

# Tye Brady

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**Summary** Accomplished leader, strategic thinker, and engineering professional with over 25 years of hands-on experience in team leadership, technical management, and system design for advanced instrumentation, autonomous vehicles, and robotic systems.

**Mission** To make a positive impact through discovery, innovative engineering, and exemplary leadership for the betterment of family, community, and planet. I do this by creating an environment of innovation, promoting a culture of kindness, and valuing the goodness, strength, and differences of people.

## Position Summary

- Co-founder MassRobotics
- Chairman of Massachusetts Autonomous Air Vehicle Research and Innovation Consortium (MAAVRIC)
- Distinguished Member of Technical Staff at Draper Laboratory
- National Academies Technology Committee Member in Entry, Descent, and Landing
- European Space Agency (ESA) Track Chair for *Miniaturization and New Technology Trends*
- AIAA/IEEE National Track Chair for *Spacecraft and Launch Vehicle Systems Technologies*
- AIAA/IEEE Session Chair for *Commercial Spacecraft and Robotics*
- Technical Director of a highly successful autonomous precision landing system (GENIE)
- Group Leader at Draper Laboratory
- Principal Investigator for a novel spacecraft relative navigation system
- Principal Systems Engineer of a highly maneuverable on-orbit spacecraft
- Project Engineer for HETE and HETE-II spacecraft programs
- Principal Electrical Engineer responsible for design and test of space-proven electronic systems

## Accomplishments Summary

### MassRobotics

- ✓ Co-founded Massachusetts based innovation center focused on robotics.
- ✓ Co-developed and communicated MassRobotics vision, material, and operational plans to key stakeholders capturing staff and external sponsorship for establishment of organization.
- ✓ Facilitated founding partner relationships to MassRobotics and helped capture over 50 regional companies for sponsorship, endorsement, and donation of services and material to realize vision.

### MAAVRIC

- ✓ Chaired MassDevelopment appointed steering committee that recommended innovative methods for the Commonwealth of Massachusetts to capture burgeoning drone marketplace.
- ✓ Lead author on multi-organizational white paper that recommended investment and resource utilization for newly acquired Joint Base Cape Cod drone test range.

### Innovation at Draper

- ✓ Initiated, developed, and led Lab wide survey on desirable innovation process, potential new business areas, and future challenges at Draper culminating in an extensive white paper on innovation published to senior management and the Officers of the Corporation.
- ✓ Envisioned, developed and co-led a new innovation pilot program (SkyRocket) that generated broad reaching interest with over half of the population voting for their favorite IR&D ideas. The pilot program resulted in four fully developed research ideas, 92 prospective ideas, and identified a large number of innovators within the Lab to senior management.

### NASA Morpheus

- ✓ Served as expert consultant to NASA Morpheus navigation team resulting in a series of increasingly successful free flights, culminating in a full system demonstration of an autonomous landing system.
- ✓ Developed and supported critical flight technologies including AGNC embedded software execution, navigation functionality, and a custom designed vision based navigation instrument (GIDE).

### NASA Osiris-Rex

- ✓ As part of NASA appointed expert panel, examined overall spacecraft design and made recommendations for improvement of the development and execution of \$1B asteroid sample program.

### NASA Flight Opportunities

- ✓ Led small, agile team to develop, implement, and test highly capable and extensible real time GNC system known as GENIE to perform precision lunar and terrestrial landings for a variety of vehicles.

- ✓ Developed and captured unique opportunity to fly Draper real-time GENIE GNC system onboard a terrestrial rocket successfully.

NASA Project M

- ✓ Defined vision and led a small capture team that developed an integrated hardware and software navigation and guidance prototype solution to land human and robotic vehicles on the Moon.
- ✓ Successfully demonstrated free flight rocket flight for less than 7 weeks of effort and less than 250K of NASA expenditure, helping capture 750K of additional Draper funding.

