Anthony J. Clark

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Computer Science
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Education

Aug 2016 **Ph.D. in Computer Science**
Department of Computer Science and Engineering, Michigan State University
East Lansing, MI, USA
Dissertation: Automatically Addressing Uncertainty Autonomous Robots with Computational Evolution
Advisor: Philip K. McKinley

Dec 2009 **B.S. in Computer Engineering**
Department of Electrical and Computer Engineering, Kansas State University
Manhattan, KS, USA
Graduated *magna cum laude*

Professional Experience

Aug 2016 to present **Assistant Professor of Computer Science**
Department of Computer Science, Missouri State University
Springfield, MO, USA

Jan to Apr 2016 **Computer Science Teaching Assistant**
Department of Computer Science and Engineering, Michigan State University
East Lansing, MI, USA
Responsibilities: Administered two weekly lab sections of “Introduction to Programming II” (CSE232), each with 23 students. My tasks included: covering lecture and lab material at the beginning of each session, creating projects, grading course projects (11 total projects), and answering questions during weekly helproom sessions.

May to Jun 2015 **Computer Science Instructor**
Department of Computer Science and Engineering, Michigan State University
East Lansing, MI, USA
Responsibilities: Organized and taught “Introduction to Programming II” (CSE232) during the summer session. My tasks included: developing/presenting lectures covering introductory programming techniques using the C++ language, developing a series of course projects, mentoring and coordinating the efforts of three teaching assistants, and modifying/expanding weekly laboratory assignments.

May 2010 to Jul 2016 **Graduate Fellow and Research Assistant**
Department of Computer Science and Engineering, Michigan State University
East Lansing, MI, USA
Software Engineering and Network Systems Laboratory
Research: Addresses adaptive control, self-modeling, and self-healing in autonomous robotic systems. A primary focus of this work is to apply evolutionary algorithms to the design and control of 3D-printed robots containing flexible components. This interdisciplinary research has benefited from the research environment at BEACON, an NSF Science and Technology Center headquartered at MSU. BEACON fosters collaboration among biologists, computer scientists, and engineers to study evolution of natural systems as well as how this process can be harnessed to solve complex problems in engineered systems.

May to Nov 2009 **Undergraduate Research Assistant**
Department of Electrical and Computer Engineering, Kansas State University
Manhattan, KS, USA
Autonomous Vehicle Systems Laboratory
Responsibilities: Designed software used to capture images at specified GPS locations with an autonomous aerial vehicle.

Aug 2008 to Apr 2009 **Undergraduate Research Assistant**
Department of Electrical and Computer Engineering, Kansas State University
Manhattan, KS, USA
Independent Research with Professor Stewart E. Stanton
Research: Investigated the fundamentals of convergence of complex solutions in power systems.

May to Jul 2008 **Software Engineer, Intern**
Garmin International
Olathe, KS, USA
Department of Positioning and Sensors
Responsibilities: Solved problems associated with positioning error due to antenna performance.

May to Jun 2007 **Undergraduate Research Fellow**
Department of Computer Science, University of Illinois at Urbana-Champaign
Urbana-Champaign, IL, USA
Multimodal Information Access & Synthesis : Data Science Summer Institute
Responsibilities: Attended lectures covering the fundamentals of Data Sciences and contributed to an image processing project.

Aug 2007 to Apr 2009 **SAS Tutor**
Scholars Assisting Scholars Program, Kansas State University
Manhattan, KS, USA
SAS is a campus-wide, free tutoring program designed for core science courses.
Responsibilities: Attended lectures on the subject I was tutoring, provided tutoring consistent with course instruction, and led review sessions prior to exams.

Awards, Honors, and Certificates

Apr 2018 **Faculty Excellence in Teaching**
College of Natural and Applied Sciences
Missouri State University

Aug 2017 **Master Advisor**
Missouri State University

Jan 2017 **Cultural Consciousness in the Classroom: Certificate of Participation**
Missouri State University

May 2016 **Outstanding Graduate Student Service Award**
Michigan State University Department of Computer Science

Sep 2013 **Best Paper Award: Workshop on Evolutionary and Reinforcement Learning for Autonomous Robot Systems**
Matthew J. Rose, Anthony J. Clark, Jared M. Moore, and Philip K. McKinley. Just Keep Swimming: Accounting for Uncertainty in Self-Modeling Aquatic Robots. In Proceedings of the 6th International Workshop on Evolutionary and Reinforcement Learning for Autonomous Robot Systems, Taormina, Italy, September 2013.

