Atriya Sen

Postdoctoral Research Associate
School of Life Sciences
Arizona State University
Tempe, Arizona, USA
+1 (518) 308 5117
Atriya@AtriyaSen.com

PROFILE

Artificial intelligence researcher; skilled in computational logic, formal modeling / knowledge representation / ontological engineering of complex domains, machine reasoning & explainable / interpretable machine learning / data mining. I code in Python & Prolog.

WORK EXPERIENCE (RESEARCH)

- Postdoctoral Research Associate, School of Life Sciences, Arizona State University — 2019–**current**

  — On automated reasoning for the biological taxonomy alignment problem. Supervised by Prof. Nico Franz.

- Postdoctoral Research Associate, Rensselaer Artificial Intelligence & Reasoning Laboratory (https://rair.cogsci.rpi.edu), Department of Cognitive Science & Department of Computer Science, Rensselaer Polytechnic Institute — 2018–2019

  — On *Tentacular AI*, a new theory of ethically and cognitively informed machine reasoning for the Internet of Things (IoT), a collaboration with IBM Research (funded by IBM & RPI under the AIRC program). Description available here: http://kryten.mm.rpi.edu/TAI/tai.html. Supervised by Prof. Selmer Bringsjord.

- Assistant Director, Rensselaer Artificial Intelligence & Reasoning Laboratory (https://rair.cogsci.rpi.edu), Department of Cognitive Science & Department of Computer Science, Rensselaer Polytechnic Institute — 2015–2019

  — Supervised 3 undergraduate AI researchers in summer 2018 and 4 undergraduate AI researchers in summer 2016.

  — Co-authored successful proposal to the US Air Force Office of Scientific Research for 2-year grant (AF9550-12-1-0003) for computational reasoning in the natural sciences, economics, and mathematical logic.

- Intern, Cognitive Computing, IBM Research Zürich — June–August 2017

— On chemical reaction prediction using symbolic machine learning (inductive logic programming), advised by Dr. Teodoro Laino.

- Research Assistant, Rensselaer Polytechnic Institute — 2013–2014

  — Funded by the US Naval Research Lab for machine reasoning in language education.

- Project-Linked Person (Research Assistant), Indian Statistical Institute — 2011–2012

  — Computer Vision & Pattern Recognition Unit. Statistical machine learning to tune OCR software for the Bengali language.

WORK EXPERIENCE (TEACHING)

- I am co-teaching (with Prof. Selmer Bringsjord) the course 'Are Humans Rational?', an investigation of the eponymous question, at Rensselaer Polytechnic Institute in the Fall 2018 semester.

- Guest Lecturer, Rensselaer Polytechnic Institute — 2015–current

  — Guest lectures in 'Introduction to Logic' and 'Are Humans Rational?'

- Teaching Assistant, Rensselaer Polytechnic Institute — 2012–2013, 2014–2015

  — Assisted with undergraduate programming and data structures courses, and (twice) CSCI 4150 'Introduction to Artificial Intelligence', a graduate-level course.

WORK EXPERIENCE (PROGRAMMING)

- I program in Python & Prolog, and have programmed in C++, PHP, Lisps, and Oz.

- Google Summer of Code 2012.

- Associate Programmer, Indus Net Technologies, Kolkata — 2010–2011

  — Worked closely with clients to develop enterprise web solutions in PHP (back-end).

EDUCATION

- Doctor of Philosophy (Computer Science) — Rensselaer Polytechnic Institute, 2017; advised by Prof. Selmer Bringsjord.

  — Sen, A. (2017). Computational Axiomatic Science. *Ph.D. Dissertation, Rensselaer Polytechnic Institute*.

- Master of Computer Applications — West Bengal University of Technology, Kolkata, India, 2010.
- Bachelor of Science in Physics, with Honours (*cum laude*) — St. Xavier's College, University of Calcutta, Kolkata, India, 2007.

CERTIFICATE

- Neural Networks and Deep Learning by deeplearning.ai on Coursera. Certificate available here: https://www.coursera.org/account/accomplishments/certificate/S3SR5C2EJEJ7.

