Mark **Edmonds**

Artifical Intelligence Researcher · Robotics Researcher

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Education

University of California, Los Angeles — *Los Angeles, CA*

Ph.D. in Computer Science, Artifical Intelligence Concentration; Advisor: Prof. Song-Chun Zhu — *September 2017 - Present*

University of California, Los Angeles — *Los Angeles, CA*

M.S. in Computer Science; Thesis Advisor: Prof. Song-Chun Zhu — *September 2015 - June 2017*

University of Dayton — *Dayton, OH*

B.S. in Computer Engineering; Magna Cum Laude; Thesis Advisor: Prof. Tarek Taha — *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

Los Angeles, CA

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

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

Dayton, OH

Undergraduate Researcher; Air Force Research Lab (AFRL)

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

Santa Monica, CA

Adjunct Professor

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

Olathe, KS

Software Engineering Intern

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

Kansas City, MO

Teacher and Tutor

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

White Mountain, NH

ONR MURI Meeting

Sept 2018

Human Causal Transfer: Challenges for Deep Reinforcement Learning

Madison, WI

CogSci Oral Presentation

July 2018

Causal Imitation: The Necessity of Integrating Observations and Interventions

Pittsburgh, PA

RSS Causal Imitation Workshop

June 2018

Feeling the Force: Integrating Force and Pose for Imitation Learning *Mountain View, CA*

CoRL Lightning Talk *November 2017*

Feeling the Force: Integrating Force and Pose for Imitation Learning *Los Angeles, CA*

ONR MURI Meeting *August 2017*