

Daniel Johnathan Barber, Ph.D.

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Education

University of Central Florida, Orlando

- Ph.D. in Modeling and Simulation 2012
- M.S. in Computer Engineering (Intelligent Systems Track) 2006
- B.S. in Computer Engineering 2004

Security Clearance

Secret Clearance, Defense Industrial Security Clearance Office. Expires 2018.

Experience

2015 - Present University of Central Florida Institute for Simulation and Training Orlando, FL

Assistant Research Professor in Autonomous Systems

- Management of large projects including research for the U.S. Army Research Laboratory (ARL), Navy, Air Force, Nuclear Regulatory Commission (NRC), Florida Department of Transportation (FDOT), and commercial entities working with sponsors and interdisciplinary teams to achieve ecologically valid results, quality applications, and transitioned tools and applications.
- Experienced working within multi-disciplinary teams of computer engineers, electrical engineers, mechanical engineers, industrial engineers, mathematicians, graphics designers, and human-factors psychologists to support efforts requiring diverse skills set in the fields of robots, simulation, metric evaluation and development, human-computer interaction, and training.
- Management of software engineers and undergraduate/graduate student assistants for development of prototype hardware and software used within human-in-the-loop research. Example software applications include dynamic reconfigurable simulation test beds for Human Robot Interaction and Nuclear Power Plant operators.
- Lead multiple Science, Technology, Engineering, and Mathematics (STEM) outreach efforts to encourage public interest in robotics through construction of dynamic and interactive exhibits demonstrated at the Orlando Science Center, Florida FIRST Lego League, and Battle Bots events.
- Principal Investigator for Multimodal Communications for Human Robot Interaction for U.S. ARL Robotics Collaborative Technology Alliance, developing advanced multimodal interfaces for squad-level human robot teaming.
- Principal Investigator of Florida Department of Transportation effort titled "Investigation of Connected Vehicles to Inform Design of Automated Vehicle Systems." Investigating the human computer interaction challenges for connected and autonomous vehicles.

2012 – 2016 DUJO, LLC. Orlando, FL

Founder and Chief Technology Officer

- Management of all software product development resulting in tools for synchronization, distribution, and analysis of data for research and selection.
- Creator of DUJO Engine, a multi-platform and user-friendly software application to design, measure, and analyze experiment data from physiological and simulation data sources.
- Creator of DUJO Surveys, a reconfigurable product for creation of custom surveys or presentation of other stimuli used in research and other human-factors applications.

2008 – 2015 University of Central Florida Institute for Simulation and Training Orlando, FL

Research Associate

- Management of large projects including research for the U.S. Army Research Laboratory (ARL), Navy, Air Force, Nuclear Regulatory Commission (NRC), and commercial entities working with sponsors and interdisciplinary teams to achieve ecologically valid results, quality applications, and transitioned tools and applications.
- Experienced working within multi-disciplinary teams of computer engineers, electrical engineers, mechanical engineers, industrial engineers, mathematicians, graphics designers, and human-factors psychologists to support efforts requiring diverse skills set in the fields of robots, simulation, metric evaluation and development, human-computer interaction, and training.
- Management of software engineers and undergraduate/graduate student assistants for development of prototype hardware and software used within human-in-the-loop research. Example software applications include dynamic reconfigurable simulation test beds for Human Robot Interaction and Nuclear Power Plant operators.
- Faculty Advisor and mentor for the Robotics Club at UCF, a student organization participating in international air, ground, surface, and underwater robotics competitions sponsored by the Association for Unmanned Vehicle Systems International (AUVSI) receiving over \$40,000 in cash awards.

- Lead multiple Science, Technology, Engineering, and Mathematics (STEM) outreach efforts to encourage public interest in robotics through construction of dynamic and interactive exhibits demonstrated at the Orlando Science Center, Florida FIRST Lego League, and Battle Bots events.
- Academic Lead and Principal Investigator for NSF Innovation Corps (I-Corps) project as part of the University of Central Florida I-Corps Sites Program: Enhancing Technology Commercialization to Develop a World-Class Innovation Ecosystem.
- Mentor for Lake Highland Preparatory School's ASPIRE Research Program.
- Successfully completed two NRC operator training courses and one NRC Technical Training Center (TTC) visit, gaining knowledge base to effectively assist in design of simulations for experiments for Nuclear Power Plant operations.
- Developed a multimodal interface combining speech and gesture inputs with visual and auditory feedback for collaboration with robot teammate.
- Completed training course for a Pressurized Water Reactor (PWR) simulator developed by GSE Systems, and adapted it to provide additional experimental controls for human-in-the-loop research.
- Lead the creation of the Experimental Platform for Instrumentation and Control (EPIC), a Java-based environment to simulate Nuclear Power Plant control panels for controlled experimentation.
- Created a gesture recognition system capable of classifying over 21 gestures and integrated it with the BigDog platform from Boston Dynamics for supervised control using arm and hand gestures.
- Created a training and experimentation application called "Tacton Presenter," for investigation of tactile icons and phrases using a Tactile Belt.
- Developed a multimedia presenter application for presentation of static images, video, and other media in controlled laboratory experiments with data logs synchronized to multiple physiological sensors.
- Created a plugin-based data analysis application, called "Log Reports," for bulk processing of raw data generated by simulations and physiological sensors for rapid data analyses in statistical packages like SPSS.
- Developed a live robot test environment for investigation of different multi-robot formations for resource or high value target protection.
- Created several autonomous robotic platforms supporting JAUS for use in Live Virtual and Constructive environments.
- Expanded upon the Mixed Initiative Experimental (MIX) Testbed, an open-source simulation environment for human-robot interaction research to support reconfigurable Operator Control Units (OCU) to test different interface paradigms for supervisory control of multiple heterogeneous unmanned systems. This MIX multi-robot configuration was awarded as a Top 5 Technical Demonstration for Methodology and Impact at the NATO Human Factors & Medicine (HFM) – 217 Panel Workshop on "Supervisory Control of Multiple Uninhabited Systems" on 8 May 2012 in Prague, Czech Republic.
- Creator of a plugin-based software suite for integration of multiple physiological sensors called "MultiSensor" capable of synchronizing EEG, ECG, GSR, fNIR, TCD, and Eye Tracking data with simulation events in real-time.
- Developed real time-generation of physiological data metrics from EEG, ECG, fNIR, TCD, and Eye Tracker sensors over dynamic type periods and simulation events for driving closed-loop training applications.
- Created a Remote Weapons System (RWS) prototype for the Engagement Skills Trainer 2000 simulator to investigate the role and effect of an RWS in dismounted teams.
- Developed a prototype cultural training and data collection environment enabling a subject matter expert to "puppeteer" multiple culturally relevant virtual avatars.
- Designed and executed human-in-the-loop experiments for human robot interaction.
- Performed statistical analyses of data collected from human-in-the-loop experimentation using SPSS.
- Published and presented internationally throughout the domains of Psychology and Engineering.
- Served as committee member for dissertations in Modeling and Simulation, contributing to academic and scientific rigor and additional outside advising.

