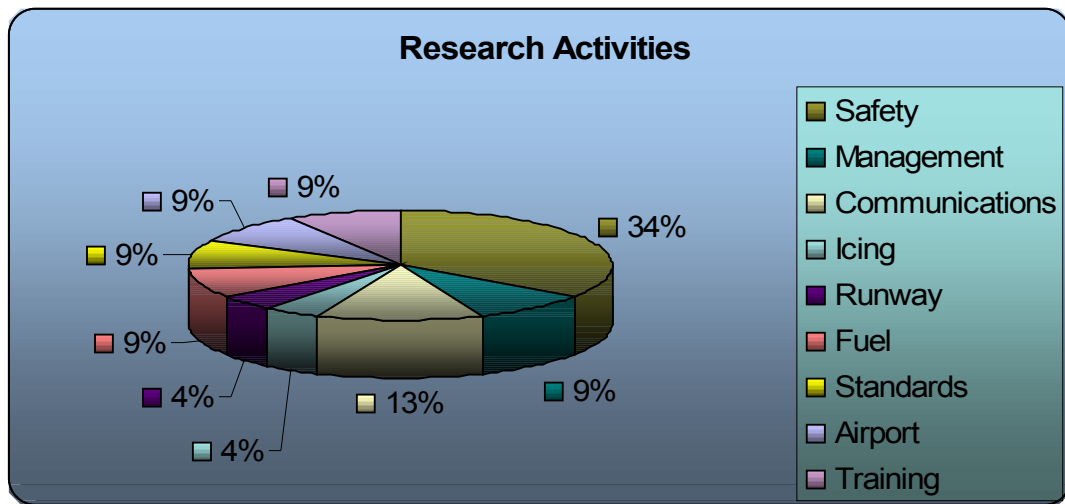


Center of Excellence for
General Aviation
Established June 2001

Embry-Riddle Aeronautical University (Lead)
University of Alaska
University of North Dakota
Wichita State University

The Federal Aviation Administration (FAA) established a Center of Excellence (COE) in the technology area of general aviation (GA) in 2001. General aviation, commonly known as GA, is defined as all aviation other than military and commercial airlines. GA aircraft range from small, single-engine planes to mid-size turboprops to the larger turboprops capable of intercontinental non-stop flying. General aviation supports business and recreation, and serves a diversity of needs from emergency medical evacuations to border patrols, fire fighting, state governments, universities, companies and individuals.

The Center for General Aviation Research (CGAR) is concerned with the following GA research areas: safety, management, communications, icing, runways, fuel system safety technologies, aircraft standards, training of pilots and inspectors and airport studies. The distribution of current CGAR research activities is indicated in the chart below.



The FAA awards to CGAR are through 50-50 matching grants and the utilization of an indefinite delivery indefinite quantity (IDIQ) contract vehicle. The contracts will consist of both cost sharing and 100% funded IDIQ's. In July 2004 the Center for General Aviation Research (CGAR) consisting of the University of Alaska, Embry Riddle Aeronautical University, Wichita State University and the University of North Dakota. Each signed a new three year cooperative agreement with the FAA, marking the start of the phase two implementation to work together with the FAA on General Aviation Research needs.

The Center for General Aviation Research (CGAR) continues efforts to work partnerships with private industry and state agencies to address common needs in general aviation research. The GA COE has supported two of the largest General Aviation events, Sun & Fun in Lakeland, Florida and the EAA fly-in at Oshkosh, WI promoting the efforts of the Center in general aviation research through community awareness. Through several outreach programs at the University of Alaska and Florida A&M University, the Center has been actively involved in educational efforts to attract the students /aviators of tomorrow into University educational programs.

The FAA awarded \$1.4M in FY07 grants and contracts for CGAR

Sponsoring Organization: Airport and Aircraft Safety R&D Division
FAA-GA Program Manager: Peter Sparacino (609-485-5430)

COE Core Team – Points of Contact

Prof. Steven Hampton, co-director, ERAU, 386-226-6725
Prof. Paul Lindseth, co-director, UND, 701-777-2917
Prof. Billy Connor, co-director, UAF, 907-474-7497
Prof. Leonard Kirk, co-director, UAA, 907-786-7224
Prof. John Tomblin, co-director, WSU, 316-978-5234

CGAR Program Office:

Mike Edwards, Director of Business Development, 386-323-8083
Deborah Burke, Finance, 386-226-4952
Karen Forte, Contracts Administrator, 386-226-7745
Danielle Lauritsch, Communications and Planning, 386-323-8083

Office of the Center of Excellence for General Aviation
600 S. Clyde Morris Blvd.
Daytona Beach, Fl. 32114
E-mail address: dbcgar@erau.edu

Center of Excellence in General Aviation Organization

<u>COE Industrial Partners</u>	<u>COE Core Team</u>	<u>COE Advisory Group</u>
Aero Shell	Embry-Riddle Aeronautical University – Daytona Beach and Prescott	Aircraft Owners and Pilot’s Association (AOPA)
Aircraft Welding Works	University of Alaska – Anchorage and Fairbanks	Experimental Aircraft Association (EAA)
Alaska Airmen’s Association	University of North Dakota	National Business Aircraft Association (NBAA)
Alaskan Aviation Safety Foundation	Wichita State University	General Aviation Manufacturing Association (GAMA)
Avidyne		National Association of State Aviation Directors (NASAO)
Bombardier Aerospace		American Association of Airport Executives (AAAE)
Cessna Aircraft Corporation		
Elite Air Shares		
Eclipse		
ESCO		
Goodrich		
Garmin		
Hartzell		
Jeppesen		
Lancair		
Raytheon Aircraft Company		
SMA		
The Alaska Science and Technology Foundation		
The Boeing Company		
Vector Training Systems		