Jul 2012 **Best Paper Award: ALIFE-13, Behavior and Intelligence Track**
Anthony J. Clark, Jared Moore, Jianxun Wang, Xiaobo Tan, and Philip McKinley. Evolutionary design and experimental validation of a flexible caudal fin for robotic fish. In Proceedings of the Thirteenth International Conference on the Synthesis and Simulation of Living Systems, East Lansing, Michigan, USA, pages 325-332, July 2012.

Dec 2011 **Honorable Mention: Graduate Research Fellowship Program**
National Science Foundation

Aug 2010 **Top Up Graduate Fellowship**
NSF BEACON Center for the Study of Evolution in Action

Aug 2010 **University Enrichment Fellowship**
Michigan State University

Dec 2009 **Graduated *magna cum laude***
Kansas State University

Publications

Jul 2018 **Review: A Web-Based Simulation Viewer for Sharing Evolutionary Robotics Results**
Clark, Anthony J. and Moore, Jared M.
In *Proceedings of the 2018 ACM Genetic and Evolutionary Computation Conference Companion*, Kyoto, Japan, July 2018. DOI: https://doi.org/10.1145/3205651.3208292

Jul 2018 **Evo-ROS: Integrating Evolution and the Robot Operating System**
Simon, Glen A., Moore, Jared M., Clark, Anthony J., and McKinley, Philip K.
In *Proceedings of the 2018 ACM Genetic and Evolutionary Computation Conference Companion*, Kyoto, Japan, July 2018.

Jul 2018 **Bend and Flex: Passive Flexibility or Active Control in a Quadruped Animat**
Moore, Jared M. and Clark, Anthony J.
In *Proceedings of the 2018 ACM Genetic and Evolutionary Computation Conference Companion*, Kyoto, Japan, July 2018. DOI: https://doi.org/10.1145/3205651.3205703

Dec 2017 **Evolving Adabot: A Mobile Robot with Adjustable Wheel Extensions**
Clark, Anthony J.
In *Proceedings of the IEEE Symposium on Robotic Intelligence in Informationally Structured Space (IEEE RiiSS'17)*, Honolulu, Hawaii, USA, pages 1-8, December 2017.
DOI: 10.1109/SSCI.2017.8280979

Jul 2017 **Effect of Animat Complexity on the Evolution of Hierarchical Control**
Moore, Jared M., Clark, Anthony J., and McKinley, Philip K.
In *Proceedings of the 2017 ACM Genetic and Evolutionary Computation Conference*, Berlin, Germany, July 2017. DOI: https://doi.org/10.1145/3071178.3071246

Dec 2016 **An Evolutionary Approach to Discovering Execution Mode Boundaries for Adaptive Controllers**
Clark, Anthony J., Devries, Byron, Moore, Jared M., Cheng, Betty H. C., and McKinley, Philip K.
In *Proceedings of the IEEE International Conference on Evolvable Systems, held in conjunction with the 2016 IEEE Symposium on Computational Intelligence (SSCI)*, Athens, Greece, pages 1-8, December 2016. DOI: https://doi.org/10.1109/SSCI.2016.7850178

Nov 2015 **Evolutionary Multiobjective Design of a Flexible Caudal Fin for Robotic Fish**
Clark, Anthony J., Tan, Xiaobo, and McKinley, Philip K.
In *Bioinspiration & Biomimetics, Special Issue on Bioinspired Soft Robotics*, November 2015. DOI: https://doi.org/10.1088/1748-3190/10/6/065006

Jul 2015 **Enhancing a Model-Free Adaptive Controller through Evolutionary Computation**
Clark, Anthony J., McKinley, Philip K., and Tan, Xiaobo
In *Proceedings of the 2015 ACM Genetic and Evolutionary Computation Conference Companion*, Madrid, Spain, pages 137-144, July 2015. DOI: https://doi.org/10.1145/2739480.2754762

