

SignalVoid

Flying in GPS denied locations



Benji Metz
Martijn Crijnen

info@vydar.eu
Admiraal de Ruyterweg 18D
Rotterdam, 3031 AB

The Team



Benji Metz

- MSc Microelectronics
- **HW optimised AI**
- Avionics mfg. Engineer at **Rocket Lab**
- Launch REXUS31 at **ESA**



Martijn Crijnen

- International Business degree
- Full time **Investment Banker**
- 3+ years of **Entrepreneurship** experience



Timber Lock

- MSc Quantum Information Science
- Electrical Engineer **Fox Crypto**
- Developing **HW encryption** for defence industry



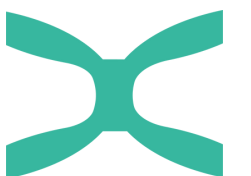
Dylan Durand

- MSc Computer Science
- **Specialised in AI**
- Researching **computer vision** pipeline for autonomous robots

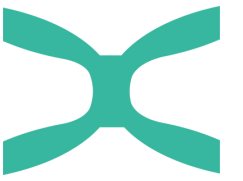


Luca Hagemans

- MSc Computer and **Embedded Systems** Engineering
- Researching sustainability of IT systems
- **Data optimisation** for storage & transmission



Issues?



THE WALL STREET JOURNAL.

Electronic Warfare Spooks Airlines, Pilots and Air-Safety Officials

Hundreds of daily flights around the world are running into GPS spoofing, a hazard that poses new risks for pilots and passengers

By [Andrew Tangel](#) [Follow](#) and [Drew FitzGerald](#) [Follow](#) | Graphics by [Adrienne Tong](#) [Follow](#) and [Carl Churchill](#) [Follow](#)
Updated Sept. 23, 2024 12:02 am ET

BY MORGAN MEAKER BUSINESS OCT 17, 2024 6:32 AM

GPS Jamming Is Screwing With Norwegian Planes

So much jamming is taking place in northeastern Norway, regulators no longer want to know.

THE KYIV INDEPENDENT

Monday, November 25, 2024

Europe Video Culture Investigations War Crimes [Dare to Ukraine](#) Explaining Ukraine

NEWS FEED, FINLAND, RUSSIA, GPS JAMMING, HYBRID WARFARE, NATO

GPS jamming in Finland likely part of Russian hybrid campaign, ISW says

Share [Twitter](#) [Facebook](#) [LinkedIn](#) [Email](#)

by Martin Fornusek and The Kyiv Independent news desk · July 12, 2024 12:18 PM · 2 min read

“Stalemate in drone warfare resulting in slow war of attrition.”

Los Angeles Times

WORLD & NATION

Israel’s ‘GPS spoofing’ tricks missiles, but also commercial airplanes, dating apps in Mideast

bfbs Forces News

Russia

Russia's new fibre-optic drones dodging Ukraine's jamming equipment

12th November 2024 at 10:33am



Russia blamed for GPS interference affecting flights in Europe

2 May 2024

Vitaly Shevchenko
Russia editor, BBC Monitoring

Share [Left Arrow](#)

AIR & SPACE FORCES MAGAZINE

Russian Jamming Is Wreaking Havoc on GPS in Eastern Europe. But Is It Hybrid Warfare?

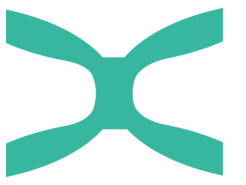
[Facebook](#) [Twitter](#) [YouTube](#) [LinkedIn](#) [Email](#)
SHARE ARTICLE

