UAV Swarms

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What is an UAV?

- Unmanned aerial vehicle
- Vehicle without a human pilot onboard
- Part of an UAS (unmanned aerial system)
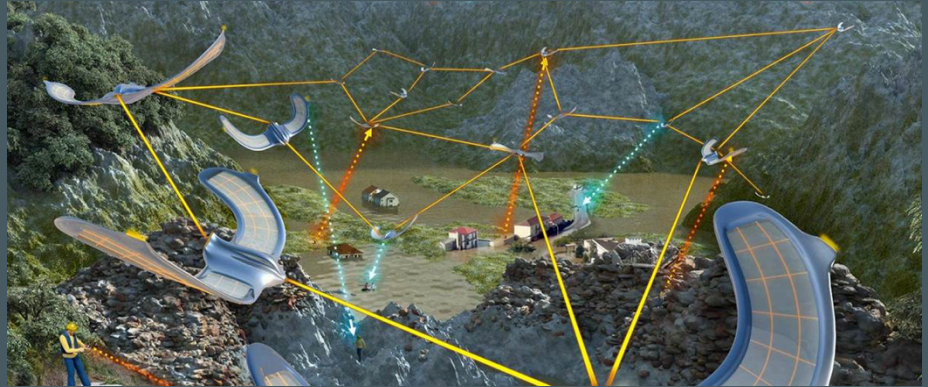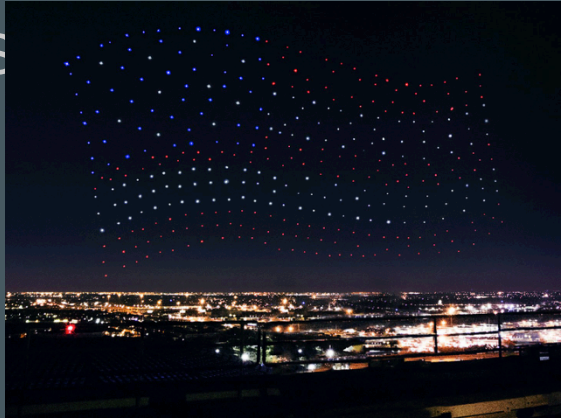- An UAS consist on an UAV a GCS and a CS

Drivers

- Works as the brain of the UAV

- It can be used as something dummi

- It contains the Flight controler

  - Reads sensor data

  - Can take decisions

Why Swarms?

- A swarm can perform actions that a single individual can't

- Military operations
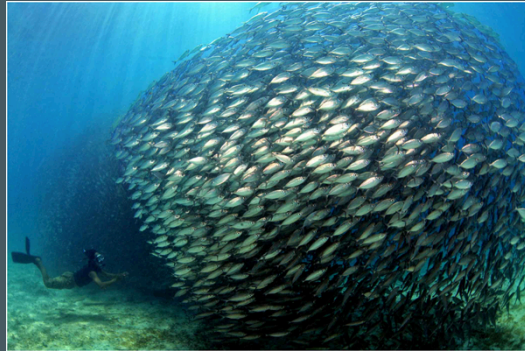
- Rescue services

- S⬤ ⬤hies

How do the swarms work?

- There is not a centralized control but...

  - The GCS decides how the swarm divides in flocks and their mission.

  - Every Flock has a leader who takes the hardest decisions

Swarm Intelligence

- Expression introduced in 1989

- The <u>collective behavior</u> of <u>decentralized</u>, <u>self-organized</u> systems, natural or artificial (wikipedia)
- Individual agents
  - Interacting locally with one another
  - Interacting with their environment

SI Models

- Boids (Bird-oid objects)

    - Simulates the flocking behaviors of birds
    - Developed by Craig Reynolds in 1986

- Vicsek
    - Studies the swarming behavior of different types of animals
    - Designed to watch the behaviors of the particles.

SI Applications

- Crowd Simulation

  - Complex interactive systems that simulates crowds in movies.
  - This technology is simple, cheap, and robust, that's why is very attractive.
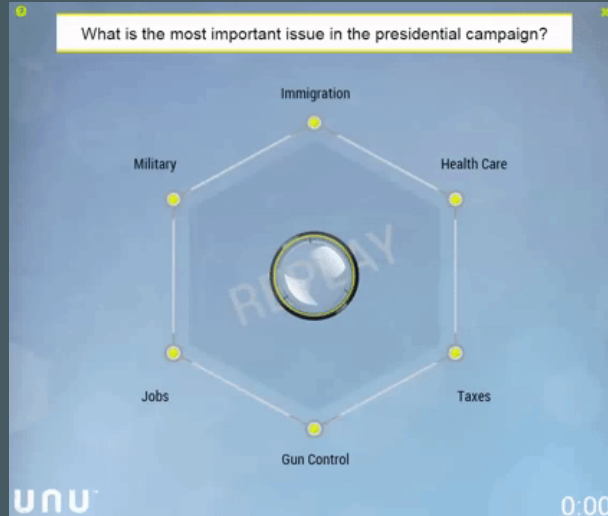 - Used in famous movies like

    Batman or LotR

SI Applications

- Human swarming

  - Distributed users can be organised as human swarms.
  - Used to make predictions, answer question or evoke opinions.

END