PUBLICATIONS AND CONFERENCE PRESENTATIONS (PEER-REVIEWED)

- G., Naveen S., Bringsjord, S., and Sen A. (2019). Towards Proof-Theoretic Semantics for the Deontic Cognitive Event Calculus. To be presented at the *Workshop on Logic and Cognition, Indian Institute of Technology, New Delhi, India, 2019, held in conjunction with the Eighth Indian Conference on Logic and its Applications*.
- G., Naveen S., Paquin, J-C., Banerjee, S., Sen, A., Mayol, P. (2019). On Datasets for Evaluating Architectures for Learning to Reason. Forthcoming in the *Proceedings of the AAAI 2019 Spring Symposium on Combining Machine Learning with Knowledge Engineering (AAAI-MAKE 2019), Stanford University, Palo Alto, California, USA, 2019*.
- Bringsjord, S., G., Naveen S., Sen, A., Peveler, M., Srivastava, B., Talamadupula, K. (2018). Tentacular Artificial Intelligence, and the Architecture Thereof, Introduced. In the *Proceedings of the 1st International FAIM Workshop on Architectures and Evaluation for Generality, Autonomy & Progress in AI (AEGAP 2018), Stockholm, Sweden, 2018, held in conjunction with IJCAI-ECAI 2018, AAMAS 2018 and ICML 2018*. Pre-print available here: http://kryten.mm.rpi.edu/TAI_AEGAP2018_cc.pdf.
- Sen, A., G., Naveen S., Bringsjord, S., Ghosh, R., Mayol, P., Srivastava, B., Talamadupula, K. (2018). Toward a Smart City using Tentacular AI. In the *Proceedings of the 2018 European Conference on Ambient Intelligence, Larnaca, Cyprus, 2018, Lecture Notes in Computer Science (Springer LNCS), Vol. 11249.*
- Peveler, M., G., Naveen S., Bringsjord, S., Sen, A. et al. Toward Cognitive-and-Immersive Systems: Experiments in a Cognitive Microworld. Forthcoming in the *Proceedings of the 6th Annual Conference on Advances in Cognitive Systems, Stanford, CA, USA, 2018*.
- Bringsjord, S., Sen, A., G., Naveen S., Paquin, J-C. et al. (2018). Ethical Operating Systems. *Reflections on Programming Systems (Springer, Cham), Pages 235-260*.

- Sen, A., Srivastava, B. et al. For AIs, Is it Ethically/Legally Permitted That Ethical Obligations Override Legal Ones? Forthcoming in the *Proceedings of the International Conference on Robot Ethics and Standards (ICRES 2018), Troy, NY, USA*, 2018.
- Bringsjord, S., G., Naveen S., and Sen, A. Demystifying "Value Alignment": Formally Linking Axiology to Ethical Principles in a Deontic Cognitive Calculus. Forthcoming in the *Proceedings of the International Conference on Robot Ethics and Standards (ICRES 2018), Troy, NY, USA*, 2018.
- Bringsjord, S., Sen, A., and G., Naveen S. Non-Standard Analysis is a Counter-Example to the Enculturated Model of the Mind. At the *Workshop on Mathematics and Culture - II, Kolkata, India*, 2018.
- Sen, A., G., Naveen S., and Bringsjord, S. A Relativistic Event Calculus. At the *3rd International Conference on Logic, Relativity and Beyond, Budapest, Hungary*, 2017. Extended abstract available here: https://www.renyi.hu//conferences/lrb17/pdf/Sen--Sundar--Bringsjord.pdf.
- G., Naveen S., Bringsjord, S., Ghosh, R., Sen, A. et al. A Study in Suicide via Defeasible Cognitive Calculi: With Provision for Self-Reasoning. At the *2017 Annual Meeting of the International Association for Computing and Philosophy, Stanford, CA, USA, 2017*.
- Sen, A., Peveler, M., Marton, N. et al. (2016). Toward the Cognitive Classroom: Mathematical Physics. At the *6th European Immersive Education Summit, Padua, Italy*, 2016. Forthcoming in the *Journal of Immersive Education*, edited by Aaron E. Walsh.
- Bringsjord, S. and Sen, A. (2016). On Creative Self-Driving Cars. *Applied Artificial Intelligence, Volume 30, Issue 8, Pages 758-786*. (Uncorrected) pre-print available here: http://kryten.mm.rpi.edu/SB_AS_CreativeSelf-DrivingCars_0323161130NY.pdf.
- Bringsjord, S., Licato, J., Sen, A., Johnson, J., Bringsjord, A., and Taylor, J. (2015). On Logicist Agent-based Economics. In the *Proceedings of the 11th Artificial Economics Conference, Porto, Portugal (Porto, Portugal: University of Porto)*. Available here: http://kryten.mm.rpi.edu/SB_JL_AS_JJ_AB_NS_JT_AE2015_0605152315NY.pdf.
- Bringsjord, S., Licato, J., G., Naveen S., Ghosh, R., and Sen, A. (2015). Real Robots That Pass Human Tests of Self-consciousness. In the *Proceedings of the 24th IEEE Symposium on Robots and Human Interactive Communications, Kobe, Japan (New York, NY: IEEE), Pages 498-504*. Pre-print available here: http://kryten.mm.rpi.edu/SBringsjord_etal_self-con_robots_kg4_0601151615NY.pdf.
- Sen, A., Bringsjord, S., Marton, N., and Licato, J. Toward Diagrammatic Automated Discovery in Axiomatic Physics. At the *2nd International Conference on Logic, Relativity and Beyond, Budapest, Hungary*, 2015. Available here: https://www.renyi.hu//conferences/lrb15/LRB15_Sen--Bringsjord--Marton--Licato.pdf.

