

TRUSTED AI SE

SERC/AIRC Phase I

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PHASE I – GOAL

Explore performance of AI models

ASSUMPTIONS

UGV is a scarce resource

UAV is a fast, multi-spectral video collection system

AI performance data corresponds to UAV

Human SME reviews video from UAV

Human SME gets feedback from UGV

APPROACH

Understanding the **problem**

Define structure for Phase II

MOEs

Time to clear a path

Effectiveness

Trustworthiness

As a factor that affects path clearing

As a factor that affects traversing the safe passage

FROM AI PERFORMANCE TO SYSTEM PERFORMANCE

A baseline time value for each activity

An activity error factor for each activity

Type 1. A mine exists but is not detected by the UAV

Type 1.1 The UGV detects the mine

Type 1.2 The UGV does not detect the mine

Type 2. A mine does not exist but is *detected*

A trust matrix

OPERATIONAL SOLUTION AT THE MISSION LEVEL

How do soldiers plan to traverse the cleared path?

Wait for cleared path

Walk with the UGV

Walk X links behind the UGV

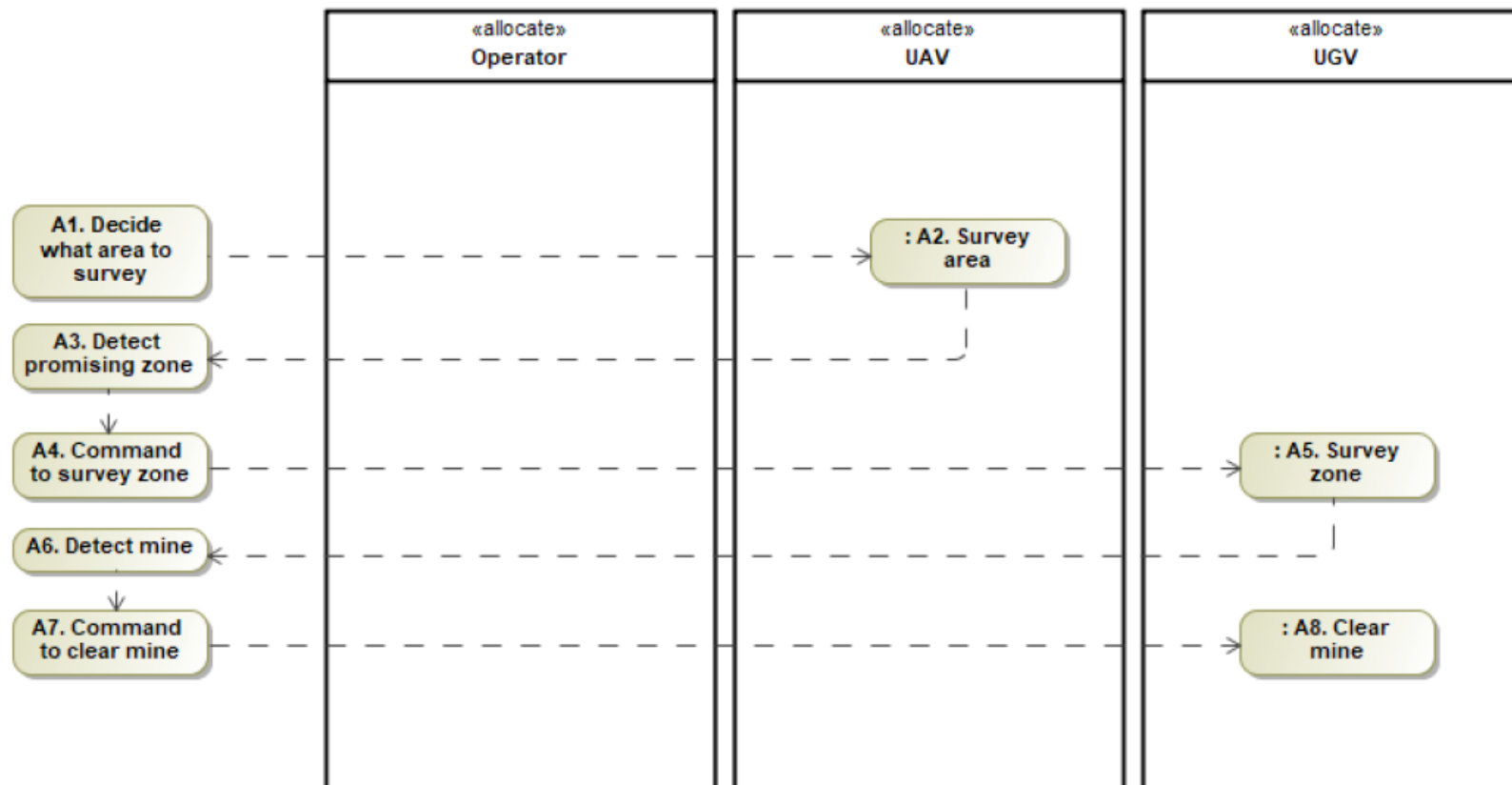
OPERATIONAL ARCHITECTURE AT THE SYSTEM LEVEL

