

## Education

### University of California, Los Angeles

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

Los Angeles, CA

Sep 2017 - Present

### University of California, Los Angeles

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

Los Angeles, CA

Sep 2015 - Jun 2017

### University of Dayton

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

Dayton, OH

Aug 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  
“Hardware Accelerated Semantic Declarative Memory Systems through CUDA and MapReduce,” *TPDS 2018*

## Conference Publications

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

(\* indicates equal contribution)

## Research

### Causal Transfer Learning

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

Los Angeles, CA

Sep 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

Sep 2015 – Sep 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 combining SLAM (using RGB-D and LIDAR), wheel odometry, and IMU data through Kalman filtering.

## Declarative Memory Acceleration

Undergraduate Researcher; Air Force Research Lab (AFRL)

Dayton, OH

May 2014 – Sep 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

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### Santa Monica College

Adjunct Professor, Computer Science Department

Santa Monica, CA

Jun 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, Aviation Department

Olathe, KS

May 2013 - Aug 2013

- Reduced testing time by 40% for the Datalink team, saving hundreds of vendor-certification testing time hours.

### Cristo Rey Kansas City High School

Teacher and Tutor

Kansas City, MO

May 2011 - Aug 2012

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

## Skills

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**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

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2017	<b>NSF Doctoral Consortium</b> , IROS 2017	Vancouver, CA
2015	<b>The Anthony Horvath and Elmer Steger Award of Excellence</b> , University of Dayton	Dayton, OH
2014	<b>Eta Kappa Nu IEEE Honor Society</b> , Member	Dayton, OH
2014	<b>Tau Beta Pi Engineering Honor Society</b> , Member	Dayton, OH
2011	<b>Eagle Scout</b> , Boy Scouts of America	Kansas City, KS

## Invited Talks

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### Causal Transfer: Challenges for Causal Learning and Reinforcement Learning

ONR MURI Meeting

White Mountain, NH

Sep 2018

### Human Causal Transfer: Challenges for Deep Reinforcement Learning

CogSci Oral Presentation

Madison, WI

Jul 2018

### Causal Imitation: The Necessity of Integrating Observations and Interventions

RSS Causal Imitation Workshop

Pittsburgh, PA

Jun 2018

### Feeling the Force: Integrating Force and Pose for Imitation Learning

CoRL Lightning Talk

Mountain View, CA

Nov 2017

### Feeling the Force: Integrating Force and Pose for Imitation Learning

ONR MURI Meeting

Los Angeles, CA

Aug 2017