Dustin Dannenhauer

Wright State Research Institute
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Current position

Research Scientist, Artificial Intelligence at Wright State Research Institute

Areas of specialization

Computer Science • Artificial Intelligence • Advanced Autonomy
Automated Planning and Acting • Cognitive Architectures • Machine Learning
Execution Monitoring • Metacognition • Rebel Agents • Explainable AI • Goal Reasoning

Funding Awards

[Principal Investigator] *Testing AI Learning in Open-world Novelty Scenarios (TALONS)*
DARPA DSO SBIR

The AI MDP-based Uncertainty Reduction (AIMUR) Certification Tool
Navy SBIR

Education

2012 - 2017 Ph.D. in Computer Science, Lehigh University
Advisor: Héctor Muñoz-Avila
Dissertation Title: *"Self Monitoring Goal Driven Autonomy Agents"*

2008 - 2012 B.S. in Computer Science, Indiana University Bloomington
Departmental Honors
Specializations: Artificial Intelligence, Programming Language Theory

Publications

Refereed Journal, Conference and Workshop Proceedings

2020 *Accepted; In Press.* Dannenhauer, D., Muñoz-Avila, H., Cox, M. T. Expectations for Agents with Goal-Driven Autonomy. *Journal of Experimental and Theoretical Artificial Intelligence (JETAI).* In Press.

2019 Amos-Binks, A., Dannenhauer, D., Aha, D. W. Intention Dynamics of Rebel Agent Behavior. *Advances in Cognitive Systems (ACS).* Massachusetts Institute of Technology, Cambridge, MA. August

2019.

2019   Amos-Binks, A., Dannenhauer, D. Anticipatory Thinking: A Metacognitive Capability. *7th Goal Reasoning Workshop.* Cambridge, MA. ACS. 2019.

2019   Wright, B., Floyd, M., Dannenhauer, D., Aha, D. W. The Game of Fluxx: A Benchmark for Goal Reasoning. *7th Goal Reasoning Workshop.* Cambridge, MA. ACS. 2019.

2019   Dannenhauer, D., Floyd, M., Decker, J., & Aha D. W. Dungeon Crawl Stone Soup as an Evaluation Domain for Artificial Intelligence. *Workshop on Games and Simulations for Artificial Intelligence.* Thirty-Third AAAI Conference on Artificial Intelligence. Honolulu, Hawaii, USA. 2019.

2019   Amos-Binks, A., Dannenhauer, D., & Aha, D. W. Computational Models of Rebel Agent Behavior for Interactive Narrative. *Symposium on Story-enabled Intelligence.* AAAI Spring Symposium Series 2019. Stanford University, CA. 2019.

2019   Muñoz-Avila, H., Dannenhauer, D., & Reifsnyder, N. Is Everything Going According to Plan? - Expectations in Goal Reasoning Agents. *Proceedings of the 33rd AAAI Conference on Artificial Intelligence (AAAI).* Palo Alto, CA: AAAI Press.

2018   Dannenhauer, D., Cox, M. T., & Muñoz-Avila, H. Declarative Metacognitive Expectations for High-Level Cognition. *Advances in Cognitive Systems.* 2018.

2018   Boggs, J., Dannenhauer, D., Floyd, M. W., & Aha, D. W. The Ideal Rebellion: Maximizing Task Performance in Rebel Agents. *6th Goal Reasoning Workshop.* Stockholm, Sweden. IJCAI. 2018.

2018   Dannenhauer, D., Floyd, M. W., Molineaux, M., & Aha, D. W. Learning from Exploration: Towards an Explainable Goal Reasoning Agent. *Adaptive Learning Agents Workshop.* Stockholm, Sweden. IJCAI. 2018.

2018   Dannenhauer, D., Floyd, M. W., Magazzeni, D., & Aha, D. W. Explaining Rebel Behavior in Goal Reasoning Agents. *Workshop on Explainable AI Planning.* Delft, The Netherlands. ICAPS. 2018.

