

European Defence Challenge V edition



V EDITION
2024-2025



The concept of ultrasonic mine detection

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What is ultrasonic detection?

- An ultrasonic flaw detector generates sound waves that travel inside the inspected component. If there is a non-conformity in the component, the wave will bounce off the component and this information will enter the defectoscope, which will immediately record the information.
- Ultrasonic sensors do not directly detect explosives - they detect objects/shapes that may contain them.
- The range of a single sensor is up to a 1.5 metres detection radius, with meaningful detection only occurring when multiple sensors detect the same reflection.
- The recommended spacing between ultrasonic sensors is between 0.5 and 1 meter, depending on the amount of interference associated with the heterogeneity of the ground and the presence of different rock fractions,
- One solution to minimize the risk of misinterpretation is to use correlation techniques and filters adapted to the expected shape of the reflected pulse. In this way, the reliability of the measurement can be improved and the information about the position of the object can be better separated from noise or unwanted reflections.

Modern approaches and existing solutions

Our concept is based on using existing solutions in a modern way. Several things are needed to carry out the operation:

- Transport drone
- Field computer
- Ultrasonic sensors
- AI model (AI can analyze complex patterns and distinguish true reflected signals from mines from interference from stones or roots)
- Grappling arm drone

Between 10,000 and 40,000 ultrasonic sensors are needed to cover 100m².

These sensors are not disposable, so they can be moved to other areas.

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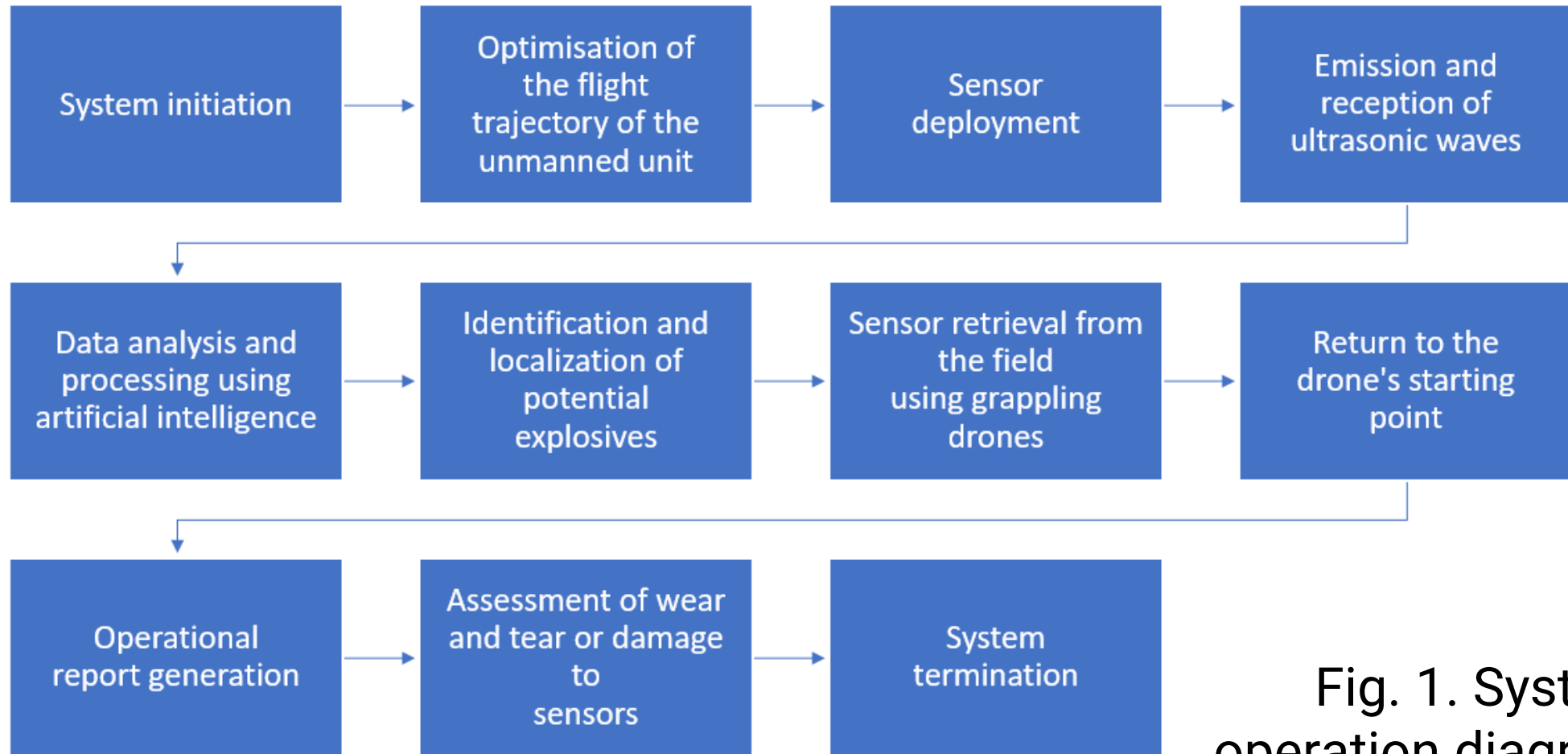


Fig. 1. System operation diagram

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Thank you for your attention!

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