

Justin Svegliato

ARTIFICIAL INTELLIGENCE PLANNING REINFORCEMENT LEARNING ROBOTICS AI ETHICS

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Education

University of Massachusetts

Amherst, MA

MS/PHD IN COMPUTER SCIENCE

September 2021 (Expected)

- *PhD Candidate with Distinction*
- **Advisor:** Shlomo Zilberstein
- **Group:** Resource-Bounded Reasoning Lab
- **Research:** Automated Decision Making
- **Dissertation:** Metareasoning for Planning and Execution in Autonomous Systems

Marist College

Poughkeepsie, NY

BS IN COMPUTER SCIENCE AND PHILOSOPHY WITH A MATHEMATICS MINOR

May 2014

- *Valedictorian, Summa Cum Laude*
- **GPA:** 4.0

Honors

University of Massachusetts

Amherst, MA

- **National Science Foundation Graduate Research Fellowship** — Awarded to high-potential PhD students early in their career
- **Distinguished Paper Award** — Awarded to a few top papers at AAAI-21
- **Distinguished Teaching Award Finalist** — Awarded to top teaching assistants for excellence in teaching
- **PhD Candidate with Distinction** — Awarded to a few top PhD students for excellence on the PhD candidacy qualifying exam
- **Victor Lesser Graduate Scholarship in Artificial Intelligence** — Awarded to a top incoming PhD student in artificial intelligence

Marist College

Poughkeepsie, NY

- **Valedictorian** — Awarded to the top graduating student
- **National Science Foundation Scholarship Award** — Included a full scholarship for all years of study
- **Excellence Award in Computer Science** — Awarded to the top graduating student in computer science
- **Excellence Award in Philosophy** — Awarded to the top graduating student in philosophy
- **Intern of the Year** — Awarded to the top graduating student for excellence in industry
- **Fiovranti Memorial Scholarship for Athletics** — Awarded for excellence in cross country and track and field
- **Summa Cum Laude** — Awarded to graduating students with at least a 3.85 GPA
- **Deans' Circle** — Admitted to a selective honors organization comprising 3% of undergraduate enrollment (all semesters)
- **Deans' List** — Awarded to students with at least a 3.6 GPA (all semesters)
- **Presidential Scholar Student Speaker** — Selected to give six talks to the top accepted prospective honor students

Research Experience

University of Massachusetts

Amherst, MA

RESEARCH ASSISTANT IN ARTIFICIAL INTELLIGENCE

June 2016 – Present

- Developing a metareasoning approach for safe operation that adjusts the actions of a task process given a collection of safety processes by using a set of Markov decision processes that execute in parallel
- Proposed a model for ethically compliant optimal decision making with respect to the constraints of a given ethical theory by using linear programming to solve an extension of a Markov decision process
- Introduced a metareasoning approach for adjusting the hyperparameters of anytime algorithms by using deep reinforcement learning to solve an extension of a Markov decision process
- Developed a solution method for solving large-scale Markov decision processes by using linear programming, dynamic programming, or heuristic search to concurrently solve multiple partially abstract Markov decision processes
- Proposed an intelligent system that can learn its competence through observing human feedback and can improve its competence by introducing state features by using an extension of a stochastic shortest path problem
- Introduced a model for agent-aware state estimation that enables an intelligent agent to exploit the behavior of rational agents in the environment by using dynamic Bayesian networks and inference techniques
- Developed an intelligent system that detects, recognizes, and handles exceptions that can be encountered during operation by using point-based value iteration to solve an extension of a hierarchical partially observable Markov decision process
- Proposed an adaptive online metareasoning approach for monitoring and controlling the deliberation process of an intelligent system to optimally balance decision quality and deliberation time by using nonlinear regression and reinforcement learning
- Introduced an automated malware defense framework that optimally increases the security of and reduces the impact on a system by using an extension of a partially observable Markov decision process to interleave different malware detection techniques

