COMPUTER VISION FOR UNMANNED AERIAL SYSTEMS

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Abstract

The objective of my research work is to increase the capabilities of Unmanned Aerial System thanks to the use of the Computer Vision. Several applications have been developed like Visual Servoing, Thermal Inspection of Buildings, Autonomous Landing on Helipads, a Visual Quadrotor Swarm or Visual Localization for IARC 14 competition.

Visual Servoing

The TLD computer vision algorithm allows a drone to follow any kind of objects or any person [3]:
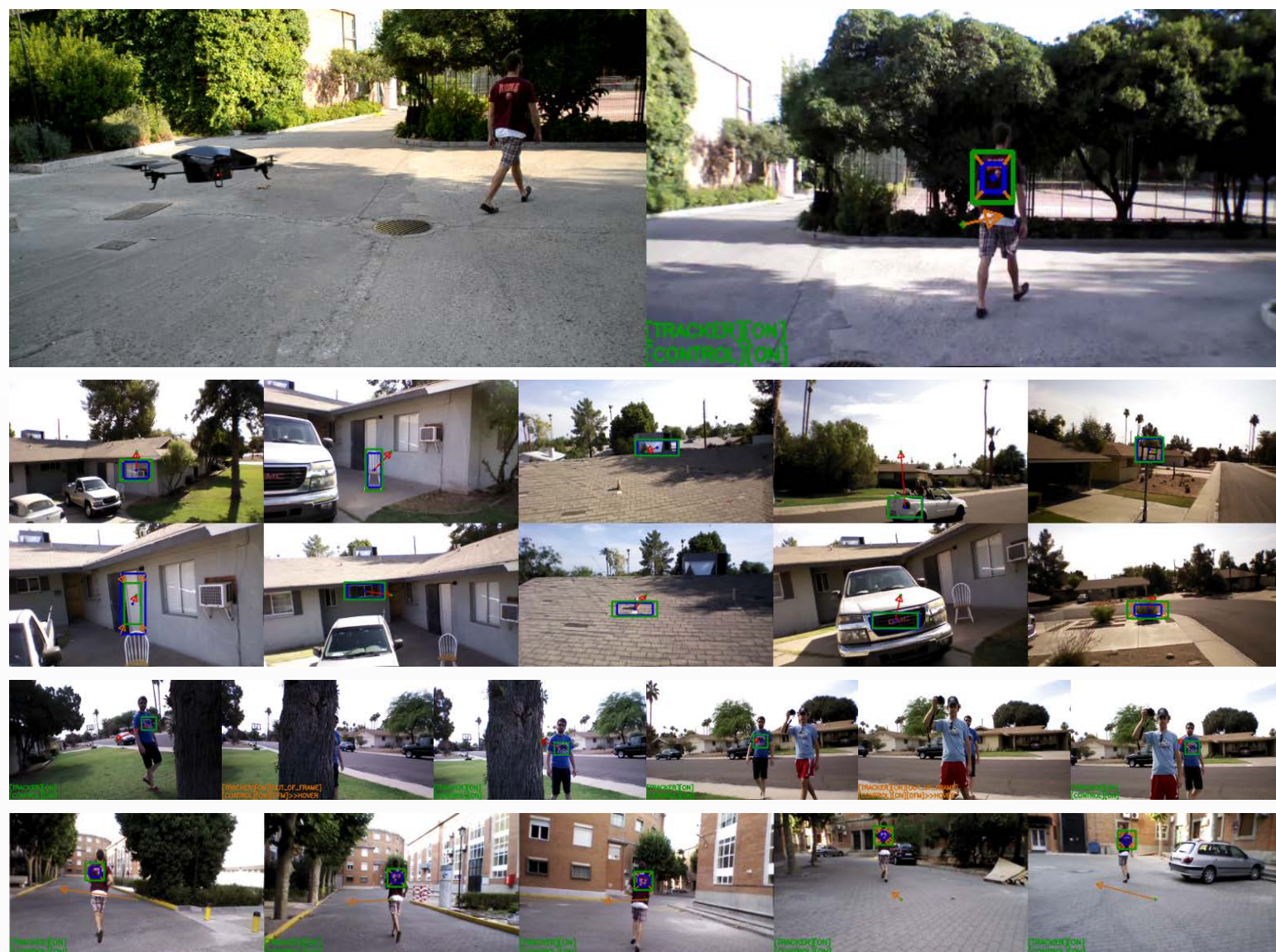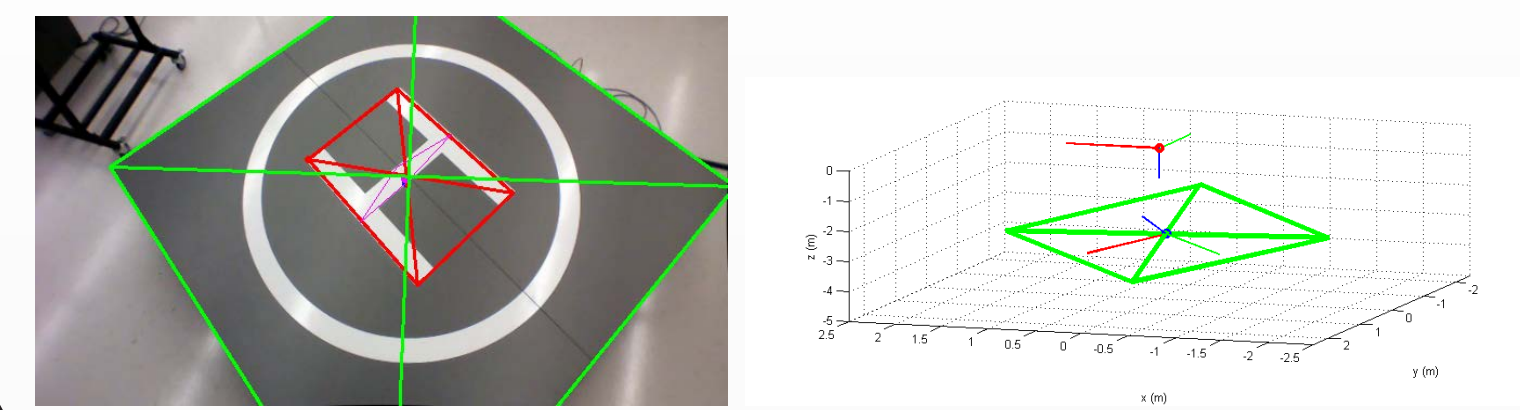

