Daniel J. Szafir, Curriculum Vitae

Assistant Professor · University of Colorado Boulder
ATLAS Institute & Department of Computer Science, 1111 Engineering Drive, Boulder, CO 80309
+1-303-735-7892 | daniel.szafir@colorado.edu | **Homepage:** www.danszafir.com | **Lab Website:** www.atlas.com/iron

Research Interests

Mission My goal is to build knowledge of how we can design novel sensing, interactive, and robotic technologies that enable new forms of human assistance.

Interests Human-robot interaction (HRI); human-computer interaction (HCI); virtual, augmented, and mixed reality; user-centered design; human-centered computing (HCC); aerial robotics; robotic technologies for space exploration; human-robot coordination and collaboration; educational technologies; robotic technologies for manufacturing

Employment

Assistant Professor
2015 – Present
University of Colorado Boulder
Boulder, Colorado

Rostered: ATLAS Institute
Tenure Home: Department of Computer Science
Affiliate Appointments: Department of Aerospace Engineering; Department of Information Science; Institute of Cognitive Science; Research and Engineering Center for Unmanned Vehicles (RECUV); Center for Neuroscience; Culture, Language, and Social Practice (CLASP) Program

Research Intern
Summer 2013 & Spring 2015
Intelligent Robotics Group, NASA Ames Research Center
Mountain View, California

Graduate Research Fellow
2010 – 2015
Department of Computer Sciences, University of Wisconsin–Madison
Madison, WI

Software Development Intern
Summer 2007 & Summer 2009
International Business Machines (IBM), Inc.,
Essex Junction, Vermont

Software Development Intern
Summer 2008
Tybrin Corporation
Nashua, New Hampshire

Education

Ph.D., Computer Science
2012 – 2015
University of Wisconsin–Madison
Madison, Wisconsin

Dissertation: "Human Interaction with Assistive Free-Flying Robots"
Committee: Bilge Mutlu (co-chair), Terrence Fong (co-chair), John Lee, Kevin Ponto, and Tom Ristenpart
NASA Space Technology Research Fellow

Master of Science, Computer Science
2010 – 2012
University of Wisconsin–Madison
Madison, Wisconsin

Bachelor of Arts, Computer Science
2006 – 2010
Boston College
Chestnut Hill, Massachusetts

Honor's Thesis: "Non-Invasive BCI through EEG: An Exploration of the Utilization of Electroencephalography to Create Thought-Based Brain-Computer Interfaces"

Bachelor of Arts, History
2006 – 2010
Boston College
Chestnut Hill, Massachusetts

Honors & Awards

2017 **Forbes 30 Under 30: Science**
Named to the Forbes 30 Under 30 list of top innovators

2016 **NASA Early Career Faculty Award**

2015 **NSF CISE Research Initiation Initiative (CRII) Award**

2014 **Doctoral Consortia**
CHI 2014 & HRI 2014

2012 – 2015 **NASA Space Technology Research Fellow (NSTRF)**

2010 **Boston College Computer Science Accenture Award**
Awarded to top graduating student in Computer Science for outstanding performance

2010 **Order of the Cross and Crown**
Boston College Honor Society for seniors demonstrating academic excellence and unusual service and leadership

2010 **Phi Beta Kappa**

2010 **Graduated Summa Cum Laude**
Boston College

Publications

Journal Articles

J.1. **Daniel Szafir**, Bilge Mutlu, and Terrence Fong. (2017). Designing Planning and Control Interfaces to Support User Collaboration with Flying Robots. *International Journal of Robotics Research* (IJRR), 36 (5–7), 514–542. doi: 10.1177/0278364916688256 — *Impact factor: 5.30*

Refereed Full Conference Papers

C.9. Catherine Diaz, Michael Walker, Danielle Albers Szafir, and **Daniel Szafir**. (2017). Designing for Depth Perceptions in Augmented Reality. In the *Proceedings of the IEEE International Symposium on Mixed and Augmented Reality (ISMAR 2017)*, Nantes, France. — *Acceptance rate: 26%*

