

DroneRelay:

Aerial Drone Platform
with relays for scenarios of
limitation and emergency

Project in informatics engineering
2020/2021 **Milestone 2**

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Requirements gathering

- Meetings with supervisors, professor Susana Sargento, professor Miguel Luís and Margarida Silva
- Trying to understand which are the main objectives from the Instituto de Telecomunicações team
- Document analysis
- Analysing similar work
- Brainstorming session

Functional Requirements

Dashboard

FD1–Should be possible to visualize real time video sent from the drones

FD2- Should display information about the mission

FD3- Must be able to display telemetry information from the drones

FD4- Must be possible to adjust relay parameters to optimize drone position



Functional Requirements

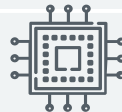
Ground Station

FG1- Must be able to process network characteristics between the ground station and the drones

FG2- Should be able to place relay drones in a optimal position taking into account communication and services parameters

FG3- The system should be able to automatically adapt telemetry information sending ratio

FG4- The system should be able to automatically adapt video parameters



Functional Requirements

Drone

FDR1– Must be able to monitor network characteristics between the ground station and the drones

FDR2–Monitor the network characteristics between itself and the other drones and transfer that information to the ground station

FDR2- Should be able to send video with different codecs and quality

FDR3- Should be able to adapt telemetry sending ratio according to the ground station



Non-Functional Requirements

Usability

NFU1- Provide a simple, complete and intuitive dashboard

NFU2 - The system must have a familiar visualization and interaction

NFU3 - To add new functionalities should be effortless on the system



Non-Functional Requirements

Performance

NFP1– The network sensor must provide new data automatically

NFP2- The camera must provide new information automatically

NFP3 - Relay should be sent almost immediately to the correct position



Non-Functional Requirements

Documentation

NFD1– Must have a documentation easy to understand about the dashboard

NFD2 - Documentation about all the sensor and specific characteristics

NFD3- Documentation with information about how to use the system

NFD4- Documentation about how the whole system works together and plugins



Context and State of The Art

- Drone-Based Wireless Relay Using Online Tensor Update: drones are advocated to serve as mobile relays to forward data streams
(<https://ieeexplore.ieee.org/document/7823731>)
- Performance Improvement of Drone MIMO Relay Station Using Selection of Drone Placement: Evaluate multiple-input multiple-output transmission when a small autonomous unmanned aerial vehicle is used as a relay station
(<https://ieeexplore.ieee.org/document/8536637>)



Actors



Security guard



Civil Protection



Drone Administrator

Actors

Security guard

- Watch live drone video
- Find specific vehicle or person
- Surveillance of important individuals
- Monitor public-gathering restrictions



Actors

Civil Protection

- Monitor forest area
- Monitor disaster area
- Find people in need of help
- Transfer lightweight high value objects (ex: blood between hospitals)
- Spread news of nearby problems for remote regions



