



An Introduction to PEGASAS, the FAA Center of Excellence for General Aviation

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Goals for this Introduction

- A quick summary of PEGASAS – the Partnership to Enhance General Aviation Safety, Accessibility and Sustainability
 - Introduce concept of FAA Centers of Excellence
 - Give a better idea about our team and collaborators
 - Overview of research effort and size of COE
 - Big-picture view of selected projects
- Discuss opportunities for partnership
 - Opportunities to interact with PEGASAS
 - Thoughts about partnerships for PEGASAS in on-demand mobility domain



FAA Centers of Excellence

- Legislation from Congress allows the FAA to establish Centers of Excellence (COEs)
 - Generally, a consortium / partnership of several universities
 - Partnership between FAA and University consortiums that have a duration of 10 years
- “The Administrator of the FAA may make grants...”, “Government’s share of costs...”
 - Provide a unique funding combination
 - Cooperative Agreements (grants)
 - Matching requirement (\$1 FAA : \$1 non federal)
 - Substantial involvement by FAA
 - IDIQ Contract (can be added by FAA Program Office)



PEGASAS Research Initiation Process and Funding

- Once COE is awarded, the competition is over
 - Allows PEGASAS to be an efficient “tool” available to FAA researchers
 - Allows PEGASAS project proposals to be crafted via iteration with FAA
 - Often multi-university teams
 - In some cases, industry and organizational partners involved
- Research requirements and funding from FAA technical organizations
 - Aviation Research Division is PEGASAS sponsor
 - Any organization in the FAA can use PEGASAS
- PEGASAS FAA program manager has zero defined budget for GA research
 - Coordinates any part of FAA with defined research requirements
 - Predominantly from Aviation Research Division
- PEGASAS not just for FAA
 - Can use our pre-existing relationships and expertise to perform research for NASA, companies, etc.



Quick Overview of PEGASAS





PEGASAS Vision in Three Themes

- Safety
 - Clearly, the most important theme for the Center of Excellence for General Aviation
 - Reduce the risk of injury or death to general aviation pilots, passengers and property
- Accessibility
 - Ensure general aviation is within reach of its users
 - Enable versatile and readily usable general aviation system - access for corporate, fractional operators as well as operators of Light Sport Aircraft
- Sustainability
 - Allow general aviation to serve the needs of future stakeholders
 - Continue providing societal benefits from general aviation



PEGASAS Universities

CORE UNIVERSITIES



AFFILIATE UNIVERSITIES

Arizona State; Florida A&M; Hampton; **Kent State**; North Carolina A&T; Oklahoma State; **Southern Illinois University, Carbondale**; Tufts; University of Minnesota, Duluth; **Western Michigan**



