

JENNIFER L. CROSS

The Robotics Institute
Carnegie Mellon University
5000 Forbes Ave.
Pittsburgh, Pennsylvania 15213
jlcross@cmu.edu
jennncross.com

RESEARCH INTERESTS

- Human-robot interaction with a focus on educational applications of robotics
- Diversity and accessibility in robotics, engineering and computer science education
- Teacher and student robotic empowerment, technological fluency, and computational thinking
- Mixed-methods evaluation of educational robotics interventions

EDUCATION

Ph.D. in Robotics 2017

Carnegie Mellon University, Pittsburgh, PA

Dissertation: Creative Robotic Systems for Talent-Based Learning

Advisor: Illah Nourbakhsh

Committee: Mitchel Resnick, Jack Mostow, and Aaron Steinfeld

M.S. in Robotics 2013

Carnegie Mellon University, Pittsburgh, PA

Advisor: Illah Nourbakhsh

B.S. in Electrical and Computer Engineering 2010

Franklin W. Olin College of Engineering, Needham, MA

Member of Olin College's fifth graduating class

AWARDS & HONORS

Program for Interdisciplinary Education Research Fellow 2011 – 2017

Department of Education - Institute of Education Sciences

Graduate Research Fellowship Program Fellow 2011 – 2014

National Science Foundation

Best Paper Award 2013

IEEE Integrated STEM Education Conference

Olin College Merit Scholarship 2006 – 2010

Franklin W. Olin College of Engineering

Carnegie Science Center Awards for Excellence 2005

Carnegie Science Center, Pittsburgh, PA

PUBLICATIONS

- Hsu, Y.-C., Dille, P., Cross, J., Dias, B., Sargent, R., and Nourbakhsh, I. (2017). Community-Empowered Air Quality Monitoring System. *In Proceedings of 2017 ACM CHI Conference on Human Factors in Computing Systems*, Denver, Colorado. (in press)
- Cross, J., Hamner, E., Zito, L., Nourbakhsh, I., and Bernstein, D. (2016). Development of an Assessment for Measuring Middle School Student Attitudes towards Robotics Activities. *In Proceedings of 2016 IEEE Frontiers in Education Conference (FIE)*, Erie, Pennsylvania.
- Cross, J., Hamner, E., Zito, L., and Nourbakhsh, I. (2016). Engineering and Computational Thinking Talent in Middle School Students: a Framework for Defining and Recognizing Student Affinities. *In Proceedings of 2016 IEEE Frontiers in Education Conference (FIE)*, Erie, Pennsylvania.
- Hamner, E., Zito, L., Cross, J., Slezak, B., Mellon, S., Harapko, H., and Welter, M. (2016). Utilizing Engineering to Teach Non-Technical Disciplines: Case Studies of Robotics within Middle School English and Health Classes. *In Proceedings of 2016 IEEE Frontiers in Education Conference (FIE)*, Erie, Pennsylvania.
- Hamner, E., Cross, J., Zito, L., Bernstein, D., and Mutch-Jones, K. (2016). Training Teachers to Integrate Engineering into Non- Technical Middle School Curriculum. *In Proceedings of 2016 IEEE Frontiers in Education Conference (FIE)*, Erie, Pennsylvania.
- Bernstein, D., Mutch-Jones, K., Hamner, E., and Cross, J. (2015). Robots and Romeo and Juliet: Studying Teacher Integration of Robotics into Middle School Curricula. Paper presented at the 2016 Annual Meeting of the American Educational Research Association (AERA), Washington, DC.
- Cross, J., Hamner, E., Bartley, C., and Nourbakhsh, I. (2015). Arts & Bots: Application and Outcomes of a Secondary School Robotics Program. *In Proceedings of 2015 IEEE Frontiers in Education Conference (FIE)*, El Paso, Texas.
- Cross, J. and Hamner, E. (2014). Identifying and Cultivating Diverse STEM Talent through Creative Robotics. *In Proceedings of 2014 American Society for Engineering Education (ASEE) Annual Conference and Exposition*, Indianapolis, Indiana.
- Cross, J., Bartley, C., Hamner, E., and Nourbakhsh, I. (2013). A Visual Robot-Programming Environment for Multidisciplinary Education. *In Proceedings of 2013 IEEE International Conference on Robotics and Automation (ICRA)*, Karlsruhe, Germany.
- Hamner, E. and Cross, J. (2013). Arts & Bots: Techniques for distributing a STEAM robotics program through K-12 classrooms. *In Proceedings of the 2013 IEEE Integrated STEM Education Conference (ISEC)*, Princeton, NJ.
- Brown, H. B., Nourbakhsh, I., Bartley, C., Cross, J., Dille, P., Schapiro, J., and Styler, A. (2012). ChargeCar Community Conversions: Practical, Electric Commuter Vehicles Now! *In Proceedings of the 2012 IEEE International Electric Vehicle Conference (IEVC)*, Greenville, SC.
- Mathews, J. D., Briczinski, S. J., Malhotra, A., and Cross, J. (2010). Extensive Meteoroid Fragmentation in V/UHF Radar Meteor Observations at Arecibo Observatory. *Geophysical Research Letters*, 37(4).