NASA ALHAT

- ✓ Chief architect for overall ALHAT program working at a national level involving 3 NASA centers and over 70 technical staff. ALHAT Program received a Gold Star by the National Research Council, the only such NASA technology development program to achieve such a distinction.
- ✓ Demonstrated systems process expertise for large architectural problem and maintained systems perspective on precise and safe lunar landing technology development, authoring vision package, concept of operations, and driving requirements.

ISC

- ✓ Technical leader and patent author responsible for a novel, fully successful, on-orbit attitude and rate sensor that performed world's first successful operation of a MEMS gyro in space coupled with the world's first demonstration of an Active Pixel Sensor (APS) star camera in space.
- ✓ Successfully led all technical aspects of technology transition of Inertial Stellar Compass (ISC) to commercial partner culminating in patent license and contracted agreement between parties.

Other

- ✓ Appointed to the National Academies technology steering committee for expertise in Entry, Descent, and Landing. Final report will guide NASA technology investment for the next 15 years.
- ✓ Served as the operational assessment technical lead on the NASA Lunar Exploration Architecture Group (LEAG) steering committee that selected the top 50 lunar sites for targeting on the Lunar Reconnaissance Orbiter (LRO) mission.
- ✓ Recipient of NASA's 2009 Exceptional Public Service Medal (EPSM) for outstanding technical leadership. EPSM is a prestigious award given to nongovernment employees for exceptional contributions to NASA's mission.
- ✓ Helped increase Draper profile through marketing, promotion, and branding of Laboratory landing expertise through interviews including Space News, MIT Technology Review, Popular Mechanics, NASA TV, YouTube, WCVB, NECN, Discovery Channel, Mass Tech Times, Twitter, & Slashdot.org.

**Education**      **Massachusetts Institute of Technology**      **Cambridge, MA**  
 Master of Science: Aeronautics and Astronautics Engineering      1999

**Boston University**      **Boston, MA**  
 Bachelor of Science: Aerospace Engineering      1990

**Experience**      **Charles Stark Draper Laboratory, Inc.**      **Cambridge, MA**  
Distinguished Member of the Technical Staff      2011-Present

With Draper Laboratory as a founding partner, developed and co-founded MassRobotics establishing a new not-for-profit organization to serve as a world-class platform for robotic innovation. Sought and facilitated key external partnerships to promote growth and realize sizable vision. Recruited key personnel, developed strategic vision, and both designed and executed detailed operational plans to form a world class robotics community across a range of industry value propositions.

Worked directly with CEO to establish a new commercially faced business unit within Draper to promote and capture advanced robotic sensing and perception methods for use on a variety of programs. Proposed and won over \$5M of external funding to develop technologies and autonomous flight methods for a highly dynamic vehicle across a spectrum of unstructured environments. Established a new internal laboratory and developed a variety of sensing and highly dynamic vehicle prototypes to advance robotic and sensing perception technology readiness.

Led numerous strategic initiatives focused on innovation process, rapid prototyping, and generation of new ideas across variety of program disciplines. Reported directly to senior management and interfaced with multiple levels of staff culminating in extensive whitepaper on effective innovation within the Lab.

Technical Director of GENIE team that developed for NASA a fully embedded closed loop integrated Autonomous Guidance, Navigation and Control (AGNC) hardware/software system to perform multiple

closed loop Vertical Takeoff Vertical Landing (VTVL) rocket flights. Field-tested GENIE system over multiple rocket vehicles, trajectories, and test campaigns with great success and numerous press citations.

Space Systems Engineering Group Leader responsible for engineering staff working a variety of commercial, civil, and military space programs. Responsibilities included performing performance reviews, developing career objectives, and matching staff to projects.

Principal Member of the Technical Staff

2007-2011

Technical Director for Autonomous Landing and Hazard Avoidance Technology (ALHAT) program that developed an integrated Autonomous Guidance, Navigation and Control (AGNC) hardware and software system with capability to perform global lunar landings under a wide variety of lighting conditions. Responsibilities as an ALHAT primary architect included managing Draper technical staff, overseeing technical matters, writing technical reports, and developing and executing fundamental system trades for NASA.

