NATHANIEL STEELE DENNLER

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EDUCATION

Ph.D. in Computer Science 2019 - Present
University of Southern California (USC)
Advisors: Maja Matarić and Stefanos Nikolaidis

B.S. in Computer Science and Robotics Engineering, GPA: 3.96/4.00 May 2019
Worcester Polytechnic Institute (WPI)
Advisors: Charles Rich, Loris Fichera, and Cagdas Onal

RESEARCH EXPERIENCE

MIT Lincoln Labs August 2018 - November 2018
Major Qualifying Project *Lexington, MA*

Optimized a novel optical tactile sensor for use in robotic grasping and manipulation applications at a government research laboratory. Reduced Manufacturing time from 3 days to 6 hours and used this sensor to perform fine manipulation tasks. Successfully detected location and orientation of a USB-like object in the robot's hand and detect if slipping was occurring while the object was inserted into a port.

Interaction Lab (University of Southern California) May 2018 - August 2018
Summer Research Assistant *Los Angeles, CA*

Developed reward behaviors and expression control for a screen-based socially assistive robotic face to be used in a study on healthy habit formation in the aging population. The same framework is also used in a longitudinal study on social cues for children with autism spectrum disorder. Designed and performed within-subject experiments to validate and evaluate reward behaviors.

ASSISTments Lab (Worcester Polytechnic Institute) August 2017 - May 2018
Interactive Qualifying Project *Worcester, MA*

Designed and developed 8 large-scale randomized controlled trials to determine the efficacy of different teaching methods in middle-school math students using self-determination theory. ANOVA analyses and other robust metrics determined the significance of different teaching methodologies.

TEACHING EXPERIENCE

Unified Robotics IV August 2018 - May 2019
Teaching Assistant *WPI*

Helped teach during lab assignments and grade homework. Aided students in understanding path planning algorithms such as A*, probabilistic pose estimation, and simultaneous localization and mapping.

Unified Robotics III August 2018 - May 2019
Teaching Assistant *WPI*

Helped teach in lab assignments and grade homework. Assisted students in understanding arm kinematics and dynamics. Explained forward, inverse, and velocity control as well as force sensing from joint torques. Introduced students to basic concepts of computer vision.

FIRST Global Challenge November 2016 - July 2017
Team Jordan Mentor *WPI*

Mentored an all-girl robotics team from Jordan on robotics concepts. Assisted in their entry into the 2017 FIRST Global competition hosted in Washington, D.C.

WORK EXPERIENCE

iRobot, inc. May 2019 - August 2019
Navigation Systems Intern *Bedford, MA*

Developed navigation systems to dictate the behavior of robots performing day-to-day tasks in home environments.

WPI Information Technology March 2017 - May 2018
Service Desk Specialist *WPI*

Triaged and advised students and faculty on computer related incidents. Performed software upgrades and troubleshooting, as well as administrative operations.

QuikOrder May 2017 - August 2017
Quality Assurance Intern *Frisco, TX*

Worked under CTO to assure that company products performed to expectations. Developed deeper understanding of large-scale software development through customer and corporate requests, database management, front-end applications, and the importance of inter-corporate communication.

PROJECT WORK

Unified Robotics IV: Turtlebot Simultaneous Localization and Mapping, WPI April 2018

Implemented nodes in ROS to enable navigation and mapping of an unknown environment. A* search was used to plan an optimal path to different way points. Configured robot to dynamically avoid obstacles and update the map in real time.

Unified Robotics III: 3 DoF Robotic Arm, WPI March 2018

Developed a control system for a three degree of freedom robotic arm using MATLAB. The arm used computer vision to identify colored masses, and used motor torques combined with the arms Jacobian matrix to determine the masss weight. Sorted multiple masses as well as dynamically tracked masses that moved during operation.

Operating Systems: Z502 Operating System, WPI October 2017

Applied concepts from class to create an Operating System for the simulated z502 architecture. Coded in C, this operating system employs process scheduling, file system organization, and multiprocessor capabilities.

Computer Animation: Cloth Modelling, WPI April 2017

Using Unity and coding in C#, developed a system to render a realistic cloth model through a grid of point masses connected by spring-damper systems. Approximated second degree differential equations with Euler integration.

Unified Robotics II: Raider of the Lost Flame, WPI April 2017

Designed and built a robot from scratch. The purpose of this robot was to autonomously navigate an unknown maze to find a candle flame. The robot utilized odometry to locate the x,y, and z location of the flame, and extinguish it. Developed several mechanical, electrical, and programmatic subsystems and coordinated these systems to work together.