Marist College

Poughkeepsie, NY

RESEARCH ASSISTANT IN DISTRIBUTED GRAPH DATABASE SYSTEMS

April 2015 – June 2016

- Investigated methods of optimizing queries against a distributed graph database system by swapping vertices and edges across worker nodes to decrease latency and increase parallelization
- Enhanced a distributed graph database system with analysis functions that report the location of vertices and edges on worker nodes
- Implemented a web dashboard that displays the vertex and edge information of each node of the distributed graph database system
- Reviewed papers on distributed graph database systems focused on query optimization and data deduplication

RESEARCH ASSISTANT IN STIMULUS-RESPONSE TESTING

February 2013 – October 2015

- Built an open source stimulus-response testing framework used to manage, customize, and administer implicit association tests through a user-friendly interface designed for psychologists
- Implemented a prototype of a customizable implicit association test for a conference demonstration
- Wrote the technical description of the architecture of the stimulus-response testing framework for a journal paper

RESEARCH ASSISTANT IN REGULAR EXPRESSIONS AND DATA COMPRESSION

September 2013 – January 2014

- Investigated methods of applying extended regular expressions to data compressed using LZ78 and LZW
- Built a web application that compressed data using LZ78 and SLP while also generating the corresponding dictionaries and grammars
- Summarized papers on extended regular expressions and lossless data compression algorithms including LZ77, LZ78, and LZW

Professional Experience

Nissan Research Center

Sunnyvale, CA

AUTONOMOUS VEHICLE CONSULTANT

October 2018 – May 2019

- Developed an autonomous system that adjusts its level of autonomy based on feedback from a manual operator in order to guarantee that a task is completed efficiently and safely
- Advised on the design and implementation of the automated reasoning architecture, including an exception handling system, on a fully operational autonomous vehicle prototype

AUTONOMOUS VEHICLE INTERN

May 2018 – October 2018

- Implemented an exception handling system on a fully operational autonomous vehicle prototype that resolves a wide range of obstructions, including road blocks, garbage trucks, parked cars, and pedestrians
- Developed a general mathematical framework for exception recovery that can be used in any autonomous system by extending a partially observable Markov decision process
- Filed a patent as the primary inventor on using hierarchical belief space metareasoning in autonomous systems to detect, recognize, and handle exceptions that can be encountered during normal operation

Goldman Sachs

Jersey City, NJ

SOFTWARE DEVELOPER IN BIG DATA ENGINEERING

July 2015 – April 2016

- Developed a scalable web application that displays real-time and historical log data to troubleshoot issues and analyze the behavior of applications and systems without requiring host access
- Implemented a refinement system that converts a SQL database to a deductive knowledge base that stores facts in a proprietary logical representation

SOFTWARE DEVELOPER IN NETWORK SOFTWARE ENGINEERING

July 2014 – July 2015

- Led the development of a network device abstraction interface that uses a domain-specific language to abstract the implementation details of underlying network device operating systems
- Built a discovery system that manages a historical configuration inventory of network devices, such as firewalls, switches, and routers
- Conducted weekly code reviews with the global team to ensure software quality

SOFTWARE DEVELOPER INTERN IN NETWORK SOFTWARE ENGINEERING

May 2012 – May 2014

- Developed a virtual IP address provisioning service that manages a global redundant route injection system
- Built an extensible network connection framework to support SSH, Telnet, HTTP, and other network protocols

OmniTech

Poughkeepsie, NY

SOFTWARE DEVELOPER

September 2013 – June 2014

- Built a load balancing system that distributes energy demand across natural gas engines to minimize fuel consumption using linear and convex optimization over a set of sustainability and efficiency features
- Developed a configurable web application that simulates a redundant network of natural gas engines of different specifications

