



Florida Institute of Technology
High Tech with a Human Touch™

Overview of the **Florida Institute of Technology**

**Federal Aviation Administration
Center of Excellence for Commercial Space Transportation
Technical Meeting
Boulder, CO**

November 9, 2011

Dr. Tristan Fiedler

**Associate Vice President for Research
FAA COE CST CESTAC Liaison**

Dr. Samuel Durrance

**Professor, Physics and Space Sciences
PI, Florida Tech, FAA COE CST**

Dr. Daniel Kirk

**Associate Professor and Associate Department Head, Mechanical and Aerospace
Engineering
CO-PI, Florida Tech, FAA COE CST**



Florida Institute of Technology
High Tech with a Human Touch™

Florida Tech Overview

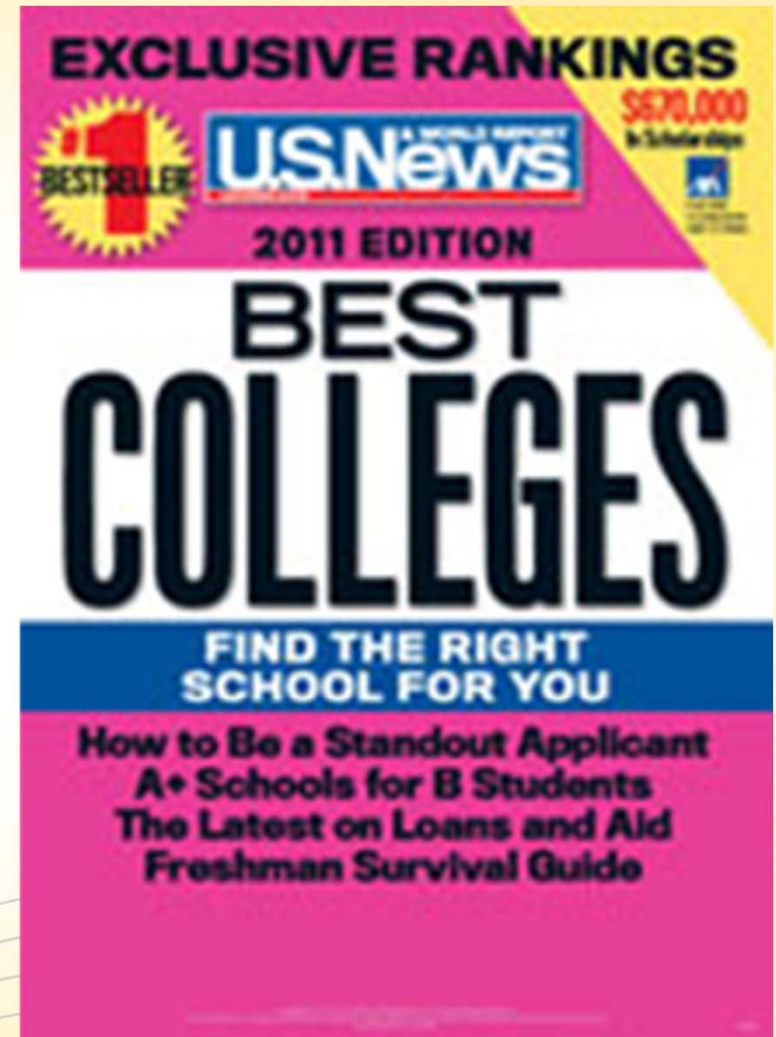


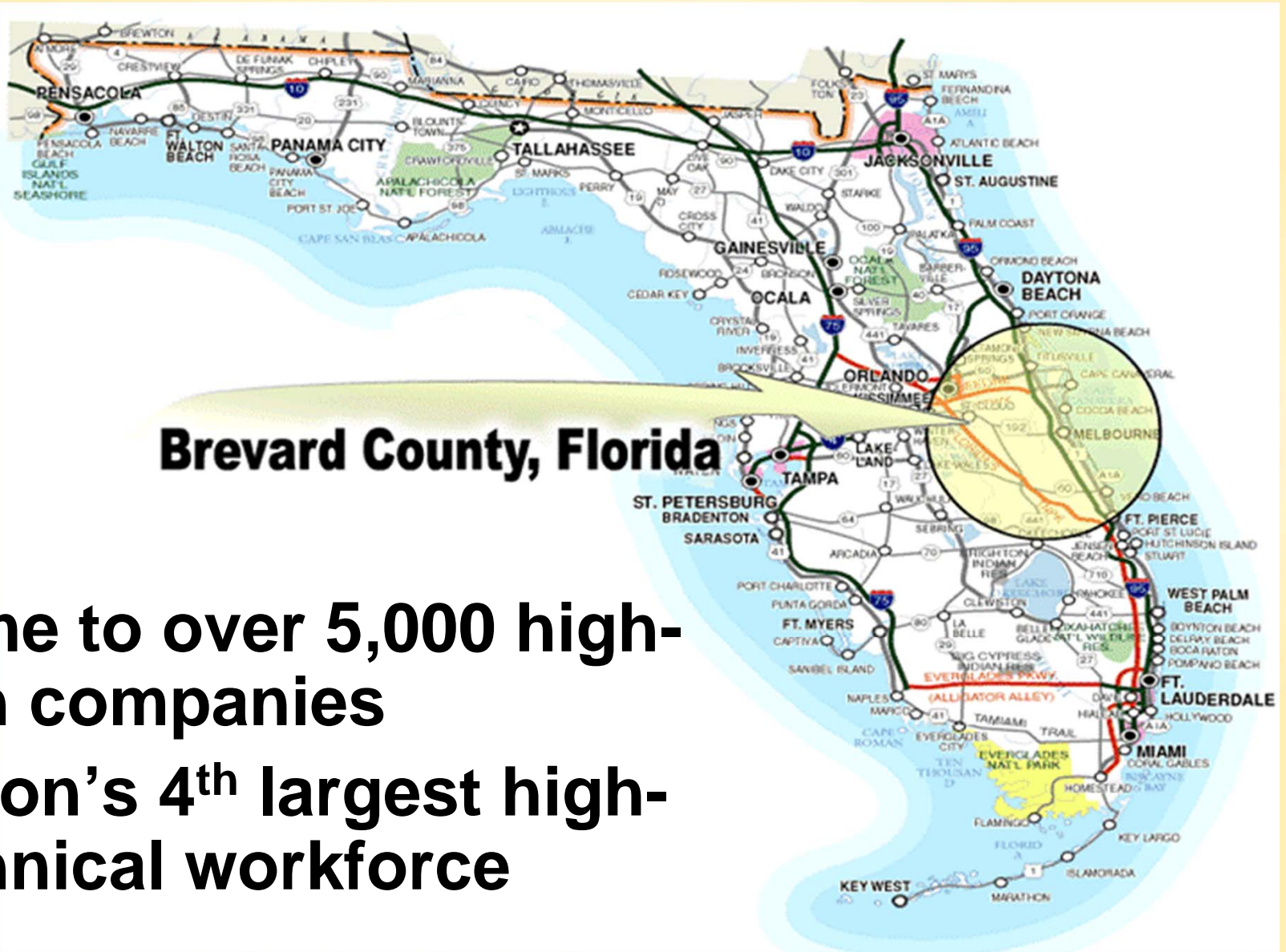
- Founded in 1958
- Five colleges
 - Engineering
 - Aeronautics
 - Science
 - Business
 - Psychology and Liberal Arts
- Programs
 - 184 degree programs
 - 84 master's degrees
 - 23 doctoral degrees



Florida Institute of Technology
High Tech with a Human Touch™

August 2010 issue of *U.S. News & World Report* college rankings, the university was named a Tier 1 Best National University, among just 197 colleges and universities.





