DRONE-2-DRONE COMMUNICATION

CCAS & ASTA Grand Opening

- Morten Skov Jørgensen, Senior Cyber-Physical Specialist, Alexandra Institute

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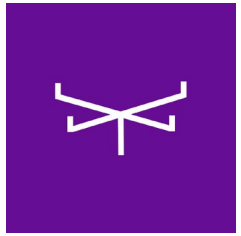
The Alexandra Institute helps you create innovative solutions based on pioneering IT research.

Our mission is to stimulate growth and social prosperity.

Secure Drone-to-Drone Communication

- Rambøll
- Meili Robots
- DTU Space
- Alexandra Institute

- Funded by InnoSec



RAMBØLL

DTU Space
Institut for Rumforskning og -teknologi

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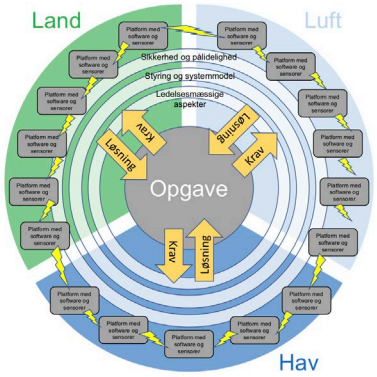
Inno-Sec
Innovation Network for Security

Description

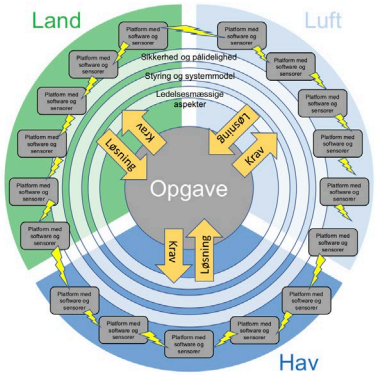
- Protocol for securely communicating between autonomous vehicles
  - Flying
  - Driving
  - Sailing
  - Diving
  - Etc.



Linden-Vørnle (2017)

Description

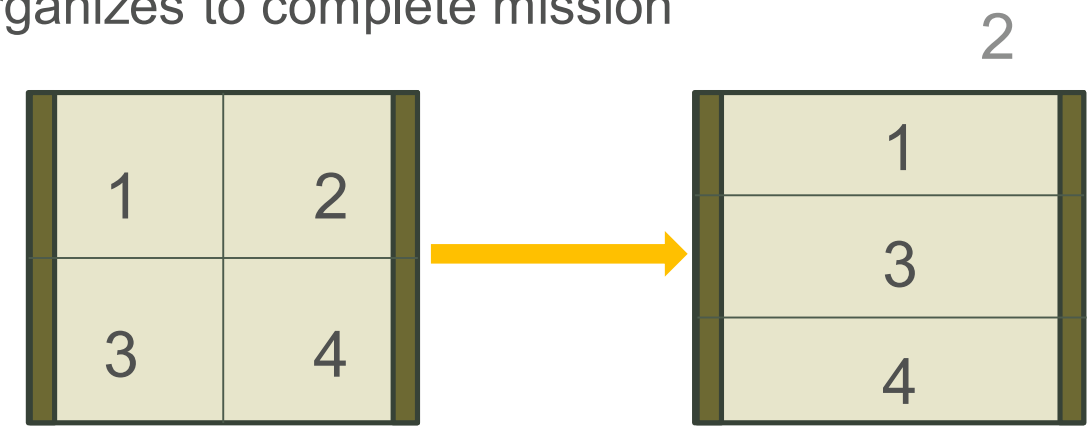
- Not a catch-all, but a possibility
- Encrypted swarm communication for collective hivemind
- Based on well-known principles from the P2P world
  - Hardened from the software pirate world
  - Catalan independence referendum
  - Wikipedia mirror



Linden-Vørnle (2017)