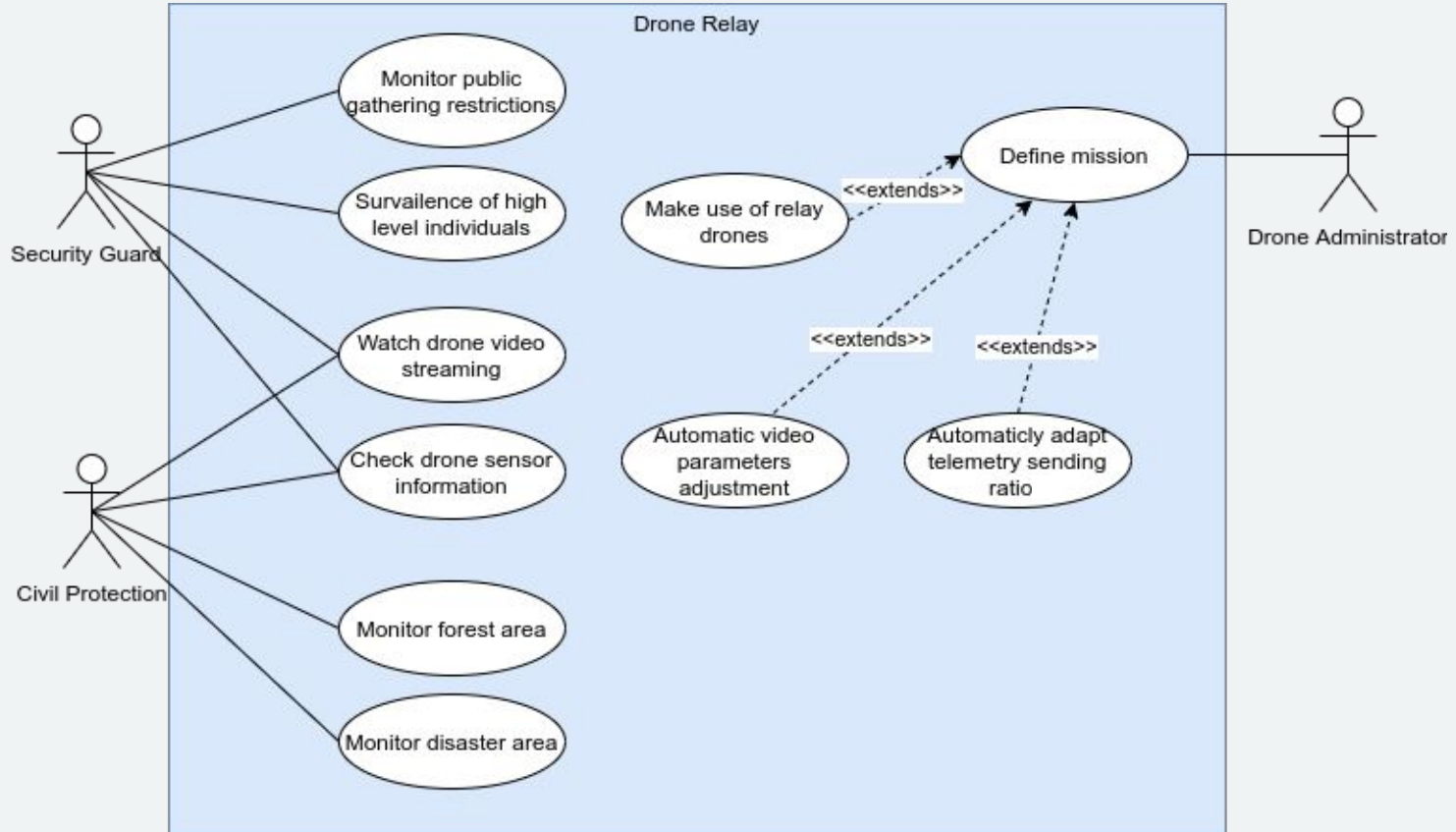
Actors

Drone Administrator

- Setup drones
- Define mission
- Manage weather conditions for drone safety
- Add and update drone auxiliary functions