TEACHING

| | |
|--|-------------|
| Principles of Human Robot Interaction (16-867) | 2015 & 2017 |
| <i>Guest Lecturer, Carnegie Mellon University</i> | |
| Topic: Robotics & Education | |
| Human Robot Interaction (16-467) | 2016 |
| <i>Guest Lecturer, Carnegie Mellon University</i> | |
| Topic: Experimental Design in Human Robot Interaction | |
| Methods & Materials for Elementary Teachers (EDUC 460) | 2015 |
| <i>Guest Lecturer, West Liberty University</i> | |
| Topic: Transdisciplinary Integration of Creative Robotics | |
| Project Course: Mobile Robotics (Summer Academy for Math and Science) | 2014 |
| <i>Course Instructor, Carnegie Mellon University</i> | |
| Systems Engineering (16-650) | 2012 |
| <i>Teaching Assistant, Carnegie Mellon University</i> | |
| Educational Robotics for the Classroom (16-651) | 2011 |
| <i>Guest Lecturer, Carnegie Mellon University</i> | |
| Topic: Robot Programming with the CREATE Lab Visual Programmer | |

OUTREACH & SERVICE

| | |
|--|-------------|
| K-12 Teacher Professional Development Workshops | 2011 – 2017 |
| <i>Workshop Leader, Various locations including: Pittsburgh, PA; Marshall, WV; Bristol, UK; and others</i> | |
| Topic: Integrating Arts & Bots Robotics into Classrooms | |
| Audience: Teachers in K-12 Schools | |
| Over 200 teachers have participated in workshops to date | |
| Integrating the E in STEM Workshop Series | 2016 |
| <i>Workshop Leader, Erie, PA</i> | |
| Topic: Transdisciplinary Integration of Creative Robotics for Identification of Student STEM Affinities | |
| Audience: K-12 Educators | |
| OurCS: Opportunities for Undergraduate Research in Computer Science | 2013 & 2015 |
| <i>Graduate Organizer, Carnegie Mellon University</i> | |
| Audience: Women in Undergraduate Computer Science Programs | |
| Robotics Institute Ph.D. Admissions Committee | 2012 – 2014 |
| Women@SCS Creative Technology Nights | 2012 – 2014 |
| <i>Workshop Leader, Carnegie Mellon University</i> | |
| Topic: Robot Programming with Scratch | |
| Audience: Middle School Aged Women | |
| Women@SCS Computer Science Roadshows | 2011 – 2013 |
| <i>Graduate Student Presenter, Carnegie Mellon University</i> | |
| Audience: K-12 Students and Educators | |

MENTORING

Master's Thesis Committee

| | |
|---|------|
| <i>Xunjie Zhang</i> , Carnegie Mellon University | 2017 |
| <i>Matthew Bernstein</i> , Carnegie Mellon University | 2012 |

Ph.D. Qualifiers Committee

| | |
|---|------|
| <i>Yen-Chia Hsu</i> , Carnegie Mellon University | 2015 |
| <i>Eleanor Avrunin</i> , Carnegie Mellon University | 2014 |

