Center Overview and UAV Highlights at NASA Ames Research Center

Welcome to the Federal Unmanned Aircraft Systems (UAS) Workshop

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Cross-cutting Role of Unmanned Aircraft Systems

Allow NASA projects to extend measurements and test new technologies

Provide a pathway for NASA instruments from ground, to balloon, to aircraft, to space.

Play a substantial role in civilian services as NASA and FAA work to develop safe and effective means for integrating them into the National Airspace System
NASA Centers and Installations

- Armstrong Flight Research Center
- Jet Propulsion Laboratory
- White Sands Test Facility
- Glenn Research Center
- Independent Verification and Validation Facility
- Plum Brook Station
- Michoud Assembly Facility
- Stennis Space Center
- Marshall Space Flight Center
- Kennedy Space Center
- Langley Research Center
- Headquarters
- Goddard Space Flight Center
- Wallops Flight Facility
- Goddard Institute for Space Studies
- Ames Research Center
Ames is One of the Early NACA Laboratories

Joseph S. Ames

NACA

1915

Langley

Ames

1939

Lewis

Dryden

1946

1958

NASA
Ames Research Center

- Occupants: ~1130 civil servants; ~2,100 contractors; 1,650 tenants
  855 summer students in 2016
- FY2016 Budget: ~$915M (including reimbursable/EUL)
- ~1,900 acres (400 acres security perimeter); 5M building ft²
- Airfield: ~9,000 and 8,000 ft runways
75 Years of Innovation

1940
Conical Camber
Arcjet Research

1950
Blunt Body Concept
Lifted Body Concept

1960
Swept-Back/Wing
Hypervelocity Free Flight

1970
Apollo Re-Entry Shape

1980
Air Transportation System
Tiltrotor

1990
Venus

2015
SSERVI

2000
Mars Science Lab
 ISS

NASA Research Park

CFD

GPSS

Kuiper Observatory

Kepler

IRIS

Aero Institute

LADDEE

Quantum Computing

NASA Research

Arcing Arcjet Research

Human Centered Computing

Human Exploration

Space Biology

SOFIA

NASA Research Park

Pleiades

Kepler

Sustainability Base

Aero Institute

Astrobiology Institute

Quantum Computing

ISS

Pleiades

ISS

Kepler

Sustainability Base

Aero Institute

Astrobiology Institute

Quantum Computing
Core Competencies at Ames Today

- Air Traffic Management
- Entry Systems
- Advanced Computing & IT Systems
- Intelligent/Adaptive Systems
- Cost-Effective Space Missions
- Aerosciences
- Astrobiology and Life Science
- Space and Earth Sciences
Air Traffic Management and Aerosciences
Advanced Computing and IT Systems

Exploring Drone Aerodynamics with Computers
Intelligent/Adaptive Systems

Search, Identify, and Track
- Optimal Search Planning
- Distant Object Detection
- Object Validation, Deep Learning
- Robust Tracking and Re-Search AI

Research and Test Facilities
- Outdoor – DART Site and Roverscape
- NUARC Indoor Flight Test Facility
- Advanced Simulation Environments
Earth Sciences

Matrice 600 hexacopter with payload to track invasive Asian carp in the Mississippi (2017 summer)

Dragon Eye @ Turrialba crater (Costa Rica) and Kilauea Crater (Hawaii) (2013)

Sierra flew over the Arctic sea ice as part of the MIZOPEX mission (2013)

Ikhana (using an autonomous modular sensor to see through smoke) as part of a Collaborative Decision Environment, relating real time information to fire responders (2007)
Partnerships and UTM

**Commercial**
- Use cases and operational needs
- Readiness of technologies (e.g., sense & avoid)
- Validation of the concept of operations
- Participation in flight tests and demonstration
- Technology options for vehicle

**FAA**
- Subject matter expertise
- Concept of operations
- Information requirements
- Roles/responsibilities definition
- Integration & interoperability needs
- Engagement on potential solutions

**NASA**
- Concept of operations
- Overall UTM information architecture and data exchange definition
- UTM research platform, flight test planning and execution
- Performance requirements for operations including planning, scheduling, track/locate, sense & avoid

14 Partner Organizations

2 Simultaneous Altitude Stratified Expanded Operations

11 UAS Platforms