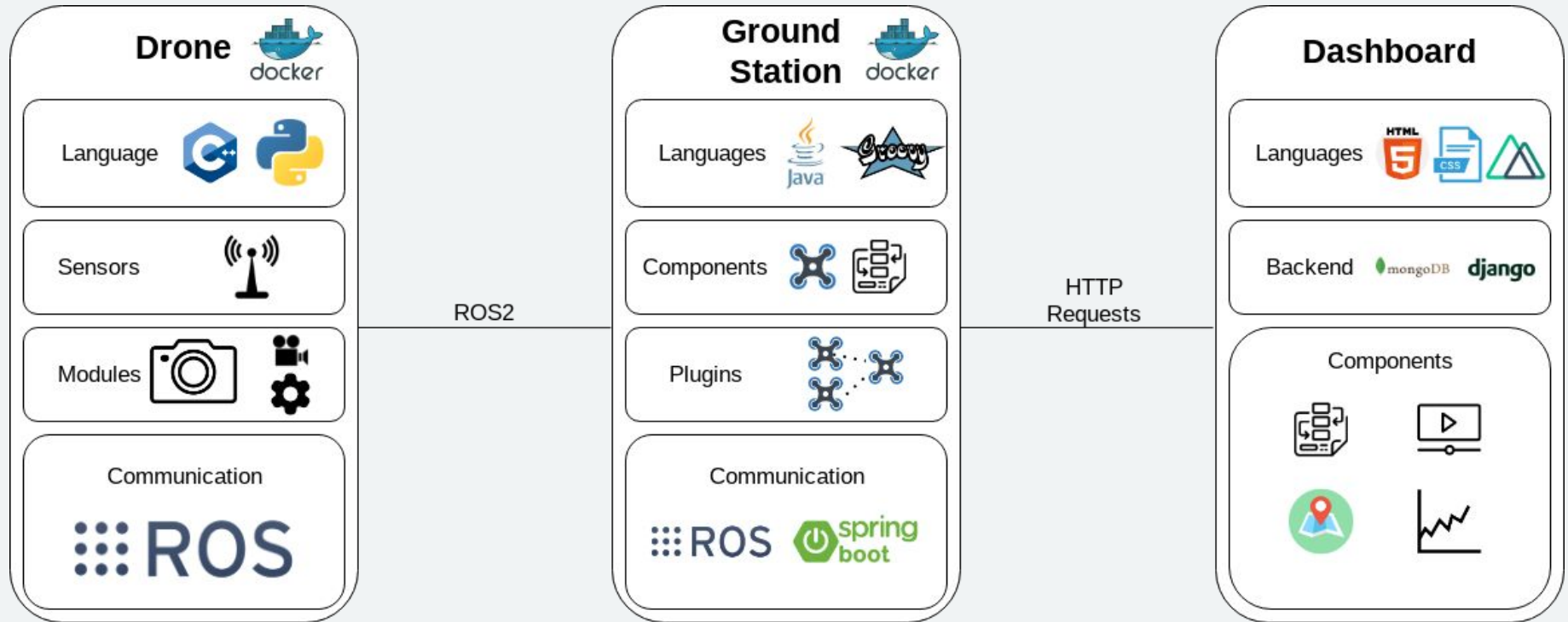


Use Case diagram

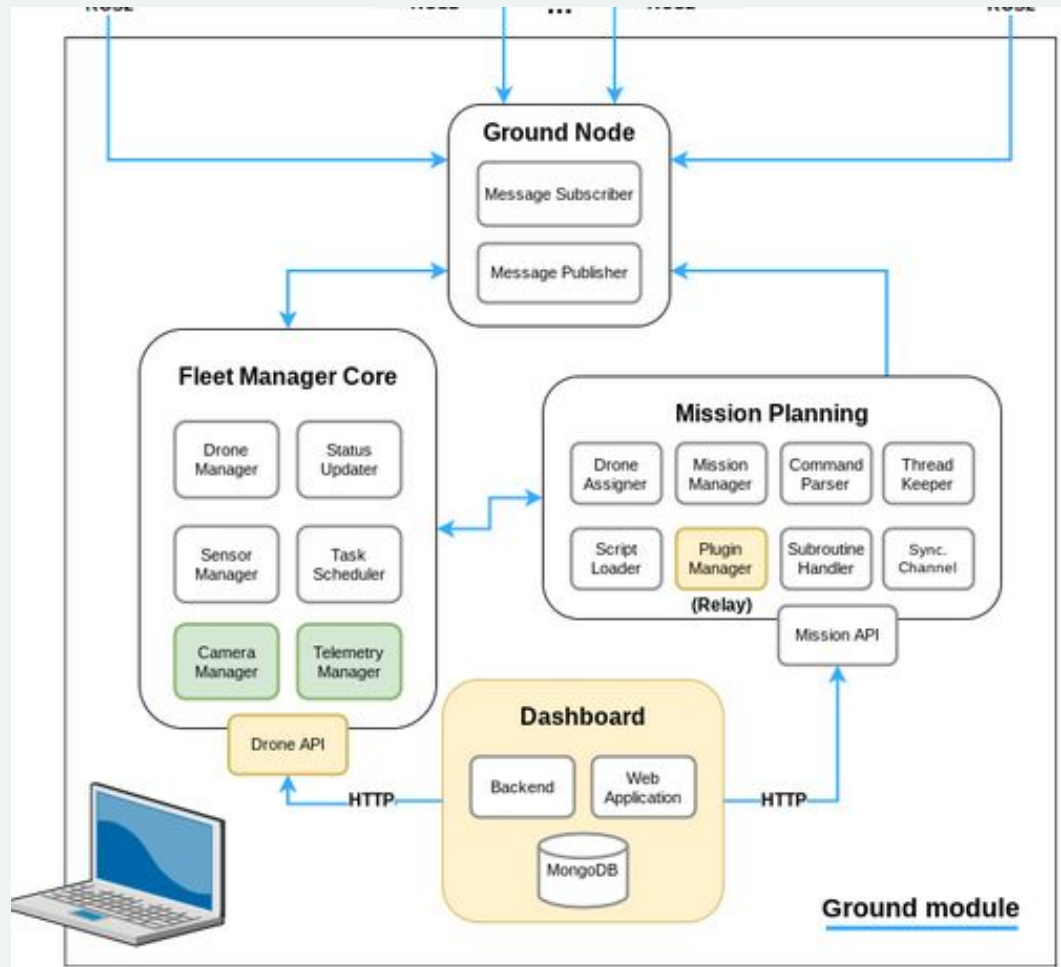


System architecture

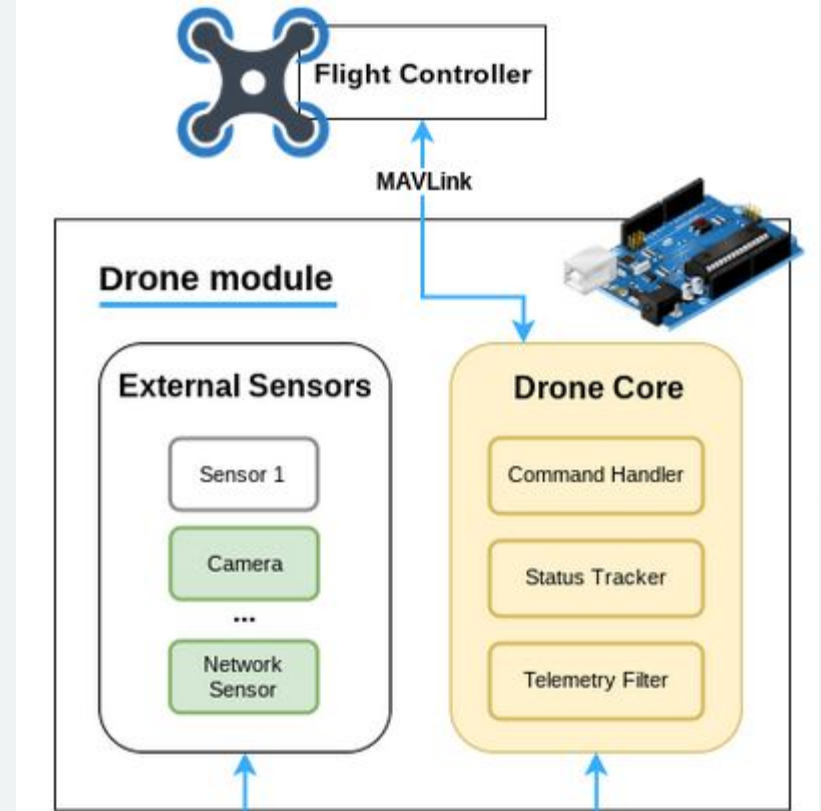
Deployment Diagram



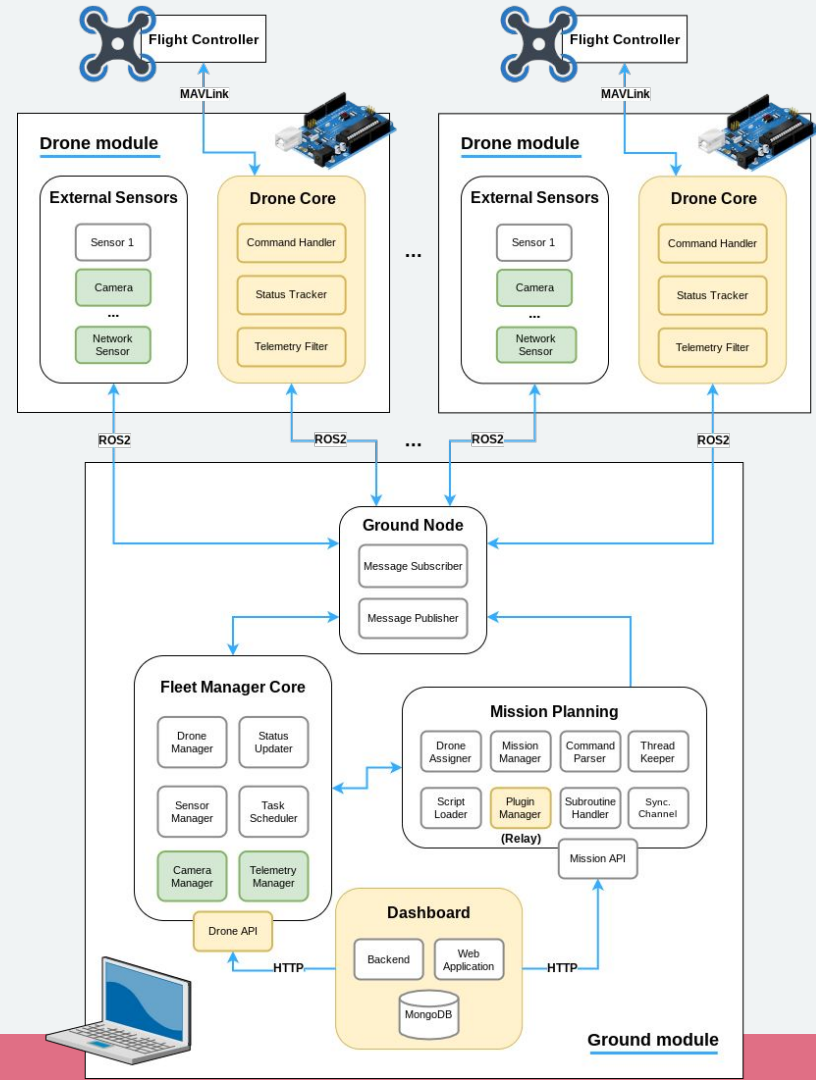
Technical Module



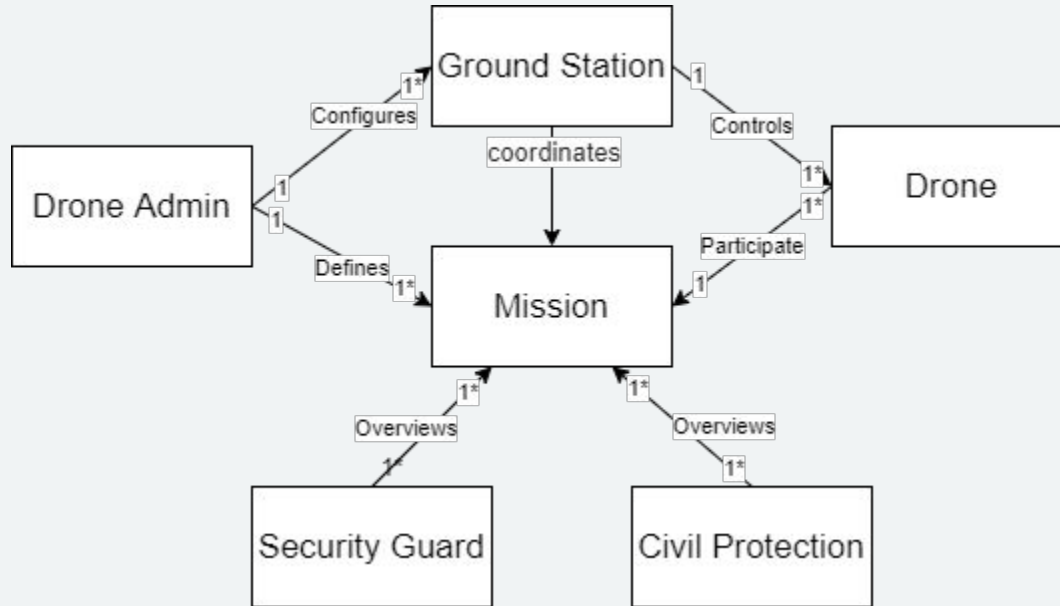
