

Dr. MATTHEW JOHNSON
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Bio: Dr. Matthew Johnson is a research scientist in the area of human-machine teaming for technologies such as robotics, software agents, and autonomous vehicles, in a variety of domains including disaster response, space applications, aviation, and military operations. Matt came to the Florida Institute for Human & Machine Cognition (IHMC) out of the military where he served as a Naval Aviator, flying both fixed wing aircraft and helicopters. Matt continued in the Navy Reserves retiring after 20 years of service. Matt obtained his undergraduate degree in Aerospace Engineering at the University of Notre Dame prior to entering the Navy. He obtained a Master's of Science in Computer Science from Texas A&M – Corpus Christi while on active duty. He completed his PhD from Delft University in the Netherlands; his thesis proposed a new approach to human-machine system design called Coactive Design. Matt has been a researcher for over 16 years with IHMC. He has worked on numerous projects including the Oz flight display for reducing the cognitive workload in the cockpit, DARPA Augmented Cognition for improving human performance, and several human-robot coordination projects for both NASA and the Department of Defense. He played a leadership role in IHMC's 2nd place finish at the international robotics competition known as the DARPA Robotics Challenge. He has worked with Nissan on fleet management of autonomous vehicles and Aerovironment on the management of multiple unmanned aircraft. Matt was also part of the DARPA ALIAS project focused on developing a robotic copilot. He is currently working with his local police department on development of their drone program. Matthew's research interest focuses on improving performance in human-machine systems through design of more effective human-machine teamwork.

Education

Institution	Major	Degree	Year
Delft University of Technology, Delft, The Netherlands	Computer Science	Ph.D., Cum Laude	2014
Texas A&M – Corpus Christi, Corpus Christi, Texas	Computer Science	M.S.	2001
University of Notre Dame, South Bend, Indiana	Aerospace Engineering	B.S.	1992

Research Interests

Autonomy, Human-Machine System Design, Human-Machine Teamwork, Human-Robot Interaction, Trust, Robotics, Control Theory, Interface Design, Artificial Intelligence, Data visualization, Software Engineering.

Professional Experience

2014- present	Research Scientist, Institute for Human and Machine Cognition
2002-2014	Research Associate, Institute for Human and Machine Cognition
2001-2012	U.S. Navy Reserves Flight Instructor, Training Air Wing Five
2000-2001	U.S. Navy Senior Officer of IT Division, Training Air Wing Four
1992-2001	U.S. Naval Aviator Active Duty

Selected Recent Projects

- Developing Drone program for local police department (2018-present)
- Working with AeroVironment to develop operations centers for large scale unmanned aircraft operations (2017-present)
- *Humanoid Avatar Robots for Co-exploration of Hazardous Environments* (2012-2018) – Co-principal Investigator for this NRI project exploring the role and effectiveness of humanoid robots as avatars in hazardous environments. Developing humanoid behaviors and advanced interface concepts to enable complex work using both Boston Dynamics Atlas robot and NASA's Valkyrie robot.

- *Aircrew Labor In-Cockpit Automation System (ALIAS)* (2015-2016) – Subcontractor to Humatics/Aurora Flight Services developing a robotic copilot. Our role was developing a knowledge acquisition process that captures the knowledge necessary for all aspects of flight and is extensible across heterogeneous airframes.
- *Context Augmented Robotic Interaction Layer* (2014-2017) – Co-principal investigator collaborating with CHI systems on this NASA SBIR developing a framework for representing context, and for using this context to enable robot adaptive decision-making and behavior in NASA mission related scenarios.
- *Fleet Management Services* (2015-2016) – Co-principal Investigator for this collaboration with Nissan and NASA. IHMC works on hierarchical interfaces in support of managing fleets of autonomous vehicles and those assisting them.
- *DARPA Robotics Challenge* (2012-2015) – Co-principal Investigator for IHMC and lead human-machine system designer. Our team placed first or second in all three phases of this international competition with over 46 teams competing across three years of competition.

Recent Lectures, Tutorials and Presentations

- 02 OCT 2018 NASA Blue Sky Presentation: What Makes a Good Robotic Surgery Assistant?
- 11 SEP 2018 NASA Webcast: Automation Myths and the Virtues of Human-Machine Teaming
- 09 JUL 2018 Panelist for USN National Academies' workshop on Multi-Domain Autonomous Systems
- 12 MAR 2018 NASA Autonomous Systems Capability Leadership Team talk on Human-Machine Teaming
- 06 FEB 2018 Two day workshop on Function and Hazard Assessment for UAS operations
- 30 NOV 2017 Embry-Riddle President's Symposium: "The Future Role of AI and Autonomy for UAS"
- 22 AUG 2017 HRT Summer School invited speaker: "Human-Machine Teaming"
- 25 MAY 2017 John's Hopkins Applied Physics Lab: "The Future of Humans & Machines"

Selected Publications (complete list at <https://www.ihmc.us/groups/mjohnson/>)

- Johnson, M., Bradshaw, J. M., & Feltovich, P. J. (2017). **Tomorrow's Human-Machine Design Tools: From Levels of Automation to Interdependencies.** *Journal of Cognitive Engineering and Decision Making.*
- Johnson, M., Shrewsbury, B., Bertrand, S., Calvert, D., Wu, T., Duran, D., Stephen, D., Mertins, N., Carff, J., Rifenburgh, W. and Smith, J. (2017). **Team IHMC's Lessons Learned from the DARPA Robotics Challenge: Finding Data in the Rubble.** *Journal of Field Robotics, 34(2), 241-261.*
- Johnson, M., Bradshaw, J. M., Hoffman, R. R., Feltovich, P. J., & Woods, D. D. (2014). **Seven Cardinal Virtues for Human-Machine Teamwork: Examples from the DARPA Robotic Challenge.** *IEEE Intelligent Systems, November/December 2014 (vol. 29 iss. 6), pp. 74-80.*
- Johnson, M., J.M. Bradshaw, P. J. Feltovich, C. M. Jonker, M. B. van Riemsdijk, and M. Sierhuis. (2104) **Coactive design: Designing support for interdependence in joint activity.** *Journal of Human-Robot Interaction, Vol. 3, No. 1, pp. 43-69.*
- Bradshaw, J. M., Hoffman, R. R., Johnson, M., & Woods, D. D. (2013). **The Seven Deadly Myths of "Autonomous Systems."** *IEEE Intelligent Systems, 28(3), 54-61. doi:10.1109/MIS.2013.70*
- Bradshaw, J. M., P. J. Feltovich, and M. Johnson. (2011) **"Human-Agent Interaction."** Chap. 13 In *Handbook of Human-Machine Interaction*, edited by G. Boy. 293-302: Ashgate.

Student Mentoring and Advising

- Georgia Tech PhD committee member (2018-present)
- Help mentor seven Naval Post Graduate Masters students (2015-2017)
- MIT PhD committee member (2015-2016)

Synergistic Activities

- UWF Intelligent Systems PhD program Coordinator for IHMC
- Assisted in organization of NASA Autonomous Crew Operations TIM (Aug 2018)
- CalvIO Industrial Robotics board member
- Organizer of workshop on Human-Agent-Robot-Teamwork 2015
- Science Saturday Youth Education Teacher