 2018.
- 2017 Knowledge Representation and Reasoning in Biomedical Informatics. Biomedical Informatics Research and Applications Seminar Series. University of Arkansas for Medical Sciences, Little Rock, AR, October 19, 2017.
- 2015 Toward replacing EHR structured data with explicit representations. CTS Ontology Workshop 2015, Ontology in Practice. The Fourth Clinical and Translational Science Ontology Workshop. Charleston, SC, September 23-25, 2015.
- 2014 The MGLAIR Multimodal Cognitive Agent Architecture. Centre for Applied Autonomous Sensor Systems, Örebro University, Örebro, Sweden. October 15, 2014.

### EDUCATION

- 2013 Ph.D. Computer Science and Engineering, University at Buffalo, Buffalo, NY
- 2004 M.S. Computer Science and Engineering, University at Buffalo, Buffalo, NY
- 2002 B.S. Computer Science, Canisius College, Buffalo, NY

### TEACHING EXPERIENCE

- 2018- Assistant Professor, Biomedical Informatics, University of Arkansas for Medical Sciences
- Course Director, *Natural Language Processing for Biomedical Informatics* (Spring 2020)
  - Guest Lecturer, *Machine Learning* (Spring 2020)
  - Guest Lecturer, *Foundations of Biomedical Informatics: Clinical Information* (Spring 2020)
  - Course Director, *Information Modeling: from Data to Knowledge* (Fall 2019)
    - Planned and presented all lectures in hybrid online/in-person class.
    - Administered weekly quizzes and homework assignments, midterm and final exams.
  - Co-Instructor, *Computational Methods in Biomedical Informatics* (Fall 2019)
    - Planned and presented two 90-minute lectures on introductory theory of computation, formal languages, and automata.
    - Planned and presented two 90-minute lectures on introductory natural language processing.
  - Guest Lecturer, *Foundations of Biomedical Informatics: Clinical Information* (Fall 2018)
    - Planned and presented 2-hour lecture on natural language processing in healthcare.

- 2017-2018 Postdoctoral Fellow, Biomedical Informatics, University of Arkansas for Medical Sciences
- Information Modelling – From Data to Knowledge (Fall 2018)
- Lectured on formal logic topics throughout the semester, including logical syntax & symbolization, semantics, deduction, and metalogic.
- Introduction to Biomedical Informatics II (Spring 2018)
- Planned and presented lectures and lab sessions on core computer science topics including automata theory, turing machines, and computability.
- Reasoning Medical Data (Spring 2017)
- Lectured on formal logic topics throughout the semester, including logical syntax & symbolization, semantics, deduction, and metalogic.
- 2017 Adjunct Lecturer, School of Information Sciences, University of Illinois at Urbana-Champaign
- Information Modelling (Summer 2017)
- 2013-2014 Adjunct Professor, Computer Science Department, Canisius College
- Introduction to Programming (Spring 2014)
- Computer Programming for Science (Fall 2013, Fall 2014)
- 2011 Adjunct Instructor, Department of Computer Science and Engineering, University at Buffalo
- Programming Language Concepts (Summer 2011)
- 2009-2010 Teaching Assistant, Computer Science and Engineering, University at Buffalo
- Programming Language Concepts (Spring 2010)
- Knowledge Representation and Reasoning (Spring 2009, Fall 2009)

#### PROFESSIONAL SERVICE

- 2020 - Reviewer for Journal of Clinical Oncology
- 2019 - Reviewer for Journal of Biomedical Informatics
- 2018 - Reviewer for BMC Medical Informatics and Decision Making
- 2017 Reviewer for Cognitive Systems Research.
- 2017 Reviewer for the Journal of Applied Ontology
- 2015 - 2019 Reviewer for American Medical Informatics Association Annual Symposium.
- 2011 - 2016 Reviewer for Biologically Inspired Cognitive Architectures.

#### PROFESSIONAL MEMBERSHIP/AFFILIATIONS

Association for Computing Machinery (ACM)  
 American Medical Informatics Association (AMIA)  
 International Association for Ontology and its Applications (IAOA)  
 The Institute of Electrical and Electronics Engineers (IEEE)