Active Projects

Project Title	University	<u>PI</u>
Helicopter Terrain Awareness Warning System (TAWS) and Enhance Vision Systems (EVS)	ERAU	Rocky Graziano
Evaluation of Training Course Variants for the “Qualification for Technically Advanced Aircraft”	ERAU	Steve Hampton
Wildlife Strike Database and Website Maintenance and Expansion of Graphics Applications to Web Search for General Aviation	ERAU	Archie Dickey
Joint Training Standards Development for New Technology GA Aircraft	ERAU	Michele Summers
Conduct of Upset Recovery Flight Training for General Aviation Safety	ERAU	Richard (Pat) Anderson
Remote Airport Lighting System (RALS)	UAA	Michael R. Inman
Training Standards Development for GA Aircraft	ERAU	Michele Summers
Enhanced Jet Exhaust Mixing to Reduce Jet Aircraft Engine Noise	WSU	Roy Myose
Technical Services for Databases and Websites	ERAU	Archie Dickey
Business Jet Loads Data Acquisition	UND	Doug M. Marshall
Development of an Aviation Weather Database Highlighting Weather Encounters (Phase I)	ERAU	M. Bazargan
Establish a North American Bird Strike Advisory System (NABSAS)	ERAU	Archie Dickey
Evaluating the Effectiveness of ADS-B in the Collegiate Flight Training	ERAU/UND	Schumacher/Northam
Detection and Prevention of Carbon Monoxide Exposure in GA Aircraft	WSU	Hossein Cheraghi
Operation Loads Monitoring of Firefighting Airplanes	WSU	Kamran Rokhsaz
Structural Usage Monitoring and Flight Regime Recognition Algorithm	ERAU	Richard (Pat) Anderson
Gap Analysis/Risk Analysis for UAS Propulsion Systems	ERAU	Tim Wilson
Regulatory Gap Analysis for Detect, Sense, and Avoid	ERAU	Tim Wilson
Command, Control and Communication for Unmanned Aircraft Systems	ERAU	Tim Wilson
Octane Enhancers from Crop Oils (Aviation-Grade Ethanol for Improved performance and Safety in Civilian and Military Aircraft)	UND	Wayne Seames
Helicopter Advanced Navigation Research Flight Training	UND	Leslie Martin
Visual Guidance-Remote Airfield Lighting	UA-A	Michael R. Inman

Completed Accomplishments

Project Title	University	PI
Terminal Operations Safety Research Project-Landing and Holding Short (LAHSO)	ERAU	John Johnson
CGAR Strategic Plan for Self Sufficiency	ERAU	Abe Harraf
To Produce Center of Excellence-GA Video	UND	Henry Borysewicz
Taxiway Centerline Deviation Study	UAF	Leonard Kirk
Development of Analytical Methods to Predict crash impact Responses of General Aviation Aircraft Seat/Occupant/Restraint System	WSU	Dr. Hamid
Florida A & M University Summer Camp	FAMU	Robert R. Klein
Security Plan for General Aviation	ERAU, UA, FAMU, UND, WSU	Dr. Tim Brady, Dean College of Aviation, ERAU-DB
Measurements of Icing Conditions in Western Atlantic Stratocumulus	UND	Michael R. Poellot
Evaluation of Gravel Runway Surface Conditions and Their Effects on Aircraft Performance During Winter Operations	UAF	Lutfi Raad, PhD.
Development and Calibration of Model for Analysis of Safety of 14CFR137 Agricultural Aircraft Operations	ERAU, UND	Dr. Seth Young (corresponding), ERAU
Development and Implementation of a Data Based Capacity Prediction Tool to Facilitate Increased Airport Throughout	ERAU	Ken Fleming
To Establish a Special Emphasis Outreach Program at the University of Alaska	UAF	Leonard Kirk
A Framework for Revalidation of Airport Standards	FAMU	Robert R. Klein
Airport Capacity Prediction and Conditions and Their Effects on Aircraft Performance During Winter Operations	ERAU	Ken Fleming
FAA Multiengine Refresher Training	ERAU	Richard P. Theokas
Outreach Program in Aviation at the University of Alaska- Fairbanks	UAF	Lutfi Raad
Aviation Safety Education and Research at Florida A&M University	FAMU	Venkitaswamy Raju, PhD.
Advanced Flight Control Systems Development for Safety Enhancements and Certification Aspects	WSU	James E. Steck

P-Pamphlet Rewrite	ERAU	Joseph Clark
Ethanol as a Fuel for General Aviation	UND	Frank Argenziano
Review of the FITS Program: Program tasks, goals, and pilot training initiatives	WSU	Alex Chaparro
Engineered Material Arresting System (EMAS)	UAF	Lutfi Raad
Defining the Optimal Mix of Aircraft and Flight Training Devices in Aviation Safety Inspector Introduction Training	ERAU	Richard P. Theokas
Safety Impact of the Capstone Program	ERAU	M. Bazargan
Automated Laser-Based Bird Dispersion System	UND	James Dunlop
Airworthiness Inspector Training	ERAU	Steve Hampton
Airport Funding Strategies	ERAU	Massoud Bazargan
FAA Airman Notification, Seminar & Event Tracking and Online Education	ERAU	Steve Hampton
Aviation-Grade Ethanol Development	UND	Paul Lindseth
LAHSO Data Collection-Phase II	ERAU	John Johnson
Conduct of Aviation Safety Inspector Training for Multiengine Airplane, Instrument and Performance Refresher in Light Twin Aircraft and Flight Training Devices	ERAU	Richard P. Theokas
Simulation of Reduced Separation Helicopter Routes in NY TRACON	ERAU	Ken Fleming
Phase II Aviation Safety, Education and Research	FAMU	Yves Anglade
GA Aircraft: In-flight Load Data Collection and Analysis Project	ERAU	Richard (Pat) Anderson
Technical Assistance with Capstone Phase II Avionics	UAA	Leonard Kirk
Effect of ADS-B on Near Mid-Air Collision Rates of GA Aircraft	ERAU	Richard P. Theokas
Statistical Analysis for General Aviation Accidents	ERAU	M. Bazargan