Marist College

Poughkeepsie, NY

WEB DEVELOPER

November 2010 – May 2012

- Designed and built the official college desktop and mobile websites
- Managed the content and styling of the homepages for a range of departments across the college
- Developed web applications for the college, including an online fashion store, a computer store, a fire extinguisher inventory system, an online newsroom, and an event scheduling system

Teaching Experience

University of Massachusetts

Amherst, MA

TEACHING ASSISTANT FOR COMPSCI 683: ARTIFICIAL INTELLIGENCE

January 2018 – May 2018 · January 2020 – May 2020

- Lectured on advanced topics in artificial intelligence, including backtracking, forward checking, and arc consistency
- Engaged with students in office hours and on the online class forum by explaining concepts and helping with homework assignments
- Assisted with the design of midterm and final exams and graded homework assignments with both written problems and coding exercises on a wide range of areas in artificial intelligence

Marist College

Poughkeepsie, NY

TEACHING ASSISTANT FOR COMPSCI 190: INTRODUCTION TO GAME DESIGN

July 2011 – August 2011

- Taught modules on game design and programming using a popular game development environment
- Directed daily lab exercises to help students learn programming concepts and develop their own computer games

Conference Papers

- **Agent-Aware State Estimation for Robust Traffic Light Classification in Autonomous Vehicles** · [In Submission](#)
Shane Parr*, Ishan Khatri*, [Justin Svegliato](#), Shlomo Zilberstein
International Conference on Intelligent Robots and Systems (IROS) · Prague, Czech Republic · 2021
- **Improving Competence via Iterative State Space Refinement** · [In Submission](#)
Connor Basich, [Justin Svegliato](#), Allyson Beach, Kyle Wray, Stefan Witwicki, Shlomo Zilberstein
International Conference on Intelligent Robots and Systems (IROS) · Prague, Czech Republic · 2021
- **Metareasoning for Optimizing Safety in Autonomous Systems** · [In Submission](#)
[Justin Svegliato](#), Connor Basich, Sandhya Saisubramanian, Shlomo Zilberstein
International Conference on Intelligent Robots and Systems (IROS) · Prague, Czech Republic · 2021
- **Metareasoning for Adjustable Algorithms with Deep Reinforcement Learning** · [In Submission](#)
Abhinav Bhatia, [Justin Svegliato](#), Shlomo Zilberstein
International Joint Conference on Artificial Intelligence (IJCAI) · Montreal, Canada · 2021
- **Ethically Compliant Planning within Moral Communities**
Samer Nashed, [Justin Svegliato](#), Shlomo Zilberstein
Conference on AI, Ethics, and Society (AIIES) · Virtual Conference · 2021
- **On the Benefits of Randomly Adjusting Anytime Weighted A***
Abhinav Bhatia, [Justin Svegliato](#), Shlomo Zilberstein
Symposium on Combinatorial Search (SOCS) · Guangzhou, China · 2021
- **Solving Markov Decision Processes with Partial State Abstractions**
[Justin Svegliato](#)*, Samer Nashed*, Matteo Brucato, Connor Basich, Shlomo Zilberstein
International Conference on Robotics and Automation (ICRA) · Xi'an, China · 2021
- **Ethically Compliant Sequential Decision Making** · [Distinguished Paper Award](#)
[Justin Svegliato](#), Samer Nashed, Shlomo Zilberstein
AAAI Conference on Artificial Intelligence (AAAI) · Virtual Conference · 2021
- **Learning to Optimize Autonomy in Competence-Aware Systems**
Connor Basich, [Justin Svegliato](#), Kyle Wray, Stefan Witwicki, Joydeep Biswas, Shlomo Zilberstein
International Conference on Autonomous Agents and Multiagent Systems (AAMAS) · Auckland, New Zealand · 2020
- **An Integrated Approach to Moral Autonomous Systems**
[Justin Svegliato](#), Samer Nashed, Shlomo Zilberstein
European Conference on Artificial Intelligence (ECAI) · Santiago de Compostela, Spain · 2020
- **A Model-Free Approach to Meta-Level Control of Anytime Algorithms**
[Justin Svegliato](#), Prakhar Sharma, Shlomo Zilberstein
International Conference on Robotics and Automation (ICRA) · Paris, France · 2020
- **Belief Space Metareasoning for Exception Recovery**
[Justin Svegliato](#), Kyle Wray, Stefan Witwicki, Joydeep Biswas, Shlomo Zilberstein
International Conference on Intelligent Robots and Systems (IROS) · Macao, China · 2019
- **Meta-Level Control of Anytime Algorithms with Online Performance Prediction**
[Justin Svegliato](#), Kyle Wray, Shlomo Zilberstein
International Joint Conference on Artificial Intelligence (IJCAI) · Stockholm, Sweden · 2018
- **OpenSR: An Open Source Stimulus-Response Framework**
Carolyn Matheus, [Justin Svegliato](#)
Human Technology · 2015
- **Distributed Graph Snapshot Placement and Query Performance in a Data Center**
Alan Labouseur, [Justin Svegliato](#), Jeong-Hyon Hwang
IEEE International Conference on Computational Science and Computational Intelligence (CSCI) · Las Vegas, NV · 2015
- **Stimulus-Response Tests: An Applied Demonstration**
Carolyn Matheus, [Justin Svegliato](#)
IEEE International Conference on Research Challenges in Information Science (RCIS) · Paris, France · 2013