Generic functional flow

- *A1. Decide what area to survey.* This consists of selecting a large area to identify the most promising zones to be cleared, including those points where mines may have been placed.
- *A2. Survey area.* This consists of surveying the area selected in A1.
- *A3. Detect most promising zones.* This consists of identifying the most promising zones to clear in the area surveyed in A2.
- *A4. Command to survey zone.* This consists of requesting a survey of the zones identified in A3.
- *A5. Survey zone.* This consists of surveying the zone requested in A4.
- *A6. Detect mine.* This consists of detecting mines in the zone surveyed in A5.
- *A7. Command to clear mine.* This consists of requesting the clearance of the mine detected in A6.
- *A8. Clears mine.* This consists of clearing the mine requested in A7.

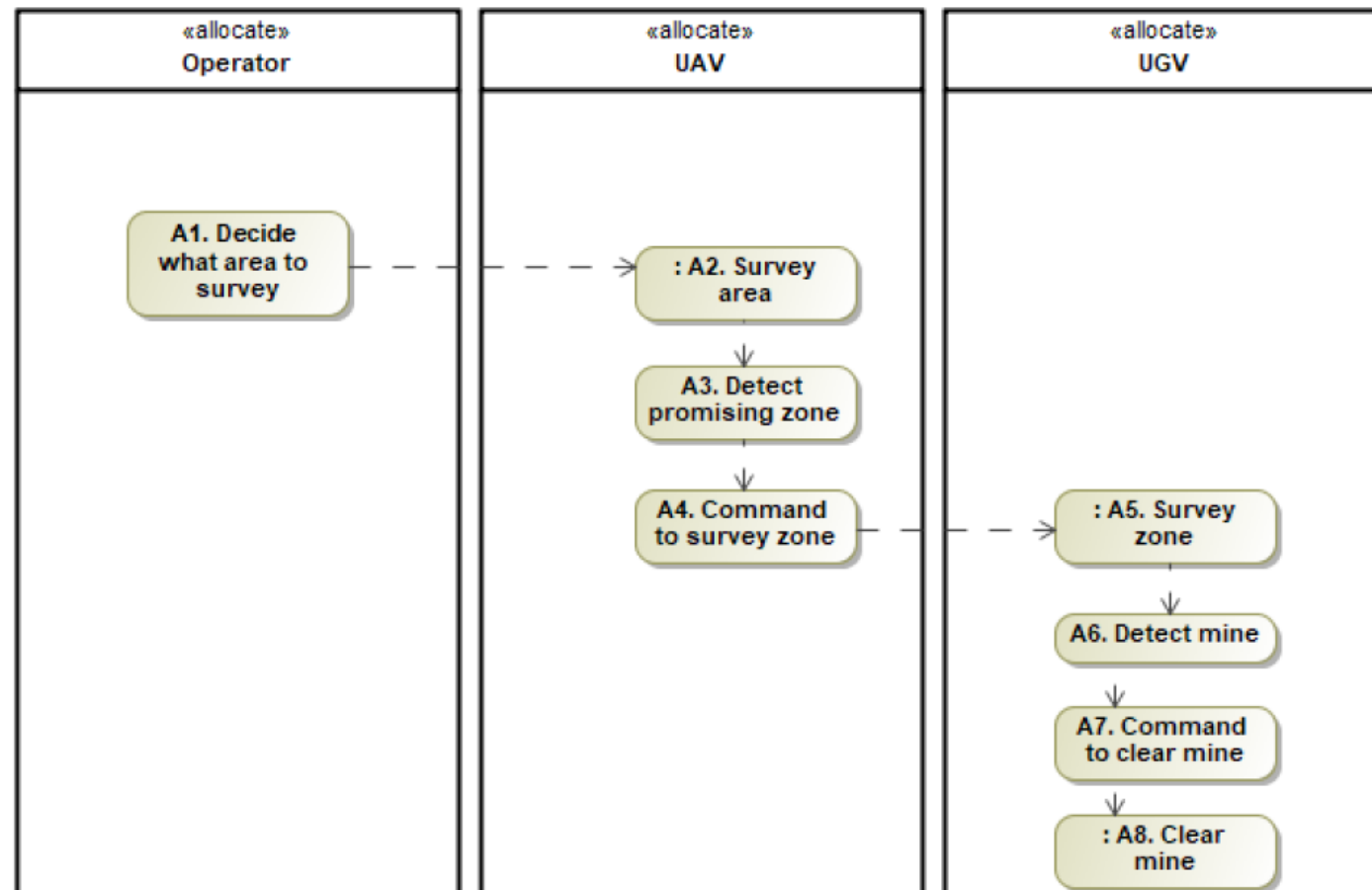
OPERATIONAL ARCHITECTURE AT THE SYSTEM LEVEL