Analysis and Evaluation of Green LED Threshold lights	ERAU	Stephan Kahne
Joint Training Standards Development- FAA Industry Standards Program	ERAU	Frank Ayers
Remote Airport Lighting Systems (RALS)	UA-A/ERAU	Mike Inman
Technology Survey on UAS Propulsion Systems	ERAU	Timothy Wilson
Compression Ignition Engine Certification Issues	ERAU	Timothy Wilson
Course Development for Qualification Training for Technically Advanced Aircraft	ERAU	Steve Hampton
Evaluation Instructor Training Course	ERAU	Steve Hampton
Investigation of the Optimal Mix of Aircraft and Flight Training Devices In Aviation Safety Inspector Indoctrination Training	ERAU	Steve Hampton
Conduct of Aviation Safety Inspector (ASI) Training for Multi-engine Aircraft	ERAU	Steve Hampton
GA Airport Funding Strategies-Phase II	ERAU	Massoud Bazargan
UAS Detect, Sense, and Avoid	UAA	Leonard Kirk
Regulation Study on Commercial UAS Vehicle Design	UAA	Leonard Kirk
ASI Course Development	ERAU	Mark Friend

*Key:

ERAU Embry Riddle Aeronautical University
 WSU Wichita State University
 UA A/F University of Alaska Anchorage & Fairbanks
 UND University of North Dakota
 FAMU Florida A&M University

Phase I Completed Projects

Terminal Operations Safety Research Project-Landing and Holding short

This project was an effort that involved graduate students, under supervision of graduate faculty, collecting data for the project operating tow video cameras, recording the position of aircraft – on or above runway threshold to stop – at taxiway exit, with a RADAR device used to record aircraft speeds during final approach, touchdown, and rollout. The tapes were reviewed and stored at the Aviation Safety Center and the data recorded in a database (hardware and software supplied by ERAU).

Investigator: John Johnson, ERAU

Taxiway Centerline Deviation Study

The taxiway centerline deviation research project provided an in depth study regarding deviation from centerline of aircraft, and the effect this may have on taxiway standards in the area of width and separation, and existing taxiway networks. The study included the use of equipment provided by the FAA and already installed at Anchorage International Airport. The project included the following: a.) Weekly checks for laser alignment b.) Bi-weekly data downloads c.) Data Reduction d.) Bi-weekly data transfer e.) Maintain a journal of activity with photos f.) Development of software routines to sort data by various aircraft type.

This effort represented a cooperative agreement between the University of Alaska Anchorage, Aviation Technology Division, the Anchorage International Airport Authority, the State of Alaska Department of Transportation and Public facilities, and the FAA Technical Center, is designed to be a mutually beneficial effort.

Investigator: Leonard Kirk, University of Alaska

Development of Analytical Methods to Predict crash impact Responses of General Aviation Aircraft Seat/Occupant/Restraint System

This project developed procedures and capabilities for analytical methods and models to predict the dynamic response of GA aircraft structures, seat-occupant-restraint systems and interior structural members to crash impacts.

Investigator(s): Dr Hamid Lankarani, WSU

Security Plan for General Aviation

A methodology was created for improving general aviation security in the United States. The plan included: (1) a survey of the general aviation security landscape, (2) a thorough review of all applicable literature, (3) a study of the security concerns of the professional associations that deal with general aviation, (4) discovery of security technology applicable to general aviation, (5) a discussion of possible short-term, mid-term, and long-term security strategies for general aviation, (6) a matrix of recommendations that will address policy and procedure, regulatory and certification issues, technology applications, phased implementation, and funding issues

The center developed the plan by working together; with industry groups and the FAA to cohesively develop a plan that addressed security issues related to general aviation.

Investigator: Dr. Tim Brady, ERAU Daytona

Measurements of Icing Conditions in Western Atlantic Stratocumulus

The Center for General Aviation Research has a diverse fleet of aircraft that includes a UND Citation (a twin-engine fanjet aircraft) that has been modified for atmospheric research, UND has

operated this research platform since 1980, conducting studies in cloud microphysics, dynamics and electrification, air pollution, turbulence, aircraft icing and low-level wind shear. This research effort required the aircraft to be flown in a number of field projects for the study of aircraft icing, including the Winter Icing and Storms Program, NEXRAD/TDWR icing algorithm development, the Canadian Atlantic Storms Project, and icing certification for an aircraft manufacturer.

Investigator: Michael R. Poellot, UND

Evaluation of Gravel Runway Surface Conditions and Their Effects on Aircraft Performance During Winter Operations

This evaluation stemmed from the fatal aircraft accident in Dryden, Ontario, in 1989. The Dryden Commission of Inquiry investigated the disaster and recommended the need to establish technically accurate means of defining surface conditions of runways and their effect on aircraft safety. The efforts studied in this research effort included the surface traction characteristics of gravel runways during spring breakup and assessing the influence of existing runway conditions such as slush, ruts, and potholes on aircraft performance. This determined the influence of adverse wind coupled with runway surface conditions on aircraft maneuverability and performance during landing. By doing so they developed meaningful correlations between data in this study and data from JWRFMP, which created a practical methodology for reporting runway conditions and other relevant information to GA pilots necessary for safe aircraft operations.