2007 – 2008

University of Central Florida Institute for Simulation and Training

Orlando, FL

Visiting Faculty

- Experienced working within multi-disciplinary teams of computer engineers, electrical engineers, mechanical engineers, industrial engineers, mathematicians, graphics designers, and human-factors psychologists to support efforts requiring diverse skills set in the fields of robots, simulation, metric evaluation and development, human-computer interaction, and training.
- Management of undergraduate/graduate student assistants for development of prototype hardware and software used within human-in-the-loop research. Example software applications include dynamic reconfigurable simulation test beds for Human Robot Interaction.
- Created JAUS++, a multi-platform open source implementation of the Joint Architecture for Unmanned Systems (JAUS) used academic and commercial applications within the United States and internationally.
- Creator of the Mixed Initiative Experimental (MIX) Testbed, an open-source simulation environment for human-robot interaction research involving supervisory control of an unmanned ground system.
- Created software application for real-time capture of video feeds from multiple USB-cameras for

synchronization with physiological data.

- Created software application to visually track position and orientation of ROOMBA robot using OpenCV.

2003 - 2006 Robotics Laboratory at UCF

Orlando, FL

Student Researcher

- Robotics laboratory manager, facility maintenance and resource allocations to projects.
- Project leader and system designer for autonomous ground vehicles.
- Developed machine vision programs using neural networks, rule based systems, and statistical classifiers for obstacle avoidance systems.
- Developed world-modeling and path-planning software for autonomous navigation with obstacle avoidance.
- Created cross-platform C++ software architecture for connecting different types of navigation sensors including digital compass and GPS.
- Wrote cross-platform C++ software libraries for connecting to different types of video sources using DirectShow, Video For Linux, and other libraries.
- Developed filtering systems for integration of multiple sources of position data generated by robotic vehicle sensors. Example data sources include GPS and wheel encoders.
- Designed and created control and communication software used by ground and surface robotic vehicles.
- Designed and constructed electrical and power distribution systems for ground vehicles.
- Developed Printed Circuit Boards (PCB) for electronics used on ground vehicles.

2004 – 2006 University of Central Florida Institute for Simulation and Training

Orlando, FL

Graduate Research Assistant

- Computer vision based arm and hand gesture recognition development with facial recognition tracking for guidance of robotic vehicles.
- Designed miniature robotic vehicles for navigation within a scaled Military Operations in Urban Terrain (MOUT) facility used for human-in-the-loop experimentation.
- Developed software and electronics for remote sharing of control of miniature robotic vehicles using multiple distributed operator stations.
- Created an interactive website for dissemination of information using PHP and MySQL.
- Conducted experiments with human participants.
- Developed stimuli for HRI experiments.
- Conference publications for dissemination of research findings.

Volunteer Work

2007 – 2014 Robotics Club at UCF

Orlando, FL

Faculty Advisor and Mentor

- Advise students on projects for international robotics competitions and senior design projects.
- Conducted special topics lectures in system design, machine learning, computer vision, and C/C++.
- Lead student teams to multiple awards at competitions sponsored by the Association for Unmanned Vehicle Systems International (AUVSI) and IEEE, totaling over \$43,500 in cash prizes.
- RoboBoats Competition
 - 2014 3rd Place - \$3,500.00
 - 2013 2nd Place - \$2000.00
 - 2012 4th Place - \$3,000.00
 - 2011 3rd Place - \$4,000.00
 - 2010 2nd Place - \$5,000.00
 - 2009 1st Place - \$6,000.00
 - 2008 1st Place - \$8,000.00
- Intelligent Ground Vehicle Competition
 - 2013 – JAUS Challenge Winner - \$250.00
 - 2011 2nd Place Overall - \$7,250.00
- RoboSub Competition
 - 2012 8th Place Gladiator Challenge - \$500.00
 - 2011 8th Place Second Chance Award - \$1000.00
 - 2010 8th Place Second Chance Award - \$1000.00
 - 2009 4th Place
- IEEE SoutheastCon
 - 2012, 2011, 2010 – Top 10 Hardware Competition
 - 2009 3rd Place Hardware Competition
 - 2008 3rd Place Hardware Competition

Principal Investigator

2017-Present General Dynamics, U.S. Army Research Laboratory (ARL). Principal Investigator: Dr. Daniel Barber (90%), Co-Principal Investigator(s): Dr. Lauren Reinerman-Jones (10%). *Robotics Collaborative Technology Alliance (RCTA) T2CIS4B – Adaptive Multimodal Communication*. CTA W911NF-10-2-0016. \$57,816.44.