2018   Molineaux, M., Floyd, M. W., Dannenhauer, D., & Aha, D. W. Human-Agent Teaming as a Common Problem for Goal Reasoning. *Symposium on Integrating Representation, Reasoning, Learning, and Execution for Goal Directed Autonomy.* AAAI Spring Symposium Series 2018. Stanford University, CA. 2018. http://siddharthsrivastava.net/sirle18/

2018   Molineaux, M., Dannenhauer, D., & Aha, D. W. Towards Explainable NPCs: A Relational Exploration Learning Agent. *Knowledge Extraction from Games Workshop.* New Orleans, LA. AAAI. 2018. https://sites.google.com/view/kegworkshop/

2017   Cox, M. T., Dannenhauer, D., & Kondrakunta, S. Goal Operations for Cognitive Systems. *Proceedings of the 31st AAAI Conference on Artificial Intelligence.* Palo Alto, CA: AAAI Press.

2016   Dannenhauer, D., Muñoz-Avila, H., & Cox, M. T. Informed Expectations to Guide GDA Agents in Partially Observable Environments. *Proceedings of the 25th International Joint Conference on Artificial Intelligence (IJCAI).* Palo Alto, CA: AAAI Press. 2016.

2016   Cox, M. T., & Dannenhauer, D. Goal transformation and goal reasoning. M.Roberts (Ed.), *Working Notes of the 4th Workshop on Goal Reasoning.* New York, IJCAI. 2016. http://makro.ink/ijcai2016grw/

2016   Dannenhauer, D. Self Monitoring Goal Driven Autonomy Agents. *Doctoral Consortium, International Joint Conference on Artificial Intelligence (IJCAI).* AAAI Press, 2016.

2016   Cox, M. T., Alavi, Z., Dannenhauer, D., Eyorokon, V., & Muñoz-Avila, H. MIDCA: A Metacognitive, Integrated Dual-Cycle Architecture for Self-regulated Autonomy. *Proceedings of the 30th AAAI Conference on Artificial Intelligence (AAAI).* Palo Alto, CA: AAAI Press. 2016.

2015   Dannenhauer, D., & Muñoz-Avila, H. Raising expectations in GDA agents acting in dynamic environments. *Proceedings of the 24th International Conference on Artificial Intelligence (IJCAI).* AAAI Press, 2015.

2015   Dannenhauer, D., & Muñoz-Avila, H. Goal-Driven Autonomy with Semantically-annotated Hierarchical Cases. *International Conference on Case-Based Reasoning (ICCBR).* Springer International Publishing, 2015. 88-103.

2015   Muñoz-Avila, H., Dannenhauer, D., & Cox, M. T. Towards cognition-level goal reasoning for playing real-time strategy games. *Goal Reasoning: Papers from the ACS Workshop.* 2015.

2014   Dannenhauer, D., Cox, M. T., Gupta, S., Paisner, M. & Perlis, D. Toward meta-level control of autonomous agents. *In Proceedings of the 2014 Annual International Conference on Biologically Inspired Cognitive Architectures: Fifth annual meeting of the BICA Society (BICA).* Elsevier/Procedia Computer Science, 41, 226-232. 2014.

2013   Dannenhauer, D. Ontological Knowledge for Goal-Driven Autonomy Agents in Starcraft. *Doctoral Consortium, 9th Artificial Intelligence and Interactive Digital Entertainment Conference (AIIDE).* 2013.

2013   Dannenhauer, D. & Muñoz-Avila, H. LUIGi: A Goal-Driven Autonomy Agent Reasoning with Ontologies. *Advances in Cognitive Systems Conference (ACS).* 2013.

2013   Dannenhauer, D., Muñoz-Avila, H. Case-based Goal Selection Inspired by IBM's Watson. *International Conference on Case-Based Reasoning (ICCBR).* Springer. 29-43. 2013.

Magazine Articles and Blurbs

2017   Dannenhauer, D. Planning and Scheduling. *AI Topics.* Apr. 2017. https://aitopics.org/class/Technology/IT/AI/Representation%20&%20Reasoning/Planning%20&%20Scheduling Web.

Doctoral Dissertation

2017   Dannenhauer, D. Self Monitoring Goal Driven Autonomy Agents. *Doctoral dissertation*, Lehigh University, Department of Computer Science and Engineering, Bethlehem, PA.