Investigator(s): Dr Lutfi Raad, UAF

Development and Calibration of Model for Analysis of Safety of 14CFR137 Agricultural Aircraft Operations

The project described was undertaken in accordance with the Federal Aviation Administration (FAA) to assess and analyze the practices of aviation activity operating under 14CFR137 – “Agricultural Aircraft Operations”. Specifically, this project helped develop and calibrate a computer model, using Administration recommended software, to assess and analyze safety requirements and potential hazards associated with agricultural aircraft operations. The project involved familiarization with all appropriate Civil Federal Regulations associated with agricultural aviation activity, identification of agricultural aircraft operators and their professional organizations, familiarization of FAA recommended software, development of model, data collection, and model calibration and validation. A comprehensive report on research performed and a calibrated model for use by the FAA towards fulfilling its mission of promoting a safe aviation industry was authored.

Investigator: Dr. Seth Young, ERAU Daytona

To Establish a Special Emphasis Outreach Program at the University of Alaska

This project expanded the relationship between The University of Alaska Anchorage (UAA) and the workforce in the aviation industry. The UAA Aviation Technology Division, is a land-rant institution, has about 16,000 students, and produces more than 2,000 graduates annually. The

university's baccalaureate academic programs include, among others, arts and sciences, engineering, business, nursing, and aviation technology. The university has a long history of working with industry and government in developing and promoting diversity in the technical and managerial workforce of the State of Alaska. UAA would like to expand its role in workforce diversity in the aviation industry. This proposal recommends implementation of a program in Aviation Education at the University of Alaska Anchorage that significantly enhances the human resource base in aviation by enhancing diversity. FAA's current research initiatives in aviation at UAA (including the present Capstone research project) have helped generate a great deal of interest in aviation studies at UAA.

An investment on the part of FAA in promoting minority student participation in aviation education and a matching investment on the part of UAA, Alaskan Native corporations, and minority-owned businesses will enhance such participation, and will produce major dividends to the human capital of the country. A grant of the order of \$25,000 for the first year to promote aviation education to Alaskan Native high school students, recruit them for degree programs in aviation technology, and to assist Alaskan Native students with college costs is requested.

Investigator: Leonard Kirk, University of Alaska

A Framework for Revalidation of Airport Standards

This project developed a new framework for validating airport standards for general aviation. The framework of this effort provided a logical extension of the established procedures and conceptual models that already exist within the Federal Aviation Administration (FAA). The research was carried out on behalf of the Center of Excellence for General Aviation Research (CGAR) and the Florida A&M University faculty. Industry partners and the associates from the University of Alaska participated as needed to complete the project.

Investigator: Robert R. Klein, FAMU

Advanced Flight Control Systems Development for Safety Enhancements and Certification Aspects

This research project included the development of smart robust control augmentation algorithms for low-cost FBW design application in GA airplanes, and a reduced reliance on redundant control channel architectures for achieving satisfactory system reliability and safety. Raytheon Aircraft Co. had financially supported the WSU flight controls research, with the ultimate goal of flight-testing the WSU algorithms on their Bonanza airplane. This project addressed specific tasks that further expanded the development and evaluation of the adaptive flight control algorithms and the EZ-fly system onboard the Bonanza by: 1) extending the evaluation to turbulence and wind shear conditions, 2) performing piloted fixed base simulation and flight testing of the control systems, 3) investigating system robustness to un-modeled airplane characteristics, 4) examining and improving the current envelope protection, auto land and flare routine on the Raytheon Bonanza, and 5) developing a list of certification requirements that need to be examined for the economic and safety benefits of the AFCS to be brought to the consumer.

Investigator: James E. Steck WSU

Ethanol as a Fuel for General Aviation

Three major areas of research were proposed for this project: 1) Fuel Development; 2) Engine Development; and 3) Airframe Development. In addition, a fourth major effort was proposed to

conduct an ethanol workshop for the aviation community. Each of the research areas also involved several tasks.

Investigator: Paul Lindseth, UND

Automated Laser-Based Bird Dispersion System

This research project tested the feasibility of utilizing automated laser systems for wildlife abatement of waterfowl near the Grand Forks, North Dakota International Airport. The results of this research will add to aviation safety by greatly decreasing bird strikes around airports. The Grand Forks International Airport proposed this project to the FAA because of a waterfowl trouble area near the airport. Since the University of North Dakota's (UND) John D. Odegard School for Aerospace Sciences is based at this airport.

Investigator: Archie Dickey

Airport Funding Strategies

A thorough research and study towards understanding the current levels of utilization and funding sources of select representative GA airports was the outcome of this project. The research focused towards studying the potential future traffic growth for these airports. The study highlighted the various strategies to meet the capital requirements for possible expansion of existing infra-structures for these airports.

Investigator: Massoud Bazargan, ERAU

FAA Airman Notification, Seminar & Event Tracking & Online Education

This project allowed the FAA Aviation Safety Program to provide a greater access for effective communication to pilots via the World Wide Web. It established an up-to-date national online database and email notification system to inform airmen of new information, including safety seminars in their region, local notices to airmen, emergency notices, changes in regulation, and any other information that may be subject to mass distribution.

Investigator: Steve Hampton, ERAU

Aviation-Grade Ethanol Development

The objective of this project was to address two key remaining research requirements crucial to establishing the commercial viability of AGE, which are 1) completing assessment of AGE compatibility with all major materials utilized in aircraft fuel systems and/or regularly exposed to fuel, and 2) developing a method for fuel water content determination.