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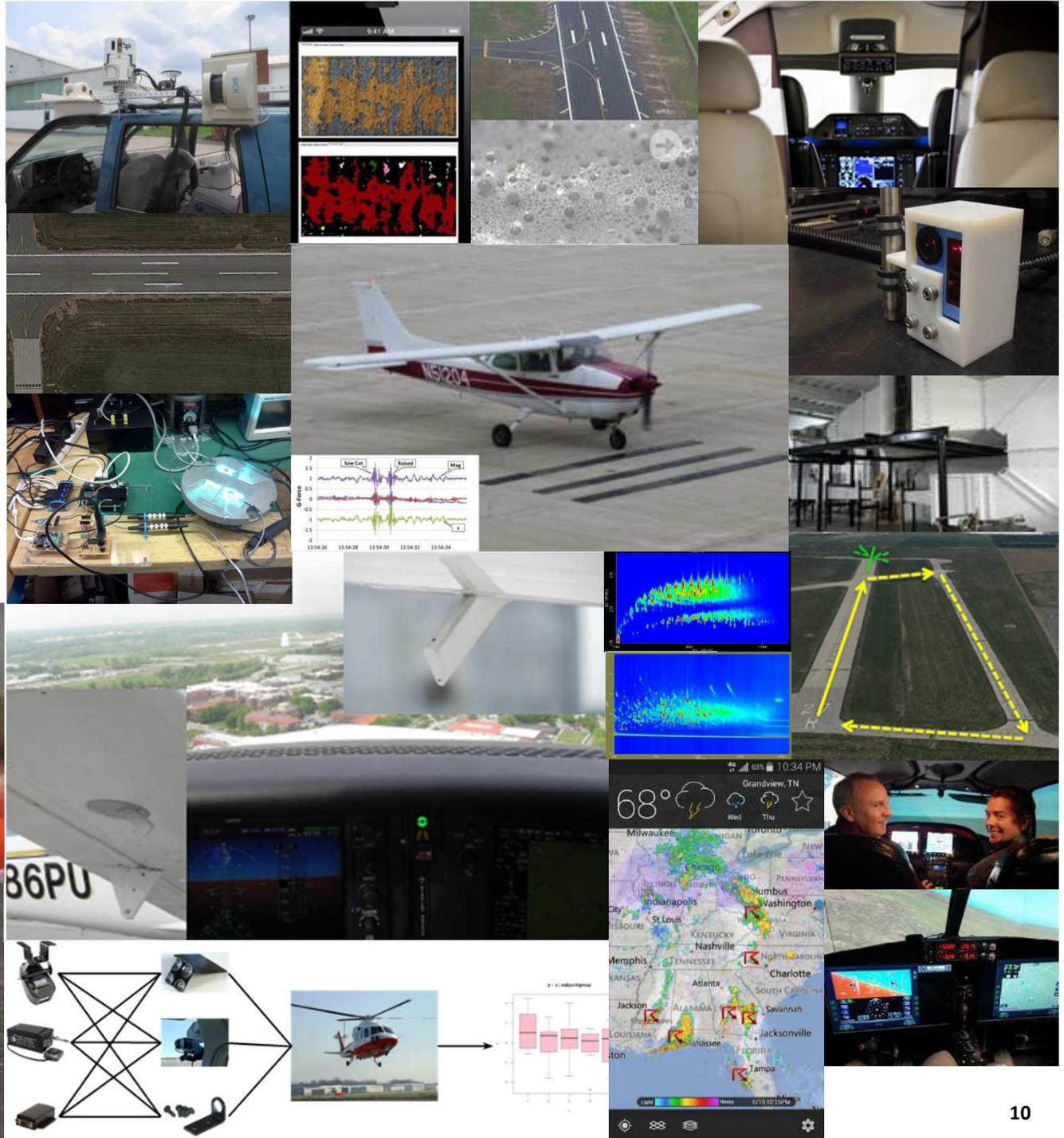


Industry and Organizational Partners (as of Aug 2015)

Category		Partner
Industry	Airframe	Cessna, Cirrus, Embraer, Gulfstream, Piper, Sikorsky
	Propulsion	Continental Motors, GE Aviation, Rolls-Royce
	Operators	Jet Aviva, NetJets
	Flight Training Devices / Simulators	Frasca International
	Aircraft / Aviation Systems	Alpha Systems AOA, Avidyne, CAPACG, Guardian Mobility, Harris Corporation, Raytheon, Rockwell Collins, Spirit Avionics
	Research / Consulting	Adaptive Aerospace Group, Battelle Memorial Institute, Flight Safety Foundation, NextGen Aerosciences, Nelson Consulting, The Spectrum Group, Woolpert
Airports	Operators	Columbus Regional Airports, South Bend Airport, Fort Wayne Airport, Kelly Field / Port San Antonio, Huntingburg Airport
	Pavements	Indiana Chapter - American Concrete Pavement Association
Government Agencies		Florida, Georgia, Indiana and Iowa Departments of Transportation, NASA Flight Deck Display Research Laboratory
Stakeholder Organizations		General Aviation Manufacturers Association (GAMA), Helicopter Association International (HAI), Take Flight Solutions, National Business Aviation Association (NBAA), National Intercollegiate Flying Association (NIFA), Ohio Aerospace Institute (OAI), Society of Aviation and Flight Educators (SAFE)



