MICHAEL J. GIANCOLA

Email: mike.j.giancola@gmail.com
Website: mjgiancola.github.io

RESEARCH INTERESTS

Explainable AI — Hybrid AI — Natural Language Reasoning — Artificial General Intelligence

EDUCATION

PhD, Computer Science *Rensselaer Polytechnic Institute (RPI)* Expected May 2023
MS, Cognitive Science — December 2022
Thesis (PhD): Reasoning with *Cognitive Likelihood* for Artificially-Intelligent Agents
Thesis (MS): Toward an Explainable Framework for Intensional Defeasible Reasoning
Advisor: Selmer Bringsjord (PhD & MS) GPA: 4.0/4.0

BS, Computer Science & Mathematical Sciences *Worcester Polytechnic Institute (WPI)* May 2018
Thesis: Permutation-Invariant Consensus Over Crowdsourced Labels
Advisors: Jacob Whitehill (CS) & Randy Paffenroth (MA) GPA: 3.92/4.0

SKILLS

	Fluent	**Proficient**	**Rudimentary**
Languages	Python, LaTeX	C, Scheme, Java	Rust, MatLab, Prolog
Libraries	NumPy, SciPy, scikit-learn	🤗 transformers, ConceptNet API	TensorFlow (py & js)

EMPLOYMENT

Applied Scientist Intern June 2022 – September 2022
Amazon Web Services (AWS) – Amazon Lex

- ◇ Researched methods for understanding entailment in indirect speech acts.
- ◇ More specifically, I developed a method to leverage commonsense knowledge in order to enable dialog agents to identify implicit intents in user utterances.

Applied Scientist Intern June 2021 – September 2021
Amazon Web Services (AWS) – Automated Reasoning Group

- ◇ Applied machine learning methods to predict the runtime of SMT solvers.

Graduate Research Assistant January 2019 – Present
Rensselaer AI & Reasoning (RAIR) Lab at RPI

- ◇ Developing an automated reasoner for a modal logic in which agents can express and reason with *qualitatively* uncertain beliefs (e.g. "I believe it is *beyond reasonable doubt* that ϕ holds.").
- ◇ Investigating the use of transformer language models (e.g. GPT-3) to generate natural-language explanations of modal logic proofs.

Software Engineering Intern May 2018 – August 2018
Optie

- ◇ Designed a neural network for predicting which users to send which notifications.

Research Summer Intern May 2017 – August 2017
IBM Thomas J. Watson Research Center

- ◇ Developed a method for 3D object localization designed to be used in autonomous cars (patent pending).

PUBLICATIONS

Journal Articles

Bringsjord, S., Govindarajulu, N.S., **Giancola, M.**, "Automated Argument Adjudication to Solve Ethical Problems in Multi-Agent Environments". In *Paladyn, Journal of Behavioral Robotics.* Vol 12, No. 1, 2021, pp. 310-335. `https://doi.org/10.1515/pjbr-2021-0009`

Book Chapters

Bringsjord, S., **Giancola, M.**, Govindarajulu, N.S. "Logic-Based Modeling of Cognition". In: *The Cambridge Handbook of Computational Cognitive Sciences.* Ron Sun, ed. Cambridge University Press, Forthcoming (March 2023).

Giancola, M., Bringsjord, S., Govindarajulu, N.S., Varela, C. "Making Maximally Ethical Decisions via Cognitive Likelihood & Formal Planning". In: *Towards Trustworthy Artificial Intelligent Systems.* M.I.A. Ferreira, M. O. Tokhi eds. Intelligent Systems, Control and Automation: Science and Engineering. Springer, 2022, pp. 127-142. doi: 10.1007/978-3-031-09823-9_10.

Bringsjord, S., Hendler, J., Govindarajulu, N.S., Ghosh, R., **Giancola, M.** "The (Uncomputable!) Meaning of Ethically Charged Natural Language, for Robots, and Us, From Hypergraphical Inferential Semantics" In: *Towards Trustworthy Artificial Intelligent Systems.* M.I.A. Ferreira, M.O. Tokhi eds. Intelligent Systems, Control and Automation: Science and Engineering. Springer, 2022, pp. 143-167. doi: 10.1007/978-3-031-09823-9_11.

Conference Papers

Giancola, M., Bringsjord, S. "Toward Generating Natural-Language Explanations of Modal-Logic Proofs" In: *Proceedings of the 15th International Conference on Artificial General Intelligence (AGI-22).* Ed. by B. Goertzel, M. Iklé, A. Potapov, D. Ponomaryov. Springer Cham, 2022.

Bringsjord, S., Govindarajulu, N.S., Slowik, J., Oswald, J., **Giancola, M.**, Angel, J., Banerjee, S., Flaherty, A. "PERI.2 Goes to PreSchool and Beyond, in Search of AGI" In: *Proceedings of the 15th International Conference on Artificial General Intelligence (AGI-22).* Ed. by B. Goertzel, M. Iklé, A. Potapov, D. Ponomaryov. Springer Cham, 2022.