Dec 2014 **Balancing Performance and Efficiency in a Robotic Fish with Evolutionary Multiobjective Optimization**
Clark, Anthony J., Wang, Jianxun, Tan, Xiaobo, and McKinley, Philip K.
In *Proceedings of the IEEE International Conference on Evolvable Systems, held in conjunction with the 2014 IEEE Symposium on Computational Intelligence (SSCI)*, Orlando, Florida, USA, pages 227-234, December 2014. DOI: https://doi.org/10.1109/ICES.2014.7008744

Jul 2014 **Hold the Spot: Evolution of Generalized Station Keeping for an Aquatic Robot**
Moore, Jared M. and Clark, Anthony J.
In *Proceedings of the Fourteenth International Conference on the Synthesis and Simulation of Living Systems (ALIFE 14)*, New York, New York, USA, pages 200-201, July 2014. DOI: http://dx.doi.org/10.7551/978-0-262-32621-6-ch033

Jul 2014 **Evolutionary Robotics on the Web with WebGL and Javascript**
Moore, Jared M., Clark, Anthony J., and McKinley, Philip K.
In *Proceedings of the Workshop on Artificial Life and the Web 2014, held in conjunction with the Fourteenth International Conference on the Synthesis and Simulation of Living Systems (ALIFE 14)*, New York, New York, USA, July 2014.

Jul 2014 **On-Board Evolution of a Model-Free Adaptive Controller for a Robotic Fish**
Clark, Anthony J., McKinley, Philip K., and Tan, Xiaobo
In *Proceedings of Evolution of Physical Systems Workshop, held in conjunction with the Fourteenth International Conference on the Synthesis and Simulation of Living Systems (ALIFE 14)*, New York, New York, USA, July 2014.

Sep 2013 **Just Keep Swimming: Accounting for Uncertainty in Self-Modeling Aquatic Robots**
Rose, Matthew J., Clark, Anthony J., Moore, Jared M., and McKinley, Philip K.
In *Proceedings of the 6th International Workshop on Evolutionary and Reinforcement Learning for Autonomous Robot Systems*, Taormina, Italy, September 2013.

Jul 2013 **Evolution of Station Keeping as a Response to Flows in an Aquatic Robot**
Moore, Jared M., Clark, Anthony J., and McKinley, Philip K.
In *Proceedings of the 2013 ACM Genetic and Evolutionary Computation Conference*, Amsterdam, The Netherlands, pages 239-246, July 2013. DOI: https://doi.org/10.1145/2463372.2463402

Jul 2013 **Evolutionary Optimization of Robotic Fish Control and Morphology**
Clark, Anthony J. and McKinley, Philip K.
In *Proceedings of the 2013 ACM Genetic and Evolutionary Computation Conference Companion*, New York, NY, USA, pages 21-22, July 2013. DOI: https://doi.org/10.1145/2464576.2464593

Jul 2012 **Evolutionary Design and Experimental Validation of a Flexible Caudal Fin for Robotic Fish**
Clark, Anthony J., Moore, Jared M., Wang, Jianxun, Tan, Xiaobo, and McKinley, Philip K.
In *Proceedings of the Thirteenth International Conference on the Synthesis and Simulation of Living Systems (ALIFE 13)*, East Lansing, Michigan, USA, pages 325-332, July 2012.
DOI: http://dx.doi.org/10.7551/978-0-262-31050-5-ch043

University Service

Apr 2018 to present **STEMentors Program Advisor**
Responsibilities: Advise the new outreach program, which is directed at providing mentoring for local lower-income schools.

Nov 2017 to present **Robotics Club Advisor**
Responsibilities: Given strong student demand, I (and one of our EE faculty) initiated Missouri State University's first robotics club.

Aug 2017 to present **ACM Chapter Advisor**
Responsibilities: Coordinate ACM study chapter activities, include: scheduling speakers, organizing off-campus activities (e.g., competitions), and recruit volunteers to help at departmental events.