Workshop Papers

- **A Metareasoning Framework for Planning and Execution in Autonomous Systems**

[Justin Svegliato](#)

ECAI Doctoral Consortium · Santiago de Compostela, Spain · 2020

- **Ethically Compliant Planning in Moral Autonomous Systems**

[Justin Svegliato](#), Samer Nashed, Shlomo Zilberstein

IJCAI Workshop on AI Safety (AISafety) · Yokohama, Japan · 2020

- **Improving Competence for Reliable Autonomy**

Connor Basich, [Justin Svegliato](#), Shlomo Zilberstein

ECAI Workshop on Agents and Robots for Reliable Engineered Autonomy (AREA) · Santiago de Compostela, Spain · 2020

- **Agent-Aware State Estimation: Effective Traffic Light Classification for AVs**

Shane Parr*, Ishan Khatri*, [Justin Svegliato](#), Shlomo Zilberstein

IROS Workshop on Sensing, Estimating, and Understanding the Dynamic World (DynamicSLAM) · Paris, France · 2020

- **Adaptive Metareasoning for Bounded Rational Agents**

[Justin Svegliato](#), Shlomo Zilberstein

IJCAI Workshop on Architectures and Evaluation for Generality, Autonomy and Progress in AI (AEGAP) · Stockholm, Sweden · 2018

- **Belief Space Planning for Automated Malware Defense**

[Justin Svegliato](#), Sam Witty, Amir Houmansadr, Shlomo Zilberstein

IJCAI Workshop on AI for Internet of Things (AI4IoT) · Stockholm, Sweden · 2018

Philosophy Papers

- **The Inadequate Ontological Foundation of Libertarian Free Will**

[Justin Svegliato](#)

Mid-Hudson Valley Philosophy Conference · Poughkeepsie, NY · 2014

- **The Revival of Reliabilism: A Mathematical Approach to the Generality Problem**

[Justin Svegliato](#)

Marist Undergraduate Philosophy Journal · Poughkeepsie, NY · 2013

Patents, Grants, Reports, and Articles

- **Introspective Autonomous Vehicle Operational Management**

[Justin Svegliato](#), Kyle Wray, Stefan Witwicki, Shlomo Zilberstein

Primary Inventor · Patent · 2020

- **Adaptive Metareasoning in Bounded Rational Agents**

Shlomo Zilberstein, [Justin Svegliato](#) (*Shadow Wrote 1/2*)