Teaching

Fall 2014   *CSE 318: Intro To Theory Of Computation*
Fall 2014   *CSE 340: Design and Analysis of Algorithms*

Undergraduate Instructor at Indiana University Bloomington

Spring 2012 *CSCI-C211: Introduction to Computer Science*
Fall 2011   *CSCI-B351: Introduction to Artificial Intelligence*
Spring 2011 *CSCI-C211: Introduction to Computer Science*
Fall 2010   *CSCI-C311: Introduction to Programming Languages*
Spring 2010 *CSCI-C211: Introduction to Computer Science*
Fall 2009   *CSCI-C211: Introduction to Computer Science*

Invited Talks

Jan. 2019   Ohio University, Athens, OH
             Title: *Self Monitoring Goal Driven Autonomy Agents*
Oct. 2018   George Mason University, Fairfax, VA
             Title: *Self Monitoring Goal Driven Autonomy Agents*
Sept. 2018   Villanova University, Villanova, PA
             Title: *Self Monitoring Goal Driven Autonomy Agents*
Mar. 2017   Wright State Research Institute, Beavercreek, OH
             Title: *Self Monitoring Goal Driven Autonomy Agents*
Feb. 2017   Sonoma State University, Rohnert Park, CA
             Title: *Self Monitoring Goal Driven Autonomy Agents*

Honors & Awards

2018   Selected as a DARPA Riser for early career scientists, presented at DARPA's 60th Anniversary
             Symposium, National Harbor, MD

2017   National Research Council (NRC) Postdoctoral Research Award (*Awarded competitive funding by
             the Director of Research for my proposal on Metacognitive Expectations*)

2014 - 2017 Rossin Doctoral Fellow
2012 - 2013 Lehigh University Fellowship
2011 - 2012 Ronald E. McNair Postbaccalaureate Achievement Program Recipient
2010   Undergraduate Instructor of the Year Award
             Department of Computer Science, Indiana University
             Awarded solely based on student nominations

Service

2020   Reviewer for the 29th International Joint Conference on Artificial Intelligence (IJCAI-2020)
2019   Organizing Committee Member of the 2019 AAAI Fall Symposium: Cognitive Systems for Antici-
             patory Thinking (COGSAT-2019)
2019   Chair of the 7th Goal Reasoning Workshop at Advances in Cognitive Systems (ACS-2019)

2019	Reviewer for the IJCAI 2019 Workshop on Explainable Artificial Intelligence (XAI)
2019	Reviewer for the 29th International Conference on Automated Planning and Scheduling (ICAPS-2019)
2019	Reviewer for the 2nd Knowledge Extraction from Games Workshop (AAAI-2019)
2018	Program Committee Reviewer for the Thirty-Third AAAI Conference on Artificial Intelligence (AAAI-2019)
2018	Co-organizer of the 6th Goal Reasoning Workshop at the International Joint Conference on Artificial Intelligence (IJCAI-2018)
2018	Reviewer for the 6th Goal Reasoning Workshop at the International Joint Conference on Artificial Intelligence (IJCAI-2018)
2018	Publicity Chair for the International Conference on Case-based Reasoning (ICCBR-2018)
2018	Program Committee Reviewer for International Conference on Case-based Reasoning (ICCBR-2018)
2018	Reviewer for Knowledge Extraction from Games Workshop (AAAI-2018)
2018	Organized and chaired the Second Annual MIDCA Workshop at Wright State University
2017	Program Committee Reviewer for the Thirty-Second AAAI Conference on Artificial Intelligence (AAAI-2018)
2017	Program Committee Reviewer for 5th Goal Reasoning Workshop at the International Joint Conference on Artificial Intelligence (IJCAI-2017)
2017	Reviewer for the Fifth Annual Conference on Cognitive Systems at Rensselaer Polytechnic Institute, Troy, New York
2017	Organized and chaired the First Annual MIDCA Workshop at Wright State University
2014	Vice President of the Graduate Student Senate at Lehigh University
2013	Organized and facilitated a student panel as part of the 2nd Workshop on Goal Reasoning at the Conference on Advances in Cognitive Systems (ACS)