July 10, 2024 | By Shaun Waterman



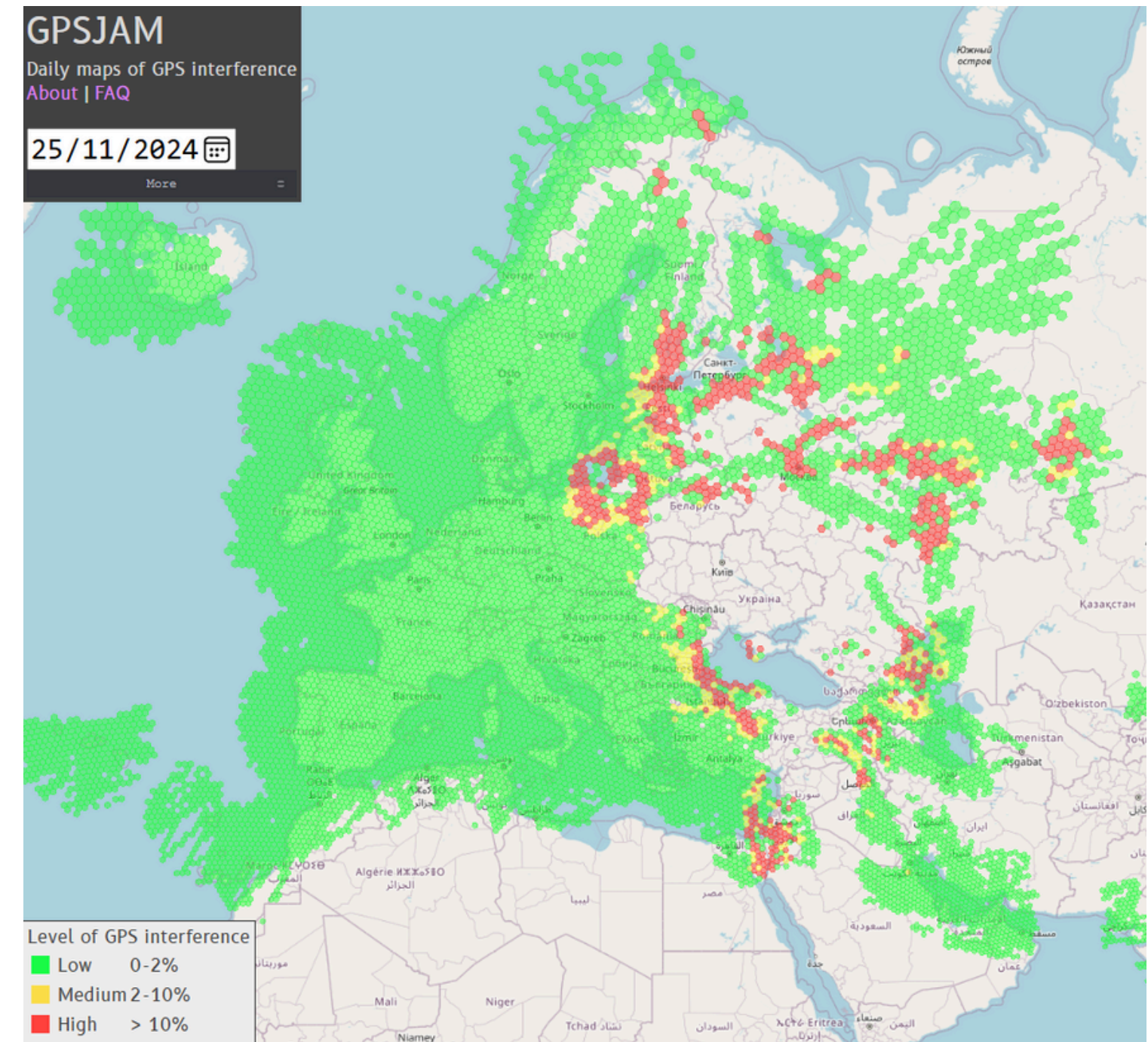
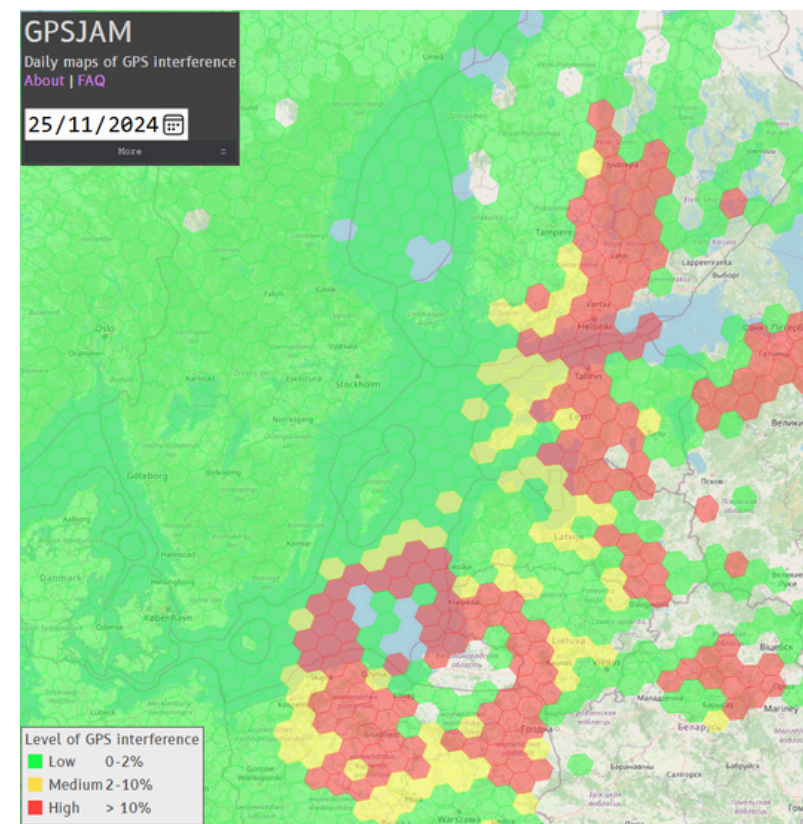
Russia jammed GPS during major NATO military exercise with US troops

By [Ryan Browne](#), CNN
© 2 minute read · Updated 11:48 AM EST, Wed November 14, 2018



Issues?