Senior Member of the Technical Staff

2000-2007

Technical Director for a \$32M Lunar Access program to develop an autonomous precision lunar landing system for NASA Explorations program. Managed all aspects of engineering with considerable focus on systems engineering and systems process. Successfully merged program and technical products with \$52M NASA Johnson Space Center ALHAT program that directly supports Explorations Lunar Lander Project Office (LLPO).

Technical Director for multiple spacecraft proposals intended for LEO, GEO, and L2 type orbits. Worked closely with external customers to develop basic ideas into feasible technical concepts suitable for proposal. Developed and fostered space hardware roadmap suitable for military space and small satellite markets.

Served as Technical Leader and chief architect for a revolutionary integrated MEMS gyro and star camera assembly called the Inertial Stellar Compass (ISC). Lead author for technical proposal that won Draper a \$10M program. Conceptualized, designed, and led ground validation activity for ISC through all phases of flight program. Chief Architect of mission operations architecture for ISC flight system under NASA ST-6 guidance. Lead patent author for ISC (United States Patent 7216036).

Served as Technical Leader and a primary author for NASA proposal that awarded Draper Laboratory \$3M for CEV related studies. Managed team of engineers and MIT faculty that produced mission architectures and vehicle design concepts for future manned missions to the Moon and Mars.

Principal Investigator for \$500K internal research project that conceptualized a low power, entirely passive, relative navigation system for use in future autonomous rendezvous spacecraft applications. Led engineering team through various system processes and design reviews to ensure a robust proof of engineering concept.

**Spacecraft Solutions, Inc.**

**Southborough, MA**

Consultant

1999-2000

Founded spacecraft consulting company that specialized in spacecraft digital design, spacecraft instrumentation, and board-level electronic design. Proven expertise and extensive experience with Actel FPGA tools and spacecraft design techniques. Designed and tested key digital functionality for three internationally based Earth stations used for the HETE-II spacecraft. Provided real-time debugging of critical launch and post-launch anomalies associated with spacecraft.

**Massachusetts Institute of Technology**

**Cambridge, MA**

Principal Spacecraft Engineer

1994-1998

HETE (High Energy Transient Explorer) Project Engineer responsible for key engineering detail of this small, low cost, astronomy spacecraft. Interfaced regularly with responsible subsystem engineer to understand, develop, and test spacecraft. Extensive debugging of attitude, power, communications, mechanical, computer, ground station, and ground support equipment issues. Managed system issues to ensure a robust, nearly autonomous, spacecraft. Directly supported HETE environmental tests that included vibration, shock, and thermal-vacuum tests. Oversaw and extensively participated in HETE launch operations campaign from initial delivery through launch. Interfaced with launch contractor on a regular basis explaining key engineering detail. Reported directly to Principal Investigator.

Senior Spacecraft Engineer 1992-1994  
Co-designer of a CCD based flight instrumentation system known as the LB. The LB was utilized as a UV and optical CCD detector instrument onboard HETE, a pathfinder for the Chandra CCD Imaging Spectrometer (ACIS) program, and also used for CCD calibration and data acquisition efforts within the CCD laboratory. Advised ACIS design team in areas of software, analog, digital, and systems engineering regarding CCD data acquisition issues and LB use.

Spacecraft Engineer 1990-1992  
Developed testing procedures and performed integration of Analog Electronics (AE) onto ASCA spacecraft. Designed suite of data acquisition hardware and software tools to characterize flight CCD chips. Calibrated AE with flight CCDs.