2017-Present General Dynamics, U.S. Army Research Laboratory (ARL). Principal Investigator: Dr. Daniel Barber (100%). *Robotics Collaborative Technology Alliance (RCTA) T4C3S1E – HRI Driven Robot Enhancements*. CTA W911NF-10-2-0016. \$88,423.19.

2016-Present U.S. Army Research Laboratory (ARL). PI: Dr. Daniel Barber (100%). *Simulation Based Training Technology Research & Development*. Cooperative Agreement W911NF-16-2-0004. \$550,000.00.

2014-Present U.S. Army Research Laboratory (ARL). Principal Investigator: Dr. Daniel Barber (100%). *Human Systems Interfaces for Emerging Simulation Applications*. Cooperative Agreement W911NF-14-2-0012. \$3,584,220.00.

2016-2016 SPAWAR. Principal Investigator: Dr. Daniel Barber (100%). *Machine Learning of Autonomous Vehicle Tactics through Human Evaluation User Study*. \$16,206.00.

2015-2016 Florida Department of Transportation. Principal Investigator: Dr. Daniel Barber (50%), Co-Principal Investigator(s): Dr. David Metcalf (30%), Michael Eakins (10%), and John Lambert (10%). *Investigation of Connected Vehicles to Inform Design of Automated Vehicle Systems*. \$150,000.00.

2015-2017 General Dynamics, U.S. Army Research Laboratory (ARL). Principal Investigator: Dr. Daniel Barber (80%), Co-Principal Investigator(s): Dr. Julian Abich (10%), and Dr. Lauren Reinerman-Jones (10%). *Robotics Collaborative Technology Alliance (RCTA) Human Robot Interaction (HRI): Investigating Tactical Multi-Modal Soldier-Robot Exchange and the HRI of Unique Mobility*. CTA W911NF-10-2-0016 \$425,000.00.

2015-2017 General Dynamics, U.S. Army Research Laboratory (ARL). Principal Investigator: Dr. Daniel Barber (100%). *Robotics Collaborative Technology Alliance (RCTA) Integrated Research (IR): Platforms and Testbeds for Integrated Research - Multi-Modal Display*. CTA W911NF-10-2-0016. \$132,908.00.

2015-2015 National Science Foundation (NSF). Principal Investigator: Dr. Daniel Barber (100%). *I-Corps Participant: University of Central Florida I-Corps Sites Program: Enhancing Technology Commercialization to Develop a World-Class Innovation Ecosystem*. \$2,500.00.

2014-2015 General Dynamics, U.S. Army Research Laboratory (ARL). Principal Investigator: Dr. Daniel Barber (80%), Co-Principal Investigator(s): Dr. Stephanie Lackey (10%), and Dr. Lauren Reinerman-Jones (10%). *Robotics Collaborative Technology Alliance (RCTA) Human Robot Interaction (HRI): Investigating Tactical Multi-Modal Soldier-Robot Exchanges*. CTA W911NF-10-2-0016 \$150,000.00.

2014-2015 General Dynamics, U.S. Army Research Laboratory (ARL). Principal Investigator: Dr. Daniel Barber (100%). *Robotics Collaborative Technology Alliance (RCTA) Integrated Research (IR): Platforms and Testbeds for Integrated Research - Multi-Modal Display*. CTA W911NF-10-2-0016 \$200,000.00.

2013-2014 General Dynamics, U.S. Army Research Laboratory (ARL). Principal Investigator: Dr. Daniel Barber (50%), Co-Principal Investigator(s): Dr. Stephanie Lackey (40%), and Dr. Lauren Reinerman-Jones (10%). *Robotics Collaborative Technology Alliance (RCTA) Human Robot Interaction (HRI): Evaluating Tactical Command and Coordination Vocabulary and Protocols*. CTA W911NF-10-2-0016 \$147,000.00.

2010-2011 U.S. Army Research Development and Engineering Command (RDECOM). Principal Investigator: Daniel Barber (100%). *RAOS: TO#47: RoboLeader Supervisory Control Simulations (SCS) for the SOURCE ATO*. IDIQ \$76,000.00.

2008-2009 U.S. Army Research Development and Engineering Command (RDECOM) Simulation Training and Technology Center (STTC). Principal Investigator: Daniel Barber (100%). *RAOS: TO#23: Intuitive User Interfaces to Games and Virtual Worlds*. IDIQ W91CRB08D0015. \$32,268.00.

Co-Principal Investigator

2017-Present Nuclear Regulatory Commission (NRC). Principal Investigator: Dr. Lauren Reinerman-Jones (65%), Co-Principal Investigator(s): Dr. Daniel Barber (17.5%) and Dr. Jonathan Harris (17.5%). *Human Performance Test Facility – Task Order 1*. IDIQ, \$608,601.00.

2014-2017 U.S. Army Research Laboratory (ARL). Principal Investigator: Dr. Brian Goldiez (34%), Co-Principal Investigator(s): Dr. Daniel Barber (33%) and Dr. Lauren Reinerman-Jones (33%). *Robot-Aided Intelligence Surveillance and Reconnaissance (RAISR)*. CA \$1,429,278.30.

