

Forum

TERATEC

20 - 21 OCTOBRE 2026

PARIS · PALAIS DES CONGRÈS

GROUND DEFENSE AI AND RUSTICITY

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BEFORE UKRAINE

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01
An ideal AI
Demonstrate full autonomy: perceive, understand, and decide independently, in all areas.

02
A general-purpose AI
All missions, all fields: an employment domain difficult to bound, and therefore to qualify.

03
An AI by data
Multiple agents, multiple sensors, crossed with tactical data in real time

04
Complex tactical autonomy
Understand the situation and decide as a crew: a challenge still open.



A solution not accessible in the short term to address all tactical, operational, and field constraints.

*Armada International (RACER, 2022)

LAND DEFENSE AI: CONSTRAINTS

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THE ENVIRONMENT

/ Rough terrain: mud, traps
/ Ground-to-ground perception: occlusions, camouflage, complex backgrounds
/ GNSS and communications jammed
/ At contact: targeted system, high attrition



EMBEDDING

/ Need HPC, but only frugal computing and limited energy available
/ Hardening: shocks, vibrations, dust
/ Data and model logistics, from edge to cloud



TRUST

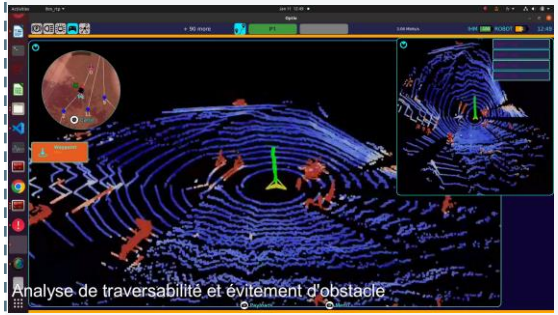
/ Explainability and mission security
/ Pre-employment qualification
/ Human in the decision loop
/ Human-robot collaboration
/ Security of property and persons

Duality: from civilian to military, there are several steps.

AI USE CASE: AUTOMATED MOBILITY

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AI to drive like a pilot.



Perception

Semantic segmentation of the multi-sensor terrain: passable grass, ditch, obstacle.

Subjectivity

Location

GNSS Denied: SLAM and visual ground odometry; image correlation for the accompanying drone

Inaccuracy

Planning

Plan on an "ideal" map
Trajectory in the robot's perceived environment.

Uncertainty

Data and calculations

A lot of data* to process, rare training data, frugal embedded computing, communication to be limited.

Limited processors

Full automation is essential: reduced cognitive workload, multi-agent, counter-jamming.

Battlefield ground understanding requires many sensors (cameras, thermal, LiDAR, radar, inertial), resulting in significant complexity, potential fragility, and cost.

Compromise to be found:

Teleoperation: low cost, but high cognitive load & jammable;

Autonomy: low cognitive load but high cost & not adaptable enough.

*Exemple : Up to 4 TB of data per hour (RACER), DARPA (RACER, 2021-2026), Armada International (2022)

UKRAINE: PRAGMATISM

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01
AI hit by contraints
Vegetation, Camouflage, decoy, cope cage, image quality, tactical.

Remote-control

02
Specific functions
In place of an overall autonomy: tracking, back tracking, visual odometry, shot detector.

Simplicity, frugality

03
AI < Human
Humans are more adaptable and are sent into contact, thus very vulnerable.

Remote-control and Mortality

04
The end justifies the means
TRL 8 is not required to be employed. The battlefield is a laboratory.

Risk





More than 55,000 Ukrainian deaths, 30 minutes of life expectancy at the front, 3 months of training for UAV operators.

AI remains a necessity, but even in Ukraine, AI-bricks are not widely used.

MASSIFY, AUTONOMIZE, BUT STAY RUSTIC

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01 Massify

Fewer operators per robot, cheaper robots, less fragile robots.

02 Autonomize

Fewer operators, therefore more autonomy. Autonomy requires sensors, computers, and will be less adaptable.

03 Stay rustic

Less complex, less fragile, and therefore less expensive. Searching for easier to repair and replace solutions

The problem: a need for system compromise

NO HUMAN

Very autonomous, but expensive

A highly efficient, robust system with low recurring costs will require a considerable effort from an entire industry*. And it is not yet here…

NO HUMAN

The masses, not very intelligent

More specialized mass robotics, with cheaper sensors, allowing less adaptation, but at a reduced price. And to industrialize

HUMAN WITH

Human – key component

Increasing basic autonomy "the bare minimum" allows distancing the human for a true operational added value.



LESS HUMAN – CHEAPER – MORE ROBUST

Some R&D pathways

Transformers, world models: Understanding the world with a simple camera.

Low-cost sensors: high-volume, robust, and inexpensive sensors

Tactical planning : use battlefield, survive longer

*Automotive LiDAR has dropped from over $50,000 to around $200 in ten years, driven by volume.