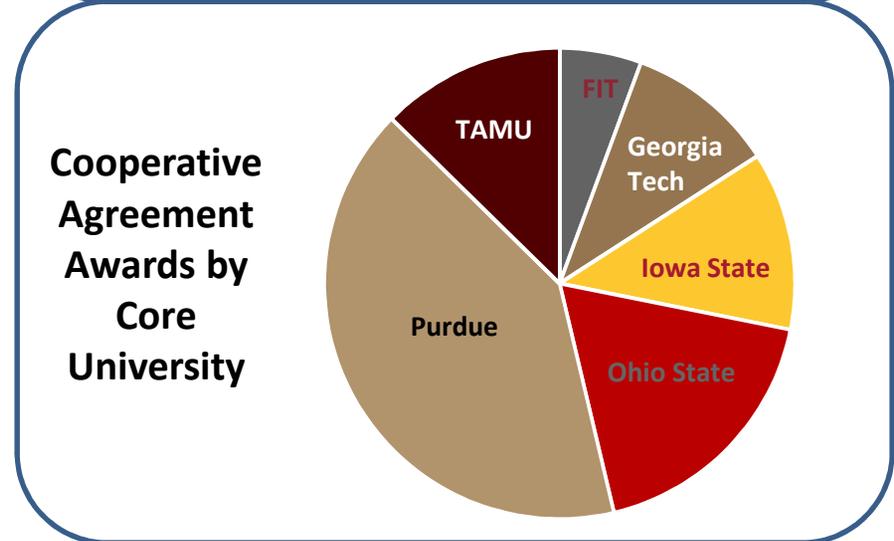
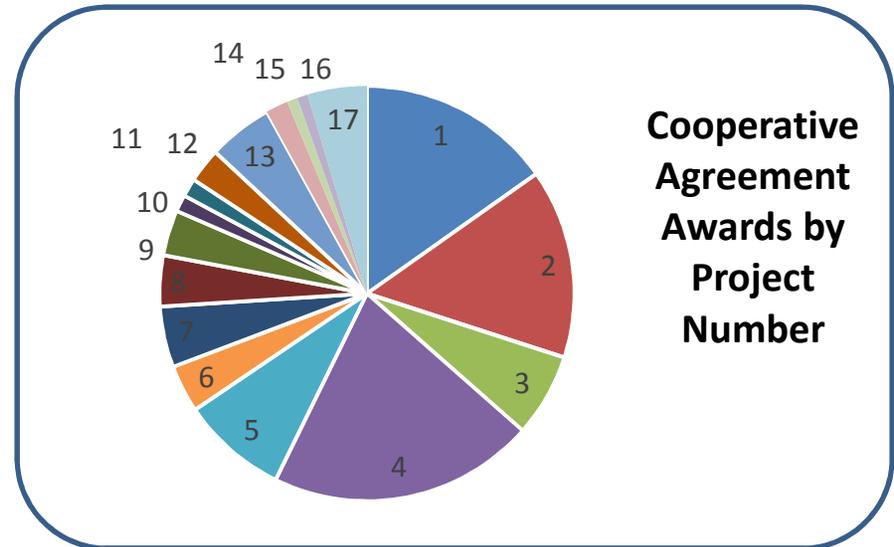
Research: Aircraft, Airports and Labs; Summary of COE Effort





Overview PEGASAS Research Efforts

- Seventeen research projects awarded as of early Sep 2015
 - Aviation Research Division
 - Airport Technology R&D Branch
 - Software & Systems Branch
 - NextGen
 - Weather
- \$10.98 million FAA funds awarded for research, prototypes and services
 - \$8.17 million via amendments to cooperative agreement
 - \$2.81 million via IDIQ contract
- Additional \$8.17 million matching provided from non-federal sources on cooperative agreements