Rozek, B., **Giancola, M.**, Bringsjord, S., Govindarajulu, N.S. "A Framework for Testimony-Infused Automated Adjudicative Dynamic Multi-Agent Reasoning in Ethically Charged Scenarios" In: *Proceedings of the Seventh International Conference on Robot Ethics and Standards (ICRES 2022).* Ed. by S. Byun, M.O. Tokhi, M.I.A. Ferreira, N.S. Govindarajulu, M.F. Silva, K. M. Goher. London, UK: CLAWAR, July, 2022, pp. 47–66.

Banerjee, S., Bringsjord, S., **Giancola, M.**, Govindarajulu, N.S. "Qualitative Mechanical Problem-Solving by Artificial Agents: Further Progress, Under Psychometric AI" In: *The International FLAIRS Conference Proceedings, volume 35.* May, 2022. doi: 10.32473/flairs.v35i.130630. (Winner of the *Best Poster Award*)

Giancola, M., Bringsjord, S., Govindarajulu, N.S. "A Solution to an Ethical Super Dilemma via a Relaxation of the Doctrine of Triple Effect". In: *Proceedings of the Sixth International Conference on Robot Ethics and Standards (ICRES 2021).* Ed. by S. Bringsjord, M.O. Tokhi, M.I.A. Ferreira, N.S. Govindarajulu, M.F. Silva. London, UK: CLAWAR, July. 2021, pp. 23-32.

Giancola, M., Bringsjord, S., Govindarajulu, N.S., Varela, C. "Ethical Reasoning for Autonomous Agents Under Uncertainty". In: *Proceedings of the Fifth International Conference on Robot Ethics and Standards (ICRES 2020).* Ed. by M.O. Tokhi, M.I.A. Ferreira, N.S. Govindarajulu, M.F. Silva, E.E. Kadar, J. Wang, and A.P. Kaur. London, UK: CLAWAR, Sept. 2020, pp. 26-41.

Bringsjord, S., **Giancola, M.**, Govindarajulu, N. S. "Culturally Aware Social Robots That Carry Humans Inside Them, Protected by Defeasible Argumentation Systems". In: *Culturally Sustainable Social Robotics (Proceedings of Robophilosophy 2020).* Ed. by M. Nørskov, J. Seibt, and O. S. Quick. Volume 335 of Frontiers in Artificial Intelligence and Applications. IOS Press, 2020, pp. 440–456. doi: 10.3233/FAIA200941.

Bringsjord, S., Govindarajulu, N. S., Licato, J., **Giancola, M.** "Learning Ex Nihilo". In: *Proceedings of the Sixth Global Conference on Artificial Intelligence (GCAI 2020).* Ed. by G. Danoy, J. Pang, and G. Sutcliffe. Volume 72 of EPiC Series in Computing. EasyChair, 2020, pp. 1-27. doi: 10.29007/ggcf.

Mitrano, P., Burklund, J., **Giancola, M.**, Pinciroli, C. "A Minimalistic Approach to Segregation in Robot Swarms". In: *Second International Symposium on Multi-Robot and Multi-Agent Systems (MRS 2019).* IEEE, 2019, pp. 105-111. doi: 10.1109/MRS.2019.8901068

Giancola, M., Paffenroth, R., Whitehill, J. "Permutation-Invariant Consensus Over Crowdsourced Labels". In: *Proceedings of the Sixth AAAI Conference on Human Computation and Crowdsourcing (HCOMP 2018).* AAAI Press, 2018, pp. 21-30.

Extended Abstracts

Giancola, M., Bringsjord, S., Govindarajulu, N. S. "Novel Intensional Defeasible Reasoning for AI: Is it Cognitively Adequate?" In: *Proceedings of the IJCAI Workshop on "Cognitive Aspects of Knowledge Representation" (CAKR 2022)* CEUR-WS, 2022.

Bringsjord, S., Angel, J., Govindarajulu, N. S., **Giancola, M.**, Bringsjord, E. "Artificial Agents to Help Address the U.S. K–12 Math Gap Between Economically Disadvantaged vs. Advantaged Youth". In: *Artificial Intelligence for K–12 Education, Part of the AAAI Spring Symposium Series.* CEUR-WS, 2021.

Giancola, M., Bringsjord, S., Govindarajulu, N. S., Licato, J. "Adjudication of Symbolic & Connectionist Arguments in Autonomous Driving AI". In: *Proceedings of the Sixth Global Conference on Artificial Intelligence (GCAI 2020).* Ed. by G. Danoy, J. Pang, and G. Sutcliffe. Volume 72 of EPiC Series in Computing. EasyChair, 2020, pp. 28–33. doi: 10.29007/k647.

ACCOLADES

Graduate Student Professional Meeting Travel Grant	RPI	August 2022
Member of the Organizing Committee	ICRES 2021	July 2021
Graduate Student Professional Meeting Travel Grant	RPI	July 2019
Provost's MQP Award in Mathematical Sciences	WPI	April 2018

ORGANIZATIONS

Graduate Outdoor Recreation Program (GORP)	RPI	August 2018 – March 2020
Upsilon Pi Epsilon – Computer Science Honor Society	WPI	Initiated December 2015
Men's Varsity Swimming & Diving Team	WPI	August 2014 – May 2018