2012-2014 Nuclear Regulatory Commission (NRC). Principal Investigator: Dr. Lauren Reinerman-Jones (55%), Co-Principal Investigator(s): Dr. Daniel Barber (25%) and Dr. Stephanie Lackey (20%). *NRC Test Facility*. IDIQ, NRCHQ12C040058. \$635,267.00.

2012 Naval Air Warfare Center Training Systems Division (NAWCTSD). Principal Investigator: Dr. Lauren Reinerman-Jones (34%), Co-Principal Investigator(s): Dr. Daniel Barber (33%) and Dr. Stephanie Lackey (33%). *Automated Human and System Performance Assessment in Operational Environments*. STTR Phase I sub-contract to Stottler-Henke Associates, Inc. \$24,000.00.

2012-2013 Army Research Laboratory ARL). Principal Investigator: Dr. Stephanie Lackey (40%), Co-Principal Investigator(s): Daniel Barber (50%) and Dr. Lauren Reinerman-Jones (10%). *Robotics Collaborative Technology Alliance (RCTA) Human Robot Interaction (HRI): Evaluating Tactical Command and Coordination Vocabulary and Protocols*. \$170,000.00

2012-2013 U.S. Army Research Laboratory (ARL). Principal Investigator: Dr. Florian Jentsch (88%), Co-Principal Investigator(s): Dr. Stephen Fiore (2%), Dr. Randall Shumaker (5%), Dr. Daniel Barber (4%), and Dr. Stephanie Lackey (1%). *Robotics Collaborative Technology Alliance (RCTA) Human Robot Interaction (HRI): Shared Mental Models for Soldier-Robot (SR) Teaming*. CTA \$122,485.00.

2012-2013 U.S. Army Research Laboratory (ARL). Principal Investigator: Dr. Florian Jentsch (75%), Co-Principal Investigator(s): Dr. Stephen Fiore (4%), Dr. Randall Shumaker (6%), Dr. Daniel Barber (8%), and Dr. Stephanie Lackey (7%). *Robotics Collaborative Technology Alliance (RCTA) Human Robot Interaction (HRI): Situation Awareness in Human-Robot Teams*. CTA \$135,000.00.

2011-2014 U.S. Army Research Development and Engineering Command (RDECOM). Principal Investigator: Dr. Stephanie Lackey (25%), Co-Principal Investigator(s): Dr. Florian Jentsch (10%), Dr. Daniel Barber (25%), Brian Plamondon (5%), Eric Ortiz (25%), and Dr. Lauren Reinerman-Jones (10%). *Human Robot Interaction (HRI) Analysis for Training Simulations and Operational Neuroscience (HATS-ON)*. IDIQ W91CRB08D0015. \$2,793,416.00.

2011-2012 General Dynamics, Army Research Laboratory ARL). Principal Investigator: Dr. Stephanie Lackey (50%), Co-Principal Investigator(s): Daniel Barber (50%). *Robotics Collaborative Technology Alliance (RCTA) Human Robot Interaction (HRI): Gestures, Posture, and Haptics in Human Robot (HR) Communication*. CTA \$120,000.00.

2011-2012 General Dynamics, Army Research Laboratory ARL). Principal Investigator: Dr. Stephanie Lackey (50%), Co-Principal Investigator(s): Daniel Barber (50%). *Robotics Collaborative Technology Alliance (RCTA) Human Robot Interaction (HRI): Integrating Multi-Modal Human Robot (HR) Communications in Live and Virtual Environments*. CTA \$57,230.00.

2010-2011 General Dynamics, U.S. Army Research Laboratory (ARL). Principal Investigator: Dr. Stephanie Lackey (50%), Co-Principal Investigator(s): Daniel Barber (50%). *Robotics Collaborative Technology Alliance (RCTA) Human Robot Interaction (HRI): Integrating Multi-Modal Human Robot (HR) Communications in Live and Virtual Environments*. CTA \$34,548.25.

2010-2011 General Dynamics, U.S. Army Research Laboratory (ARL). Principal Investigator: Dr. Stephanie Lackey (50%), Co-Principal Investigator(s): Daniel Barber (50%). *Robotics Collaborative Technology Alliance (RCTA) Human Robot Interaction (HRI): Gestures, Posture, and Haptics in Human Robot (HR) Communications*. CTA \$66,450.00.

2010-2010 General Dynamics, U.S. Army Research Laboratory (ARL). Principal Investigator: Dr. Randall Shumaker (10%), Co-Principal Investigator(s): Dr. Stephen Fiore (9%), Dr. Annie Wu (9%), Dr. Peter Hancock (9%), Dr. Florian Jentsch (9%), Dr. Shaun Gallagher (9%), Dr. Ladislau Boloni (9%), Dr. Denise Nicholson (9%), Daniel Barber (9%), Dr. Stephanie Lackey (9%), and Dr. Lauren Reinerman-Jones (9%). *Robotics Collaborative Technology Alliance (RCTA) Planning Phase*. CTA \$67,290.00.

2009-2012. U.S. Office of Naval Research. Principal Investigator: Dr. Stephanie Lackey (50%), Co-Principal Investigator(s): Dr. Sae Schatz (25%) and Daniel Barber (25%). *Modeling the Effects of Temperament on Society (METS)*. Grant \$150,000.00.

2009-2010 U.S. Department of Defense (DoD). Principal Investigator: Dr. Denise Nicholson (35%), Co-Principal Investigator(s): Dr. Eduardo Salas (20%), Dr. Shawn Burke (25%), Dr. Randall Shumaker (10%), Daniel Barber (10%). *Human, Social, and Cultural Behavior – Intelligent Resource Operational Network (HSCB-IRON) for Training and Analysis*. W91CRB09C0026. \$550,000.01.