**Honors** NASA Outstanding Contribution Award 2014  
National Academies Appointment for Entry, Descent, and Landing Expertise 2010  
NASA Exceptional Public Service Medal, NASA 2009  
Distinguished Performance Award, Draper Laboratory 2003  
Engineering Vice-President's Annual Award for Best Technical Publication, Draper Laboratory 2003  
Winner of Draper Laboratory Innovation Challenge 2003

**Patents** Integrated Rate Isolation Sensor, Patent Number US 8,290,744 2012  
Integrated Inertial Stellar Attitude Sensor, Patent Number US 7216036 B2 2007

**Publications** STEINER, T., BRADY, T., HOFFMAN, J., "Graph-based Terrain Relative Navigation with Optimal Landmark Database Selection", *IEEE Aerospace Conference*, Big Sky, Montana, 7 – 14 March 2015.

GREENBAUM, A., BRADY, T., DENNEHY, C., "Understanding International GNC Trends", *IEEE Aerospace Conference*, Big Sky, Montana, 7 – 14 March 2015.

BRADY, T., PASCHALL, S., STREETMAN, B., "Guiding Rocket Science with Passion, Purpose, and Team", *GNC 2014: 9<sup>th</sup> International ESA Conference on Guidance, Navigation & Control Systems*, Porto, Portugal, 2 – 6 June 2014.

PASCHALL, S., BRADY, T., STREETMAN, B., "Demonstrating Autonomous Planetary Landing with GENIE", *GNC 2014: 9<sup>th</sup> International ESA Conference on Guidance, Navigation & Control Systems*, Porto, Portugal, 2 – 6 June 2014.

COHANIM, B., BRADY, T., "Onboard and Self-Contained Landing Site Selection for Planetary Lander/Hoppers", *IEEE Aerospace Conference*, Big Sky, Montana, 1 – 8 March 2014.

PASCHALL, S., BRADY, T., "Rocket Validation of the ALHAT Autonomous GNC Flight System", *IEEE Aerospace Conference*, Big Sky, Montana, 1 – 8 March 2014.

GREENBAUM, A., BRADY, T., DENNEHY, C., "Finding the Gaps in Space GNC Hardware", *IEEE Aerospace Conference*, Big Sky, Montana, 1 – 8 March 2014.

STEINER, T., BRADY, T., "Vision-based Navigation and Hazard Detection for Terrestrial Rocket Approach and Landing", *IEEE Aerospace Conference*, Big Sky, Montana, 1 – 8 March 2014.

COHANIM, B., BRADY, T., "Hazard Detection for Small Robotic Landers and Hoppers", *IEEE Aerospace Conference*, Big Sky, Montana, 2 – 9 March 2013.

PASCHALL, S., BRADY, T., "Demonstration of a Safe and Precise Planetary Landing System On-board a Terrestrial Rocket", *IEEE Aerospace Conference*, Big Sky, Montana, 3 – 10 March 2012.

SMITH, et al., "The Exoplanet Mission to Detect Transiting Exoplanets with a CubeSat Space Telescope", *25<sup>th</sup> Annual AIAA/USU Conference on Small Satellites*, Logan, Utah, 8 – 11 August 2011.

BRADY, T., BAILEY, E., CRAIN, T., PASCHALL, S., "ALHAT System Validation", *8<sup>th</sup> International ESA Conference on Guidance and Navigation Control Systems*, Carlsbad, Czech Republic, 5 – 12 June 2011.

BRADY, T., PASCHALL, S., DEMARS, K., CRAIN, T., BISHOP, R., "GENIE Flight Test Results and System Overview", *AAS 34<sup>th</sup> Rocky Mountain Guidance and Control Conference*, Breckenridge, Colorado, 5 – 9 February 2011.

BRADY, T., "Expanding the Spacecraft Application Base with MEMS Gyros", *SPIE Photonics West Conference*, San Francisco, California, 22 – 27 January 2011.

BRADY, T., PASCHALL, S., CRAIN, T., "GN&C Development for Future Lunar Landing Missions", *AIAA Guidance, Navigation, and Control Conference*, Toronto, Ontario, Canada 2 – 5 August 2010.