IARC 2014

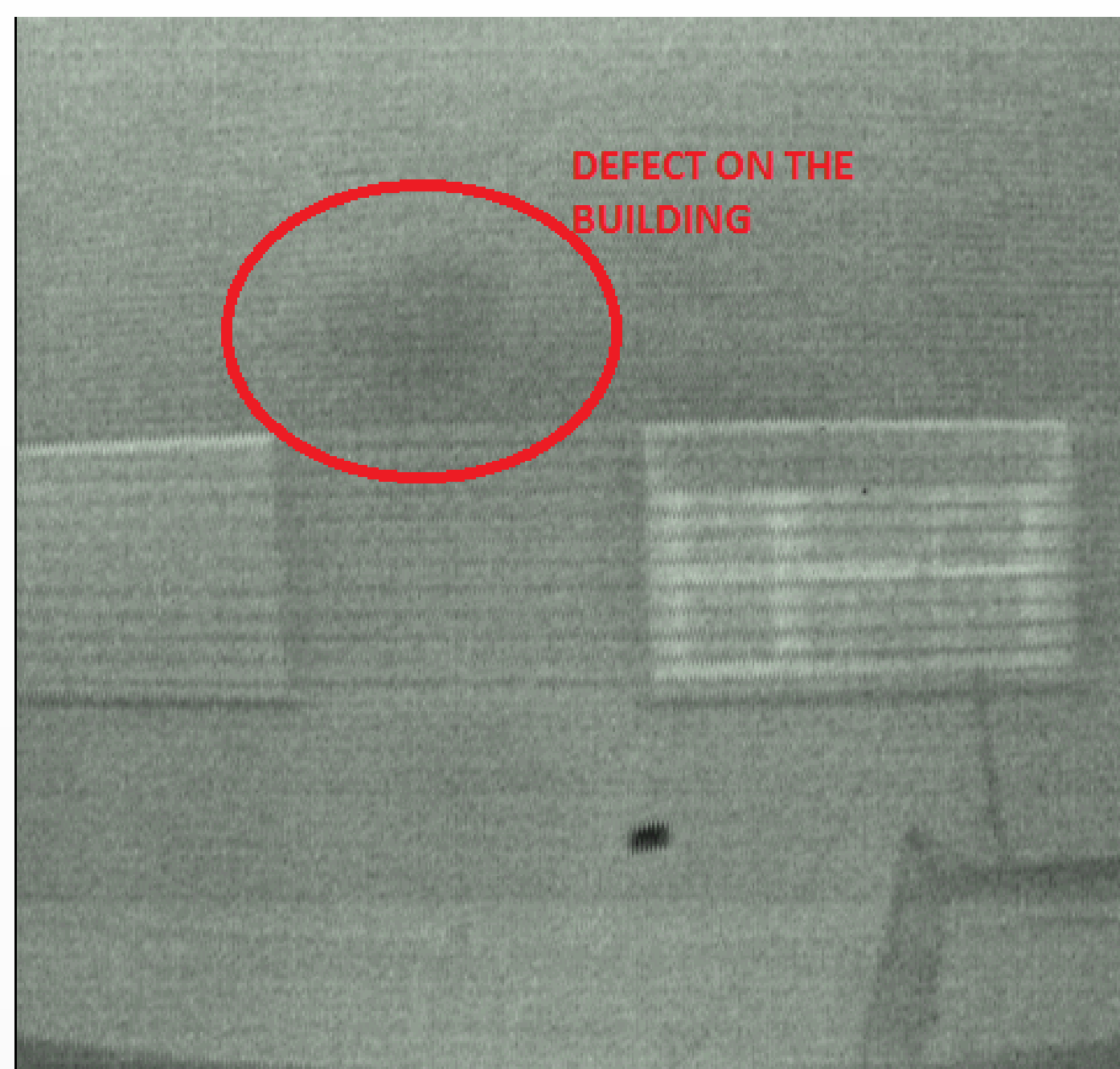A multicamera monocular slam based on a grid is being developed for the IARC 2014:

Autonomous Landing

A computer vision algorithm detects and re-construct the pose of the helipad for the autonomous ship board landing of the UAV [1]:
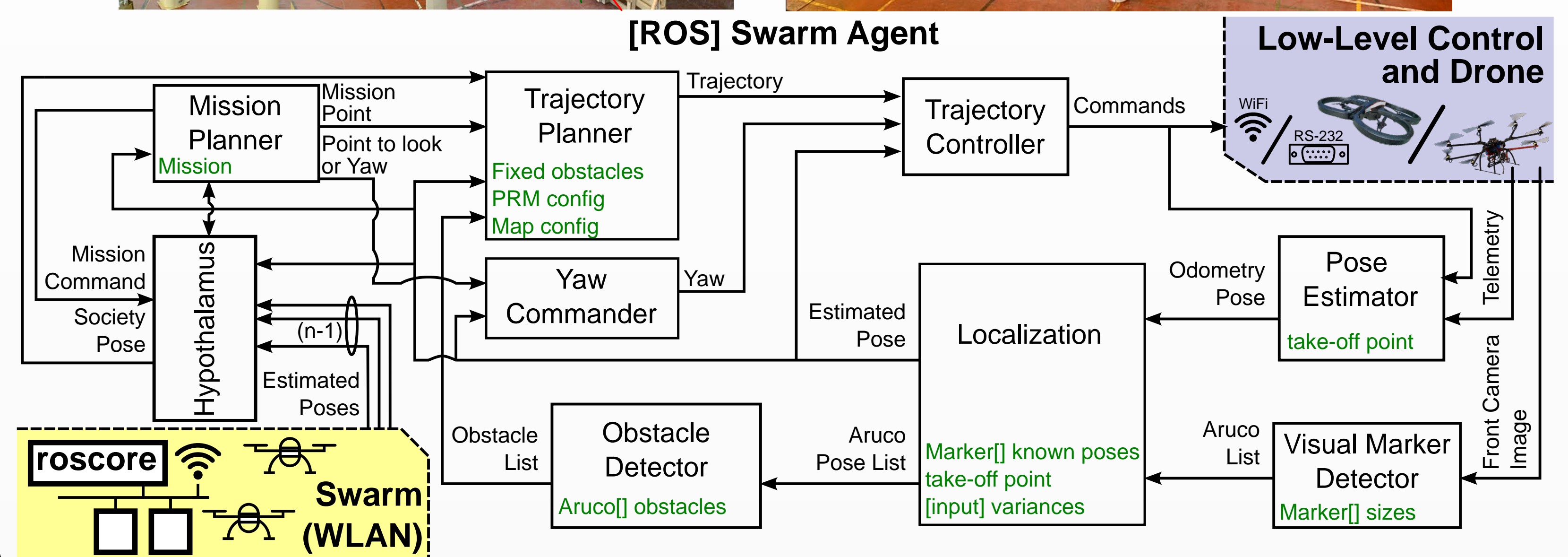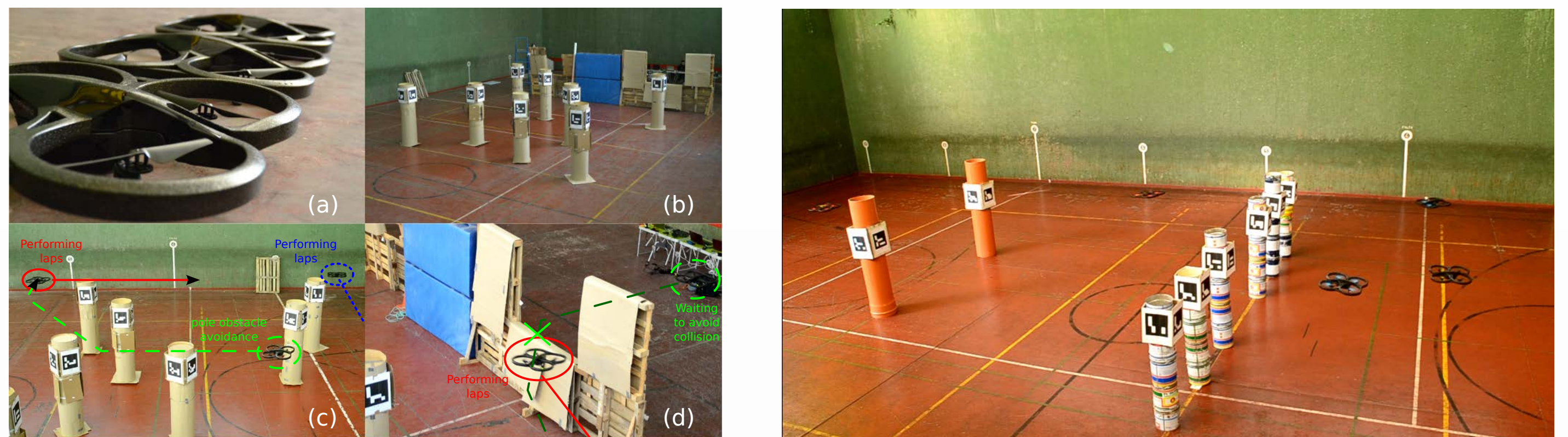

Visual Quadrotor Swarm

A visually guided multirotor swarm has been developed using external visual marks for the localization and mapping task [2], used to win the IMAV 2013 competition:

Thermal Inspection

The thermal cameras are equipped onboard of the drone to detect defects on the buildings:

DEFECT ON THE BUILDING

[ROS] Swarm Agent

More at...

www.vision4uav.eu

International Awards

The Computer Vision Group has been adwarded with two international competition prizes:
- IMAV 2013, Toulouse (France): 1st prize **"Indoors Autonomy" Challenge**.
- IMAV 2012, Braunschweig (Germany): **"Best Automatic Performance - IMAV 2012"**, and 2nd prize **"Indoor Flight Dynamics - Rotory Wing MAV"**.

References

[1] **J. L. Sanchez-Lopez**, J. Pestana, S. Saripalli, P. Campoy. An Approach Towards Visual Autonomous ship board landing of a VTOL UAV. Journal of Intelligent and Robotic Systems. 2013.

[2] **J. L. Sanchez-Lopez**, J. Pestana, P. de la Puente, P. Campoy. "Visual Quadrotor Swarm for IMAV 2013 Indoor Competition". In 2013 International Micro Aerial Vehicle Conference and Flight Competition (IMAV 2013). Toulouse (France). September, 17-20, 2013.

[3] J. Pestana, **J. L. Sanchez-Lopez**, S. Saripalli, P. Campoy. "Vision based GPS-denied Object tracking and Following for Unmanned Aerial Vehicles". in The 11th IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR 2013). Linköping (Sweden).