C.8. Darren Guinness, **Daniel Szafir**, and Shaun Kane. (2017). GUI Robots: Using Off-the-Shelf Robots as Tangible Input and Output Devices for Unmodified GUI Applications. In the *Proceedings of the ACM Conference on Designing Interactive Systems (DIS 2017)*, Edinburgh, United Kingdom. — *Acceptance rate: 24%*

C.7. **Daniel Szafir**, Bilge Mutlu, and Terrence Fong. (2015). Designing Mechanisms for Communicating Directionality in Flying Robots. In the *Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction (HRI 2015)*, Portland, Oregon. — *Acceptance rate: 25%*

C.6. Allison Sauppé, **Daniel Szafir**, Chien-Ming Huang, and Bilge Mutlu. (2015). From 9 to 90: Engaging Learners of All Ages. In the *Proceedings of the ACM Technical Symposium on Computer Science Education (SIGCSE 2015)*, Kansas City, Missouri. — *Acceptance rate: 36%*

C.5. **Daniel Szafir**, Bilge Mutlu, and Terrence Fong. (2014). Communication of Intent in Assistive Free Flyers. In the *Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction (HRI 2014)*, Bielefeld, Germany. — *Acceptance rate: 24%*

C.4. **Daniel Szafir**, Bilge Mutlu. (2013). ARTFul: Adaptive Review Technology for Flipped Learning. In the *Proceedings of the ACM/SigCHI Conference on Human Factors in Computing Systems (CHI 2013)*, Paris, France. — *Acceptance rate: 20%*

C.3. Kevin Ponto, Ross Tredinnick, Aaron Bartholomew, Carrie Roy, **Daniel Szafir**, Daniel Greenheck, and Joe Kohlmann. (2013). SculptUp: A Rapid, Immersive 3D Modeling Environment. In the *Proceedings of the IEEE Symposium on 3D User Interfaces (3DUI 2013)*, Orlando, Florida. doi: 10.1109/3DUI.2013.6550247 — *Acceptance rate: 27%*

C.2. **Daniel Szafir**, Bilge Mutlu. (2012). Pay Attention! Designing Adaptive Agents that Monitor and Improve User Engagement. In the *Proceedings of the ACM/SigCHI Conference on Human Factors in Computing Systems (CHI 2012)*, Austin, Texas. *Acceptance rate: 23%*

C.1. **Daniel Szafir** and Robert Signorile. (2011). An Exploration of the Utilization of Electroencephalography and Neural Nets to Control Robots. In the *Proceedings of the IFIP TC.13 International Conference on Human-Computer Interaction (INTERACT 2011)*, Lisbon, Portugal. *Acceptance rate: 22%*

Refereed Short Conference Papers

S.1. **Daniel Szafir**. (2014). Human Interaction with Assistive Free-Flyers. In *Doctoral Consortium Extended Abstracts of the ACM/SigCHI Conference on Human Factors in Computing Systems (CHI 2014)*, Toronto, Canada. *Acceptance rate: 25%*

Refereed Workshop & Symposium Papers

W.5. **Daniel Szafir**. (2016). A Cognitive Basis for Human Interaction with Aerial Robots. In the *Proceedings of the Workshop on Human-Robot Interaction for Small and Personal Unmanned Aerial Vehicles held at the Robotics: Science and Systems Conference (RSS 2016)*, Ann Arbor, Michigan.

W.4. Steve McGuire, P. Michael Furlong, Christoffer Heckman, Simon Julier, **Daniel Szafir**, and Nisar Ahmed. (2016). Teamwork Across the Stars: Machine Learning to Overcome the Brittleness of Autonomy. In the *Proceedings of the Workshop on Human-Robot Collaboration: Towards Co-Adaptive Learning Through Semi-Autonomy and Shared Control held at the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2016)*, Daejeon, Korea.

W.3. Danielle Albers Szafir and **Daniel Szafir**. (2016). Cognitive Load in Visualization: Myths and Misconceptions. In the *Proceedings of the Creation, Curation, Critique and Conditioning of Principles and Guidelines in Visualization (C4PGV 2016) held at the IEEE Conference on Visual Analytics Systems and Technology, Information Visualization, and Scientific Visualization (VIS 2016)*, Baltimore, Maryland.