Employment

2020 - Pres.	RESEARCH SCIENTIST
Wright State Research Institute, Beavercreek, OH 45431
I lead research in goal reasoning and cognitive architectures, with a particular focus on metacognition.
2019 - 2020	SCIENTIST
Martin Defense Group (formerly Navatek LLC), Arlington, VA 22203
I lead research in goal reasoning, cognitive architectures, and machine learning applied toward a range of autonomous systems for the Navy, Marine Corps, DARPA, and Army.
2017 - 2019	POSTDOCTORAL RESEARCH ASSOCIATE OF THE NATIONAL RESEARCH COUNCIL
Naval Research Laboratory, Washington, D.C.
Investigating areas of robust autonomous agents, explainable artificial intelligence, and rebel agents. Mentored two PhD students during summer of 2018 on the topics of rebel agents and online learning of action models.
2014	RESEARCH INTERNSHIP
University of Maryland, College Park, MD
Investigated metacognitive capabilities in autonomous agents under Michael T. Cox; Gained experience with TREX, Baxter robot, ROS, Gazebo, and the MIDCA cognitive Architecture.

2012   RESEARCH INTERNSHIP
        Naval Research Laboratory, Washington, D.C.
        Performed a literature review on goal-reasoning agents under David Aha.

2010   SOFTWARE ENGINEER INTERNSHIP
        Cerner Corporation, Kansas City, MO
        Assisted testing of a multi-threaded system to detect and fix race conditions; worked on a colorized
        text editor for healthcare formatted document editing.

Certifications

Fall 2014   Teacher Development Program
             Lehigh University

Conferences & Workshops Attended

2019   AAAI Fall Symposium, Arlington, VA.

2019   Protege Short Course, Stanford University, Palo Alto, CA.

2019   Advances in Cognitive Systems, Massachusetts Institute of Technology, Cambridge, MA.

2019   Science of Deep Learning Colloquia, National Academy of Sciences, Washington, D.C.

2019   DARPA AI Colloquium, Alexandria, VA

2018   D60: DARPA's 60th Anniversary Symposium, National Harbor, MD
        Selected as a DARPA Riser where I presented a poster on Goal Transformations to current DARPA Program Managers

2018   Advances in Cognitive Systems (ACS-18), Stanford, California
        Oral presentation in main conference

2018   International Joint Conference on Artificial Intelligence (IJCAI-18), Stockholm, Sweden
        Co-organizer of 6th Goal Reasoning Workshop
        Multiple oral presentations in 6th Goal Reasoning Workshop
        Poster in Adaptive Learning Agents (ALA) Workshop
        Organized joint panel between Goal Reasoning and Engineering Multi-Agent Systems (EMAS) Workshops

2018   International Conference on Automated Planning and Scheduling (ICAPS-18), Delft, The Netherlands
        Oral presentation in Explainable AI Planning Workshop

2018   Association for the Advancement of Artificial Intelligence (AAAI-18), New Orleans, LA
        Oral Presentation in Knowledge Extraction from Games Workshop

2018   Second Annual MIDCA Workshop, Wright State University
        Organizer, Chair of the workshop

Multiple oral presentations

2017   International Joint Conference on Artificial Intelligence (IJCAI-17), Melbourne, Australia
Oral presentation in Goal Reasoning Workshop

2017   First Annual MIDCA Workshop, Wright State University
Organizer, Chair of the workshop
Multiple oral presentations

2016   International Joint Conference on Artificial Intelligence (IJCAI-16), New York City, NY
Oral presentation in main conference
Oral presentation in doctoral consortium
Oral presentation in Goal Reasoning Workshop

2016   Association for the Advancement of Artificial Intelligence (AAAI-16), Phoenix, AZ

2015   International Joint Conference on Artificial Intelligence (IJCAI-15), Buenos Aires, Argentina
Oral presentation in main conference

2015   Advances in Cognitive Systems (ACS-15), Atlanta, GA
Oral presentation in Goal Reasoning Workshop

2013   Advances in Cognitive Systems (ACS-13) , Baltimore, MD
Chair and participant of the student panel
Poster in main conference

2013   Artificial Intelligence and Interactive Digital Entertainment (AIIDE), Boston, MA
Poster in doctoral consortium

2013   International Conference on Case-based Reasoning (ICCBR), Saratoga Springs, NY
Oral presentation in main conference
Oral presentation in doctoral consortium

2011   Association for the Advancement of Artificial Intelligence (AAAI), San Francisco

2011   Machine Learning Summer School, Purdue University, June 13th - 24th