BRADY, T., PASCHALL, S., "The Challenge of Safe Lunar Landing", *IEEE Aerospace Conference*, Big Sky, Montana, 6 – 13 March 2010.

CRAIN, T., BISHOP, R., BRADY, T., "Shifting the Inertial Navigation Paradigm with MEMS Technology", *AAS 33th Rocky Mountain Guidance and Control Conference*, Breckenridge, Colorado, 6 – 10 February 2010.

BRADY, T., PASCHALL, S., ZIMPFER, D., EPP, C., ROBERTSON, E., "Hazard Detection Methods for Lunar Landing", *IEEE Aerospace Conference*, Big Sky, Montana, 7 – 14 March 2009.

COHANIM, B., FILL, T., PASCHALL, S., MAJOR, L., BRADY, T., "Approach Phase Delta-V Considerations for Lunar Landing", *IEEE Aerospace Conference*, Big Sky, Montana, 7 – 14 March 2009.

MAJOR, L., BRADY, T., PASCHALL, S., "Apollo Looking Forward: Crew Task Challenges", *IEEE Aerospace Conference*, Big Sky, Montana, 7 – 14 March 2009.

PASCHALL, S., BRADY, T., FILL, T., SOSTARIC, R., "Lunar Landing Trajectory Design for Onboard Hazard Detection & Avoidance", *AAS 32th Rocky Mountain Guidance and Control Conference*, Breckenridge, Colorado, 2 – 6 February 2009.

BRADY, T. "Next Generation Inertial Stellar Compass", *Space Flight Mechanics Conference*, Savannah, Georgia, 8 – 12 February 2009.

EPP, C., ROBERTSON, E., BRADY, T., "Autonomous Landing and Hazard Avoidance Technology (ALHAT)", *IEEE Aerospace Conference*, Big Sky, Montana, 1 – 8 March 2008.

PASCHALL, S., BRADY, T., COHANIM, B., "A Self Contained Method for Safe and Precise Lunar Landing", *IEEE Aerospace Conference*, Big Sky, Montana, 1 – 8 March 2008.

FOREST, L., COHANIM, B., BRADY, T., "Human Interactive Landing Point Redesignation for Lunar Landing", *IEEE Aerospace Conference*, Big Sky, Montana, 1 – 8 March 2008.

BRADY, T., SCHWARTZ, J., "ALHAT System Architecture and Operational Concept", *IEEE Aerospace Conference*, Big Sky, Montana, 3 – 10 March 2007.

BRADY, T., SCHWARTZ, J., TILLIER, C., "System Architecture and Operational Concept for an Autonomous Precision Lunar Landing System", *AAS 30th Rocky Mountain Guidance and Control Conference*, Breckenridge, Colorado, 3 – 7 February 2007.

BRADY, T., BUCKLEY, S., LEAMMUKDA, M., "Space Validation of the Inertial Stellar Compass", *21st Annual AIAA/USU Conference on Small Satellites*, Logan, Utah, 12 – 15 August 2007.

BRADY, T., BUCKLEY, S., TILLIER, C., "Ground Validation of the Inertial Stellar Compass", *IEEE Aerospace Conference*, Big Sky, Montana, 6 – 13 March 2004.

BRADY, T., et al. "The Inertial Stellar Compass (ISC): A Multifunctional, Low Power, Attitude Determination Technology Breakthrough", *AAS 26th Rocky Mountain Guidance and Control Conference*, Breckenridge, Colorado, 5 – 9 February 2003.

BRADY, T., et al. "The Inertial Stellar Compass: A New Direction in Spacecraft Attitude Determination", *16th Annual AIAA/USU Conference on Small Satellites*, Logan, Utah, 12 – 15 August 2002.

**Member**

America Institute of Aeronautics and Astronautics (Associate Fellow)  
Association of Unmanned Vehicle Systems International (Senior Member)

**Interests**

Cycling, soccer, skiing, guitar, and golf.