W.2. **Daniel Szafir**. (2014). Human Interaction with Assistive Free-Flyers. In the *Proceedings of the Human-Robot Interaction Pioneers Workshop held at the ACM/IEEE International Conference on Human-Robot Interaction (HRI 2014)*, Bielefeld, Germany.

W.1. **Daniel Szafir** and Kevin Ponto. (2012). Panoramic Imagery of Physical Locations Inside Immersive Environments. In the *Proceedings of the Midwest Graphics Conference (Midgraph 2012)*, Chicago, Illinois.

Refereed Abstracts

A.2. Steven Johnson, Xiang Zhi Tan, **Daniel Szafir**, and Bilge Mutlu. (2014). Using At-A-Glance Displays to Enhance Student Attention. In the *McPherson Eye Research Institute (MERI) Symposium*, Madison, Wisconsin.

A.1. **Daniel Szafir**, and Robert Signorile. (2010). Non-Invasive BCI through EEG. In the *New England Undergraduate Computing Symposium (NEUCS 2010)*, Boston, Massachusetts.

Conference Demonstrations

D.1. Kevin Ponto, Ross Tredinnick, Aaron Bartholomew, Carrie Roy, **Daniel Szafir**, Daniel Greenheck, and Joe Kohlmann. (2013). SculptUp: A Rapid, Immersive 3D Modeling Environment. In the *IEEE Symposium on 3D User Interfaces (3DUI 2013) Contest*, Orlando, Florida.

Theses

T.2. **Daniel Szafir**. (2015). Human Interaction with Assistive Free-Flying Robots. *Doctoral Dissertation*, University of Wisconsin–Madison, Madison, WI, USA.

T.1. **Daniel Szafir**. (2010). Non-Invasive BCI through EEG: An Exploration of the Utilization of Electroencephalography to Create Thought-Based Brain-Computer Interfaces. *Bachelor's Honor's Thesis*, Boston College, Chestnut Hill, MA, USA.

Technical / Policy Reports

R.1. **Enhanced User Interface Working Group.** (2017). Public Safety Enhanced User Interface R&D Roadmap. *National Institute of Standards and Technology's (NIST) Public Safety Communications Research (PSCR) Program*.

Patents

P.1. Bilge Mutlu and **Daniel Szafir**. (2012). Teaching System for Improving Information Retention Based on Brain-State Monitoring. U.S. Patent Application *# US 13/437,699*, Publication *# US 20130260361 A1*.

Research Grants & Gifts

Federal Grants

National Science Foundation Research Initiation Initiative (NSF-CISE-CRII)
Amount: $174,300
Period: 2016 – 2018
Leveraging Implicit Human Cues to Design Effective Behaviors for Collaborative Robots
Investigator: Daniel Szafir (PI)

National Aeronautics and Space Administration Early Career Faculty (NASA ECF) Award NNX16AR58G
Amount: $359,389
Period: 2016 – 2019
Developing Principles for Effective Human Collaboration with Free-Flying Robots
Investigator: Daniel Szafir (PI)

Corporate and Foundation Gifts & Grants

Intel Research Award #1553595
Amount: $126,993
Period: 2016 – 2017
Fusing Robotics and Consumer Devices for New Multimedia
Investigator: Daniel Szafir (PI)

University Grants

University of Colorado Boulder Innovative Seed Grant Program
Amount: $30,000
Period: 2016 – 2017
FieldView: Using Mobile Devices to Blend Data Collection and Analysis for Field Research
Investigator: Danielle Albers Szafir (PI) and Daniel Szafir (Co-I)

Fellowships and Awards with UW-Madison Affiliation

National Aeronautics and Space Administration Space Technology Research Fellowship (NSTRF) Award NNX12AN14H
Amount: $264,000
Period: 2012 – 2015
Effective Human-Robot Collaborative Work for Critical Missions
Investigator: Bilge Mutlu (PI)
Student Fellow: Daniel Szafir

Google Glass Award
Amount: $27,860
Period: 2013 – 2015
Improving Everyday Learning Using Glass
Investigator: Bilge Mutlu (PI) and Daniel Szafir

Selected Press Coverage

2017 **Forbes (US)**
Research highlighted as part of inclusion in the *Forbes 30 Under 30* list of top innovators

2017 **CU Engineering Magazine (US)**
Research covered in *"Getting to Know Your Robot"*

