253-282-3029 cmbirmingham19@gmail.com

Christopher Birmingham Curriculum Vitae

Education

University of Southern California, Los Angeles, California
Computer Science, PhD August 2018 - Present
- Concentrating on Social Robotics in Dr. Maja Mataric's Interaction Lab

University of Bristol, Bristol, United Kingdom
Robots and Autonomous Systems, MRes May 2018
- GPA 3.95
- Research Thesis - *Visual Relocalization with RGB-D SLAM and Convolutional Neural Networks*

Gonzaga University, Spokane, Washington
Bachelor of Science, Honors, in Electrical Engineering, Computer Science Minor May 2015
- Cumulative GPA: 3.85, Magna Cum Laude
- GU Honors Program Fall 2011-Spring 2015
  - A separate humanities curriculum culminating in an undergraduate thesis

Awards
- 2015 - Marshall Scholarship - *Started at University of Bristol 2016*
- 2015 - School of Engineering and Applied Science Excellence Award - *Gonzaga*
- 2015 - NSF GRFP Honorable Mention

Relevant Coursework
- (Graduate) Computational Human-Robot Interaction; Learning in Autonomous Systems; Bio Inspired AI; Image Processing and Computer Vision; Robotics Systems; Robotic Fundamentals, Robotics Research Preparation
- (Undergraduate) - UComp Arch & Assembly; Python; C++; Electronics Design; Algorithms & Data Structures; Communication Systems; Parallel & Cloud Comp; AI; Computer Architecture

Research Experience

University of Southern California, Los Angeles CA August 2018-Present
Robotics Masters Student
- Developed and supported hardware for the NSF Expeditions grant, in which tutoring robots are deployed to the homes of children with ASD

University of Bristol, Bristol UK September 2016-February 2018
Robotics Masters Student
- Explored user experience introducing assistive robots to the home with Dr. Caleb-Solly
- Combined deep learning depth estimation and RGBD SLAM algorithms for relocalization with Dr. Andrew Calway
- Developed master's thesis and presented poster at Bristol Robotics Lab Research Symposium.

Gonzaga Honors Program, Spokane WA August 2014-May 2015
Undergraduate Researcher
- Analyzed the history of AI algorithm development and contrasted it with human psychological development stages
- Presented work to the Spokane community and written work is available in Gonzaga's library

Georgia Tech SURE REU, Atlanta, GA May 2014-August 2014
Undergraduate Research Assistant
- Designed and implemented a food delivery system using the PR2 robot with Dr. Charlie Kemp
- Wrote up and presented work for Georgia Tech faculty panel

Gonzaga University CS Department, Spokane WA September 2013- May 2014
Undergraduate Research Assistant
- Natural Language Processing
- Presented results at Spokane Intercollegiate Research Conference

Work Experience

Slyce, Philadelphia PA January 2018-August 2018
Team Leader
- Developed scalable algorithms for accurate single shot image recognition
- Managed a team of researchers

Anzu Partners, Washington DC January 2016-August 2016; January 2018-Present
Associate

- Researched prospective investments, focused on companies related to robotics
- Assisted in technical project support for investment portfolio, including starting an intern program and automating elements of the manufacturing line for a photonics startup
- Currently working as an integrations engineer with a visual search company

Gonzaga Department of Engineering, Spokane WA August 2013-May 2015
Grading Assistant

- Graded papers for Circuits I and II

Boeing Commercial Airplanes, Tukwila WA June 2013-August 2013
Factory Controls Engineering Intern

- Developed CATIA/DELMIA manufacturing CAD models & Learned Kuka Robot Language

Other Experience

European Robotics League - Service Robots Competition, Bristol UK May 2017-Present
Team Member

- Developing service robot capabilities for the elderly and disabled populations on the PR2 Robot. Our team competed in the Barcelona and Edinburgh regional events.

University of Bristol Amazon Robotics Challenge, Bristol UK January 2017-May 2017
Team Leader

- Led a team of graduate students to complete the Amazon Robotics Challenge, picking a list of items off a shelf and placing them in a bin.

Robotics Club, Spokane WA Spring 2013- Spring 2015
Founding Member and President

- Developing robotic hand, quadcopter and other devices using 3D printing and Arduinos

Gonzaga IEEE Chapter, Spokane WA Fall 2013- Spring 2015
Vice President

- Organizing, leading meetings, inviting speakers and development of a Micromouse team

Relevant Skills

Programming

- Python, C++, C, Matlab, Tensorflow, CSS, ROS, Assembly, Git
- Experienced working with the Willow Garage PR2, PAL TIAGO, and Universal Robots UR10

Technical Skills

- Soldering, Eagle PCB design, Rapid Prototyping and Design

Papers and Presentations

Visual Relocalization with RGB-D SLAM and Convolutional Neural Networks - 2017

- Master's level thesis I wrote during the first year of University of Bristol Robotics Ph.D. Poster presented at Bristol Robotics Laboratory Research Symposium.
- I combined a CNN capable of producing pixel-wise depth estimations for single RGB images with a RGB-D SLAM algorithm and tested the accuracy of the system for the task of relocalizing new RGB images in a 3D model. The results were below the state of the art monocular relocalization due to the high error in the depth estimation CNN, particularly around features used by the RGB-D SLAM algorithm.

Human Cognition vs AI: A Developmental Comparison and the Moral Implications - 2015

- Undergraduate Thesis, on display in the Gonzaga Library. Presented to the Gonzaga and Spokane community.
- I studied the history and trends of AI research and development and correlated those patterns with human development from infancy to young adulthood. I concluded that the development of AI, with definite exceptions, is inversely correlated with human development, starting with high level reasoning tasks and logical proofs and now working backwards to learning models similar to those of infants.

Creating Common Sense: Feeding Yogurt Using the PR2 with Multi-Modal Anomaly Detection – 2014

- Research Experience for Undergraduates at Georgia Tech, paper and presentation.

- Along with two other undergraduates I developed an anomaly detection system for the PR2 robot while it was feeding yogurt to a person. It detected errors and dangerous conditions with a high true positive rate, but the small but significant false positive rate led to a decrease in efficiency, suggesting a tradeoff between safety and efficiency.

Grammatical and Semantic Coherence as Related to N-Gram Size in the Brown Corpus – 2013

- Poster presented at the Spokane Intercollegiate Research Conference
- I developed a statistical model of the English language using Claude Shannon's technique for estimating the entropy and redundancy of a language and the Brown Corpus. We generated random sentences and had English speakers rate the sentences for grammatical and semantic coherence on a Likert scale. We found the coherence correlated with n-gram size of the statistical model, suggesting that there is a valid statistical element to the English language.