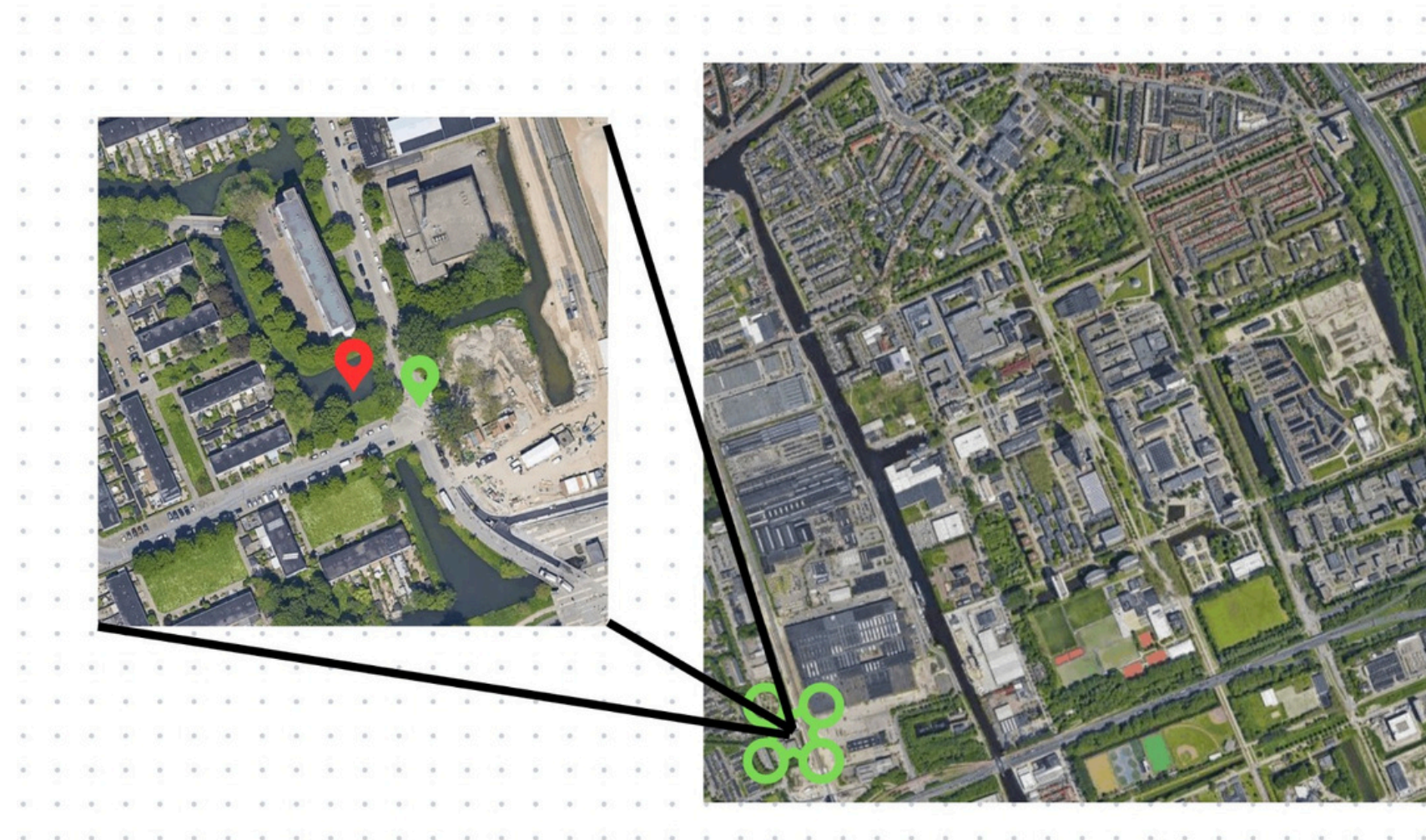
- 100's Km of GPS denied regions
- Traditional GPS denied navigation
 - 2% [m/min] error [1]
 - 2km error (at 300km/h)
- 20% drone success rate
- 10.000 (drones/month in Ukraine)



SignalVoid as the Solution

This weekend we achieved:

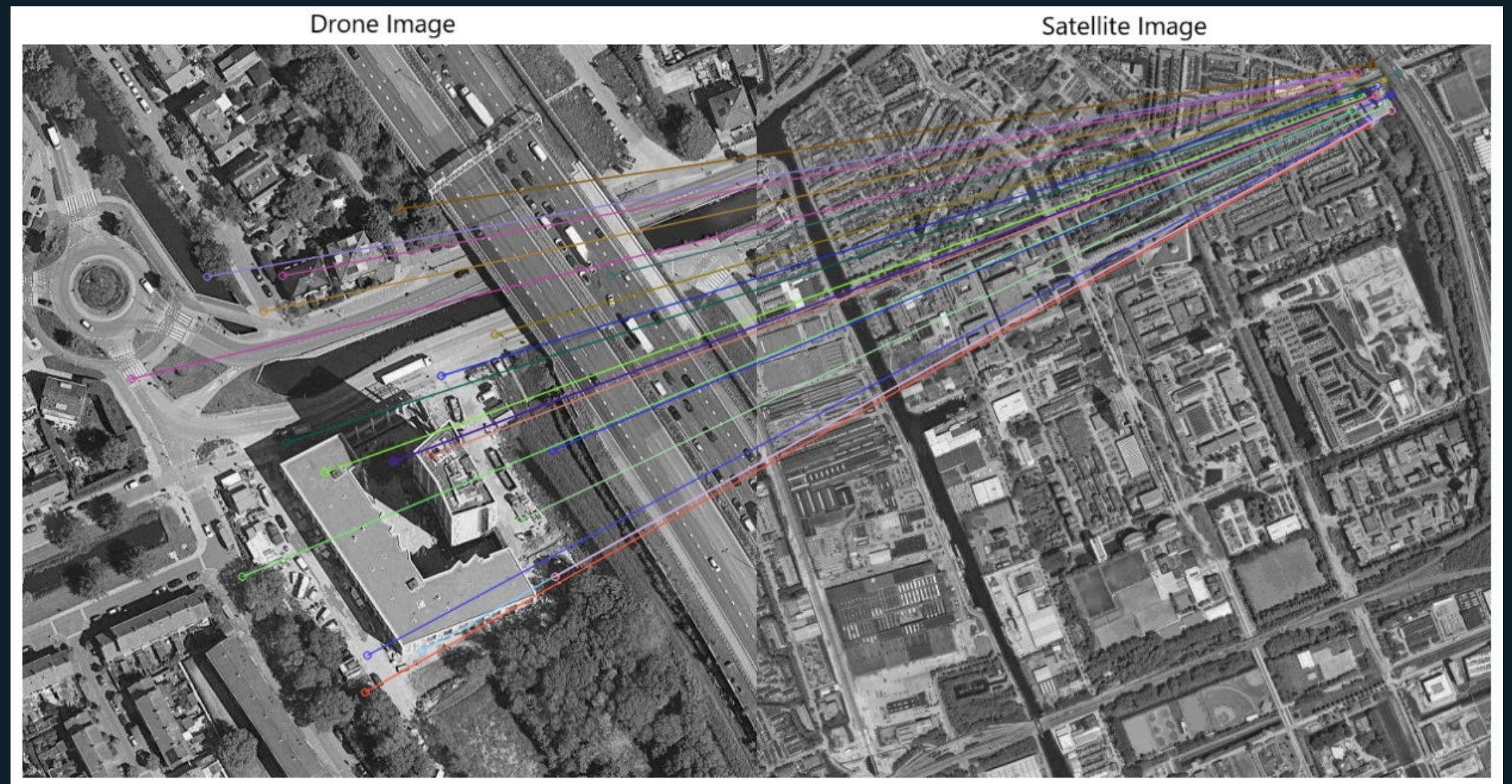
- 30m accuracy within 25km²
- Drone success rate 20% → 80%
- Module costs:
 - 1.500EUR - 2.000EUR
 - Ground to Air Interception cost:
300.000EUR
- Total destruction of an enemy battalion requires 200 drones
 - 3-4M EUR costs



Technology



- Feature Extraction
 - Multiple layers of gaussian blur
 - Gradient extraction for every layer
 - Grey scale
- Feature Matching
 - Current tests: 20 features
 - Potential optimisation
- Unsupervised ML to estimate coordinates