2016 **Daily Camera (US)**
Research covered in *"CU Student Meredith Burgess brings Tech to Pole Dance"*

2013 **Wisconsin State Journal (US)**
Research covered in *"Science Festival Mixes Learning, Fun"*

2012 **New Scientist (UK)**
Research covered in *"Mind-reading Robot Teachers Keep Students Focused"*

2012 **Discovery News (US)**
Research covered in *"Mind-reading Robot Teachers Head to Class"*

2012 **Engadget (US)**
Research covered in *"Mind-reading Robotic Teachers Are More... Anyone? Anyone? Attention-grabbing"*

2012 **La Repubblica (Italy)**
Research covered in *"U.S.: Robot Teacher Seeks Out Distracted Students"*

Invited Talks

2017 **Seminar Speaker**
NASA Ames Research Center, Intelligent Robotics Group, Mountain View, California
"Developing Principles for Effective Human Collaboration with Free-Flying Robots"

2017 **Workshop Opening Speaker**
Bridging the Gap in Space Robotics Workshop, RSS Conference, Boston, Massachusetts
"Bridging the Gap in Space Robotics"

2016 **Seminar Speaker**
NASA Ames Research Center, Intelligent Robotics Group, Mountain View, California
"Human-Robot Interaction at CU Boulder"

2016 **Seminar Speaker**
Aerospace Engineering Sciences, University of Colorado Boulder, Boulder, Colorado
"Leveraging Cognitive Engineering for Human-Robot Interaction"

2016 **Colloquium Speaker**
Institute of Cognitive Science (ICS), University of Colorado Boulder, Boulder, Colorado
"Leveraging Cognitive Engineering for Human-Robot Interaction"

2016 **Invited Speaker**
Aerospace Ventures (ASV) Day, University of Colorado Boulder, Boulder, Colorado
"Design Principles for Effective Human-Robot Collaboration"

2016 **Seminar Speaker**
Human-Centered Computing (HCC) Seminar, University of Colorado Boulder, Boulder, Colorado
"Human Interaction with Small Flying Robots"

2015 **Seminar Speaker**
Robotics, Controls, and Dynamic Systems (RCDS) Seminar, University of Colorado Boulder, Boulder, Colorado
"Human Interaction with Small Flying Robots"

2015 **Invited Speaker**
University of Iowa, Iowa City, Iowa
"Unlocking the Assistive Potential of Emerging Technologies"

2015 **Colloquium Speaker**
Arizona State University, Tempe, Arizona
"Unlocking the Assistive Potential of Emerging Technologies"

2015 **Colloquium Speaker**
University of Colorado Boulder, Boulder, Colorado
"Unlocking the Assistive Potential of Emerging Technologies"

Teaching

University of Colorado Boulder

CSCI 7000-008 / ATLS 5519 Human-Robot Interaction

Spring 2016 & 2017

Enrollment: 20 – 30

Overall Instructor Evaluation: 5.2/6.0

I designed and taught a graduate-level course that introduces students to the field of human-robot interaction (HRI). The course involves three key components: (1) a principles component that develops an understanding of the fundamental concepts of HRI through lectures and discussions of seminal and modern HRI research, (2) a methods component that helps students build a "toolbox" of essential qualitative and quantitative research methods, and (3) a project component in which students use their knowledge of HRI principles and methods to conduct a complete research inquiry, which encompasses posing a novel HRI research question, designing an empirical experiment, collecting and analyzing data, and reporting their findings.

CSCI 4830/7000-007 / ATLS 4519/5519 Introduction to Virtual Reality

Fall 2015, 2016, & 2017

Enrollment: 40 – 50

Overall Instructor Evaluation: 5.8/6.0

I designed and taught a combined undergraduate/graduate course to introduce students to the field of virtual reality. The course involves two key components: (1) developing an understanding of the fundamental principles of virtual reality such as presence, immersion, and engagement and (2) building technical skills for developing virtual reality applications using modern methods and tools, including WebGL and Unity. The course offers students an entry-level introduction to computer graphics and virtual reality using a combination of lectures, hands-on exercises, and team project assignments.

