

Project title: Aerial Robotics Cooperative Assembly System

Starting date: 28/11/2011

Duration in months: 48

Call: FP7-ICT-2011-7

Abstract

The ARCAS project proposes the development and experimental validation of the first cooperative free-flying robot system for assembly and structure construction. The project will pave the way for a large number of applications including the building of platforms for evacuation of people or landing aircrafts, the inspection and maintenance of facilities and the construction of structures in inaccessible sites and in the space.

The detailed scientific and technological objectives are:

- 1) New methods for motion control of a free-flying robot with mounted manipulator in contact with a grasped object as well as for coordinated control of multiple cooperating flying robots with manipulators in contact with the same object (e.g. for precise placement or joint manipulation)
- 2) New flying robot perception methods to model, identify and recognize the scenario and to be used for the guidance in the assembly operation, including fast generation of 3D models, aerial 3D SLAM, 3D tracking and cooperative perception
- 3) New methods for the cooperative assembly planning and structure construction by means of multiple flying robots with application to inspection and maintenance activities
- 4) Strategies for operator assistance, including visual and force feedback, in manipulation tasks involving multiple cooperating flying robots.

The above methods and technologies will be integrated in the ARCAS cooperative flying robot system that will be validated in the following scenarios: a) Indoor testbed with quadrotors, b) Outdoor scenario with helicopters, c) free-flying simulation using multiple robot arms.

The project will be implemented by a high-quality consortium whose partners have already demonstrated the cooperative transportation by aerial robots as well as high performance cooperative ground manipulation. The team has the ability to produce for the first time challenging technological demonstrations with a high potential for generation of industrial products upon project completion.

Beneficiaries:

- FUNDACION ANDALUZA PARA EL DESARROLLO AEROESPACIAL FADA-CATEC Spain
- DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV DLR Germany
- UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II. UNINA Italy
- CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS France
- UNIVERSIDAD DE SEVILLA USE Spain
- UNIVERSITAT POLITECNICA DE CATALUNYA UPC Spain
- SPACETECH GMBH STI Germany
- ALSTOM INSPECTION ROBOTICS AG AIR Switzerland