Brevard County, Florida

- Home to over 5,000 high-tech companies
- Nation's 4th largest high-technical workforce



Major Aerospace Employers in Florida

- **Harris** – HQ in Melbourne, employs 8,000 in Brevard
- **Northrop-Grumman** – employs 1,400 in Melbourne
- **Boeing** – employs ~1,000 in Brevard
- **Siemens** – employs 3,500-4,000 in Orlando
- **DRS** – est. 500 in Brevard
- **NASA/KSC** – 2,000 civil servants with large fraction of engineering positions
- **Lockheed-Martin Missile & Fire Control** – employs ~6,000 in central FL
- **Pratt & Whitney**



Florida Institute of Technology
High Tech with a Human Touch™

Vibrant Student Body



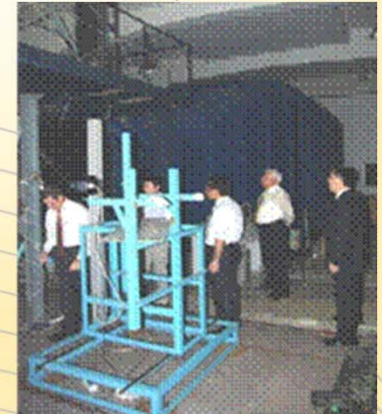
- 13,000+ students: main campus, extended sites and online
- Representing all 50 states and more than 100 countries
- International flavor to our community
- Small Student-faculty ratio
- Over 100 student organizations
- NCAA Division II varsity athletics competes in Sunshine State Conference



Florida Institute of Technology
High Tech with a Human Touch™

International Collaborations

- Beihang Univ (Beijing University of Aeronautics and Astronautics), China
- Taiwan-Florida Higher Education Conferences
- Shanghai Dian Ji University, China
- Shanghai Electric Corp., China (a World 500 Corp.)
- 2+2 BSME programs with Huazhong University of Sci & Tech and Shanghai Ocean University since 2008
- Numerous universities in France, Belgium, and Germany





Florida Tech Research Overview

- Major resurgence in number of proposals for funded research
- Total Research and Sponsored Program Expenditures: \$14M+
- Total Open Research and Sponsored Program Contracts: \$94M+
- Number of principal investigators doubled in last three years to 90 faculty members; four have received prestigious NSF Career Awards



COLLEGE OF ENGINEERING CENTER FOR SPACE COMMERCIALIZATION



Contact

Daniel Kirk, Ph.D.
Interim Director of the Center for Space Commercialization
Associate Professor
Propulsion
(321) 674-7622 • dkirk@fit.edu

Fredric Ham, Ph.D.
Dean, College of Engineering
Harris Professor
Intelligent Systems
(321) 674-8020 • fhm@fit.edu

Hector Gutierrez, Ph.D.
Associate Professor
Mechatronics and Instrumentation
(321) 674-7321 • hgutier@fit.edu

Stephane Bucaille, Ph.D.
Assistant Professor
Model Based Systems Engineering
(321) 674-8425 • sbucaille@fit.edu

Adrian Peter, Ph.D.
Assistant Professor
Intelligent Systems, Information Analysis and Exploitation
(321) 674-8417 • apeter@fit.edu

William Allen, Ph.D.
Associate Professor
Information Assurance
(321) 674-8856 • wallen@cs.fit.edu

Ju Zhang, Ph.D.
Assistant Professor
Thermal Systems
(321) 674-7058 • jzhang@fit.edu

Mission Statement

To identify, promote and support the use of space to provide goods or services of commercial value, and to support U.S. aerospace industries and NASA needs toward a profitable commercialization of space

Center Need and Overview

- Space industry re-organization has created unique market conditions for the development and commercialization for technologies developed in space.
- New methodologies are required to develop space missions with proven return on investment.
- Center will foster collaboration among researchers from highly diversified scientific, engineering and business communities, including universities, businesses and government entities.