University of Wisconsin–Madison

CS302 Introduction to Programming

Summer 2011

Enrollment: 88

Overall Instructor Evaluation: 4.19/5.00 (47 responses)

I taught a summer section of an introductory programming course in Java. I was responsible for all aspects of the course including developing and delivering lectures, exams, and assignments and supervising TA graders.

CS302 Introduction to Programming

Fall & Spring 2010 – 2012

Enrollment: 20 – 25

Overall Instructor Evaluation: 4.84/5.00 (65 responses)

Taught four semester-long sections (~23 students/section) of an introductory programming course in Java. Responsible for preparing and presenting lectures, grading, and shared development of assignments and exams with other instructors. I received two awards for excellence in undergraduate education for my work in this course.

Advising & Mentoring

Graduate Student Advisees

2017 – Present **Connor Brooks**
Ph.D., Department of Computer Science, University of Colorado Boulder

2017 – Present **Daniel Prendergast**
Ph.D., Department of Computer Science, University of Colorado Boulder

2016 – Present **Madhur Atreya**
Ph.D., ATLAS Institute, University of Colorado Boulder
Co-advising with Mark Gross (CS/ATLAS)

2016 – Present **Hooman Hedayati**
Ph.D., Department of Computer Science, University of Colorado Boulder

2016 – Present **Michael Iuzzolino**
Ph.D., Department of Computer Science, University of Colorado Boulder
Co-advising with Danielle Albers Szafir (Information Science)

2016 – Present **Bo "Bryan" Cao**
M.S., Department of Computer Science, University of Colorado Boulder

2016 – Present **Jordan Peters**
M.S., Department of Computer Science, University of Colorado Boulder

2016 – Present **Rohit Raje**
M.S., Department of Computer Science, University of Colorado Boulder

2016 – Present **Michael Walker**
M.S., Department of Computer Science, University of Colorado Boulder

Undergraduate Student Advisees

2015 – Present **Catherine Diaz**
Department of Computer Science, University of Colorado Boulder
First author of ISMAR 2017 publication while an undergraduate

2016 – Present **Meredith Burgess**
Department of Computer Science, University of Colorado Boulder

Graduated and Past Advisees

2015 – 2016 **Brandon Barrett**
Department of Computer Science, University of Colorado Boulder

Thesis Committee Member

2015 – Present **Darren Guinness, Ph.D. Thesis**
Department of Computer Science, University of Colorado Boulder
Adviser: Shaun Kane
Dissertation Title: *TBD*

2015 – Present **Stephen McGuire, Ph.D. Thesis**
Department of Aerospace Engineering Sciences, University of Colorado Boulder
Adviser: Nisar Ahmed
Dissertation Title: *TBD*

2016 **Christine Fanchiang, Ph.D. Thesis**
Department of Aerospace Engineering Sciences, University of Colorado Boulder
Adviser: David M. Klaus
Dissertation Title: *A Quantitative Human Spacecraft Design Evalaution Model for Assessing Crew Accommodation and Utilization*

2017 – Present **Tarah Peltz, B.S. Senior Thesis**
Department of Computer Science, University of Colorado Boulder
Dissertation Title: *TBD*

Professional Activities & Service

Program Committee Work

2018 **Program Committee Member**
ACM/IEEE International Conference on Human-Robot Interaction (HRI)

2017 **Program Committee Member**
Robotics: Science and Systems (RSS)

2017 **Videos and Demonstrations Tracks Co-Chair**
ACM/IEEE International Conference on Human-Robot Interaction (HRI)

2017 **Associate Chair, Program Committee**
ACM/SigCHI Conference on Human Factors in Computing Systems (CHI)

2016 & 2017 **Associate Editor, Program Committee**
IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN)

2016 **Associate Editor, Program Committee**
IEEE Workshop on Advanced Robotics and its Social Impacts (ARSO)

2016 **Workshop Program Committee Member**
Robotics: Science and Systems (RSS) Workshop on Human-Robot Interaction for Small and Personal Unmanned Aerial Vehicles

2015 **Panel Chair & Program Committee Member**
HRI Pioneers at the ACM/IEEE International Conference on Human-Robot Interaction (HRI)