Co-Investigator or Senior Investigator

2011-2013 John Templeton Foundation. Principal Investigator: Dr. Shaun Gallagher. Co-Principal Investigator(s): Dr. Bruce Janz, Dr. Stephanie Lackey, Dr. Lauren Reinerman-Jones, Garret H Riggs, Dr. Stephen Fiore, and Eileen Smith. *Space, Science, and Spirituality: Simulating Awe and Wonder*. Role: Senior Investigator. Responsible for integration of physiological sensor data within simulation environment and development of tools to process data for statistical analyses.

2010-2011 Office of Naval Research (ONR). Principal Investigator: Stephanie Lackey. *Development of Pilot Training Technology for Analysis of Medical Datasets*. Role: Co-Investigator. Responsible for interacting with collaborators to aggregate and analyze data sets.

2009-2011 Office of Naval Research (ONR). Principal Investigator: Denise Nicholson. Co-Principal Investigator(s): Dr. Cali Fidopiastis and Dr. Larry Davis. *Perceptually-informed Virtual Environments (PerceiVE)*. STTR Phase I and II. Role: Senior Investigator. Responsible for simulation development and integration with EEG physiological sensors.

Refereed Journals

- Reinerman-Jones, L., **Barber, D.**, Hancock, P., Szalma, J. (2017). Human Interaction with Robotic Systems: Performance and Workload Evaluations. *Journal of Ergonomics*. doi: 10.1080/00140139.2016.1254282.
- Abich IV, J., **Barber, D.** (2017). The Impact of Human-Robot Multimodal Communication on Mental Workload, Usability, and Expectations. *Journal on Multimodal User Interfaces*. doi: 10.1007/s12193-016-0237-4.
- Wiltshire, T., Warta, S., **Barber, D.**, Fiore, S. (in press). Enabling Robotic Social Intelligence Through the Design of Artificial Cognitive Systems with Engineered Human Social-Cognitive Mechanisms. *Journal of Cognitive Systems Research*.
- Mercado, J.E., Rupp, M., Chen, J. Y.C., Barnes, M.J., **Barber, D.**, Procci, K. (2015). Intelligent Agent Transparency in Human-agent Teaming for Multi-UxV Management. *Journal of Human Factors and Ergonomics Society*.
- Barber, D.**, Reinerman-Jones, Matthews, G. (2014). Towards a Tactile Language for Human-Robot Interaction: Two Studies of Tacton Learning and Performance. *Journal of Human Factors and Ergonomics Society*. doi: 10.1177/0018720814548063.
- Matthews, G., Reinerman-Jones, L., **Barber, D.**, Abich IV, J. (2014). The Psychometrics of Mental Workload: Multiple Measures are Sensitive but Divergent. *Journal of Human Factors and Ergonomics Society*. doi: 10.1177/0018720814539505.

Book Chapters

- Stowers, K., Kasdaglis, N., Rupp, M., Chen, J., **Barber, D.**, Barnes, M. (2016). Insights into Human-Agent Teaming: Intelligent Agent Transparency and Uncertainty. In P. Savage-Knepshield and J. Chen (eds.), *Advances in Human Factors in Robots and Unmanned Systems*, Advances in Intelligent Systems and Computing 499, DOI 10.1007/978-3-319-41959-6_13.
- Lackey, S., **Barber, D.**, Reinerman-Jones, L.E., Ortiz, E., and Fanfarelli, J. (2014). Human Robot Communication. In K. Hale & K. Staney (Eds.) *Handbook of Virtual Environments*, 2nd ed. ISBN: 9781466511842.
- Vice, J., Skinner, A., Berka, C., Reinerman-Jones, L., **Barber, D.**, Pojman, N., Tan, V., et al. (2011). Perceptually-Informed Virtual Environment (PerceiVE). In D. Schmorow & C. Fidopiastis (Eds.), *Foundations of Augmented Cognition. Directing the Future of Adaptive Systems* (1st ed.). Orlando, FL: Springer.
- Barber, D.**, Reinerman-Jones, L., Lackey, S., & Hudson, I. (2011). Augmenting Robot Behaviors Using Physiological Measures. In D. Schmorow & C. Fidopiastis (Eds.), *Foundations of Augmented Cognition. Directing the Future of Adaptive Systems* (1st ed., pp. 567-572). Orlando, FL: Springer. Retrieved from <http://www.springerlink.com/index/0749J54312411843.pdf>.
- Barber, D.**, & Hudson, I. (2011). Distributed Logging and Synchronization of Physiological and Performance Measures to Support Adaptive Automation Strategies. In D. Schmorow & C. Fidopiastis (Eds.), *Foundations of Augmented Cognition. Directing the Future of Adaptive Systems* (1st ed., pp. 559-566). Orlando, FL: Springer. Retrieved from <http://www.springerlink.com/index/88071XR777827L64.pdf>.
- Reinerman-Jones, L., **Barber, D.**, Lackey, S., & Nicholson, D. (2010). Developing Methods for Utilizing Physiological Measures. In M. Tadeusz, K. Waldemar, & V. Rice (Eds.), *Advances in Understanding Human Performance: Neuroergonomics, Human Factors Design, and Special Populations*. Miami, Florida.
- Barber, D.**, Schatz, S., & Nicholson, D. (2010). AVATAR: Developing a Military Cultural Role-Play Trainer. In D. Schmorow & D. Nicholson (Eds.), *Advances in Cross-Cultural Decision Making*. Miami, Florida: CRC Press.
- Fidopiastis, C., Drexler, J., **Barber, D.**, Cosenzo, K., Barnes, M., Chen, J. Y. C., & Nicholson, D. (2009). Impact of Automation and Task Load on Unmanned System Operator's Eye Movement Patterns. In D. D. Schmorow, I. V. Estabrooke, & M. Grootjen (Eds.), *Foundations of Augmented Cognition, Neuroergonomics, and Operational Neuroscience* (pp. 229-238). San Diego, CA: Springer. doi:10.1007/978-3-642-02812-0_27.

