# **Hawkeye System** - An Active Vision Algorithm for drones

## Mission:

Develop a gimbal system that detects objects and keeps them centered in the image autonomously to enhance safe indoor drone flight, introducing further sensing techniques such as thermal sensing.

## Steps to the goal:

1. Research (Hardware)
   1. Gimbal search (Roque) 🟢
   2. Camera search (Ferran) 🟡
   3. Connections (Ekaitz) 🟡
2. Research (Software)
   1. Object Tracking Algorithms (Ekaitz) 🟡
   2. Gimbal Control (Roque) 🟡
   3. Control Loops for active vision (Mario) 🟡
   4. Simulation environment (Ferran) 🟡
3. Separate development
   1. Camera object tracking (Ekaitz & Ferran) 🔘
      1. Basic camera operation
      2. Try different YOLO algorithms
      3. Implement in in-built camera chip
      4. Test in different scenarios (e.g. high velocity of objects, of camera…)
      5. Save synchronously camera data
      6. Train our own model (???)
   2. Gimbal control (Mario & Roque) 🔘
      1. Basic gimbal operation
      2. Implement basic stabilization algorithm
      3. Develop cascaded algorithms for further controls (test i/o)
4. Implementation of control loop
5. Test in controlled environment
6. Implementation in drone hardware
   1. YOLO in camera / Raspberry PI 5
   2. Control algorithm in Storm32 / Raspberry PI
7. Final testing
8. Development of further technologies

## GitHub

**CLONE REPOSITORY**

1. Log In to GitHub and check that you are a collaborator
2. Go to desired local folder:

cd path/to/your/project

1. Clone repository:

git clone https://github.com/ferran-artero/Hawkeye\_System

**NAVIGATE TO REPOSITORY**

cd path/to/your/project

\* If you try git status and it says “not a git repository,” you're in the wrong folder

**BRANCHES**

# All possible branches and know where you are

git branch

# Move to a branch

git checkout branch

# Create a branch

git checkout -b new-branch-name

**PULL**

*Option 1*

git pull --all # pulls changes for all tracking branches

*Option 2*

# Fetch all updates (metadata)

git fetch --all

# Then pull specific branches

git pull origin main

git pull origin teammate-branch

git pull origin your-branch

**PUSH**

git push origin branch

RESEACH

Camera:

* YOLO Algorithms. What are they? How do they work?
* Which models can we use?
* Pros and cons of each.
* Which fits better for different use cases.
* How can we run them in a Luxonis and in a Raspberry PI 5.
* Can we train our own model? Benefits and drawbacks (Do we really need to train our own model?).

Gimbal:

* How does a gimbal work? Basic understanding of the functionality process of a gimbal.
* Which components does it have? Basic understanding on the gimbal and Storm32 hardware.
* How does our gimbal work?
  + What is a firmware?
    - Which one does our gimbal have?
    - How does it work?
    - Which things does it do automa>tically?
  + Understanding of the gimbals GUI.
    - What can it already do as plug and play?
    - Which parameters can we adjust? What do they do?
    - How can we upload our own scripts?
    - How do these scripts run?
    - Is this GUI enough for us? Should we create our own firmware or push another one for better controllability?