# Computer Vision for U.A.V.







Computer Vision Group Center for Automatics and Robotics CAR Campus ETSII Technical University Madrid – UPM

www.vision4uav.eu

## Vision for UAVs www.vision4uav.eu

Our **Vision** is to provide Unmanned Aerial Vehicles (**U.A.V.**) with the highest degree of **autonomy** by exploiting the powerful sensor of **vision**.

Our **Mission** is to be always at the front end of the technology in Image Processing and Control techniques in order to achieve technology transfer into demanding U.A.S. civil applications.

#### Our Values are:

- Permanent updating with the latest worldwide R&D in may related fields is essential for improving our research
- Having challenging aims and testing the proposed solutions are two essential components for innovating our research and products
- International cooperation is important for enriching the knowledge and the solutions





## Rotary wings UAV for maneuvering

#### Helicopters

Gas powered helicopter Rotomotion LLC Electric powered helicopter Rotomotion SR-20



#### **Multirotors**

Oktokopter from Mikrokopter







LinkQuad from UAS Technologies Sweden

- 1. Visual Information enhancing (e.g. objet tracking, mosaicking, stabilization)
- 2. Visual Detection and Pattern Recognition
- 3. Pose estimation and Map estimation (VSLAM)
- 4. Visual Control (Image based V.C and Position based V.C.)





Visual Information enhancing (e.g. objet tracking, mosaicking, stabilization)



Mosaicking Douro river by Porto

POLITÉCNICA





Air to air refuelling For Cobham with University of Bristol

Robust tracking Licenced Sw for Airelectronics S.L.



#### 2. Visual Detection and Pattern Recognition





- Tower detection and tracking
- Isolator detection (ROI) for Union Fenosa Project "INNPACTO" Spanish Economics Ministery



3. Pose estimation and Map estimation (VSLAM)

Pose estimation using external codes





Autonomous landing at Arganda campus



#### Trajectorry planing at IMAV 13

Net recovery For Usol S.L.



3. Pose estimation and Map estimation (VSLAM)

Pose estimation using Visual Odometry



IARC 14 Competition Using optical flow and sensor fusion

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4. Visual Control (Image based V.C and Position based V.C.)



Window inspection at ETSII







Meteo mast inspection EchoRD project



#### See & Avoid for Usol S.L.



## Vision on UAV for civil applications



Electric tower inspection at Iberdola facilities in Guadalix





Volcan inspection Poa volcan in Costa Rica