CONFERENCE & WORKSHOP ORGANIZATION & REVIEWING

- Organizing Committee, *International Workshop on Urban Intelligence 2019, London, UK*.
- Program Committee, *Second AAAI Workshop on Reasoning and Learning for Human-Machine Dialogues (DEEP-DIAL 2019), Honolulu, HI, USA*.
- Organizing Committee, *International Conference on Robot Ethics and Standards 2018 (ICRES 2018), Troy, NY, USA*.
- Reviewer, Annual Meeting of the Cognitive Science Society 2014 (CogSci 2014).

BOOKS

- Sen, A., Bringsjord, S., and G., Naveen S. Computational Axiomatic Science. *Forthcoming*.
- Baase, S. and Sen, A. (2013). A Gift of Fire: Social, Legal, and Ethical Issues for Computing Technology (Boston: Pearson). Fourth International Edition.

CONFERENCE POSTERS

- Bringsjord, S., G., Naveen S., Sen, A., and Elmore, C. (2019). A Formalization of Cognitive Continuity/Discontinuity, to Settle the Darwin's-Mistake Debate. At the 41st Annual Meeting of the Cognitive Science Society (CogSci 2019), Montreal, Canada.
- Peveler, M. et al., & Sen, A. et al. (2017). Framework for Mental Models for the Cognitively Smart Immersive Room. At the *September 2017 IBM Research Cognitive Colloquium, Yorktown Heights, NY, USA*.
- Sen, A., G., Naveen S., Bergland, E., Licato, J. et al. (2017). Computational Exploration of Gödel's Speedup Theorem. At the *5th Annual Conference on Advances in Cognitive Systems, Troy, NY, USA*.
- Bringsjord, S., Sen, A., Elmore, C., and G., Naveen S. (2017). Toward Formalizing the Darwin's-Mistake Debate. At the *5th Annual Conference on Advances in Cognitive Systems, Troy, NY, USA*.
- Peveler, M., Sen, A., G., Naveen S., and Bringsjord, S. (2017). Toward Plan Recognition that Incorporates Theory of Mind. At the *5th Annual Conference on Advances in Cognitive Systems, Troy, NY, USA*.
- Peveler, M., O'Neill, K., Sen, A. et al. (2016). The Planning Dilemma in Cognitive Computing. At the *September 2016 IBM Research Cognitive Colloquium, Yorktown Heights, NY, USA*.

- Sen, A., Peveler, M., Marton, N. et al. (2015). Toward the Cognitive Classroom: Mathematical Physics. At the *November 2015 Rensselaer-IBM Research Cognitive Colloquium, Troy, NY, USA*.
- Sen, A. & Dana, S. K. (2009). A composite image encryption algorithm using a 3-order cellular neural network and the DES symmetric-key block cipher. At the *International Symposium on Complex Dynamical Systems and Applications, Digha, India*.

OTHER TALKS

- G., Naveen S., Paquin, J-C., Banerjee, S., Sen, A., Bringsjord, S. (2018). On Evaluating Learning to Reason. Presented at the *IBM AI Week 2018 Knowledge Representation Meets Machine Learning Workshop, Cambridge, MA, USA, 2018*.
- Computational Axiomatic Science. Invited talk at *IBM Research Boston & IBM Research Yorktown Heights*, 2017.
- Toward Learning Chemical Reactivity. Invited talk at *IBM Research Zürich*, 2017.
- 3 Minute Thesis Competition. *Rensselaer Polytechnic Institute*, 2017.
- Towards a More Cultured Computer. At the *Rensselaer Polytechnic Institute School of Science Graduate Research Symposium 2014*.
- Scientific Computing with Python. Invited talk at the *Software Freedom Day 2011, Indian Statistical Institute, Kolkata, India*.

AWARDS

- 3 Minute Thesis Competition. *Rensselaer Polytechnic Institute*, 2017. Placed runner-up.
- Bishop Cashmere Award for Outstanding Creative Talent. *St. James' School, Kolkata, India*,2004.

CODA

- I play classical piano, co-edited a college science magazine, was on RPI's School of Science Council, have won awards at national-level debate moots, and chess tournaments.