Minimal allocation



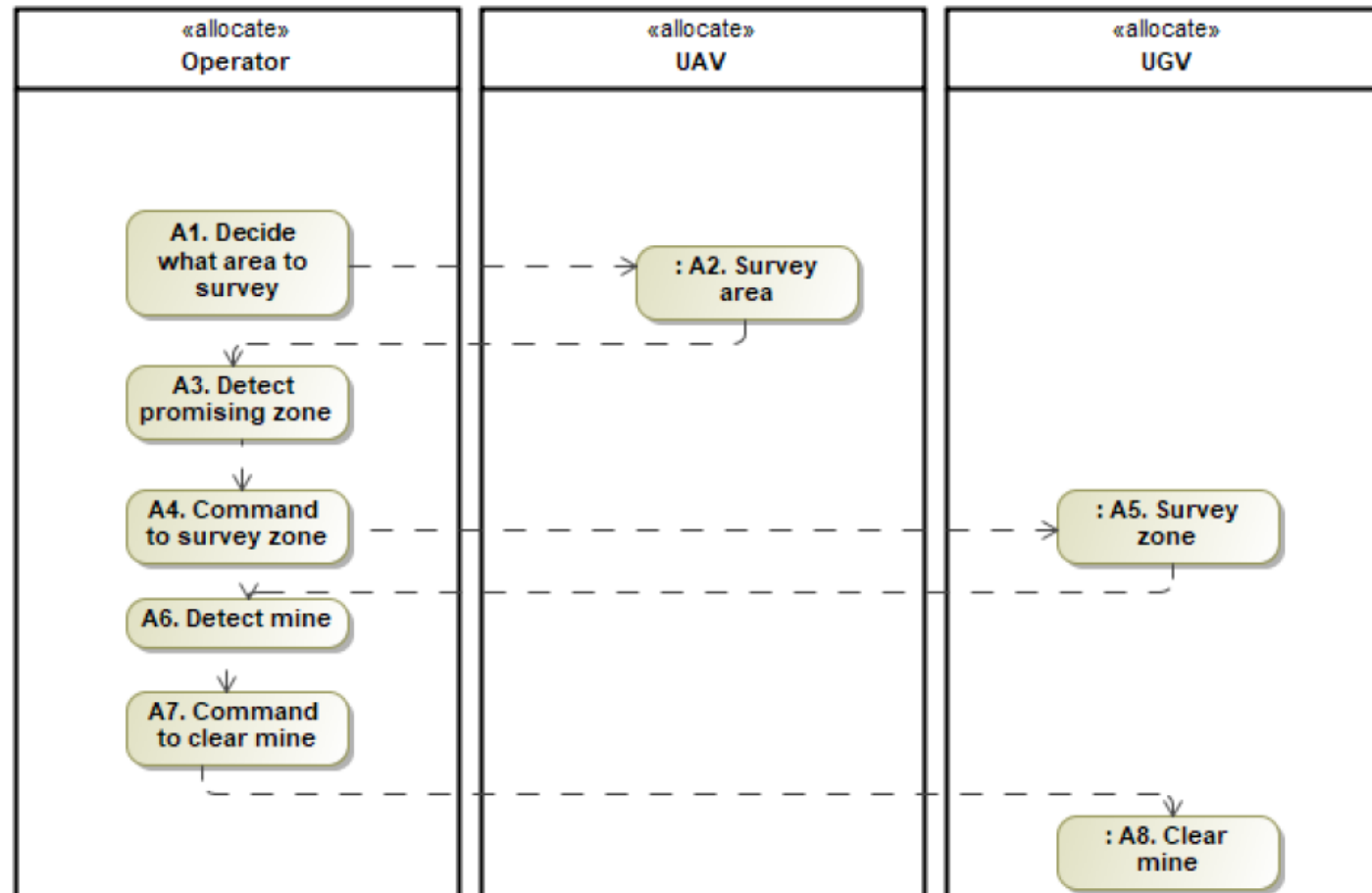
OPERATIONAL ARCHITECTURE AT THE SYSTEM LEVEL