Research Projects

- Project 3: Angle of Attack Equipment in General Aviation Operations
 - Team: Purdue, Ohio State, Florida Tech
 - PEGASAS POC: Brian Dillman, Purdue
 - Aug 2013 start, Mar 2015 end
 - Proposed focus areas / tasks:
 - Analysis of best practices and development of educational materials
 - Attitude awareness enhancement
 - Stabilized approach analysis (main thrust of project)
 - In-kind contributions from AlphaSystems and CAPACG



- Project 4: Weather Technology in the Cockpit (WTIC)
 - Team: Texas A&M, Ohio State, Purdue (with subcontracts to affiliates Western Michigan, Southern Illinois, Kent State)
 - PEGASAS POC: Barrett Caldwell, Purdue
 - Jan 2014 start; now in Phase II



- Effectively a “program” with four major, coordinated research topics
 - Quantify Causality
 - Transition from VFR to IMC
 - General Aviation Weather Alerting
 - General Aviation MET Information Optimization



Research Projects

- Project 5: National General Aviation Flight Information Database (NGAFID)

- Team: Purdue, Georgia Tech, Ohio State
- PEGASAS POC: Karen Marais, Purdue
- Jan 2014 start; Phase II underway
- Focus areas / Tasks:

- Exceedence and aircraft performance modeling
- Algorithms to predict “safety events”
- Use case concepts for pilots

J	ft	deg	kt	kt	fpm	deg	deg	G	G	deg	deg	volts	volts	amps	amps	gals
l	ARMSL	DAT	IAS	GndSpd	VSpd	Pitch	Roll	LatAc	NormAc	HDDG	TRK	volt1	volt2	amp1	amp2	FCyl
86	1258.6	23.2	0	2.59	0	-0.47	-0.19	0	0	322.9	273.9	27.4	27.4	5.1	1.9	0.61
87	1253.4	23.2	0	1.4	0	-0.48	-0.19	0.01	0	323	266.5	27.4	27.4	5.1	1.9	0.48
88	1248.7	23.2	0	0	0	-0.46	-0.2	0	0	322.9	266.5	27.4	27.4	5.1	1.9	0.48
89	1245.6	23.2	0	0	0	-0.46	-0.19	0	0	322.9	266.5	27.4	27.4	5.1	1.9	0.69
90	1248.2	23.2	0	0	0	-0.47	-0.2	0	0	322.8	266.5	27.4	27.4	5.1	1.9	0.61
91	1248.7	23.2	0	0	0	-0.47	-0.2	0	0	322.8	266.5	27.4	27.4	5.1	1.9	0.61
92	1252.7	23.2	0	0	0	-0.47	-0.2	0	0	322.7	266.5	27.4	27.4	5	1.9	0.61
93	1249.1	23.2	0	0	0	-0.48	-0.2	0	0	322.6	266.5	27.4	27.4	5	1.9	0.74
94	1251.8	23.2	0	0	0	-0.48	-0.2	0	0	322.6	266.5	27.4	27.4	5	1.9	0.82
95	1252.8	23.2	0	0	0	-0.49	-0.19	0	0	322.5	266.5	27.4	27.4	5	1.9	0.74
96	1293	23.2	0	0	0	-0.49	-0.19	0	0	322.5	266.5	27.4	27.4	5.1	1.9	0.69
97	1222.6	23.2	0	0	0	-0.51	-0.19	0	0	322.5	265.1	27.4	27.4	5	1.9	0.82
98	1172.6	23.2	0	0	0	-0.49	-0.19	0	0	322.5	266.5	27.4	27.4	5	1.9	0.82
99	1179	23.2	0	0	0	-0.49	-0.19	0	0	322.5	266.5	27.4	27.4	5.1	1.9	0.69
100	1181.4	23.2	0	0	0	-0.48	-0.19	0	0	322.5	266.5	27.4	27.4	5	1.9	0.55
101	1181.5	23.2	0	0	0	-0.48	-0.19	0	0	322.5	266.5	27.4	27.4	5	1.9	0.48
102	1181.8	23.2	0	0	0	-0.48	-0.19	0	0	322.6	266.5	27.4	27.4	5	1.9	0.55
103	1183	23.2	0	0	0	-0.48	-0.19	0	0	322.6	266.5	27.4	27.4	5	1.9	0.82
104	1180.1	23.2	0	0	0	-0.48	-0.19	0	0	322.6	266.5	27.4	27.4	5	1.9	0.95
105	1180	23.2	0	0	0	-0.47	-0.19	0	0	322.7	266.5	27.4	27.4	5	1.9	0.82
106	1178.7	23.2	0	0	0	-0.47	-0.2	0	0	322.7	266.5	27.4	27.4	5.1	1.9	0.69
107	1177.7	23.2	0	0	0	-0.48	-0.2	0	0	322.7	266.5	27.4	27.4	5	1.9	0.69
108	1177.2	23.2	0	0	0	-0.48	-0.2	0	0	322.7	266.5	27.4	27.4	5	1.9	0.82