PROFESSIONAL ACTIVITIES & MEMBERSHIPS

| | |
|--|-------------|
| Future Faculty Program | 2011 – 2017 |
| <i>Eberly Center for Teaching Excellence and Educational Innovation</i> , Carnegie Mellon University | |
| Women@SCS | 2010 – 2017 |
| <i>School of Computer Science</i> , Carnegie Mellon University | |
| American Society for Engineering Education | 2013 – 2017 |
| IEEE | 2012 – 2017 |
| Society of Women Engineers | 2007 – 2017 |

RESEARCH EXPERIENCES

- Carnegie Mellon University** 2010-2017
Graduate Research Assistant
Robotics Institute – CREATE Lab (Community Robotics Education and Technology Empowerment Lab)
- The Pennsylvania State University, State College, PA** Summer 2009
National Science Foundation EEREU Undergraduate Scholar
Electrical Engineering Department – Radar Space Sciences Lab
- Olin College Undergraduate Research, Needham, MA**
Undergraduate Research Assistant
Advanced Computing Lab – Exploded Field-Programmable Gate Array Project 2008 – 2010
Olin Biomimetic Robotics Lab – Student Directed Robotics Project 2007 – 2008
- Charles Stark Draper Laboratory, Cambridge, MA** Summer 2007
Undergraduate Intern
Mechanical Systems Division and Robotic Systems Division

ACADEMIC PROJECTS

- Senior Capstone in Engineering Course – Low-Cost Position Sensor for Robotic Applications Fall 2009 – Spring 2010
Team Project Manager [Spring 2010]
- Researched implementation and integration of numerous low-cost commercial sensor technologies for novel sensor package; collaborated with MIT's Lincoln Laboratory for integration into larger autonomous system; designed complementary sensor sub-systems to minimize error sources; implemented large scale sensor integration in LabVIEW
 - Collaborated with 7 team members and 2 staff members at MIT's Lincoln Laboratory; elected Team Project Manager; led team meetings and managed project completion timeline; managed material and personnel resources; principle interface between team, Lincoln Laboratory staff and college officials
- Materials Science - Dye Sensitized Solar Cell Design Spring 2008
- Performed experiment for optimizing efficiency of dye sensitized solar cells; researched fundamental semiconductor and solar cell material properties; developed experiment goals and procedures; fabricated and tested numerous custom solar cells; worked with 3 other team members
- Software Design - Enterprise Management Application Spring 2008
- Designed enterprise management application for student organization task management; coded SQL query generating online interface for application; performed collaborative team programming with 3 team members
- Electromechanical Engineering – Automated Pill Dispenser Fall 2007
- Designed and prototyped automated timer-based pill dispenser; fabricated prototype parts; designed and implemented timing and control circuits; presented final prototype to faculty and peers; collaborated with four team members

Nature-Inspired Design – Vertical Wall Climber

Fall 2006

- Designed a wall climbing device based on a tree frog; drafted plans for construction and machined prototype parts; presented final prototype and design to faculty; collaborated with four team members

Mechanics – Double Pendulum Numerical Modeling

Fall 2006

- Derived motion equations for modeling a chaotic mechanical system; created a simulation of system in MatLab; coauthored a technical report on the simulation and presented a final report to faculty

LEADERSHIP

Society of Automotive Engineers Baja Competition

Fall 2006 – Summer 2010

Team Co-Manager [Summer 2007 –Summer 2009]

- Led a team of 30 members to design and fabricate a small off-road vehicle for the national Baja SAE competition; designed multimedia materials for recruiting corporate sponsorship; tripled team size through recruiting members; managed material and personnel resources; interfaced between team and college administrative and safety officials
- *Leadership Advisor [Summer 2009 –Summer 2010]*
- Initiated mini-workshops for 5 person team management group; taught essential group management skills and techniques; advised team structuring and interfacing with college administrative and safety officials; led discussions on team dynamics problems and resolutions
-

PROFESSIONAL SKILLS

- Computer: MATLAB, LabVIEW, ExpressPCB, Python, Verilog, pSpice, Java, SolidWorks, AutoCAD, LaTeX
- Machine Shop: CNC Mill, Manual Mill, Manual Lathe, Drill Press, Band Saw, Sander, GMAW Welding