Investigator: Paul Lindseth, UND

Phase II Aviation Safety, Education and Research

This project focused on establishing an aviation option within the Electronic/Manufacturing Technology program in the division of engineering technology. The initial establishment of the

program was part of the Phase I of the proposal which was funded by the FAA. Phase II requested funds to allow FAMU to continue developing and implementing the aviation option program, to initiate a planning phase for setting up a baccalaureate level degree program in aviation technology, and the continued development of the faculty expertise in aviation and aviation related research.

The primary objective focused on the promotion of diversity in aviation through continued effort at recruiting minority students and the retention of existing students for the aviation option within the Electronic/Manufacturing engineering technology program.

Investigator: Yves Anglade, FAMU

GA Aircraft: In-Flight Load Data Collection and Analysis Project

This project focused on the requirements for evaluating the fatigue life of critical aircraft structures. Two of these are the wings and the empennage structure. Most commonly, the fatigue life is determined using the Palmgren-Miner linear cumulative damage theory. To calculate the fatigue life using this method, one must know the loading history or the loading spectra of the aircraft. There is information on flight loads. i.e., normal acceleration near aircraft center of gravity, for general aviation aircraft that can be used to determine the fatigue life of airplane wings

Investigator: Richard (Pat) Anderson, ERAU

Effect of ADS-B on Near Mid-Air Collision Rates of GA Aircraft

This project shed the light on new technology used to reduce collision rates for GA aircraft. A new aircraft collision-avoidance system was installed on more than 100 aircraft at Embry-Riddle Aeronautical University's Daytona Beach, Florida, and Prescott, Arizona, campuses. It used the MX20 multi-function displays and DL90 universal access transceivers from UPS Aviation Technologies. The new technology gave pilots of small aircraft unprecedented awareness of their surroundings and significantly decreased hazards associated with traffic, weather, and terrain. Historical data was compared to data collected during the experiment period to determine the validity of the hypothesis.

Investigator: Richard P. Theokas, ERAU

Statistical Analysis for General Aviation Accidents

The author reviewed the existing data on General Aviation accidents resulting in fatalities, by identifying associations and patterns between flight elements and risk factors, and recommending a methodology to identify root cause. The study focused at identifying causes such as Human, Weather, Machine, Maintenance and FBO oriented problems. Furthermore, the study highlighted patterns (if any) and ranking of major causes among these accidents on a year-by-year basis. The results of this study will enable the FAA to view historical data in a fresh perspective, ultimately suggesting actions to reduce such accidents in the future.

Investigator: Massoud Bazargan, ERAU

Joint Training Standards Development-FAA Industry Standards Program

The SAFER SKIES initiative created a focused action plan to reduce General Aviation fatal accidents by 20% by 2007. At the same time, a new generation of aircraft has emerged offering

high performance and dramatically increased capabilities to the General Aviation pilot. In FY 2002, AFS created a new program, FAA Industry Training Standards (FITS). When fully implemented, this program provided a vehicle to incorporate system safety initiatives in training standards and practices. FAA Flight Standards Service is engaging industry partners and the GA Center of Excellence through the FAA Technical Center in the development of FAA Industry Training Standards (FITS). The purpose of this project was to develop the methodology to create and deploy joint training standards under the FAA/Industry Training Standards (FITS) program for a new generation of technologically sophisticated and extremely capable aircraft entering the General Aviation fleet.

Investigator: Frank Ayers, ERAU

Remote Airport Lighting Systems (RALS)

The goal of this project was to organize, conduct, and report the results and recommendations of this airfield lighting review. This review was anticipated to be a 3 year project beginning with first year project team development, project scope of work assignments, literature review, and prototype identification. The follow-on years involved flight and ground testing of available systems and research and development of improved systems.

Investigator: Mike Inman, UAA

Investigation of the Optimal Mix of Aircraft and Flight Training Devices in Aviation Safety Inspector (ASI), General Aviation (GA) Operations Indoctrination Training

The tasks to be performed and reports delivered in support of Aviation Safety Inspector (ASI), General Aviation (GA) Operations Indoctrination Training allowed the FAA to evaluate mixes of single engine and multiengine aircraft and their respective Level 6 Flight Training Devices (FTDs) and to define an optimal mix of aircraft and FTDs for its ASI GA Operations Indoctrination Training course.

Investigator: Steve Hampton, ERAU

Phase II Completed Projects

Conduct of ASI Training for Multiengine Airplane Instrument and Performance Refresher in Light Twin (Reciprocating Engine) Aircraft and Flight Training Devices

The training provided refreshed ASIs in job-relevant knowledge and skills including aircraft systems and performance, new technology avionics, review of instrument flight principles, and flight under normal and abnormal conditions. Previous efforts have demonstrated the training value and skill transfer effectiveness of Flight Training Devices (FTDs) that exactly match the aircraft equipment, to effectively train and refresh the ASI™ flight performance.

Investigator: Steve Hampton, ERAU

Regulation Study on Commercial UAS Vehicle Design

The CGAR research team looked at design and certification criteria with an emphasis on size, speed and impact energy limits of UAS as it relates to the safety of manned aircraft and persons and property on the ground. In reviewing regulations for vehicle design, the working group looked at work that has been accomplished with other UAS efforts.

Investigator: Leonard Kirk, UAA

Compression Ignition (Diesel) Engine Certification Issues

The purpose of this effort provided a survey of relevant, extant propulsion systems, either in use or nearly operational, and those which are certified systems whose capability is particularly well suited to unmanned autonomous aircraft (Phase 1). The goal ascertained the best choices for various classes of vehicles including latest developments. Additionally, a second phase will investigate the existing regulations for certification the ability of these systems to meet these requirements (Phase 2).