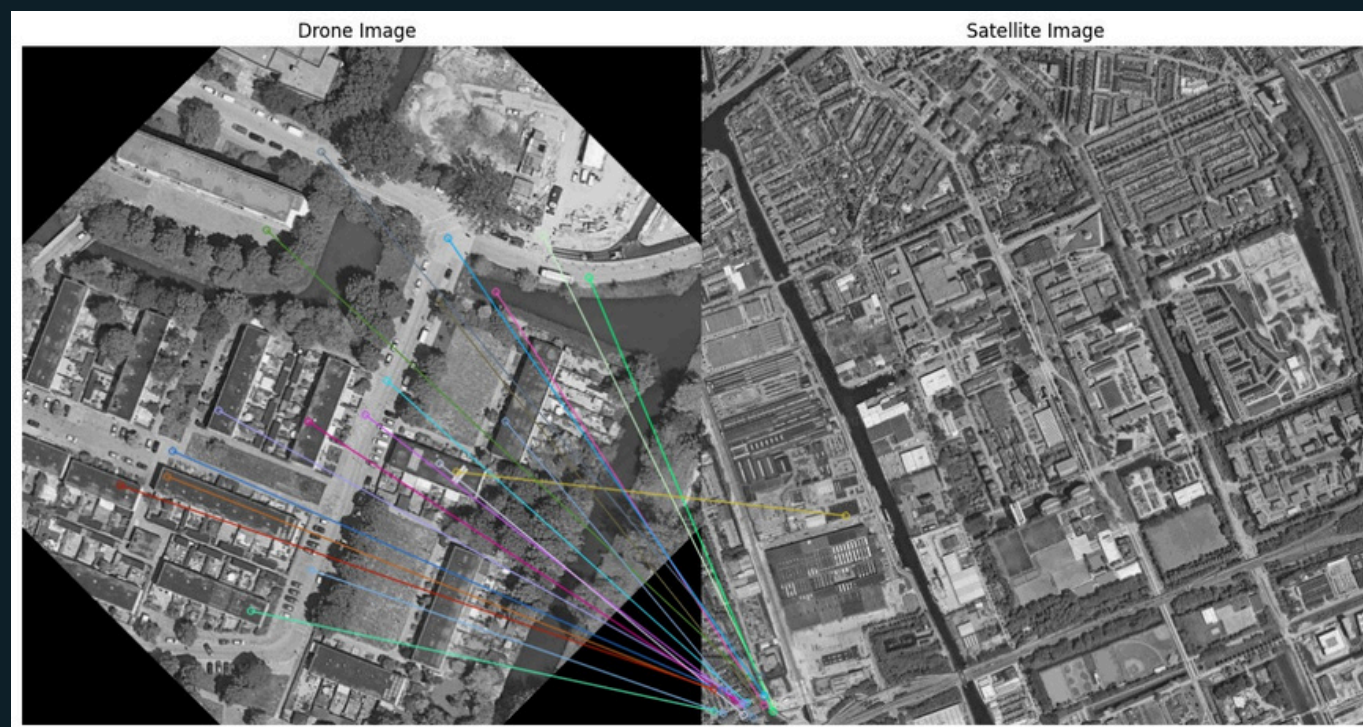
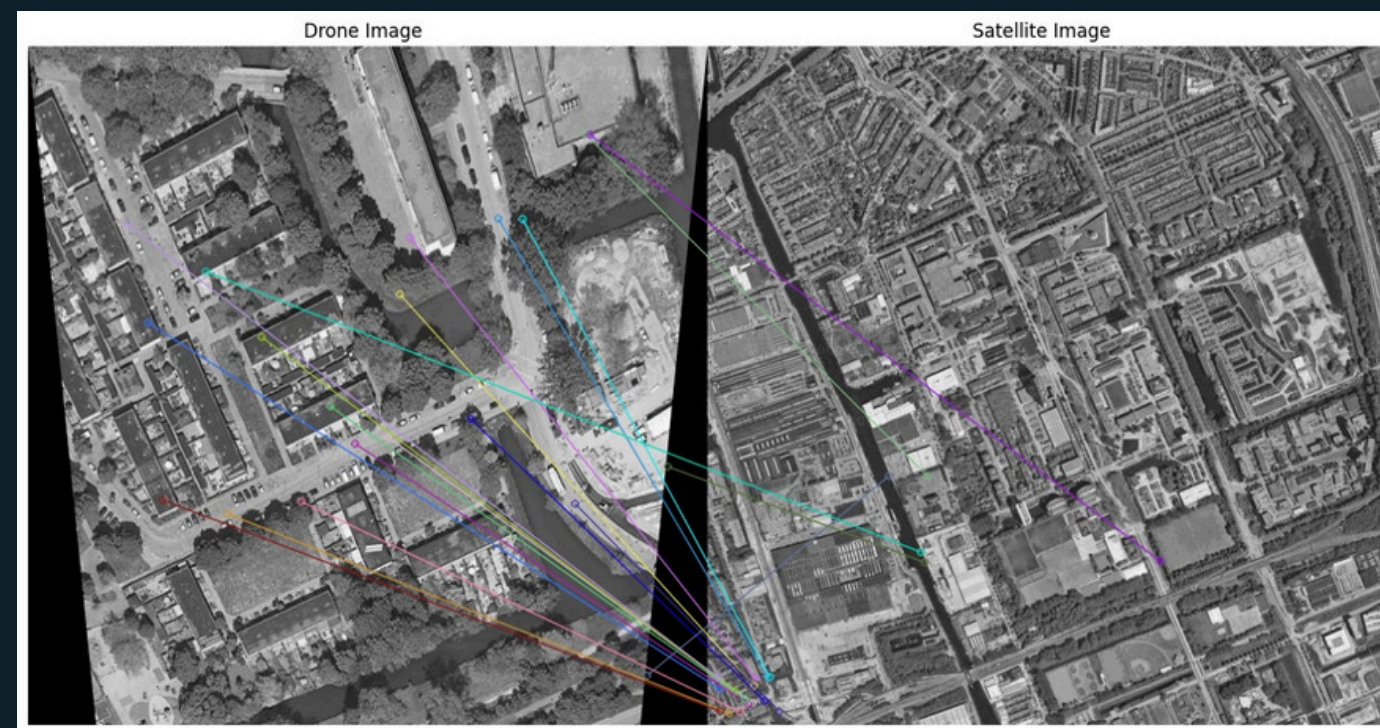
