EMBERION

SWIR Imaging for Defense Applications

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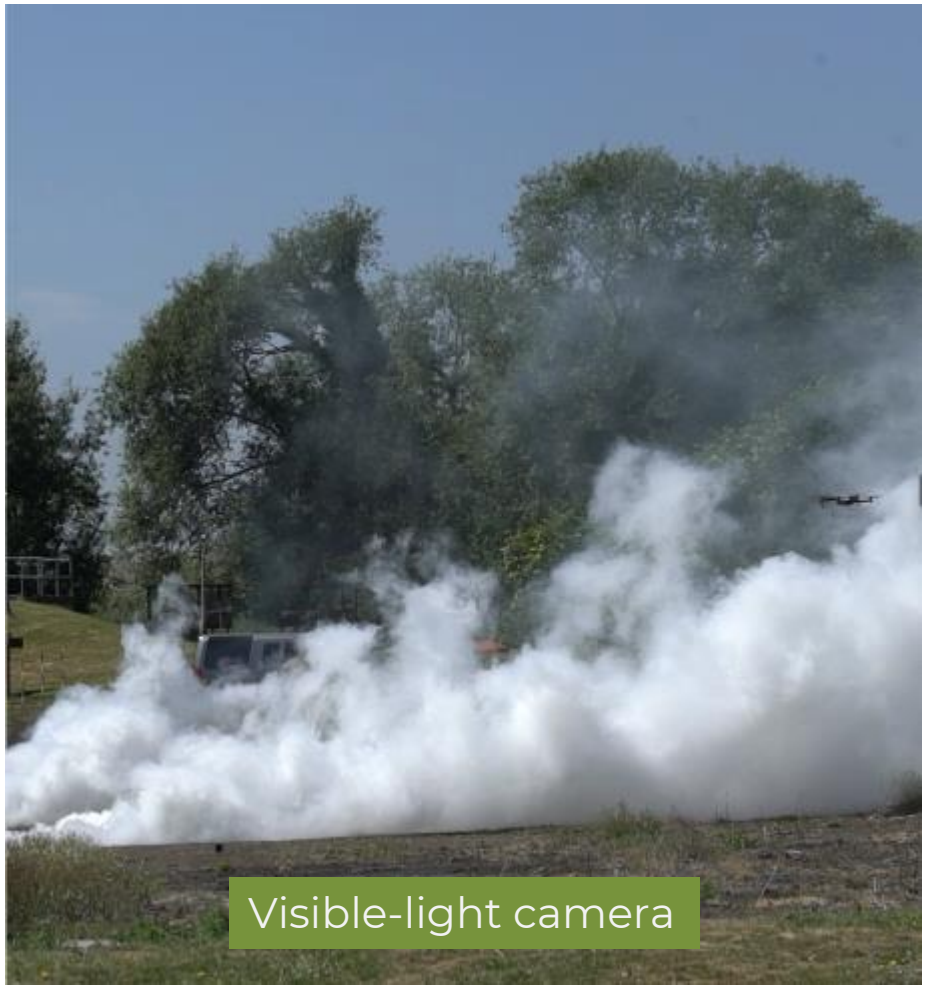
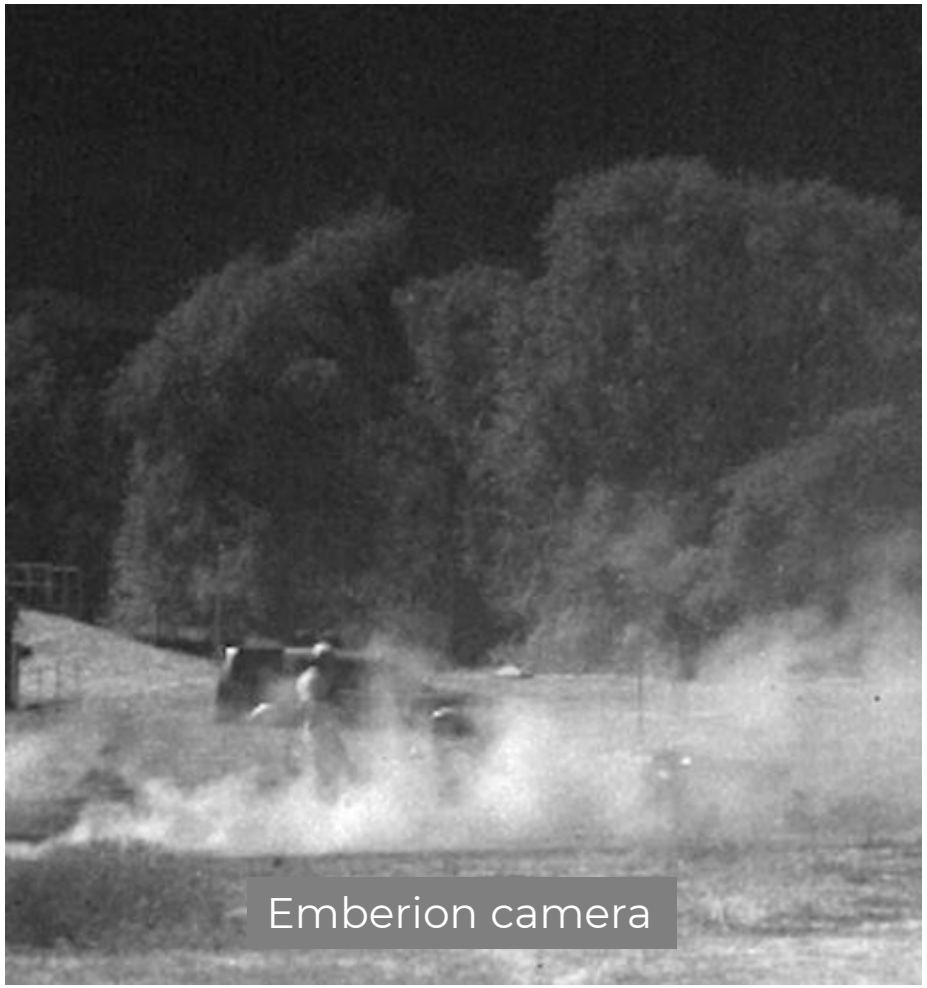
SWIR provides more information on the battlefield