2014 **Workshop Program Committee Member**
Workshop on Utilizing EEG Input in Intelligent Tutoring Systems at the AAAI 12th International Conference on Intelligent Tutoring Systems (ITS)

Referee Service

2016 **Funding Agency Panelist**
National Science Foundation (NSF)

2016 **Funding Agency Panelist**
National Aeronautics and Space Administration (NASA)

2016 & 2017 **Funding Agency External Reviewer**
National Science Foundation (NSF)

2012 – Present **Referee for Journal Articles**
International Journal of Robotics Research (IJRR)
ACM Transactions on Computer-Human Interaction (TOCHI)
ACM Transactions on Interactive Intelligent Systems (TiiS)
IEEE Transactions on Human-Machine Systems (THMS)
IEEE Transactions on Affective Computing (TAC)
IEEE Robotics and Automation Magazine (RAM)

2012 – Present **Referee for Conference Proceedings**
ACM/IEEE International Conference on Human-Robot Interaction (HRI)
ACM/SigCHI Conference on Human Factors in Computing Systems (CHI)
ACM/SigCHI Symposium on User Interface and Software Technology (UIST)
ACM/SigCHI Conference on Designing Interactive Systems (DIS)
IEEE International Conference on Robotics and Automation (ICRA)
IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN)
Robotics: Science and Systems Conference (RSS)
IEEE International Symposium on Mixed and Augmented Reality (ISMAR)
International Symposium on Robotics Research (ISRR)

University Service

2017 – Present **Executive Committee**
ATLAS Institute, University of Colorado Boulder

2017 – Present **Computing Curriculum Committee**
ATLAS Institute, University of Colorado Boulder

2016 – Present **CU Boulder Human-Computer Interaction Consortium (HCIC) Committee**
University of Colorado Boulder

2015 – Present **Graduate Program Committee**
ATLAS Institute, University of Colorado Boulder

2016 – Present **Faculty Adviser**
Virtual Reality Club, University of Colorado Boulder

2016 – 2017 **Faculty Search Committee**
Department of Computer Science, University of Colorado Boulder

2016 – 2017 **Faculty Search Committee**
ATLAS Institute, University of Colorado Boulder

2016 – 2017 **Faculty Inclusive Excellence Team**
BOLD Center, University of Colorado Boulder

2016 – 2017 **Undergraduate Program Committee**
Department of Computer Science, University of Colorado Boulder

2016 **Computer Science Department Video**
Led creation of promotional video highlighting the Computer Science Department at the University of Colorado Boulder for graduate recruiting and department advertising.

2015 – 2016 **Graduate Program Committee**
Department of Computer Science, University of Colorado Boulder

External Research Service

2017 **Workshop Organizer: *Bridging the Gap in Space Robotics***
Workshop at the 2017 Robotics: Science and Systems (RSS) Conference
Co-organizers: Christoffer Heckman (CU Boulder), Nisar Ahmed (CU Boulder), and Jay McMahon (CU Boulder)

2016 **Public Safety Communications Research (PSCR) User Interface R&D Working Group**
National Institute of Standards and Technology (NIST) and the National Telecommunications and Information Administration (NTIA)

Volunteering & Outreach

2017 **High School Mentoring**
Worked with high school students from the Dawson School, enabling them to gain research experience while completing senior projects as lab interns.

2016 – 2017 **Hosted Lab Visits**
Hosted middle school students from the Logan School as part of STEM enrichment program
Hosted "Open Lab" event for the public as part of National Robotics Week
Hosted open lab events for the public as part of ATLAS Expo

2014 **Student Volunteer**
ACM/IEEE International Conference on Human-Robot Interaction (HRI)

2013 – 2014 **Grandparents University Instructor**
University of Wisconsin-Madison
Taught two sessions (~20 students/session) of a "Social Robotics" major to grandparents and grandchildren. Course used hands-on activities, multi-media presentations, and programming of Lego Mindstorms robots to teach concepts in programming and robotics to young and senior students.

Professional and Academic Memberships

Association for Computing Machinery (ACM)

Institute of Electrical and Electronics Engineers (IEEE)

Phi Beta Kappa Honor Society

Alpha Sigma Nu Jesuit Honor Society

Phi Alpha Theta National Historical Honor Society

Golden Key International Honor Society