Aug 2017 to present **CSC Representative, CNAS College Council (elected)**
Responsibilities: Act upon curricular matters that are referred to it by departments within the college. The College Council approves departmental proposals, rejects and returns proposals to the originating department, or amends and approves proposals.

Aug 2016 to present **CSC Representative, CNAS Diversity Committee**
Responsibilities: Represent my department at the college level diversity committee. A primary goal for the members of this committee is to improve the retention of students that are considered at risk for either dropping out or transferring. We improve retention through a variety of activities: poster sessions, scholarships, and picnics.

Aug 2016 to present **CSC Representative, CNAS Student Recruitment Committee**
Responsibilities: Attend recruitment events on the behalf of the college, and make recommendations to the dean regarding recruitment procedures.

Aug 2014 **Coordinator, Computer Science and Engineering Graduate Association (elected)**
Responsibilities: Coordinated monthly meetings for graduate students in the Department of Computer Science and Engineering, facilitated communication of Department news and policies, and organized graduate student service opportunities.

Aug 2014 **Graduate Representative, Computer Science and Engineering Graduate Studies and Research Committee (elected)**
Responsibilities: Act as a voting member of the GSRC, which establishes academic standards, coordinates graduate course offerings, determines admission standards and policies for financial awards, and evaluates Ph.D. qualifier examinations.

Aug 2013 **Graduate Representative, Computer Science and Engineering Departmental Meetings (elected)**
Responsibilities: Act as a voting member at CSE department meetings.

Professional Activities

Apr 2018 **Program Committee Member, EvoROBOT Track at the Evostar 2018 Conference**
Responsibilities: Review and rank submitted papers.
Parma, Italy, April 2018

Sep 2017 **Abstract/Poster, Evo-ROS: Integrating Evolutionary Robotics and ROS**
Moore, Jared M., Clark, Anthony J., Simon, Glen, McKinley, Philip K.
In *2017 IEEE/RSJ International Conference on Intelligent Robots and Systems*
Vancouver, BC, Canada, September, 2017

Jul 2017 **Organizer, SimER: Simulation in Evolutionary Robotics Workshop held at the 2017 Genetic and Evolutionary Computation Conference**
Responsibilities: Co-organize a workshop that brought together experts from around the world to discuss the topic of simulation; specifically how we can improve the current state of simulation in ER.
Berlin, Germany, July 2017

Mar 2017 **Reviewer, IEEE Transactions on Systems, Man and Cybernetics: Systems**

Apr 2016 **Reviewer, IEEE Transactions on Systems, Man and Cybernetics: Systems**

Dec 2014 **Reviewer, IEEE Transactions on Robotics**

Dec 2013 **Reviewer, 2014 IEEE Symposium Series on Computational Intelligence**
Orlando, Florida, USA, December 2014

Dec 2013 **Reviewer, Eighth IEEE International Conference on Self-Adaptive and Self-Organizing Systems**
London, UK, September 2014

Sep 2013 **Invited Conference Talk: Evolving Aquatic Robots**
The Twelfth European Conference on Artificial Life (ECAL), International Evolution of Physical Systems Workshop (EPS)
Taormina, Italy, September 2013

Dec 2012 **Reviewer, Seventh IEEE International Conference on Self-Adaptive and Self-Organizing Systems**
Philadelphia, Pennsylvania, USA, September 2013

Advising, Mentoring, and Outreach

Aug 2016 to present **Advising Undergraduate Researchers**
Responsibilities: I typically coordinate and advise three to six undergraduate students from different departments every semester. Their projects are related to my robotics research to varying degrees.

Mar to Jun 2015 **Mentor, Visiting Scholar Program**
Department of Computer Science and Engineering, Michigan State University
Responsibilities: Co-mentored Mr. René Draschwandtner, a visiting Master's student from the University of Applied Sciences in Austria. I worked with Mr. Draschwandtner, Dr. Jared Moore, and Dr. Philip McKinley to study locomotion and grasping behaviors for a snake-like robot using methods from evolutionary robotics.