- Brand, Y., Ebersoldt, M., **Barber, D.**, Chen, J.Y.C., Schulte, A., (2018). Design and Experimental Validation of Transparent Behavior for a Workload-adaptive Cognitive Agent. International Conference on Intelligent Human Systems Integration: Integrating People and Intelligent Systems (IHSI 2018), Dubai, United Arab Emirates, January 7-9, 2018.
- Schmitt, F., Roth, G., **Barber, D.**, Chen, J.Y.C., Schulte, A., (2018). Experimental Validation of Pilot Situation Awareness Enhanced through Transparency Design of a Scalable Mixed-Initiative Mission Planner. International Conference on Intelligent Human Systems Integration: Integrating People and Intelligent Systems (IHSI 2018), Dubai, United Arab Emirates, January 7-9, 2018.
- Barber, D.**, Best, A., (2017). Connected and Automated Vehicle Simulation to Enhance Vehicle Message Delivery. In the proceedings of the Applied Human Factors and Ergonomics (AHFE), Los Angeles, CA.
- Barber, D.**, Carter, A., Harris, J., Reinerman-Jones, L., (2017). Feasibility of Wearable Fitness Trackers for Adapting Multimodal Communication. In the proceedings of the Human Computer Interaction International (HCII), Vancouver, CA.
- Matthews, G., Reinerman-Jones, L., **Barber, D.**, Teo, G., Wohleber, R., Jinchao, L., Rose Panganiban, A. (2016). Resilient Autonomous Systems: Challenges and Solutions. In the proceedings of Resilience Week, IEEE.
- Oh, J., Zhu, M., Park, S., Howard, T.M., Walter, M.R., **Barber, D.**, Romero, O., Suppe, A., Navarro-Serment, L., Duvall, F., Boularias, A., Vinokurov, J., Keegan, T., Dean, R., Lennon, C., Bodt, B., Childers, M., Shi, J., Daniilidis, K., Roy, N., Lebiere, C., Hebert, M., Stentz, A. (2016). Integrated Intelligence for Human-Robot Teams. In the Proceedings of the International Symposium on Experimental Robotics (ISER), Tokyo, Japan.
- Teo, G., Reinerman-Jones, L., Matthews, G., **Barber, D.**, Harris, J., Hudson, I. (2016). Augmenting Robot Behaviors Using Physiological Measures of Workload State. In the proceedings of Human Computer Interaction International. Toronto, CA.
- Abich IV, J., **Barber, D.**, Elliott, L. E. (2016). An Initial Investigation of Exogenous Orienting Visual Display Cues for Dismounted Human-Robot Communication. In the proceedings of the 7th International Conference on Applied Human Factors and Ergonomics, Orlando, FL.
- Barber, D.**, Howard, T., Walter, M. (2016). A Multimodal Interface for Real-Time Soldier-Robot Teaming. In the proceedings of SPIE Defense, Security, and Sensing – Unmanned Systems Technology, Baltimore, Maryland USA, April 17-21.
- Kopinsky, R., Gupta, N., Ordonez, C., Sharma, A., Collins, E., **Barber, D.** (2016). Human guidance of mobile robots in complex 3D environments using smart glasses. In the proceedings of SPIE Defense, Security, and Sensing – Unmanned Systems Technology, Baltimore, Maryland USA, April 17-21.
- Kattoju, R., **Barber, D.**, Abich, J., Harris, J. (2016). Technological evaluation of gesture and speech interfaces for enabling dismounted soldier-robot dialogue. In the proceedings of SPIE Defense, Security, and Sensing – Unmanned Systems Technology, Baltimore, Maryland USA, April 17-21.
- Barber, D.**, Abich IV, J., Phillips, E., Talone, A., Jentsch, F., Hill, S. (2015). Field assessment of multimodal communication for dismounted human-robot teams. In the proceedings of the 59th Human Factors and Ergonomics Society Annual Meeting.
- Barber, D.**, Beck, C. (2015). Effects of Tacton Names and Learnability. In the proceedings of Human Computer Interaction International (HCII), Las Angeles, CA, August.
- Abich IV, J., **Barber, D.**, Reinerman-Jones, L. (2015). Experimental environments for dismounted human-robot multimodal communications. In the proceedings of Human Computer Interaction International (HCII), Las Angeles, CA, August.
- Hill, S. G., **Barber, D.**, Evans, A. W. (2015). Achieving the Vision of Effective Soldier-Robot Teaming: Recent Work in Multimodal Communication. HRI'15 Extended Abstracts, March 2–5, 2015, Portland, OR, USA. ACM 978-1-4503-3318-4/15/03. <http://dx.doi.org/10.1145/2701973.2702026>.
- Lackey, S.J., Maraj, C.S., **Barber, D.** (2014). Immersion, Presence, and Flow in Robot-Aided ISR Simulation-Based Training. In the proceedings of the 2014 Winter Simulation Conference, Savannah, GA, December 7 – 10.
- Reinerman-Jones, L., Parchment, A., Matthews, G., **Barber, D.**, Lackey, S.J. (2014). Cerebral Blood Flow Velocity and Stress as Predictors of Decision Making. In the proceedings of the 58th Human Factors and Ergonomics Society Annual Meeting, Chicago, Illinois, October 27 - 31.
- Mercado, J.E., Reinerman-Jones, L., **Barber, D.**, Leis, R. (2014). Investigating Workload Measures in the Nuclear Domain. In the proceedings of the 58th Human Factors and Ergonomics Society Annual Meeting, Chicago, Illinois, October 27 - 31.
- Leis, R., Reinerman-Jones, L., Mercado, J., **Barber, D.**, Sollins, B. (2014). Nuclear Power Plant Task Workload Across Repeated Sessions. In the proceedings of the 58th Human Factors and Ergonomics Society Annual Meeting, Chicago, Illinois, October 27 - 31.
- Reinerman-Jones, L.E., Matthews, G. Abich, J., & **Barber, D.** (2014). Psychophysiological Metrics for Workload are Demand-Sensitive but Multifactorial. Proceedings of the Annual International Meeting of the Human Factors and Ergonomics Society (HFES), Chicago, IL.
- Teo, G., Reinerman-Jones, L., **Barber, D.**, Hudson, I. (2014). Determining Language for Human Robot Navigational Commands. In the proceedings of the 58th Human Factors and Ergonomics Society Annual Meeting, Chicago, Illinois, October 27 - 31.