Center Objectives

- Support U.S. aerospace industry and NASA needs toward a profitable commercialization of space
- Coordinate mission profile definitions and validation of return on investments
- Identification of relevant technologies or methodologies, development of and elaboration of associated roadmaps
- Promotion of achievements for beneficial use by national agencies or private industries

Current Projects

- Mars Orbiter Electrical Systems Interfaces Design using Model Based Systems Engineering Methodology, with JPL
- Polar Imaging CubeSat Mission and Spacecraft Design using Model Based Systems Engineering Methodology, with Harris
- Liquid Behavior in Zero Gravity, with NASA, Aurora and MIT
- Fiber Optics Instrumentation for Rocket Vehicle Applications, with NASA

The Center for Space Commercialization complements Florida Tech's role in the Federal Aviation Administration's Center of Excellence for Commercial Space Transportation.

For more information contact Dr. Daniel Kirk, Interim Center Director—dkirk@fit.edu

College of Engineering Center for Space Commercialization

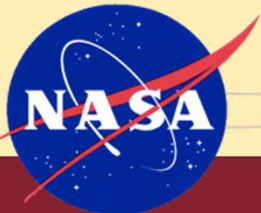
- Identify, promote and support use of space to provide goods/services of commercial value
- Support aerospace industries and NASA



Florida Institute of Technology
High Tech with a Human Touch™

Aerospace Systems And Propulsion (ASAP) Laboratory

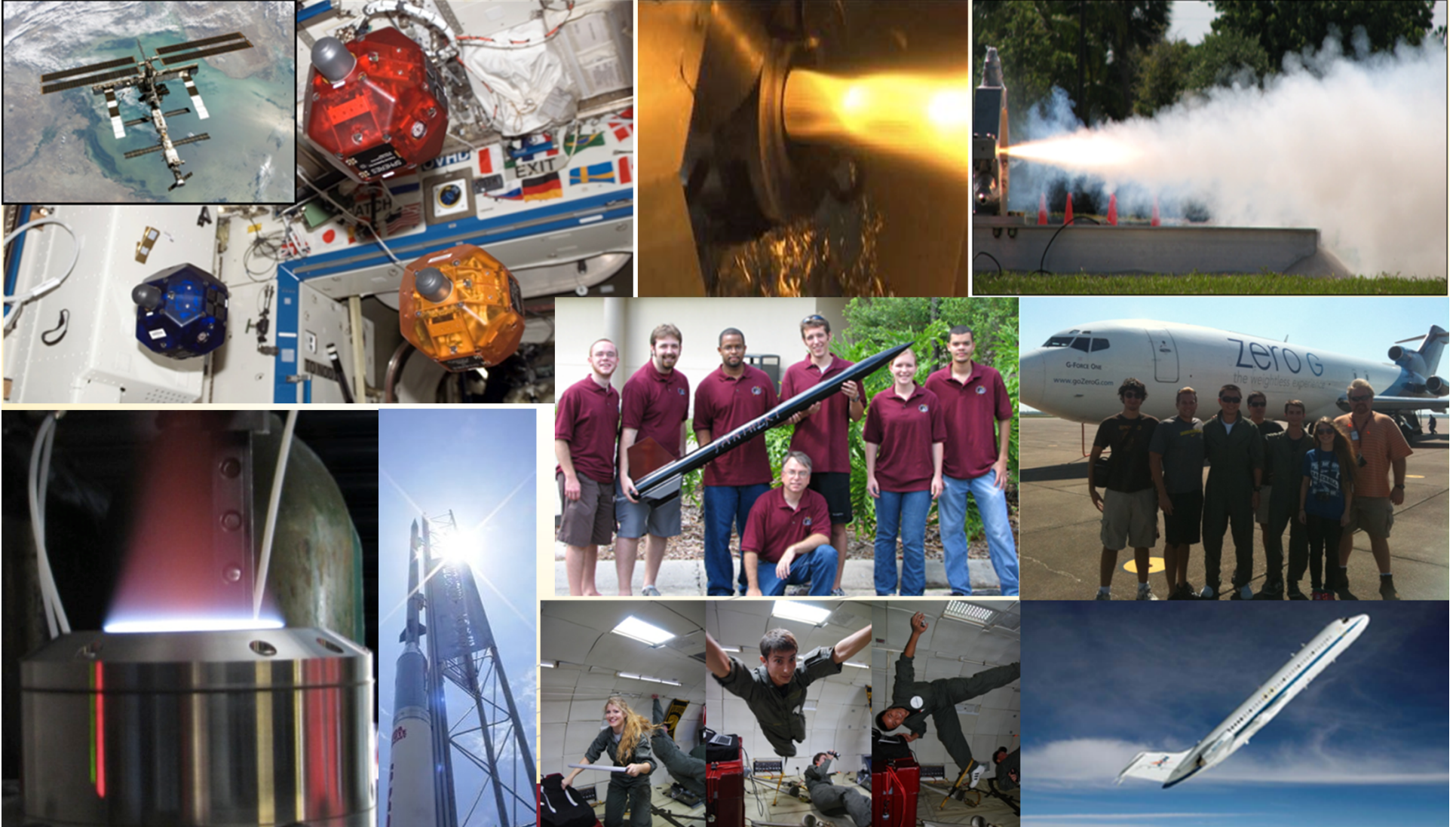
- Mission of ASAP Lab is to support development and integration of advanced propulsion systems
- Over 3.5 million dollars of funding from NASA, United States Air Force, Office of Naval Research, and National Science Foundation
- Over 70 journal and conference publications