Investigator: Timothy Wilson, ERAU

ASI Course Development

A partnership was forged between Embry-Riddle Aeronautical University (ERAU) as a member of the General Aviation Center of Excellence, and the Federal Aviation Administration (FAA), including members of the management team and a select group of General Aviation Safety Inspectors (ASIs) that determined the scope and direction of a cohesive training and assessment program that is expected to improve the business and interpersonal competencies of FAA (ASIs) and, in turn, the safety practices within general aviation.

Investigator: Mark Friend, ERAU

Publications

Technical reports

FITS

- Ayers, F., Robertson, C., & Connolly, T. (2004), *FITS Private Instrument Generic Syllabus for Technically Advanced Aircraft*, Version 1.0, <http://www.faa.gov/avr/afs/fits/>
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- Ayers, F., Robertson, C., & Connolly, T. (2003), *FITS Master Instructor Syllabus TAA Scenario Based Instructor Guide*, Version 1.0, <http://www.faa.gov/avr/afs/fits/>
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- Ayers, F., Connolly, T., & Summers, M. (2004), *Scenario Based Training, Course Developers Guide: A Guide for Training Providers, Fixed Base Operators, and Aircraft Manufacturers*. http://www.faa.gov/education_research/training/fits/
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- Robertson, L. C. (Ph.D), and Summers, M. (2007). *Evaluating the Satisfaction and Quality of FITS Flight Training*. http://www.faa.gov/education_research/training/fits/
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- Summers, M., Jennison, J., and Avellino, M. (2007). *FITS Generic Instrument Airplane Rating Syllabus (Multi-Engine)*. http://www.faa.gov/education_research/training/fits/
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Others

Dickey, Archie. 2001. *Development and Maintenance of Airport Wildlife Hazard Mitigation Website for the FAA and Its Use as a Communication Tool*. 4th Joint Meeting Bird Strike Committee. USA/Canada, Sacramento, CA.

Dickey, Archie and Allen Newman. 2002. *Development of an Integrated Warning System Providing National and Airport Specific Wildlife Strike Risks: Review of the FAA Wildlife Mitigation website*. Wildlife Research Working Group. Panama City, FL.

Dickey, Archie. 2002. *Current and Future Bird Strike Risks: Querying the FAA Natural Strike Database Wildlife*. Wildlife Research Working Group. Albuquerque, NM.

Dickey, Archie and Allen Newman. 2003. *Status of Airport Wildlife Hazard Mitigation website* (Poster Presentation). 5th Joint Meeting Bird Strike Committee. USA/Canada, Toronto, Canada.

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FITS

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Ayers, F. and Connolly, T. (8 October, 2004), *The FITS Project Approach to Flight Training*, University Aviation Association Fall Education Conference, Toronto Canada

Ayers, F. and Wright, B., (4-7 November 2003) *Joint Training Standards Development For New Technology General Aviation Aircraft-FAA/Industry Training Standards*, Federal Aviation Administration Centers of Excellence 3rd Joint Annual Meeting, Daytona Beach, FL.

Ayers F., Connolly, T., & Dubuque, D., *FAA Industry Training Standards*, Federal Aviation Administration, General Aviation, Center of Excellence, 2nd Annual Meeting, Anchorage, Alaska

Others

Abdelghany, A. Guzhva, V.S., Bazargan, M, and Byers, D. (2008), Funding Strategies for Self-Sustained General Aviation Airports, accepted for publications in the *Journal of the Transportation Research Board*, Forthcoming

Bazargan, M., Guzhva, V., (2008), Factors Contributing to Fatalities in General Aviation Accidents, *Journal of World Review of Intermodal Transportation Research*, Forthcoming.

Guzhva, V.S., Bazargan, M, and Byers, D. (2007), Determinants of Financial Health of U.S. General Aviation Airports., *Journal of Airport Management*, Forthcoming.

Guzhva, V.S., Bazargan, M, and Byers, D. (2008) Entrepreneurial Spirit in Government Managed Enterprises: Evidence from the U.S. General Aviation Airports, *Journal of Public Budgeting, Accounting, and Financial Management*, Forthcoming.

Industry/ University Presentations

FITS

2004

Ayers, F., (14 March, 2004) *Single Pilot Resource Management* (Invited presenter at the Cirrus Owners and Pilots Association Pilot Proficiency Program (CPPP), Las Vegas, NV.

Ayers, F., (25 January, 2004) *Single Pilot Resource Management* (Invited presenter at the Cirrus Owners and Pilots Association Pilot Proficiency Program (CPPP), Saint Augustine, FL.

Ayers, F., and Wright, B., (July, 2003) *FAA Industry Standards* (Tent Forum, Experimental Aircraft Association Annual Fly-Inn, Oshkosh WI)

Robertson, C. L., (2004). Instructional Designs for Teaching Higher-Order Thinking Skills to Pilots. Submitted for publication to International Journal of Applied Aviation Studies. Oklahoma City, OK: Government Printing Office.

Robertson, C. L., (2004). Teaching Pilots Judgment, Decision-Making, & Critical Thinking. Accepted for publication to International Journal of Applied Aviation Studies. Oklahoma City, OK: Government Printing Office.

Robertson, C. L., (2004). Challenges in Aviation Education. FAA Aviation News: Aviation Safety from Cover to Cover. July/August 2004 p. 18-20.

Robertson, C. L., (2004). Delivering Pilot Education Online. Minneapolis, MN: Capella University.

Robertson, C. L., (2004). Instructional Designs for Aviation Education. Minneapolis, MN: Capella University.

2005

Roberston, C.L. Ayers, F., French, J., Blickendsderfer, E., et.al. (2005). The Future of FITS and The Challenges Ahead. Fairbanks, AK: University of Alaska Fairbanks.