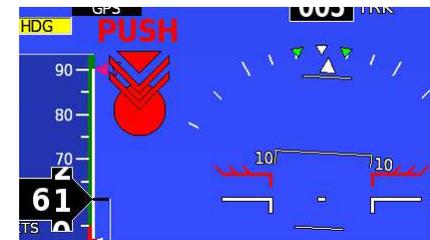
Research Projects

- Project 16: Characterization of Derived Angle of Attack and Flight Path Angle Algorithms
 - Team: Texas A&M, Ohio State
 - PEGASAS POC: John Valasek, Texas A&M
 - Awarded Aug 2015
 - Focus areas / Tasks:
 - Characterize limitations and uncertainties in derived AOA methods
 - Incorporate AHRS in a hardware-in-the-loop simulation
 - Potential comparison to sensed AOA measurements



Aspen Avionics
AOA indicator in
Evolution Flight
Display System as
an illustration

http://www.aspenavionics.com/assets/img/site/AOA_TOP.png



GRT Avionics derived
AOA display on Horizon
HX as illustration

http://www.grtavionics.com/wpimages/wp98c70ce5_06.png



Opportunities for Interaction with PEGASAS

- For FAA supported research, contact Pete Sparacino (peter.sparacino@faa.gov) at WJH Tech Center
- For other research-supporting organizations, contact Bill Crossley (crossley@purdue.edu), or any of the site directors (see slide 8)
- PEGASAS Annual Meeting
 - One day conference like presentations of projects, interaction with FAA technical monitors and sponsors, industry partners
 - 2016 Annual Meeting – planned for late May / early June at Iowa State University
 - Previous annual meeting presentations available online: <https://www.pegasas.aero/meetings.php>
- PEGASAS facilitated workshops
 - PEGASAS researchers discuss future research needs / topics with FAA
 - Help prompt thinking about future requirements, expand upon or add depth to efforts supporting current requirements



Thoughts about PEGASAS partnerships in the On-Demand Mobility domain

- PEGASAS provides an efficient research tool to FAA
 - Engagement mechanisms with FAA already in place
 - PEGASAS universities provide excellent capabilities in aviation and in engineering
- Potential for “transition research” for On-Demand Mobility
 - PEGASAS researchers could pursue technology maturation efforts in support of NASA
 - PEGASAS researchers could pursue technology assessment efforts in support of FAA certification framework
 - Lessons learned and expertise could facilitate transition between two types of efforts
- We want to make General Aviation safer, accessible and sustainable



PEGASAS Website

www.pegasas.aero

Contains project summaries, news, and other information