AI intensive allocation



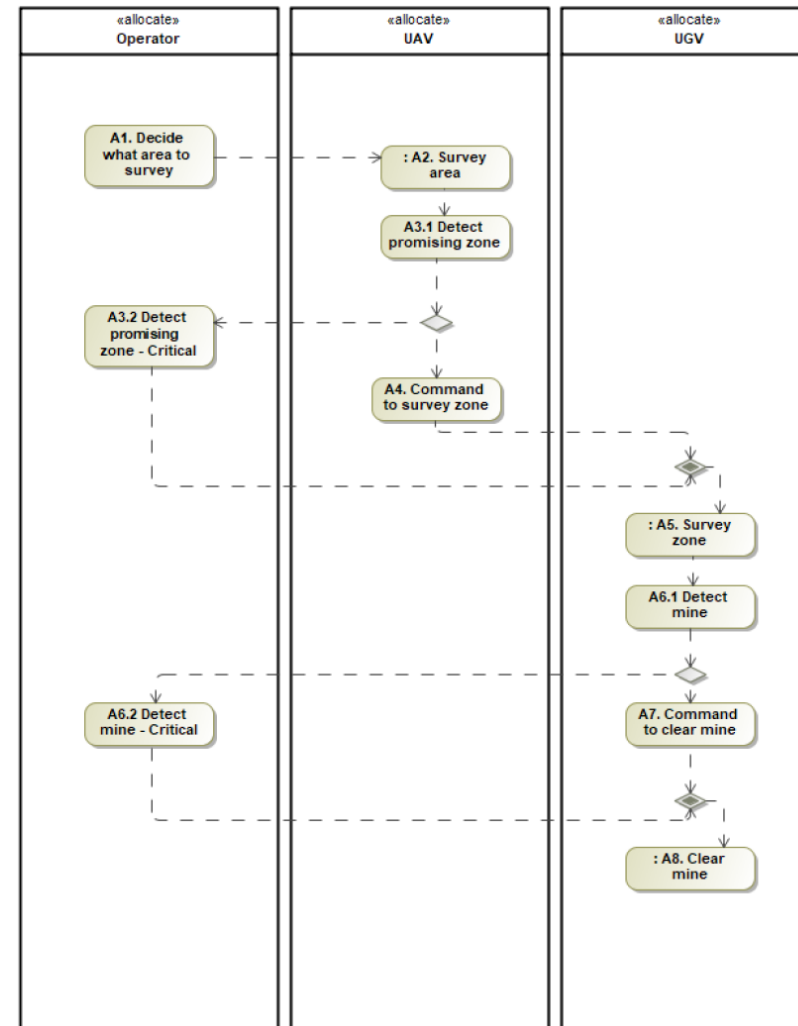
OPERATIONAL ARCHITECTURE AT THE SYSTEM LEVEL