Unified Robotics I: Alphie, WPI February 2017

Designed and built a robot to autonomously move cylindrical rods from a vertical position to a horizontal position using four-bar linkages. Manufactured the robot from laser-cut wood and 3D-printed parts.

Artificial Intelligence: Rhea, WPI February 2017

On a team of four, interfaced with Facebooks reaction data to train several different machine leaning models in python to predict emotional reactions to any given input. Investigated different feature extraction methods and analyzed relative effectiveness of models using 5-fold cross validation.

Software Engineering: Kabasuji, WPI April 2016

Collaboratively developed a java-based puzzle game similar to a tangram on a team of five using the entity-boundary-controller paradigm. Supported movement of game pieces, a level builder, and three unique styles of play.

PUBLICATIONS

1. Dennler, N. S. (2018). Implications of Self-Determination Theory on Student Performance (Undergraduate Interactive Qualifying Project No. E-project-052518-150127). Retrieved from Worcester Polytechnic Institute Electronic Projects Collection: http://www.wpi.edu/Pubs/E-project/Available/E-project-052518-150127

PRESENTATIONS

1. "Mobile Manipulation through Tactile Sensing," presented at MIT Lincoln Labs in Lexington, MA, October 2018
2. "Expression Salience of Socially Assistive Robotics," presented at the Southern California REU Conference at the Institute for Creative Technologies in Los Angeles, CA, July 2018

LEADERSHIP

Alpha Phi Omega (National Service Fraternity), WPI October 2016 - May 2019

Merit Badge University Director *April 2018 - May 2019*

Organized a committee to plan an event to host 300 boy scouts in a two-day conference at the WPI campus. The boy scouts attended a series of classes that helps them learn skills pertaining to science, technology, engineering, art, and mathematics.

Service Vice President *January 2018 - April 2018*

Planned over a record high of 3180 man-hours of community service to benefit the campus, community, and nation over the course of a semester. This was the largest number in the chapter's history (formed in 1964). Examples of services include: aiding in disaster relief, promoting STEM careers in underrepresented students, assisting in elderly care, and raising funds for cancer research.

Fellowship Vice President *August 2017 - January 2018*

Organized fun events to promote bonding among members of the service fraternity. We used these opportunities to promote the fraternity to new members, enabling us to more effectively serve the community.

Cheese Club, WPI January 2017 - May 2019

Public Relations *September 2017 - May 2019*

Successfully promoted cheese club to the student body, growing the number of members from around 40 people to over 100 people. Helped deliver presentations on cheese history and relevant cheese pairings.

Rho Beta Epsilon (Robotics Engineering Honors Society), WPI January 2017 - May 2019

Vice President *January 2018 - May 2019*

Organize end-of-term events to assist younger students in final projects. Created resources to help students prepare for graduate school in robotics including: planners, presentations on graduate school, lists of faculty and research areas, and project ideas.

Cyber Security Club, WPI February 2018 - May 2019

Treasurer *August 2018 - May 2019*

Managed funds and helped organize capture-the-flag style coding challenges. Presented to treasury councils to secure funding for campus-wide events.

PROFESSIONAL SOCIETIES

Upsilon Pi Epsilon (Computer Science), WPI

Tau Beta Pi (Engineering), WPI

Rho Beta Epsilon (Robotics Engineering), WPI

Association for Computing Machinery, WPI

SKILLS

Programming Languages: Python, C/C++, Java, MATLAB, JavaScript, C#, MUMPS, R, and Bash

Software: ROS, Gazebo, Rviz, Linux/Unix Systems, Git, LaTeX, Autodesk Maya, ZBrush, SolidWorks, and SPSS

Manufacturing: 3D printing, Laser Cutting, Silicone Casting, Sewing, and Soldering

Miscellaneous: Pairs Figure Skating, 3D Animation, Flute, Violin, and Running

AWARDS

Salisbury Award Recipient, Worcester Polytechnic Institute, April 2019

NSF Graduate Research Fellow, National Science Foundation, April 2019

Program of the Year (Merit Badge University), WPI, April 2019

Distinguished Service Key (Alpha Phi Omega), WPI, April 2019

USC Annenberg Fellow, University of Southern California, February 2019

U.S. Novice Challenge Skate Pairs Champion, USFSA, October 2017

Charles O. Thompson Scholar Award Recipient, WPI, March 2016

AP Scholar with Distinction, College Board, July 2014 - July 2015

National Chemistry Olympiad Semi-Finalist, USNCO, April 2015

U.S. National Silver Medalist in Intermediate Pairs Figure Skating, USFSA, January 2015

French Consulate Acadian Song Contest Winner, Lunenburg High School, March 2014