Technical Module



Technical Module



Domain Model



Dashboard

DRONES

MISSIONS

STATIONS

ALL AIRCRAFT (2)

drone01

BATTERY

SENSORS

drone02

DISABLED

BATTERY

SENSORS

2021-04-12 18:06:27,999

STATE

COMMANDS

CONFIGURATIONS

HEALTH CHECKS

DRONE STATE

STATE

READY

LAND STATE

ON_GROUND

ARMED

BATTERY

100%

FLIGHT MODE

HOLD

ASSIGNABLE

MISSION

NONE

CURRENT COMMAND

NONE

POSITION

LONGITUDE

-8.660815

LATITUDE

40.633490


ALTITUDE


8.192000


HOME




Dashboard

 DRONES

 MISSIONS

 STATIONS

ALL MISSIONS (0) 

ADD MISSION

NAME

Enter the name

The name of the mission

DESCRIPTION

Enter the description

FILE UPLOAD

☐ Select this option if you want to upload a mission from a file

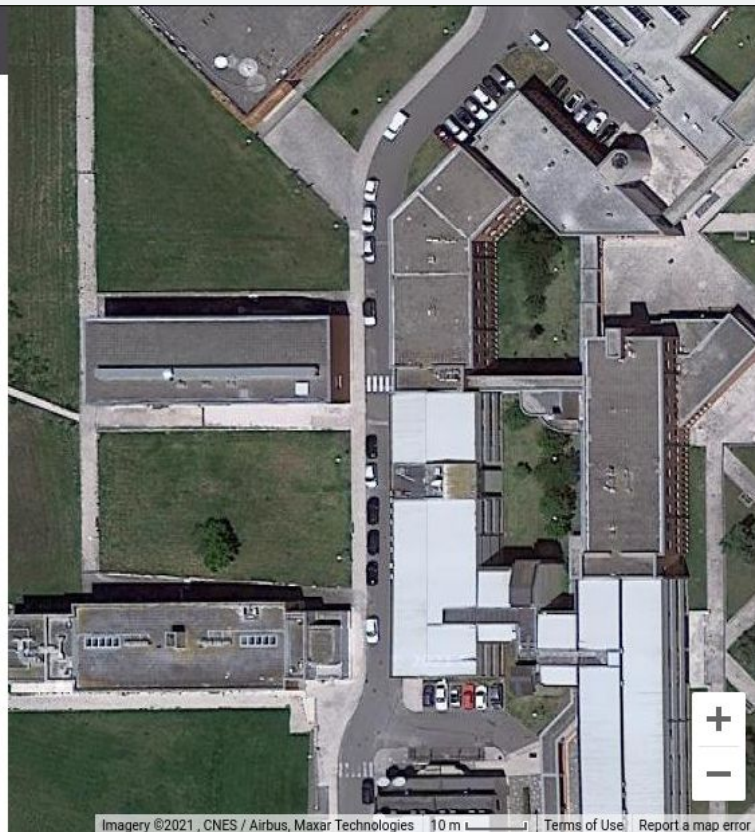
DRONE

TYPE


Other


PATH ALGORITHM


Other





Dashboard


 DRONES

 MISSIONS

 STATIONS

ALL STATIONS (1) 

