# UAS Mission Trainer

Overview

The increasing demand for unmanned aerial systems (UAS), also called remotely piloted aircraft (RPA), to support military operations is undeniable. Unmanned systems continue to grow in importance and are becoming critical assets in support of modern combat operations, humanitarian missions, and training partnerships and exercises with allied nations. This insatiable demand has brought a range of challenges including training and preparing UAS pilots and sensor operators for future missions.

CAE designs and delivers a comprehensive UAS mission trainer suite based on an open architecture with commercial-off-the-shelf hardware and high-fidelity simulation software. Customers benefit from greater flexibility for networking, distributed mission training, and integration within a comprehensive training environment. The comprehensive solution also prepares the integrated mission team (pilot, payload specialist, and mission commander) in platform operating procedures, data interpretation and analysis, and team coordination. CAE's UAS Mission Trainer is a solution that helps minimize risks while reducing the need of training in live assets and helps prepare crews to optimize mission readiness.

Features of the CAE UAS Mission Trainer

The CAE UAS Mission Trainer is platform-agnostic, meaning the simulator can be tailored to simulate any specific UAS aircraft with any sensor payload suite. Leveraging the Open Geospatial Consortium Common Database (OGC CDB) architecture and commercially available technology, CAE's UAS Mission Trainer is not subject to the International Traffic in Arms Regulations (ITAR).

The completely immersive synthetic environment provides capabilities for ab-initio training, basic flight operation, basic payload operation as well as mission planning and mission rehearsal. The UAS Mission Trainer is completely flexible and can be configured to meet any of our customer's needs, including laptop/desktop solutions, portable trainers, and fixed-based trainers.
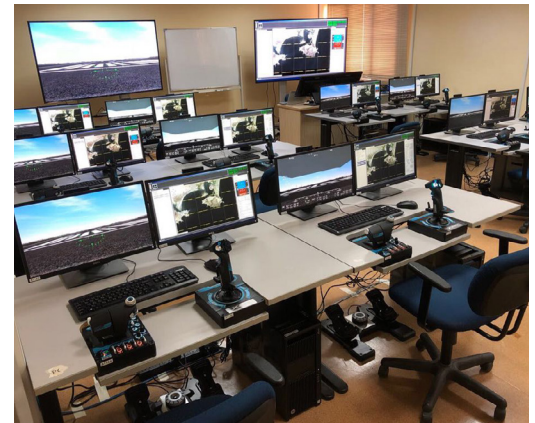
The simulation software includes:

> A common software baseline providing:
  » High fidelity simulation independent of hardware configuration
  » Easily customized to meet user's needs
  » Not regulated by the International Traffic in Arms Regulation (Non-ITAR)
  » Unclassified, vendor agnostic, and reconfigurable trainer
  » Distributed mission operations
  » Architecture/distributed interactive simulation (HLA/DIS)
  » Support for the OGC CDB format with dynamic synthetic environment (DSE):
    • Real-time dynamic database updates
    • Weather, weapon effects, localized damage and feature placement

> Compatible with CAE Real-time Insights and Standardized Evaluations (RISE) – part of our leading-edge advanced learning management ecosystem

> Two types of Unmanned Aerial Systems (UAS) are available:
  » Fixed-Wing Medium Altitude Long-Endurance (MALE)
  » Vertical Take-Off and Landing (VTOL)

> Computer-Generated Forces (CGF) scenario editor

> Interfaces with various subsystems:
  » STANAG 4586 Gateway
  » Computer Generated Forces (CGF), including CAE STRIVE, Presagis STAGE, OneSAF, VBS3 and others
  » Image generators, including CAE Medallion-6000, Presagis VegaPrime, and others

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Comprehensive Simulated Payload Suite

The CAE UAS Mission Trainer includes a comprehensive suite of state-of-the-art simulated sensing technology models, including but not limited to:

> Industry-leading electro-optical Imaging

> Charge coupled devices (CCD)/Day, and TV/ electro-optical (EO)

> Industry-leading infrared systems (IR)

> Low light TV (LLTV)

> Sensor payloads with laser rangefinder (LRF)

> Laser target designator (LTD) and laser pointer

> Maritime patrol radar (MPR)

> Synthetic aperture radar (SAR), including Ground Moving Target (GMTI) and inverse-SAR (ISAR) modes

> Signal intelligence (SIGINT)

> Communication intelligence (COMINT)

> Electronic intelligence (ELINT)

> Effectors: Smart and laser guided weapons

The CAE UAS Mission Trainer can be further expanded to include the following options:

> Electronic warfare (EW): Protection sensors, including radar warning receivers (RWR), laser warning receivers (LWR), missile approach warning receivers (MAWS), and sophisticated electronic support measures (ESM) systems

> Countermeasures: Chaff/flare dispensers, infrared jammers, and radar jammers

> Light detection and ranging (LIDAR)

> Acoustics and sonar

> Magnetic anomaly detection (MAD) system

The Synthetic Environment

CAE's UAS Mission Trainer features a tactical virtual environment that simulates, in real time, a virtual battlefield for air, land, and naval multi-domain operations.

The HLA-compliant software provides high-fidelity, physics-based models that populate the synthetic environment with friendly, hostile, and neutral forces to conduct operational training and mission rehearsal. Students train and interact with the UAS using the controls and displays they would use when operating the unmanned system in theatre, providing the realism required to train as they would operate during a mission.

Program Example

CAE has developed a Predator Mission Trainer for the Italian Air Force. The high-fidelity Predator Mission Trainer specifically represents the Italian Air Force's General Atomics Predator A and Predator B to support pilot and sensor operator mission training. In partnership with General Atomics and the Italian Air Force, CAE performed flight testing on an actual Italian Air Force Predator aircraft to gather the required flight data to ensure the highest fidelity simulation of flight systems and sensor payloads.

In 2019, the Italian Ministry of Defence and Italian Air Force formally qualified the CAE-built Predator Mission Trainer for zero flight time training on the Predator B/MQ-9 variant and the simulator was accepted as ready-for-training at the Amendola Air Base in Italy. In early 2018, the Italian Air Force began training on the Predator A variant of the Predator Mission Trainer. The Predator Mission Trainer is the world's first Level D equivalent simulator for unmanned aircraft where aircrews can potentially conduct all training in the simulator without necessarily requiring further training on the actual aircraft.

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