National Science Foundation Grant on Robust Intelligence · \$450,000 · 2018

- **Travel Grant**

[Justin Svegliato](#)

International Joint Conference on Artificial Intelligence (IJCAI) · \$900 · 2018

- **Student Scholar Grant**

[Justin Svegliato](#)

50 Years of the ACM Turing Award Celebration · ACM Special Interest Group on Artificial Intelligence (SIGAI) · \$1,500 · 2017

- **Celebrating the Past, Present, and Future of Computing**

Timothy Lee*, [Justin Svegliato](#)*

AI Matters Article · 2017

- **Deep Jammer: A Music Generation Model**

[Justin Svegliato](#), Sam Witty

COMPSCI 697L: Deep Learning Report · 2016

Advising and Mentoring

2020 – Present

Allyson Beach

MS Student

[IROS-20 \(In Submission\)](#)

2019 – Present

Abhinav Bhatia

PhD Student

[SOCS-21, IJCAI-21 \(In Submission\)](#)

2019 – Present

Shane Parr

Undergraduate Student

[ICRA-20 Workshop, IROS-21 \(In Submission\)](#)

2019 – Present

Ishan Khatri

Undergraduate Student

[ICRA-20 Workshop, IROS-21 \(In Submission\)](#)

2019 – 2020

Connor Basich

PhD Student

[AAMAS-20, ECAI-21 Workshop, ICRA-21 \(In Submission\)](#)

2018 – 2019

Prakhar Sharma

MS Student

[ICRA-19](#)

Presentations and Invited Talks

- 2021 **Metareasoning for Efficient Planning and Reliable Execution in Autonomous Systems** · Dissertation Proposal
- 2021 **Ethically Compliant Sequential Decision Making** · AAAI
- 2020 **A Metareasoning Framework for Planning and Execution in Autonomous Systems** · ECAI Doctoral Consortium
- 2020 **An Integrated Approach to Moral Autonomous Systems** · ECAI
- 2020 **A Model-Free Approach to Meta-Level Control of Anytime Algorithms** · ICRA
- 2019 **Belief Space Metareasoning for Exception Recovery** · IROS
- 2018 **Belief Space Metareasoning for Exception Recovery** · Nissan Research Center
- 2018 **Meta-Level Control of Anytime Algorithms with Online Performance Prediction** · IJCAI
- 2018 **Adaptive Metareasoning for Bounded Rational Agents** · IJCAI Workshop on AEGAP
- 2018 **Belief Space Planning for Automated Malware Defense** · IJCAI Workshop on AI4IoT
- 2015 **Distributed Graph Snapshot Placement and Query Performance in a Data Center** · CSCI
- 2014 **The Inadequate Ontological Foundation of Libertarian Free Will** · Mid-Hudson Valley Philosophy Conference
- 2013 **OpenSR: An Open Source Stimulus-Response Framework** · Marist College Research Symposium

University Service

University of Massachusetts

Amherst, MA

- **Member** — New Student Committee August 2016 – Present
- **Member** — Social Committee August 2016 – Present
- **Lab Meeting Organizer** — Resource-Bounded Reasoning Lab August 2017 – July 2018 · October 2020 – Present
- **Mentor** — Incoming PhD Student Mentoring Program August [2020 · 2021]
- **Contributor** — Towards Data Science Medium Blog July 2017 – April 2020
- **Graduate Representative** — College of Information and Computer Sciences January 2019 – January 2020
- **Mentor** — Girls Inc. Eureka! Summer Workshop August [2017 · 2019]
- **Lab Poster Designer** — Resource-Bounded Reasoning Lab February [2017 · 2018]
- **Member** — Running Club February 2017 – October 2018
- **Senator** — Graduate Student Senate August 2017 – August 2018
- **Web Developer** — Emerging Technologies, Racial Equity, and the Future of Work Workshop April 2018
- **Mentor** — Women in Engineering Career Day October [2017 · 2018]
- **Steward** — Graduate Employment Office August 2016 – August 2017