Human intensive allocation

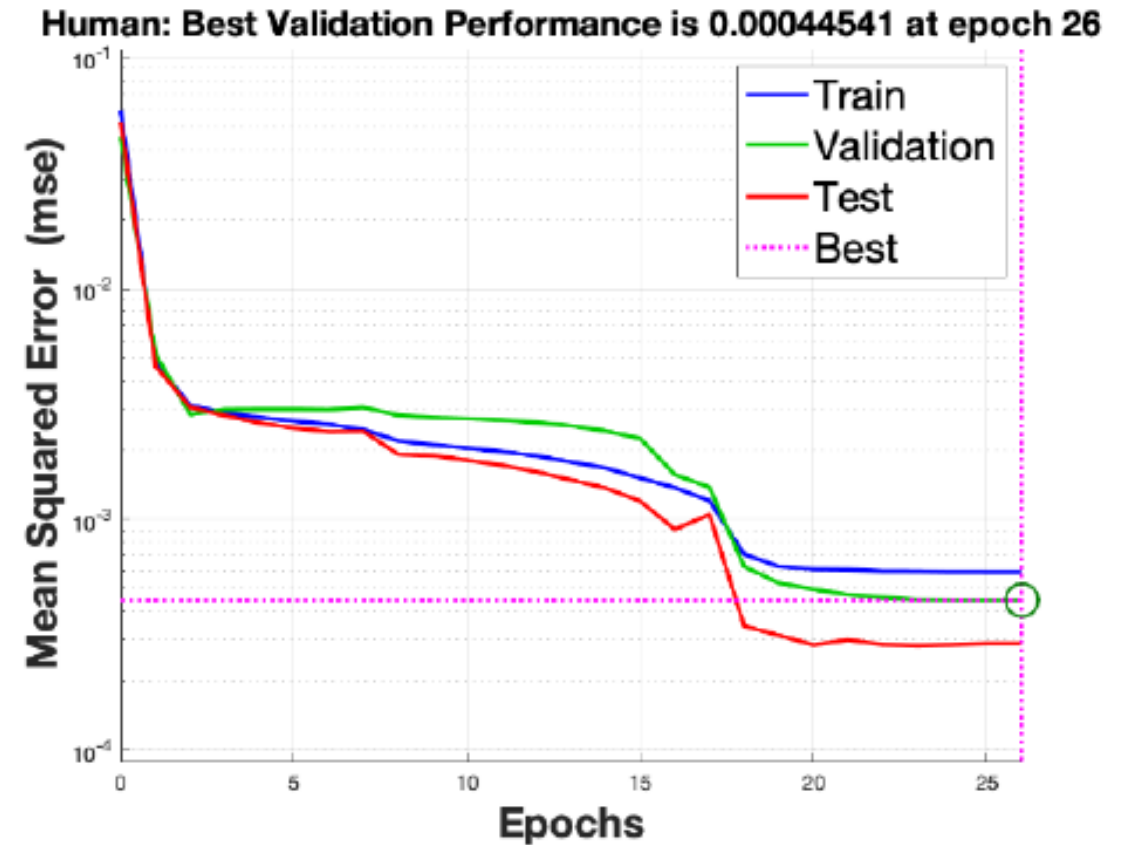
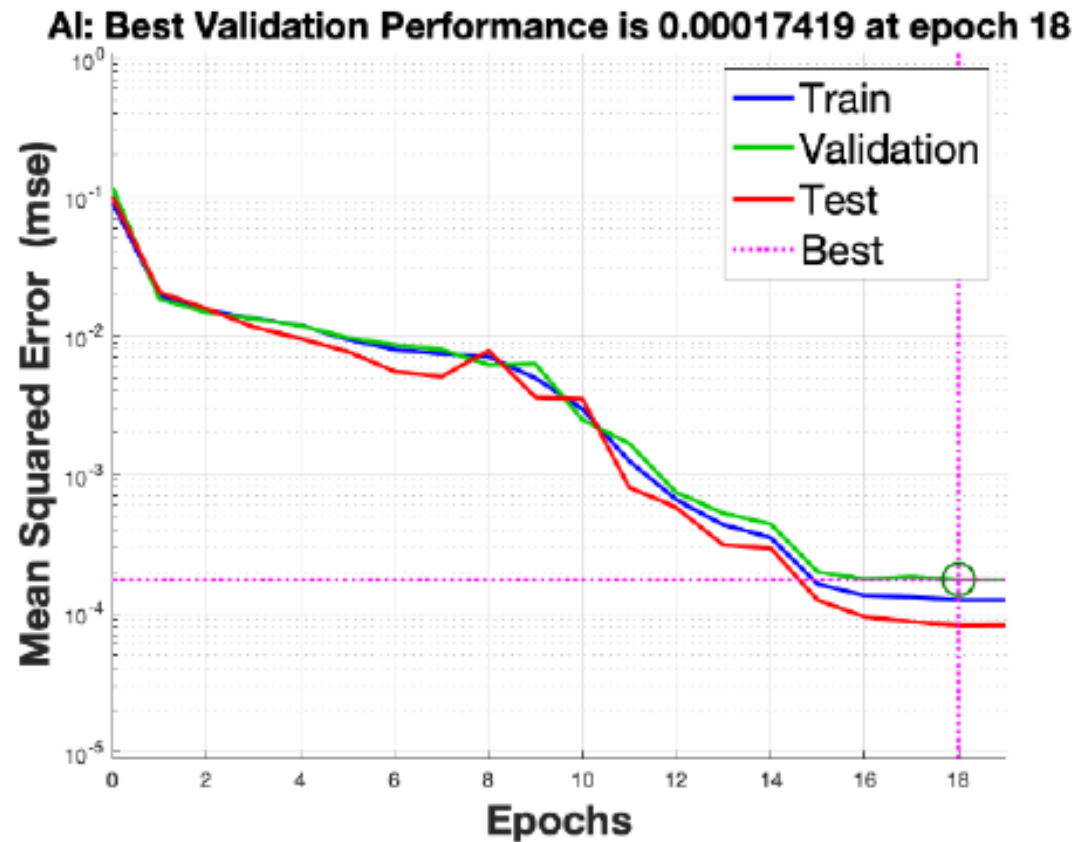