 local
ONLINE

 local

IP


http://localhost:8001

DESCRIPTION

STATUS

ONLINE

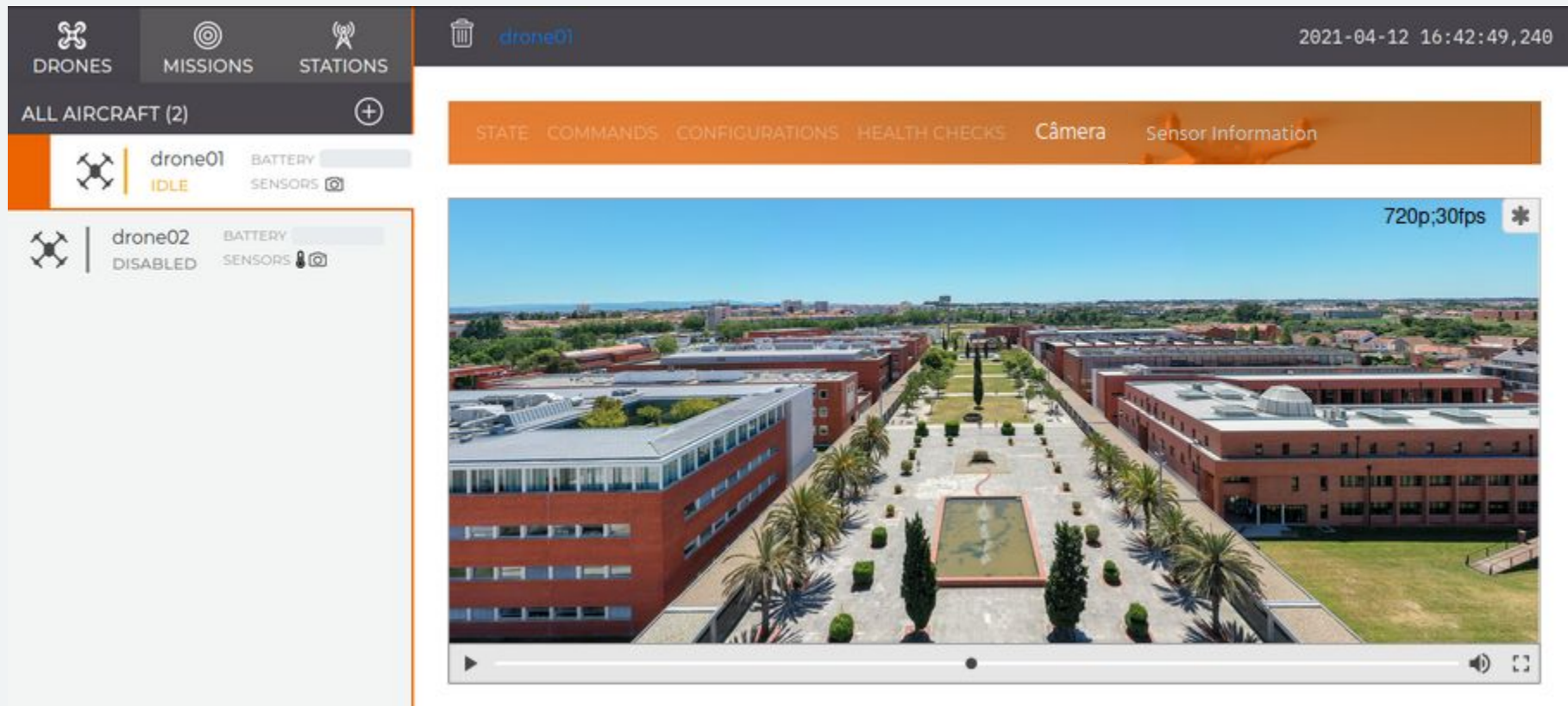
SELECTED