- Harris, J., **Barber, D.** (2014). Speech and Gesture Interfaces for Squad Level Human Robot Teaming. In the proceedings of SPIE Defense, Security, and Sensing – Unmanned Systems Technology, Baltimore, Maryland USA, May 5 - 9.
- Barber, D.**, Wohleber, R.W., Parchment, A., Jentsch, F., Elliott, L. (2014). Development of a Squad Level Vocabulary. In *Virtual, Augmented and Mixed Reality. Designing and Developing Virtual and Augmented Environments* (pp. 139-148). Springer International Publishing.
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- Wiltshire, T.J., **Barber, D.**, Fiore, S.M. (2013). Towards Modeling Social-Cognitive Mechanisms in Robots to Facilitate Human-Robot Teaming. In the proceedings of Human Factors and Ergonomics Society, San Diego, California, September 30 – October 4.
- Descheneaux, C. Reinermain-Jones, L., **Barber, D.** (2013). Hemispheric Differences and Spatial Ability in Robot to Human Tactile Communications. In the proceedings of Human Factors and Ergonomics Society, San Diego, California, September 30 – October 4.
- Barber, D.**, Lackey, S., Reinerman-Jones, L., Hudson, I. (2013). Visual and Tactile Interfaces for Bi-Directional Human Robot Communication. In the proceedings of SPIE Defense, Security, and Sensing - Unmanned Systems Technology, Baltimore, Maryland USA, April 29 – May 3.
- Lackey, S., **Barber, D.**, Reinerman, L., Badler, N. I., & Hudson, I. (2011). Defining Next-Generation Multi-Modal Communication in Human-Robot Interaction. Proceedings of the 55th Human Factors and Ergonomics Society Conference. doi:10.1177/1071181311551095.
- Reinerman-Jones, L., Taylor, G., Sprouse, K., **Barber, D.**, & Hudson, I. (2011). Adaptive Automation as a Task Switching and Task Congruence Challenge. Proceedings of the 55th Human Factors and Ergonomics Society Annual Meeting. doi:10.1177/1071181311551041.
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- Ortiz, E., **Barber, D.**, Stevens, J., & Finkelstein, N. (2009). Simulation to Assess an Unmanned System's Effect on Team Performance. The Interservice/Industry Training, Simulation & Education Conference (IITSEC). Orlando, FL.
- Barber, D.**, & Nicholson, D. (2009). Intelligent Resource Operational Network (IRON) for Cultural Modeling. 18th Conference on Behavior Representation in Modeling and Simulation (pp. 147-148). Sundance, UT.
- Varcholik, P., **Barber, D.**, & Nicholson, D. (2008). Interactions and Training with Unmanned Systems and the Nintendo Wiimote. The Interservice/Industry Training, Simulation & Education Conference (IITSEC) (Vol. 2008, pp. 1-9). Orlando, FL.
- Barber, D.**, Davis, L., Nicholson, D., Chen, J. Y. C., & Finkelstein, N. (2008). The Mixed Initiative Experimental (MIX) Testbed for Human Robot Interactions with Varied Levels of Automation. 26th Army Science Conference. Orlando, FL.
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- Barber, D.**, Davis, L., Kemper, D., Smith, P., & Nicholson, D. (2007). Collaborative Human Robot Interactions in Combined Arms Operations. 2007 International Symposium on Collaborative Technologies and Systems (pp. 88-92). Orlando, FL: IEEE. doi:10.1109/CTS.2007.4621742.
- Barber, D.**, Becker, B. C., & Gonzalez, F. G. (2006). Discover Vision: A Framework for Building, Evaluating, and Testing Performance Based Machine Vision Applications. Association for Unmanned Systems International (AUVSI) North America. Orlando, FL.
- Barber, D.**, Sims, V. K., Chin, M. G., Velie, M., Sushil, D. J., Pepe, A. A., Ellis, L. U., Finkelstein, N., & Shumaker, R. (2006). Anthropomorphism of textured faces. Proceedings of the Human Factors and Ergonomics Society, 50.
- Roberts, T., **Barber, D.**, Becker, B. C., & Gonzalez, F. (2005). Software design for an autonomous ground vehicle for the 13th annual intelligent ground vehicle competition. In D. P. Casasent, E. L. Hall, & J. Roning (Eds.), *Intelligent Robots and Computer Vision XXIII: Algorithms, Techniques, and Active Vision* (Vol. 6006, p. SPIE - The International Society for Optical Engineering). SPIE. doi:10.1117/12.630962.
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Best, A., Narang, S., **Barber, D.**, & Manocha, D. (2017). AutoVi: Autonomous Vehicle Planning with Dynamic Maneuvers and Traffic Constraints Technical Report, IEEE International Conference on Robotics and Automation (ICRA).