Jul 2015 **Instructor, Introduction to Robotics Engineering Program**
Introduction to Evolutionary Robotics, Michigan State University
Responsibilities: Presented my research and an explanation of evolutionary robotics to 22 high school students. I introduced a web-based evolutionary robotics simulation platform (BoxCar2D) to the students and in a hands-on laboratory session helped them answer several questions regarding the evolutionary robotics process.

Aug 2014 **Co-Organizer of Sandbox Session, Evolution-In-Action Software and the Web**
BEACON Congress, Michigan State University
Responsibilities: Organized an open discussion regarding the application of state-of-the-art web technologies to evolutionary research and outreach projects.

Jul 2014 **Instructor, College of Engineering High School Summer Program**
Introduction to Robotics Engineering, Michigan State University
Responsibilities: Introduced evolutionary robotics to approximately 20 high school students in a tutorial style. The tutorial was based on an interactive web-based simulation environment developed by myself and Jared M. Moore. Students conducted evolutionary experiments in which they evolved robots in simulation.

Jul 2014 **Mentor, NSF Research Experience for Teachers Summer Program**
College of Engineering, Michigan State University
Responsibilities: Mentored a local high school engineering instructor, Charles Payson. Over the course of his second summer in the program, Mr. Payson designed, implemented, and presented a web application used to teach evolutionary robotics concepts to K-12 students and the general public. I taught Mr. Payson web-programming skills as well as aided him in developing a curriculum for high school students.

Jul 2014 **Instructor, BEACON High School Summer Residential Program**
W.K. Kellogg Biological Station, Michigan State University
Responsibilities: Presented an overview of evolutionary computation to a group of four high school students interested in STEM fields, and then facilitated their work as they conducted, wrote about, and presented results from their own evolutionary study in a day-long course.

May to Jul 2013 **Mentor, NSF Research Experience for Teachers Summer Program**
College of Engineering, Michigan State University
Responsibilities: Mentored a local high school engineering instructor, Charles Payson. During a six-week program, I aided Mr. Payson in learning C++ programming, evolutionary algorithm development, and creating dynamic simulations. At the end of the program, I assisted Mr. Payson in translating his research into a robotics lesson plan using the VEX robotics platform.

May 2011 to Jul 2013 **Mentor, NSF Research Experience for Teachers Summer Program**
College of Engineering, Michigan State University
Responsibilities: Mentored a local elementary school teacher, Adam Ford, who specializes in computers and robotics. Mr. Ford developed the Biolume environment, which demonstrates evolution 'in-action' using using simple robots. The Biolume project is an outreach exhibit aimed at demonstrating evolutionary principles to the general public.

Grant Activity

I have contributed to the writing, editing, and motivating studies of the following grants.

Nov 2016 **Missouri State University Major Equipment Grant**
Amount: $24,000
Details: Funds were utilized to purchase a 3D printer and a CNC mill that will be used by faculty and students in the Departments of Computer Science and Engineering.

Aug 2011 to Apr 2014 **II-EN: Evolution Park: An Evolutionary Robotics Habitat for the Study of Crawling, Swimming and Flying Creatures**
Amount: $305,000
Sponsor: NSF, Division Of Computer and Network Systems
PI: P. McKinley, Co-PIs: X. Tan, J. Boughman

Aug 2011 to Apr 2012 **Exploiting Robot-Fish Interactions and Evolutionary Computing to Understand and Synthesize Complex Collective Behavior**
Amount: $110,642
Sponsor: NSF BEACON Center for the Study of Evolution in Action
PI: X. Tan, Co-PIs: P. McKinley, J. Boughman

Aug 2012 to Apr 2013 **Understanding and Synthesizing Collective Behavior with Mixed Robotic and Live Fish Schools**
Amount: $169,923
Sponsor: NSF BEACON Center for the Study of Evolution in Action
PI: X. Tan, Co-PIs: P. McKinley, J. Boughman

Aug 2013 to Apr 2014 **Distributed, Onboard Evolution in a Robotic Cloud**
Amount: $168,231
Sponsor: NSF BEACON Center for the Study of Evolution in Action
PI: T. Soule (U. Idaho), Co-PIs: R. Heckendorn (U. Idaho), P. McKinley (MSU), J. Zhan (NCA&T), S. Harrison (NCA&T)