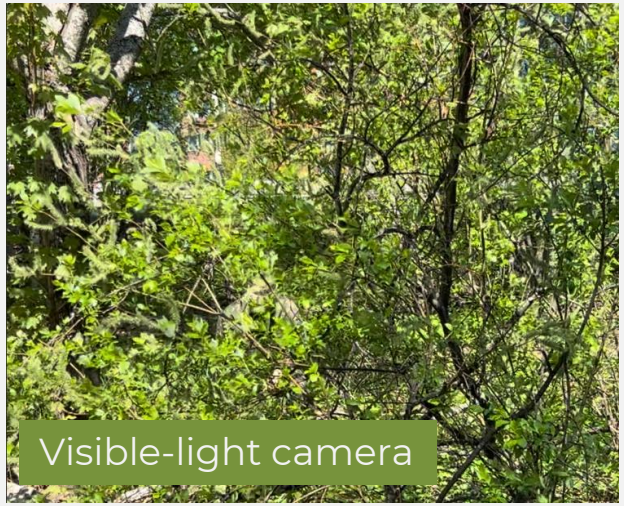


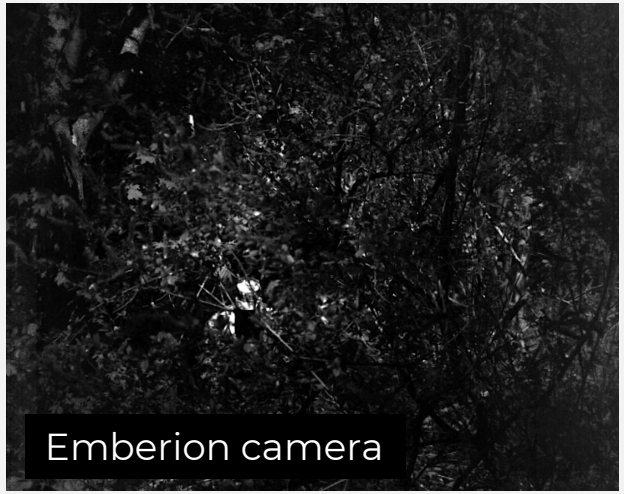
SWIR key value for defence

1. Enhanced visibility in any condition
   - See through smoke, fog, smog, snow & haze
   - Tracking drones during & after laser attack

2. Identify camouflaged material on the battlefield
   - Netting, uniforms
   - Identify objects based on their spectral fingerprint

3. Detecting lasers with wide spectral range
   - Identify laser range finders or direct designation spots
   - Identification on both sides of the battlefield