Robertson, C.L. Ayers, F., French, J., Blickendsderfer, E., Et.all. (2005). FITS Update and Challenges. Fairbanks, AK: University of Alaska Fairbanks.

Spanitz, J. (2005). CGAR FITS Meeting. Fairbanks, AK: University of Alaska Fairbanks.

2006

French, J. (June 28, 2006). *Scenario Based Training (SBT) vs. Maneuvers Based Training (MBT): ERAU Results Task 1 & 2*. Prescott AZ: Embry-Riddle Aeronautical University.

Glista, K, T. (June 28, 2006). *FAA/Industry Training Standards Program Update*. Prescott, AZ: Embry-Riddle Aeronautical University.

2007

Blickensderfer, L. E. (Ph.D.), & Jennison. J. (June, 7, 2007). *Empirical Investigation of the Learner Centered Grading Debrief*. Atlantic City, NJ: FAA William J. Hughes Technical Center.

Glista, T. (June 6, 2007). *FAA/Industry Training Standards Status*. Atlantic City, NJ: FAA William J. Hughes Technical Center.

Robertson, L. C. (June 7, 2007). *FITS Fastrac*. Atlantic City, NJ: FAA William J. Hughes Technical Center.

Other

Bazargan-Lari, & M., Ross, D., (2004). *A Comparative Risk Measure For General Aviation*, (Proceedings of Multiple Criteria Decision Making (MCDM 2004), Whistler, B. C. Canada August 6-11)

Dickey, A., & Newman, A. (2002). *Development and Maintenance of Airport Wildlife Hazard Mitigation website for the FAA and Its Use As A Communication Tool*. FAA Airport Technology Transfer Conference & Expo. Atlantic City, NJ.

Dickey, A., & Newman, A. (2004). *Maintaining a User-Friendly Interface Using Airport Wildlife Hazard Mitigation Website*: 2004 Airport Technology Transfer Conference and Exposition, Atlantic City, NJ.

Dickey, Archie, Allen Newman, and Michel Hovan. (2005). *Collection and Dissemination of Wildlife Strike Data at Airports for the US Federal Aviation Administration via the World Wide Web*. International Bird Strike Committee 27th Meeting Athens.

Dickey, A., & Newman, A. (2005). *Enhancement of the FAA's On-line Wildlife Aircraft Strike Database with an Interactive Graphic Capability*_7th Joint Meeting Bird Strike Committee USA/Canada, Vancouver, BC, Canada.

Annual Meetings

2005

Lee, X. (2005). *Unmanned Aircraft Systems*. CGAR Annual Meeting,

2006

Anderson, P. R., (Ph.D), (ATP). (June 28, 2006). *Structural Usage Monitoring and Flight Regime, Recognition Algorithm and Methodology Enhancement and Validation*. CGAR Annual Meeting, Prescott, AZ: Embry Riddle Aeronautical University.

Bazargan, M. and Knopp, K. (June 28, 2006). *Statistical Analysis for Fatal General Aviation Accidents*. CGAR Annual Meeting, Prescott, AZ: Embry-Riddle Aeronautical University.

Rice, A. (June 29, 2006). *Things I've Learned: Cessna Training Pilots*. CGAR Annual Meeting, Prescott, AZ: Embry-Riddle Aeronautical University.

Cheraghi, H. S., Jorgensen, M., and Myose, R. (June 28, 2006). *Detection and Prevention of Carbon Monoxide Exposure in General Aviation Aircraft*. CGAR Annual Meeting, Prescott, AZ: Embry-Riddle Aeronautical University.

Decker, H. (June 29, 2006). *FAA Success Story: Inspector Training at the Center of Excellence for General Aviation Research (CGAR)*. CGAR Annual Meeting, Prescott, AZ: Embry-Riddle Aeronautical University.

Dickey, A. (June 28, 2006). *Wildlife Strike Database and Website Maintenance and Expansion of Graphics Applications to Web Search for General Aviation*. CGAR Annual Meeting, Prescott, AZ: Embry-Riddle Aeronautical University.

Friend, M. (June 29, 2006). *Aviation Safety Inspector (ASI) Training*. CGAR Annual Meeting, Prescott, AZ: Embry-Riddle Aeronautical University.

Johnson, J. (June 29, 2006). *Land and Hold Short Operations (LAHSO) Data Collection Phase II*. CGAR Annual Meeting, Prescott, AZ: Embry-Riddle Aeronautical University.

Kirk, L. (June 29, 2006). *UAS Regulatory Study*. CGAR Annual Meeting, Prescott, AZ: Embry-Riddle Aeronautical University.

Martin, L. and Lease, J. (Presenter). (June 28, 2006). *Using ADS-B at UND to Conduct Advanced Navigation Research in a Helicopter Training Program*. CGAR Annual Meeting, Prescott, AZ: Embry-Riddle Aeronautical University.

Rich, K., and Walker, G. (June, 29, 2006). *Detect, Sense and Avoid for Small Unmanned Aircraft Systems for the Avoidance of an Air-to-Air Collision*. CGAR Annual Meeting, Prescott, AZ: Embry-Riddle Aeronautical University.

Theokas, P. R. (June, 29, 2006). *Effect of ADS-B on Near Mid-Air Collision Rates of GA Aircraft*. CGAR Annual Meeting, Prescott, AZ: Embry-Riddle Aeronautical University.

Waldock, D. W., (June 28, 2006). "No Greater Evil..." *The History and Legacy of the Grand Canyon Midair Collision of 1956*. CGAR Annual Meeting, Prescott, AZ: Embry-Riddle Aeronautical University.