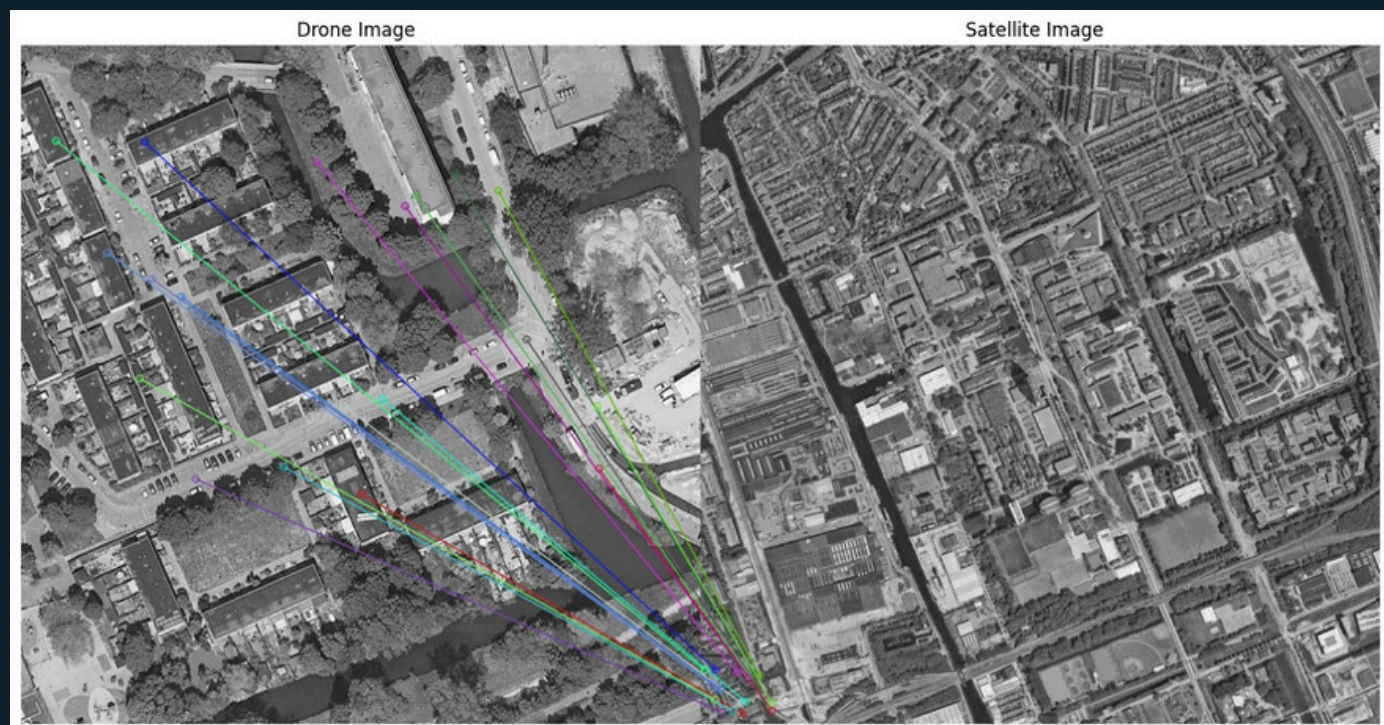
Technology



