Joint Architecture for Unmanned Systems

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Joint Architecture for Unmanned Systems
Goal and Approaches

• The Purpose Of JAUS Is Interoperability With An Emphasis On The Logical Communications Between Heterogeneous Computing Systems Used For Unmanned Systems Command And Control.


• JAUS Is Open, Scalable, And Responsive To The Unmanned Systems Communities’ Needs.
Joint Architecture for Unmanned Systems
Program Overview

**Purpose:** The primary purpose of JAUS is interoperability -- the ability to operate unlike systems with unlike controllers.

**Product:** A standard messaging set to support the rapid and cost-effective development of unmanned systems.

**Payoff:**
- More efficient development,
- Reduced ownership cost, and
- An expanded range of vendors.

**Sponsored By:**
OSD Joint Ground Robotics Enterprise
Joint Architecture for Unmanned Systems
Challenge

Objectives:
• Vehicle Platform Independence
  Supports Interoperability on any platform
• Mission Isolation
  Supports configurable payloads
• Computer Hardware Independence
  Not based on dated technology
• Technology Independence
  Supports technology insertion
• Operation Independence
  Allows the user to determine the operation
• Communications Independence
  No requirement for specific data link

Challenges:
• Avoid being “locked into” a vendor’s solution.
• Avoid being “locked out” of technology advancements.
• Support all classifications of control (teleop, semi-autonomous) and all classifications of systems (combat, combat support, combat service support).
• Support the evolution of a system from one classification to another.
• Usable under current acquisition guidelines.

Problem:
• Subsystems common to unmanned systems (UMS) have been unique for each system.
• Performance gains made by one system cannot be easily leveraged for a different system with a similar requirement.
Joint Architecture for Unmanned Systems

Timeline

- Oct-95: J AUGS Initiated by the UGV S JPO
- Dec-97: OSD charters J AUGS WG
- Feb-98: JRP mandates J AUGS for all UGV projects
- Aug-01: Configuration Mgt instituted
- Oct-00: Voting and Change Control are formalized
- Sep-02: OSD recharter S J AUGS for all unmanned systems
- Apr-04: SAE adopts J AUGS as AS-4
- Apr-07: NAVY mandates J AUGS for UUV/USV
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- Apr-04: SAE adopts J AUGS as AS-4
- Apr-07: NAVY mandates J AUGS for UUV/USV
- Nov-05: NBSCAB mandates J AUGS for all Federally funded acquisitions
- Jul-97: DM 1.0
- Aug-99: RA 1.1
- Aug-01: RA 2.0
- Jul-01: DCP 1.0
- Aug-02: SOP 1.3
- Oct-02: RA 3.0
- Oct-03: DM 3.0
- Dec-03: RA 3.1
- Mar-04: DM 3.1
- Oct-04: RA 3.2
- Dec-05: DM 3.2
- Oct-07: AIR 5665
- Apr-99: Message Routing Experiment
- Oct-03: OPC 1.0 Experiment
- Jul-05: OPC 2.5 Experiment
- Apr-06: OPC 3.0 Experiment
- Oct-06: JSSL Workshop
- Aug-04: OPC 2.0 Experiment
- Nov-05: OPC 2.75 Experiment

Technology to the Warfighter Quicker
Joint Architecture for Unmanned Systems
JAUS Working Group

Chairman
Jeff Kotora

Compliance Plan
Robert Wade
US Army AMRDEC

SOP/Doc Control
Daniel Carroll
SSC San Diego

Strategic Planning
Jeff Kotora
Titan/OSD

Domain Model
Robert Wade
US Army AMRDEC

Experimentation
Parag Batavia
Applied Perception

Transport
Kathy Weinhold
iRobot

Reference Architecture
Jeff Wit
WINTEC, Inc

- Web Page: www.jauswg.org
- FTP Site: ftp.jauswg.org
  - Username: jauswgftp
  - Password: jauswgftp

Technology to the Warfighter Quicker
• Society of Automotive Engineers (SAE) October 2004
  • Aerospace Council
    » Avionics Systems Division (ASD)
  • Unmanned Systems Committee (AS-4)

JAUS And AS-4 Will Execute In Parallel Until Further Notice
Current Systems & Developments:

- Air Force ARTS
- Air Force REDCAR
- Army CRS
- Army FCS (UGV, UAV, US, UM, MGV)
- Army MDARS-E
- Army RCSS
- Marine Corps Gladiator
- Navy JUSC2 ACTD
- Navy MTRS
- Navy Spartan ACTD
- Navy USSV
- State Department NGEODRCV
Joint Architecture for Unmanned Systems
SAE Participant Organizations

Service, Industry & Academic Participants:

- Applied Perception
- Autonomous Solutions
- BAE
- Boeing
- Carnegie Mellon
- General Dynamics
- Harris
- iRobot
- L-3
- Lockheed Martin
- Northrop Grumman
- SAIC
- Univ of Florida
- DoC NIST
- OSD JGRE

- Air Force AAC
- Air Force Research Laboratory
- Army AMDEC
- Army ARDEC
- Army CERDEC
- Army MANSCEN
- Army STRI
- Army TARDEC
- Army UAMBL
- Marine/Army RS JPO
- Navy EODTECHDIV
- Navy NSWC
- Navy NUWC
- Navy SPAWAR SC
- PM Soldier

The JAUS Working Group Has Over 29 Organizational Members

Technology to the Warfighter Quicker
Recent Accomplishments

• **OSD Joint Ground Robotics Enterprise** – Mandated for use by all JGRE programs.

• **Army Future Combat Systems** – Operational Requirements Document required capability.

• **Navy Littoral & Mine Warfare** – Directed for incorporation in Unmanned Ground Systems, Unmanned Surface Vehicles and Unmanned Underwater Vehicles.

• **National Bomb Squad Commanders Advisory Board** – Requires JAUS compliance for use by all federally funded robotic programs FY’08 and beyond.

**JAUS Is Evolving Into The Unmanned Systems Messaging Standard**
Joint Architecture for Unmanned Systems

Upcoming Milestones

- Complete transition to SAE
- Dynamic registration/configuration
- Mission planning and execution
- Transport specification
- Weapons/fire control
- Component definition changes
- Products
  - Compliance Tool Suite

JAUS/SAE AS-4
Unmanned Systems Interoperability
Joint Architecture for Unmanned Systems

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