Zeidlik, T., and Inman. M. (June 28, 2006). *Remote Airport Lighting: Collaboration Among Schools*. CGAR Annual Meeting, Prescott, AZ: Embry-Riddle Aeronautical University.

2007

Anderson, P. R. (Ph.D), (ATP). (June 7, 2007). *Structural Usage Monitoring and Flight Regime Recognition*. CGAR Annual Meeting, Atlantic City, NJ: FAA William J. Hughes Technical Center.

Bazargan, M. (June 6, 2007). *General Aviation Airport Funding Strategies*. CGAR Annual Meeting, Atlantic City, NJ: FAA William J. Hughes Technical Center.

Cheraghi, H., Jorgensen, M., and Myose, R. (June 6, 2007). *Detection and Prevention of Carbon Monoxide Exposure in General Aviation Aircraft*. CGAR Annual Meeting, Atlantic City, NJ: FAA William J. Hughes Technical Center.

Dickie, A. (June 6, 2007). *ERAU Wildlife Hazard Mitigation Activity: 2006-2007 Tasking Summary*. CGAR Annual Meeting, Atlantic City, NJ: FAA William J. Hughes Technical Center.

Graziano, R., and Barber. A. (June 7, 2007). *Helicopter Terrain Awareness Warning System and Enhanced Vision Systems*. CGAR Annual Meeting, Atlantic City, NJ: FAA William J. Hughes Technical Center.

Inman, M. (June 6, 2007). *Remote Airport Lighting Systems (RALS)*. CGAR Annual Meeting, Atlantic City, NJ: FAA William J. Hughes Technical Center.

Kirk, L. (June 7, 2007). *Unmanned Aircraft Systems Regulatory Review*. CGAR Annual Meeting, Atlantic City, NJ: FAA William J. Hughes Technical Center.

Kirk, L., and Frushour, G. (June 7, 2007). *Unmanned Aircraft Systems: Detect, Sense, and Avoid Study*. CGAR Annual Meeting, Atlantic City, NJ: FAA William J. Hughes Technical Center.

Lewis, P. (June 6, 2007). *National Aeronautics Research and Development Policy: Overview and Outreach*. CGAR Annual Meeting, Atlantic City, NJ: FAA William J. Hughes Technical Center.

Martin, L. (June 6, 2007). *Advanced Navigation Research in a Helicopter Training Program*. CGAR Annual Meeting, Atlantic City, NJ: FAA William J. Hughes Technical Center.

Myose, R., and Hoffman, K. (June 6, 2007). *Enhanced Jet Exhaust Mixing To Reduce Jet Aircraft Engine Noise*. CGAR Annual Meeting, Atlantic City, NJ: FAA William J. Hughes Technical Center

Schneider, J., Wilson, T., Griffs, C., and Pierpont, P. (June 7, 2007). *Compression Ignition Engine Certification Issues*. CGAR Annual Meeting, Atlantic City, NJ: FAA William J. Hughes Technical Center.

Schneider, J., Wilson, T., Griffs, C., and Pierpont, P. (June 7, 2007). *UAS Propulsion Systems: Technology Survey*. CGAR Annual Meeting, Atlantic City, NJ: FAA William J. Hughes Technical Center.

Wiggins, M. (June 7, 2007). *TAA Qualification Course for FAA Aviation Safety Inspectors*. CGAR Annual Meeting, Atlantic City, NJ: FAA William J. Hughes Technical Center.

2008

Anderson, P. R. (June 5, 2008). *Spin/Upset Recovery Familiarization Course 18802*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.

Anderson, P. R. (June 5, 2008). *HUMS: Structural Usage Monitoring and Flight Regime Recognition*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.

Ayers, F. (June 4, 2008). *Learner Centered Grading*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.

Bazargan, M. (June 5, 2008). *General Aviation Weather Related Safety Study*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.

Blachut, C. & Martin, L. (June 5, 2008). *Advanced Navigation Research in a Helicopter Training Program*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.

Dickey, A. (June 4, 2008). *ERAU Wildlife Hazard Mitigation Activity*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.

Gawdiak, Y. (June 4, 2008). *JPDO, NextGen: A Look Ahead*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.

Gossett, S. (June 5, 2008). *MTSU's Success in FITS*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.

Graziano, R. (June 5, 2008). *Helicopter Terrain Awareness Warning Systems and Enhanced Vision Systems*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.

- Inman, M. (June 4, 2008). *Remote Airport Lighting Systems: Updates*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.
- Marshall, D. (June 4, 2008). *UAS: Analysis of 14 CFR Parts 91 & 43*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.
- Marshall, D. (June 5, 2008). *Operational Loads Monitoring for Business Jet Aircraft*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.
- Marshall, D. (June 5, 2008). *Statistical Loads Data for the Boeing 777-200ER Aircraft in Commercial Operations*. CGAR Annual Meeting, AK: University of Alaska at Anchorage.
- Myose, R. (June 5, 2008). *Detection and Prevention of Carbon Monoxide Exposure in General Aviation Aircraft*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.
- Northam, G. (June 5, 2008). *ADS-B and Flight Safety*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.
- Rokhsaz, K. (June 5, 2008). *Operational Usage Information for a General Aviation Propeller*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.
- Seames, W. (June 5, 2008). *Octane Enhancers from Crop Oils*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.
- Stevens, S. (June 5, 2008). *Weather Technology in the Cockpit Program*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.
- Summers, M. (June 4, 2008). *FITS in the Mainstream*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.
- Wilson, T. (June 4, 2008). *ERAU: UAS Projects*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.
- Wright, R. (June 5, 2008). *The Real World of Single Pilot Jet Training*. CGAR Annual Meeting, Anchorage, AK: University of Alaska at Anchorage.