Invariant:

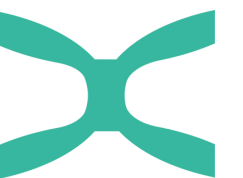
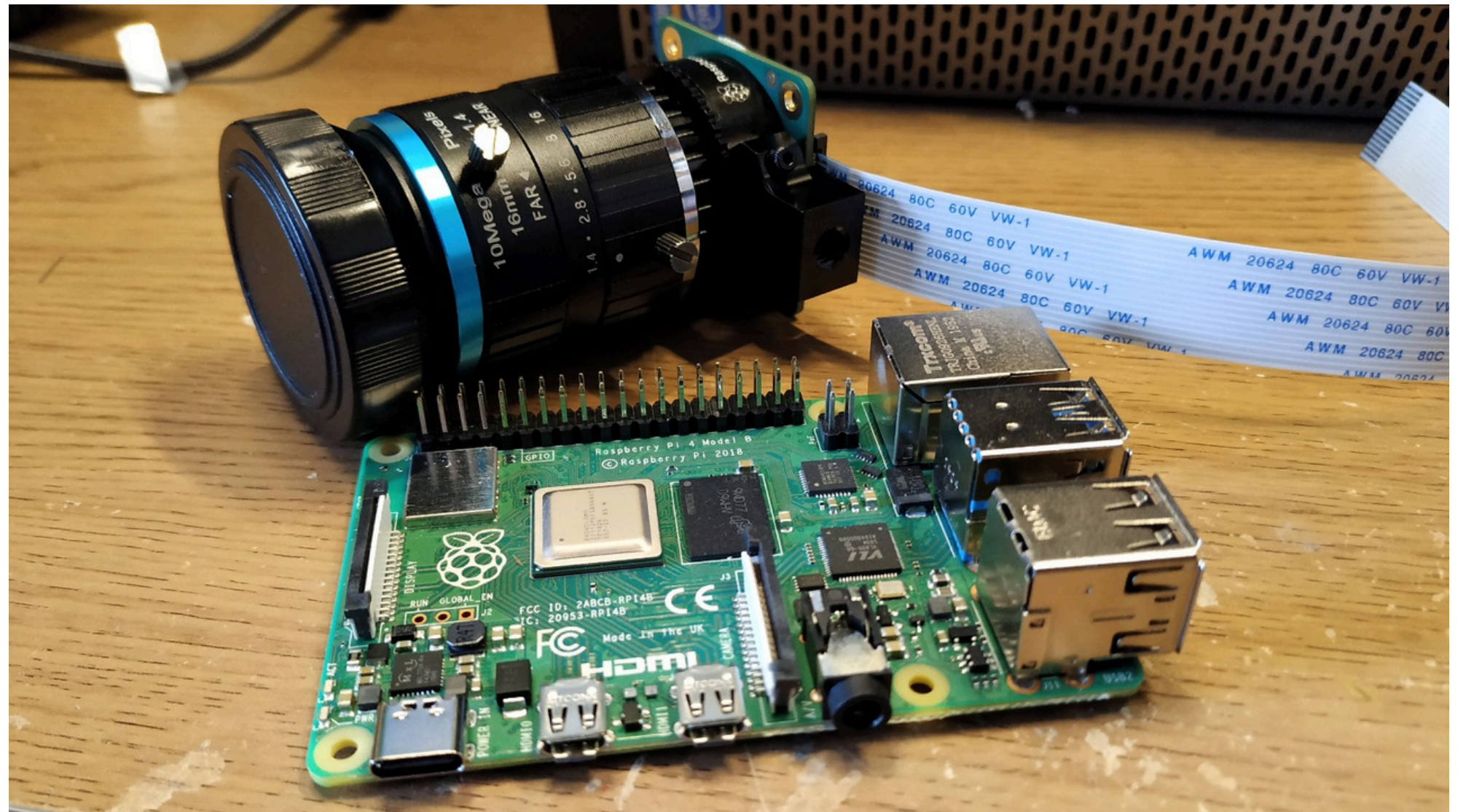
- Scale
- Rotation
- Warping

We can increase accuracy through more complex feature extraction using CNNs in the future.

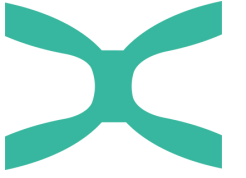


Technology

- Sensor fusion for outlier correction
- Low power hardware
 - Embedded Hardware
- Cost effective
 - Off the shelf
 - 1.500EUR - 2.500EUR



Market Opportunity

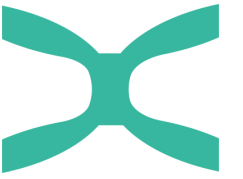


- Year 1+:
 - 40.000EUR revenue
 - Potential Customers
 - Smooth Stone Dynamics
 - Dutch Ministry of Defence
 - European Initiatives (EDIS, EDIP & SEAP)
 - Pilots
 - first deliverable: 10 Modules
 - Spread out over potential customers
- Year 3-5
 - Self sufficient in Europe
 - Scalable production line
 - Strengthening NATO-friendly borders
 - Additional products