Marist College

Poughkeepsie, NY

- **Member, Vice President** — Computer Society August 2010 – May 2014
- **Member** — Mathematics Club August 2010 – May 2014
- **Member** — Chess Club August 2013 – May 2014
- **Member** — Philosophy Reading Group August 2013 – May 2014
- **Host** — 4th Mid-Hudson Philosophy Conference May 2014
- **Presenter** — 3rd Mid-Hudson Philosophy Conference May 2013
- **Commentator** — 2nd Mid-Hudson Philosophy Conference May 2012
- **Member** — Habitat for Humanity August 2010 – May 2012
- **Peer Mentor** — Leo Hall Dormitory August 2010 – May 2012
- **Runner-Up** — Computer Society's 2nd Annual Hackathon September 2011

Professional Service

- **IROS Workshop on Ethical Robotic Systems (EBS)** — Main Organizer September 2021
- **Conference on Uncertainty in Artificial Intelligence (UAI)** — Program Committee March 2021
- **International Conference on Intelligent Robots and Systems (IROS)** — Reviewer February 2021
- **International Joint Conference on Artificial Intelligence (IJCAI)** — Program Committee January 2021
- **International Conference on Robotics and Automation (ICRA)** — Reviewer October 2020
- **AAAI Conference on Artificial Intelligence (AAAI)** — Program Committee September 2020
- **IEEE Transactions on Cybernetics** — Reviewer August 2019
- **IEEE Transactions on Cybernetics** — Reviewer March 2019

Memberships

- **Association for the Advancement of Artificial Intelligence (AAAI)** — Student Membership
- **Institute of Electrical and Electronics Engineers (IEEE)** — Student Membership
- **Association for Computing Machinery (ACM)** — Student Membership
- **Robotics and Automation Society (RAS) Technical Committee on Robot Ethics** — Student Membership

Technical Skills

Languages (Advanced)	Java, Python, JavaScript, SQL, HTML, CSS, bash
Languages (Competent)	C++, PHP, Visual Basic, Scratch, TypeScript
Languages (Basic)	Maple, Haskell, Fortran, Lisp, Scheme, Racket, Perl, z/OS Assembly, MATLAB, Prolog, R, PostgreSQL
Libraries	ROS, jQuery, React, Bootstrap, D3, Node, npm, Django, Theano, Keras, NumPy, SciPy, Scikit, MongoDB
IDEs	Eclipse, NetBeans, IntelliJ, PyCharm, CLion, Visual Studio Code, Sublime Text, Overleaf, TeXShop
Utilities	Git, Apache Subversion, Aqua Data Studio, Paint.NET, GIMP, Vim, Nano, Terminator, iTerm
Graphic Design	Blender, Astah Professional, Adobe Photoshop/ImageReady, Draw.io
Operating Systems	Windows, macOS, Linux (Ubuntu, Kubuntu, RHEL, Solaris, ...)
Licenses	Student Pilot License (Solo Endorsement), Amateur Extra Radio License (Call Sign: K3GR)
Certifications	NAUI Scuba Diver Certification, NAUI EANx Diver Certification, AHA First Aid/CPR/AED Certification
Foreign Languages	Spanish (Advanced Reading, Intermediate Writing, Intermediate Speaking, Beginner Listening)
Miscellaneous	Rubik's Cube, Guitar, Ukulele, Chess

References

Shlomo Zilberstein

PROFESSOR OF COMPUTER SCIENCE · ASSOCIATE DEAN OF RESEARCH AND ENGAGEMENT

University of Massachusetts Amherst

shlomo@cs.umass.edu

PhD Research Advisor

Joydeep Biswas

ASSISTANT PROFESSOR OF COMPUTER SCIENCE

University of Texas Austin

joydeepb@cs.utexas.edu

PhD Dissertation Committee