

Mark Edmonds

ARTIFICIAL INTELLIGENCE RESEARCHER · ROBOTICS RESEARCHER

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Education

University of Los Angeles, California

Ph.D. in Computer Science, Artificial Intelligence Concentration; Advisor: Prof. Song-Chun Zhu

Los Angeles, CA

September 2017 - Present

University of Los Angeles, California

M.S. in Computer Science; Thesis Advisor: Prof. Song-Chun Zhu

Los Angeles, CA

September 2015 - June 2017

University of Dayton

B.S. in Computer Engineering; Thesis Advisor: Prof. Tarek Taha

Dayton, OH

August 2011 - May 2015

Research Interests

Causality	Causal model induction through simulation and exploration
Reinforcement Learning	Transfer learning and domain adaptation
Robotics	Learning from demonstration and transfer learning

Journal Publications

- [1] **Mark Edmonds**, Tanvir Atahary, Scott Douglass, Tarek Taha TPDS 2018
Hardware Accelerated Semantic Declarative Memory Systems through CUDA and MapReduce

Conference Publications

- [6] **M. Edmonds***, J. Kubricht*, Colin Summers, Y. Zhu, B. Rothrock, S.C. Zhu, H. Lu CogSci 2018
Human Causal Transfer: Challenges for Deep Reinforcement Learning Oral Pres.
- [5] X. Xie*, H. Liu*, **M. Edmonds**, F. Gao, S. Qi, Y. Zhu, B. Rothrock, S.C. Zhu ICRA 2018
Unsupervised Learning of Hierarchical Models for Hand-Object Interactions
- [4] **M. Edmonds***, F. Gao*, X. Xie, H. Liu, S. Qi, Y. Zhu, B. Rothrock, & S.C. Zhu IROS 2017
Feeling the Force: Integrating Force and Pose for Fluent Discovery through Imitation Learning to Open Medicine Bottles Oral Pres.
- [3] H. Liu*, X. Xie*, M. Millar*, **M. Edmonds**, F. Gao, Y. Zhu, V. Santos, B. Rothrock, & S.C. Zhu IROS 2017
A Glove-based System for Studying Hand-Object Manipulation via Pose and Force Sensing Oral Pres.
- [2] **M. Edmonds**, T. Atahary, T. Taha, & S. Douglass SNPD 2015
High Performance Declarative Memory Systems through MapReduce
- [1] D. Prince, **M. Edmonds**, A. Sutter, M. Cusumano, W. Lu, & V. Asari NAECON 2015
Brain Machine Interface using Emotiv EPOC to control Robai Cyton Robotic Arm

(* indicates equal contribution)

Research

Causal Transfer Learning

Los Angeles, CA

Graduate Student Researcher; Center for Vision, Cognition, Learning, and Autonomy (VCLA)

Sept 2017 - Present

- Examining how causal knowledge can be incorporated into reinforcement learning to enable better knowledge transfer across task and environment domains.
- Studied how humans perform in causal transfer tasks and compared performance against state-of-the-art reinforcement learning algorithms.

Imitation Learning using Tactile Feedback

Graduate Student Researcher; Center for Vision, Cognition, Learning, and Autonomy (VCLA)

Los Angeles, CA

Sept 2015 – Sept 2017

- Transferred visually latent causal changes from a human demonstrator to a robot using a tactile glove and an And-Or graph through autoencoders and neural networks.
- The manipulation policy uses the And-Or graph to encode long-term temporal constraints and uses haptic feedback to incorporate real-time sensor data.
- Deployed robot localization on a ROS-based Baxter robot using SLAM (using RGB-D and LIDAR), wheel odometry, and IMU data, combined using Kalman filtering.

Declarative Memory Acceleration

Undergraduate Researcher; Air Force Research Lab (AFRL)

Dayton, OH

May 2014 – Sept 2015

- Accelerated the declarative memory module of AFRL's CECEP cognitive architecture (based on ACT-R).
- The research focused on leveraging the parallelization of CUDA, yielding a 100x speedup over the fastest existing implementation. Utilized CUDA, thread pools, ontology parsers, and IPC.

Experience

Santa Monica College

Adjunct Professor

Santa Monica, CA

June 2016 - Present

- CS 80, Internet Programming, a class focused on HTML, CSS, JavaScript, MySQL, and PHP.
- CS 50, Introduction to C Programming, a class focused on C fundamentals.
- CS 52, Introduction to C++ Programming, a class focused on C++ fundamentals.

Garmin International

Software Engineering Intern

Olathe, KS

May 2013 - August 2013

- Interned as a member of the Datalink team in the Aviation Department.
- Reduced verification testing time by 40%.

Cristo Rey Kansas City High School

Teacher and Tutor

Kansas City, MO

May 2011 - August 2012

- Pre-calculus and chemistry tutor and teacher at an inner city high school.

Skills

Programming Python, C/C++, Shell, LaTeX, Matlab, Javascript, HTML5, CSS, Node.JS, Java, CUDA

Topics Machine Learning, Graphical Models, Reinforcement Learning, Bayesian Networks, Statistical Modeling

Teaching Introduction to C, Introduction to C++, Internet Programming

Honors & Awards

2017 **NSF Doctoral Consortium**, IROS 2017

Vancouver, CA

2015 **The Anthony Horvath and Elmer Steger Award of Excellence**, University of Dayton

Dayton, OH

2014 **Eta Kappa Nu IEEE Honor Society**, Member

Dayton, OH

2014 **Tau Beta Pi Engineering Honor Society**, Member

Dayton, OH

2011 **Eagle Scout**, Boy Scouts of America

Kansas City, KS

Invited Talks

Causal Transfer: Challenges for Causal Learning and Reinforcement Learning

ONR MURI Meeting

White Mountain, NH

Sept 2018

Human Causal Transfer: Challenges for Deep Reinforcement Learning

CogSci Oral Presentation

Madison, WI

July 2018

Causal Imitation: The Necessity of Integrating Observations and Interventions

RSS Causal Imitation Workshop

Pittsburgh, PA

June 2018

Feeling the Force: Integrating Force and Pose for Imitation Learning

CoRL Lightning Talk

Mountain View, CA

November 2017