OPERATIONAL ARCHITECTURE AT THE SYSTEM LEVEL

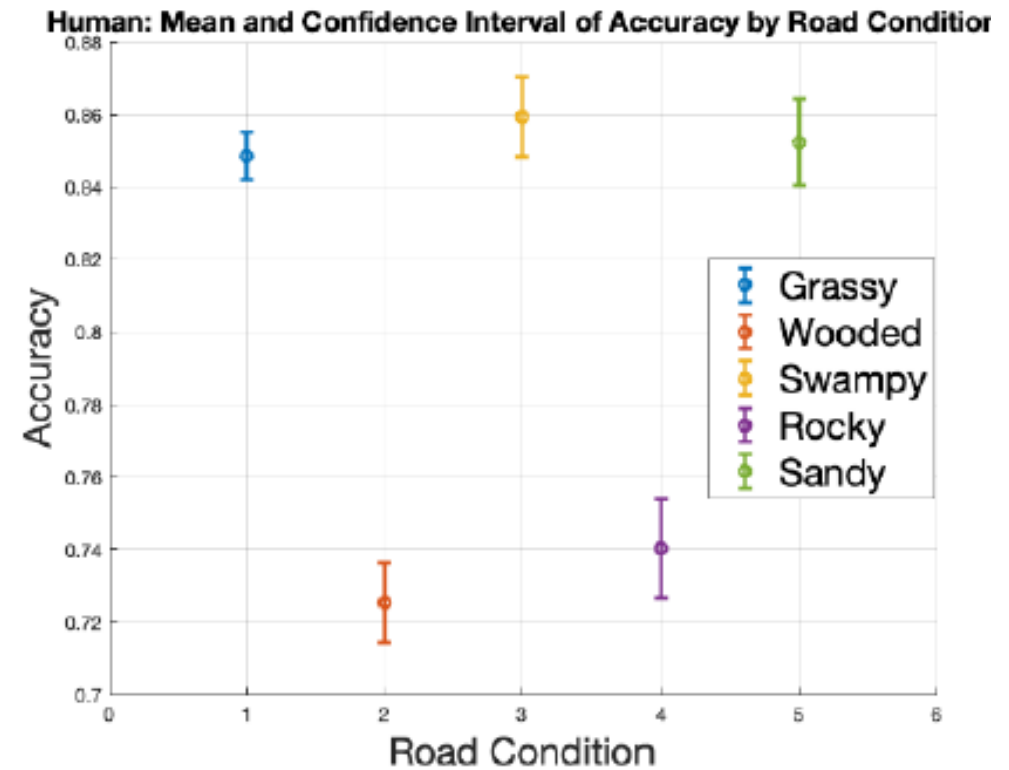
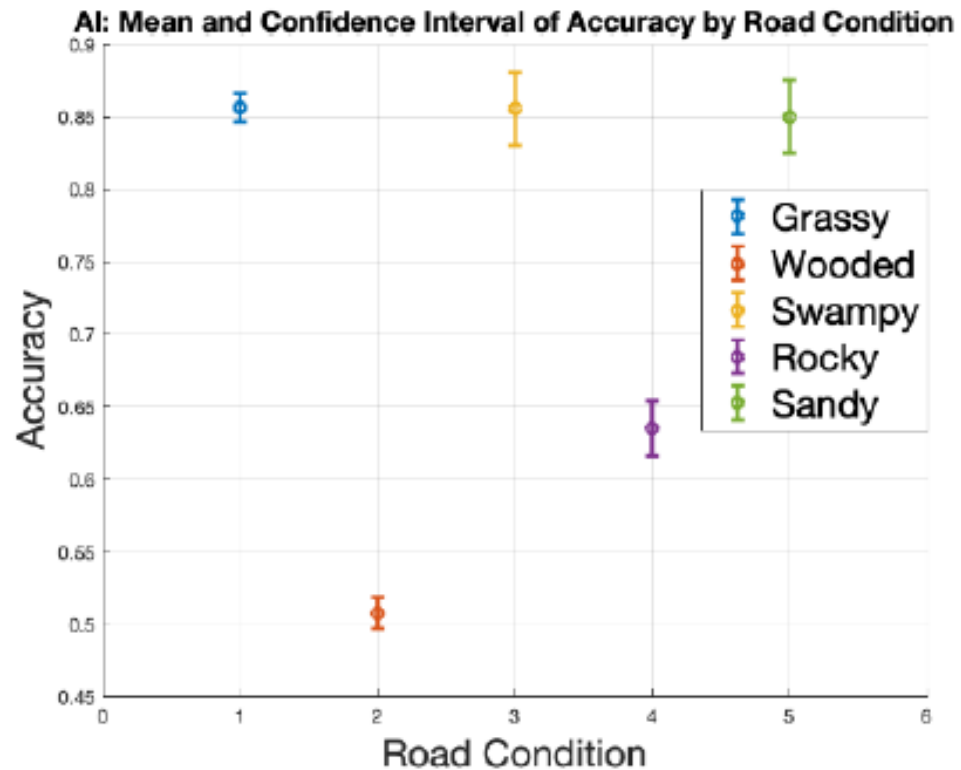
Performance-based allocation



CHARACTERIZING AI vs HUMAN PERFORMANCE



CHARACTERIZING AI vs HUMAN PERFORMANCE



Does the operator trust the performance of the AI models?

Does the UGV trust the information provided by the UAV?

Do the UGV and the UAV trust the information provided by the operator?

VULNERABILITIES

...of each function

...of each information exchange

NEXT

Implement performance model

Perform trade studies

THANK YOU

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