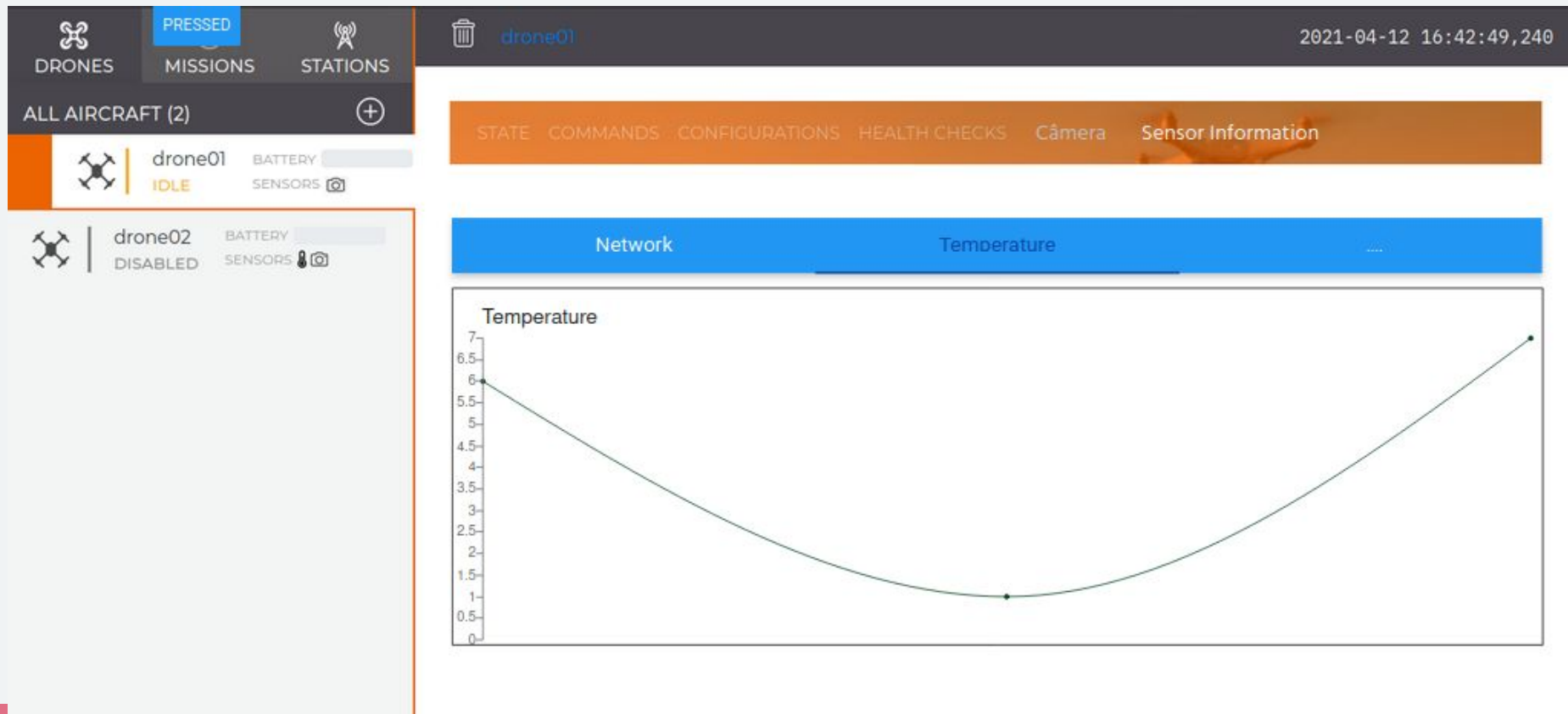
ACTIONS

UNSELECT

Mockups



Mockups



Thanks!

Do you have any questions?

Micro site github
Micro site