Usage - organization

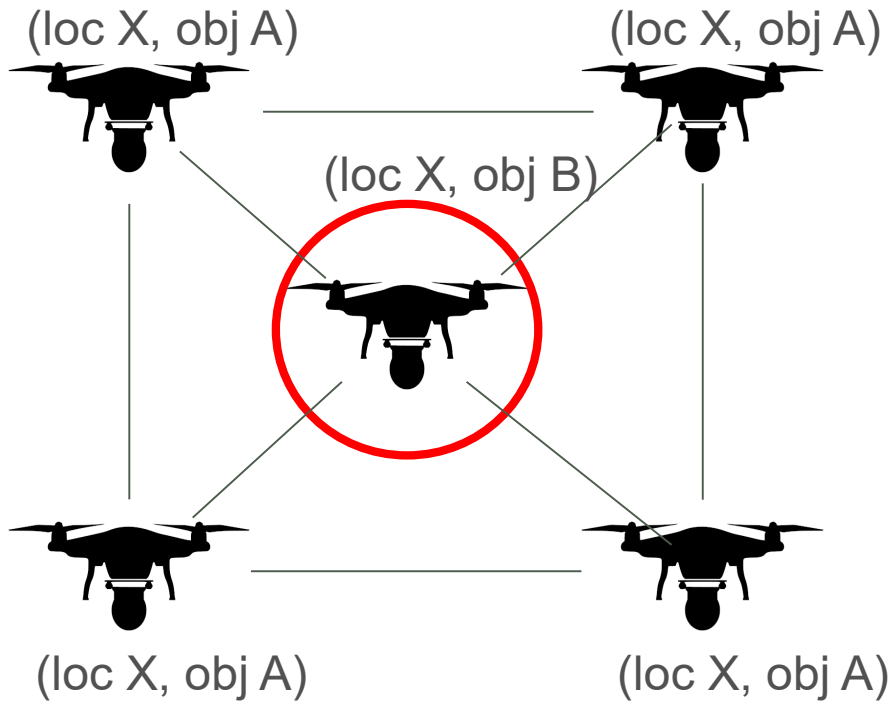
- Enhance resilience in case of break-down
  - If C2 unit loses connection, the mission can continue
  - If an agent breaks down, swarm re-organizes to complete mission



- Utilizes different features of agents for optimizing efficiency
  - If an agent has special hardware, data can be piped to said unit
  - Self-organising based on agent features
  - Minimizes latency for real-time actions

Usage - context

- All agents know about each other
  - Inverse: unknown units are possible adversaries
  - Bad actors can use almost undetectable units
- Any sensor can be placed in the network
  - RGB camera
  - Thermal
  - Radio
  - Etc



Technology

- Golang
- Libp2p
  - Open Source
  - Support for multiple languages
  - Maintained by IPFS community
  - Used by Microsoft, Cloudflare, Brave
- ROS
- Three.js
- Unity

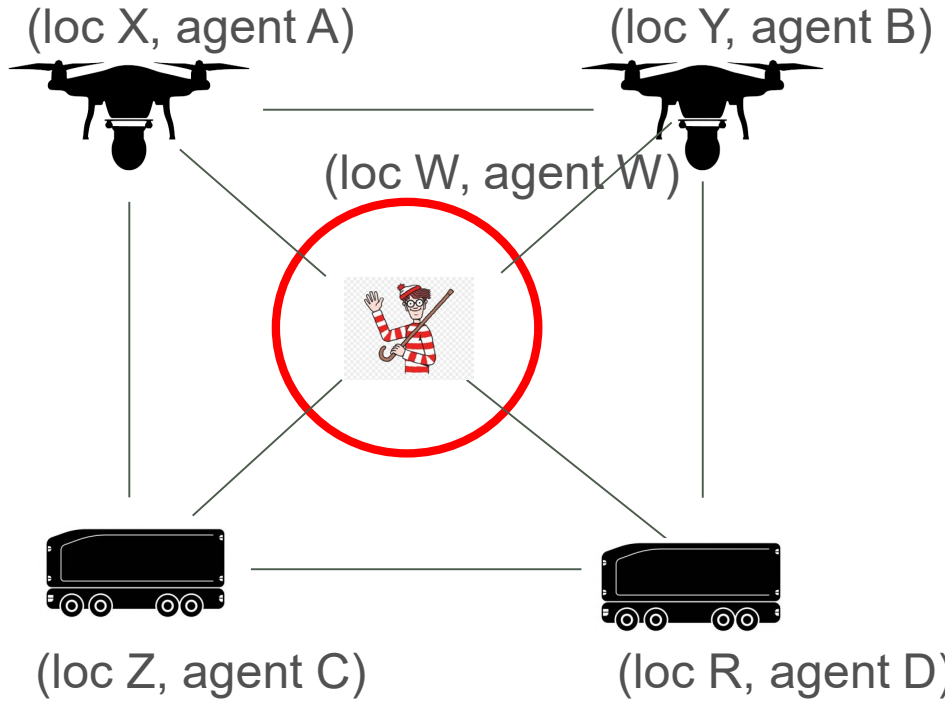
Technology

- Libp2p
  - TCP-based
  - Private/public key
  - Pubsub
  - Gossip Protocol
- Three.js
  - Debugging
- Unity
  - Visualization
  - Simulation

Example – Where's Waldo

- Find Waldo in urban environment
- Modality: flying, driving
- Human Detection ML in swarm
  - REST endpoint for modularity

- Flow:
  - Agent B breaks down
  - Swarm agrees
  - Reorganization handled by chosen agent
  - New specific mission sent to all agents



Theme day – 24/11-20

- The ASTA facility at DTU
- Physical and virtual demo of protocol
- Talks and discussions about the technology

Thank you for your time

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