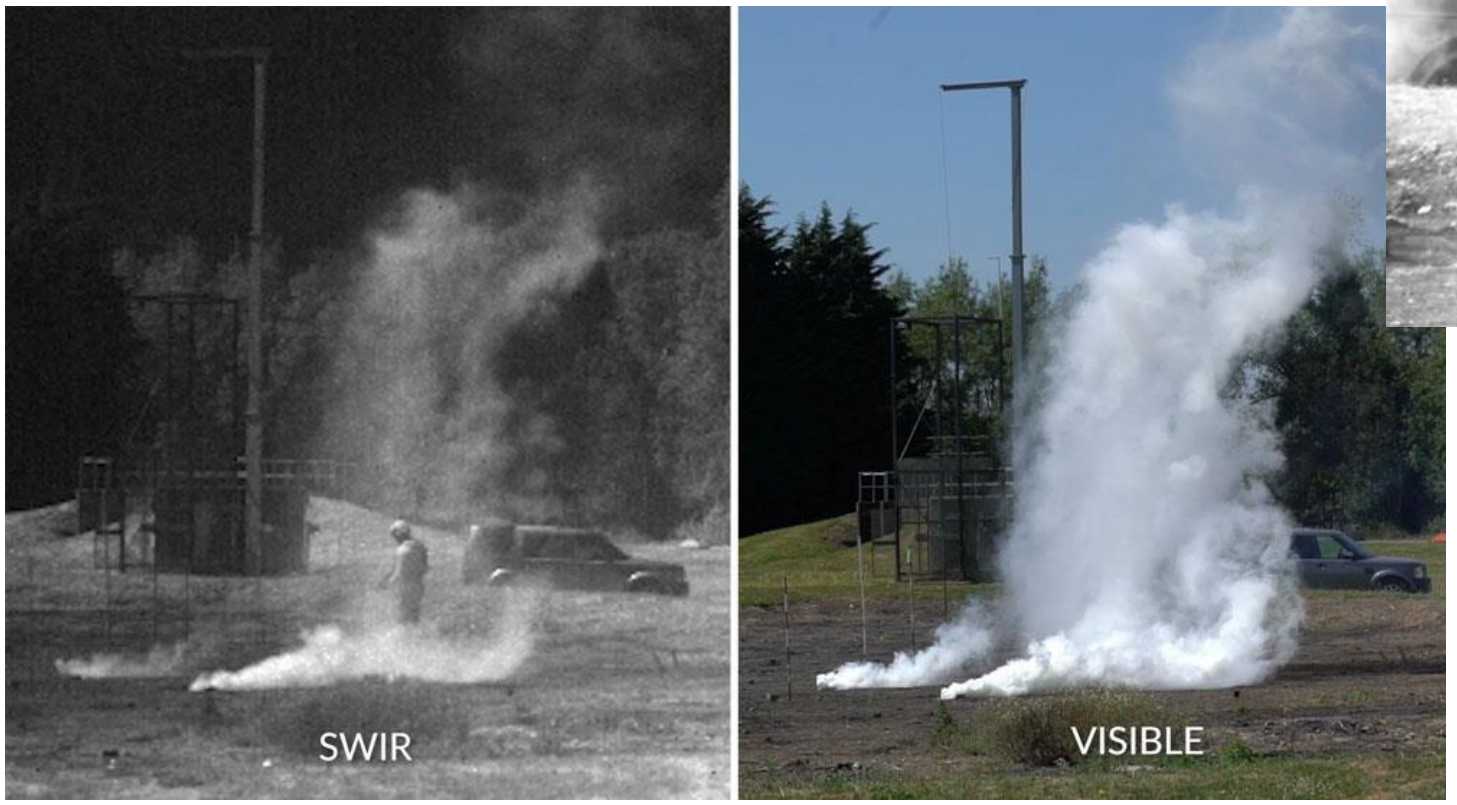




Snapshot of a video with military smoke grenades

Emberion camera showcases excellent see through capabilities with military smoke grenades

Hand grenade smoke see through capabilities



Vehicle launched phosphorus smoke grenade see through capabilities with 1550 nm laser range finder spot detected when smoke emerging. Typically deployed at armored fighting vehicles and tanks

Read more & videos:
https://www.emberion.com/tactical-advantage-through-swir-by-emberion/