Childers, M., Lennon, C., Bodt, B., Pusey, J., Hill, S., Camden, R., Oh, J., Dean, R., Keegan, T., Diberardino, C., Karumanchi, S., Douillard, B., Gupta, N., Ordonez, C., Shill, J., Collins, E., Clark, J., **Barber, D.**, Duperret, J., Wenger, G., Zhu, M., Park, S., Koditschek, D., Johnson, A., Suppe, A., & Navarro, Serment, L. (July, 2016). US Army Research Laboratory (ARL) Robotics Collaborative Technology Alliance 2014 Capstone Experiment, ARL-TR-7729, US Army Research Laboratory.

Invited Presentations

Barber, D., Abich, J., & Reinerman-Jones, L. (May, 2015). Multimodal Communication for Dismounted Human-Robot Teams. Invited address at the Department of Defense Human Factors and Ergonomics Technical Advisory Group (DoD HFE TAG) Meeting 69.

Selkowitz, A., Boyce, M., Lakhmani, S., **Barber, D.**, Chen, J. Y.C. (May 2015). The Effects of Agent Transparency on Human Interaction with an Autonomous Squad Member. Invited address at the Department of Defense Human Factors and Ergonomics Technical Advisory Group (DoD HFE TAG) Meeting 69.

Barber, D. (February, 2015). Florida Unmanned Systems Business Exp. Invited panel sessions on Science, Technology, Engineering, and Mathematics (STEM). Wyndham Orlando Resort, Orlando, FL.

Reinerman-Jones, L.E., **Barber, D.**, & Teo, G. (May, 2014). Development of a Squad Level Vocabulary for Human-Robot Interaction. Invited address at the Department of Defense Human Factors and Ergonomics Technical Advisory Group (DoD HFE TAG) Meeting 68.

Service

Society of Automotive Engineers (SAE) AS-4 JAUS Committee Participant 2009-Present

Reviewer for IEEE World Haptics 2017.

Reviewer for Workshop on Model Learning and Human-Robot Communication (MLHRC) 2016.

Reviewer for IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) 2015.

Reviewer for Workshop on Model Learning for Human-Robot Communication, Robotics: Science and Systems 2015.

Reviewer for Journal of Computers in Human Behavior 2016.

Patents

System and Method for Visual Correlation of Digital Images. U.S. No. 9,665,796 B2, dated May 30, 2017.

Media & Coverage

Barber, D., Metcalf, D. (2017). "Self-driving car simulator at UCF to help shape national policy." WFTV9, August 4, 2017. <http://www.wftv.com/video?videoId=581908406&videoVersion=1.0>.

Barber, D. (2015). "UCF Professors learn real lessons from simulated autonomous car." Orlando Sentinel. <http://www.orlandosentinel.com/features/education/os-ucf-self-driving-simulation-20151222-story.html>.

Barber, D. (2013). STTC Supports Successful IST Robotics Club. Team Orlando, retrieved March 22, 2014 from <http://www.teamorlando.org/sttc-supports-successful-ist-robotics-club/>.

Hudson, I., Barber, D. (2013). ARL Supported Robotics Club Takes 2nd Place, retrieved March 22, 2014 from <http://www.teamorlando.org/arl-supported-robotics-club-takes-2nd-place/>.

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UCF (2009). UCF Opportunity Minutes – Robotics Club. Retrieved March 22, 2014 from <http://youtu.be/VpiJncuAig0>.

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Awards

2014 – University of Central Florida Millionaire's Award
2014 – Lake Highland Preparatory School's ASPIRE Research Program Outstanding Mentor
2013 – University of Central Florida Innovator Award
2012 – University of Central Florida Innovator Award
2012 – Lake Highland Preparatory School's ASPIRE Research Program Outstanding Mentor

Teaching

Dissertation Chair

Lakhmani, Shan (Spring 2018). Modeling and Simulation, University of Central Florida.

Dissertation Committee Member

Descheneaux, Charles (Fall 2017). Modeling and Simulation, University of Central Florida.

Ryan Kopinsky (Summer 2017). Mechanical Engineering, Florida State University.

Stowers, Kimberly (Summer 2017). Human Factors Psychology, University of Central Florida.

Harris, Jonathan (Spring 2017). Industrial Engineering, University of Central Florida.

Maxwell, Douglas B (Summer 2015). Modeling and Simulation, University of Central Florida.

Salcedo, Julie (Summer 2014). Modeling and Simulation, University of Central Florida.

Directed Research

Shan Lakhmani (Fall 2015 – Summer 2017)

Irwin Hudson (Fall 2015)

Ravikiran Kattoju (Fall 2015)

Michael Schwartz (Fall 2014)

Guest Lecture

University of Central Florida - ESI 6891 - Industrial Engineering Research Methods Fall 2017

Computer Skills

Programming Languages

- Expert in C/C++ and Java
- Proficient in Python, C#, HTML, XML, PHP

Software Libraries

- Qt5, OpenCV, Boost, OpenSceneGraph, wxWidgets, zlib, LZMA, bzip2, libpng, libjpeg, TinyXML, TinyXML2, MathGL, json-cpp, libvlc, JAUS++

Development Environments and Build Tools

- Visual Studio, CMake, QtCreator, Eclipse, Netbeans

Operating Systems

- Windows, Linux (Ubuntu), and OSX

Software Applications

- Microsoft Office, SPSS, Subversion, SSH, Doxygen