Florida Institute of Technology
High Tech with a Human Touch™

ASAP Laboratory



Spacecraft Systems Laboratory

Dr. Stephane Bucaille, sbucaille@fit.edu
Dr. Daniel Kirk, dkirk@fit.edu
Dr. Hector Gutierrez, hgutier@fit.edu
Dr. William Arrasmith, warrasmi@fit.edu



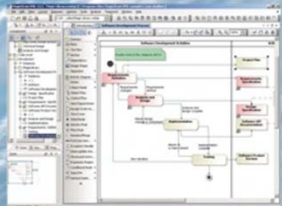
Florida Institute of Technology
High Tech with a Human Touch™



Multi-disciplinary collaboration between Electrical and Computer Engineering, Engineering Systems and Mechanical and Aerospace Engineering

Laboratory objectives:

- Develop a Model Based Systems Engineering approach, using SysML language, adapted to spacecraft systems development
- Offer flexible and collaborative processes and tools for definition, development, simulation and validation of future missions and spacecraft systems



Project examples:

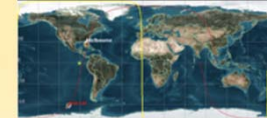
- Design of a small spacecraft capturing and processing pictures of both poles (Harris)
- Design and prototype of a "mission observer" cubesat (JPL)
- EMC/RF susceptibility and emissions for payload and spacecraft
- Micro-gravity testing and evaluation platform aboard reduced-gravity aircraft



HARRIS

JPL

College of Engineering Spacecraft Systems Laboratory



- NASA Jet Propulsion Laboratory is Model Based Systems Engineering (MBSE) approach for its future developments and programs
- To design, using the MBSE approach, to manufacture, integrate and validate spacecraft systems



FAA COE CST: Current Task

- 247. Air & Space Traffic Considerations for CST
- PI: Dr. Nathaniel Villaire
- Graduate Student: Nicole Maillet
- Presenting today (November 9) at 16:45 – 17:00



Summary

- Florida Tech has strong performance history of working with industry, academia, NASA
- Exploring additional ways to further engage Florida industry into COE