Mark **Edmonds**

ARTIFICAL INTELLIGENCE RESEARCHER · ROBOTICS RESEARCHER

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Education

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

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

University of Los Angeles, California   *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; 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   **Oral Pres.**
     Bottles

[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
ONR MURI Meeting

Feeling the Force: Integrating Force and Pose for Imitation Learning
ONR MURI Meeting