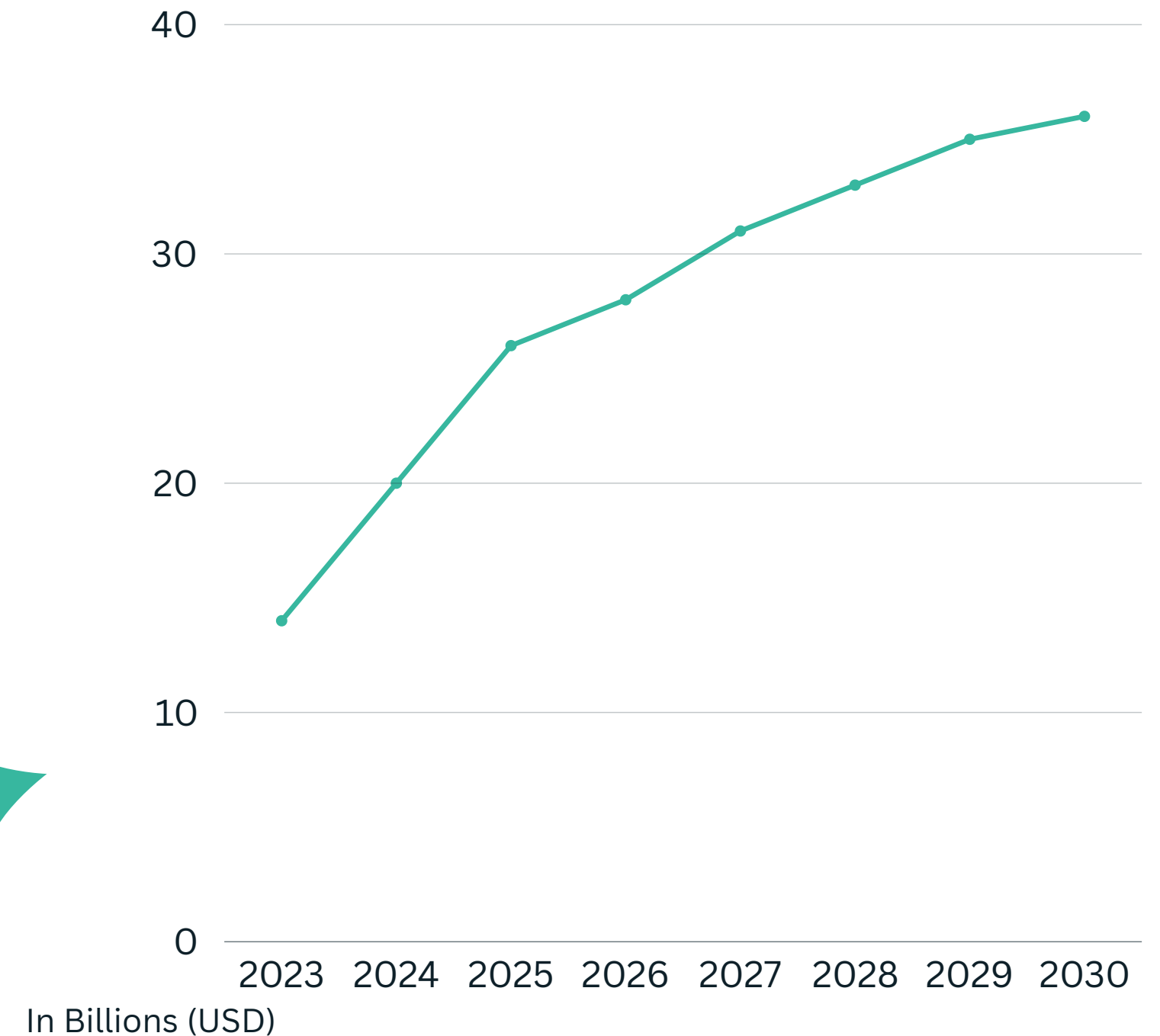


Path to Market

- Strong personal networks in defence industry
- Competitive pricing model
 - Module costs: 1.500EUR - 2.500EUR
- Growing markets
 - Global Defence Spending
 - 2.19T USD in 2024
 - 23.9T USD in 2033
 - CAGR: 27%
 - NA Military Drone market



Expected Growth of the NA Military Drone Market



CAGR: 22%+

SignalVoid



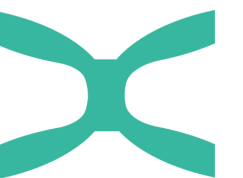
Questions?

Benji Metz
Martijn Crijnen

info@vydar.eu
Admiraal de Ruyterweg 18D
Rotterdam, 3031 AB

Technology

Where there is structure there is information



Business

- *Commercial Airlines*
- *Rescue missions*
 - *Mountainous terrain*
 - *Dense forests*
 - *Polar regions*
- *Humanitarian Aid*