Camouflage detection

Camouflage detected behind trees
Camouflage uniform has NIR coating, however in SWIR range camouflage easily detectable

Showcasing camera capabilities with an LRF

- A 1550 nm laser range finder (LRF) tested for laser detection with two primary use cases
  - Seeing the LRF spot on the object when measuring the distance to an object
    - Ensure you are measuring the distance to the right object in complex battlefield environment
  - Identifying an LRF measuring distance to you
    - Detect lasers pointing at you and take necessary countermeasures early on
- Emberion camera provides consistent performance in both scenarios

Seeing the LRF spot

Detecting the LRF

Distance ~215 m, images taken with Myutron SWIR zoom-lens

Emberion in Brief

Deep-tech company developing and providing broad wavelength cameras for multiple applications

- Emberion develops and produces infrared cameras capturing light from visible 400 nm up to 2000 nm short-wave infrared (SWIR)
- Cameras are designed in-house from read-out integrated circuitry (ROIC) to nanotechnology-based sensors, electronics, firmware and software
- Products are suitable for demanding application areas, including machine vision, surveillance and defence
- IP portfolio includes over 100 granted patents
- 30+ employees and sales network with global reach
- 4 camera products with 2 variants in market to date

Espoo, Finland

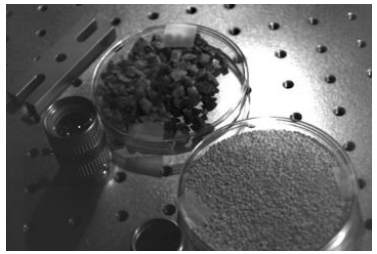
Cambridge, UK

Emberion VS17 / VS20 Compact

Emberion VS17 / VS20 Core

Emberion differentiates in CQD-based SWIR cameras

Emberion is the leader with broader wavelength range, high-speed imaging and dynamic range

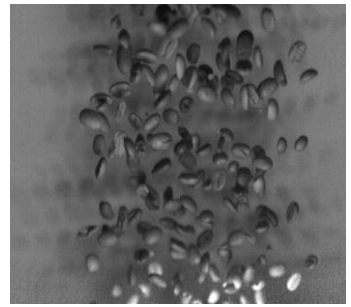


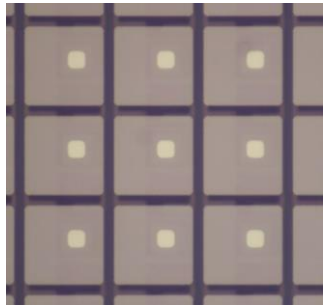
High dynamic range

- Maximized dynamic range: over 120 dB in log mode
- Non-saturating measurement

High speed imaging

- Emberion provide 400 fps at VGA resolution and 1900 fps for 1/4VGA
- 1 µs exposure time possible



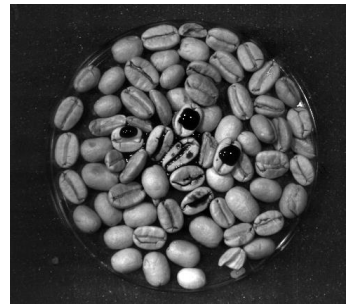


Excellent scalability to small pixel size

- Emberion's IC approach maximizes the signal-to-noise ratio for small pixels

Broad spectral range

- Emberion is the front runner in wavelengths above 1,700 nm;
- Camera variants up to 1700 nm and 2000 nm with optimized performance peaks



Emberion offering for defense applications

Now - 2025

Detecting lasers with wide SWIR spectral range

- Identify laser range finder or direct detection spots on both sides of the battlefield – see your own or other parties' lasers
- Also future wavelengths covered

Enhanced visibility in any condition

- See through smoke, fog, smog & haze
- Tracking drones during & after laser attack

Identify any camouflaged material on the battlefield

- E.g. netting, uniforms

Next - 2026

Camera module for deeper integration e.g. into drones enables smaller and lighter footprint

- SWaP optimization
- SDI interface

Enabling hyperspectral scanning capability with pushbroom imaging optimized sensor for detailed object recognition

Megapixel camera to see more details on the battlefield

In future – 2027 and onwards

Midwave (MWIR) sensor

- MWIR the ultimate surveillance solution
- Providing the ideal performance for any condition and distance surveillance without cryo-cooling

Wafer-level packaged sensor-only product for highest volume and lowest cost deployments

- Capability to bring Emberion's products to every dismounted soldier and every size drone