



MARKET CHALLENGES

VTOL UAVs can be used in many inspection and surveillance tasks. A practical limitation of these devices comes from their **poor energy efficiency**. Convertible VTOL UAVs, which are typically composed of a set of propellers and wings, constitute an interesting alternative to both classical VTOL UAVs and scaled airplanes. The control of this type of systems is known to be difficult: during transitions between hover and cruising flight, strong and rapid variations of the aerodynamic forces acting on the vehicle can lead to fast and large variations of the angle of attack. So these forces must be finely controlled in order to avoid **flight instability**.



INNOVATIVE SOLUTIONS

A new VTOL UAV with an associated feedback control approach have been designed. The vehicle consists of coplanar propellers and a wing that can rotate around an axis belonging to the propellers' plane. An **efficient control** of the vehicle can be obtained without air-velocity measurements. Finally, the structure is easily **scalable**: wings can be replaced by different wings, without impacting on the rest of the structure, knowing that various wings will be more or less good adapted according to the conditions of flight, speeds of flight and the embarked payload.



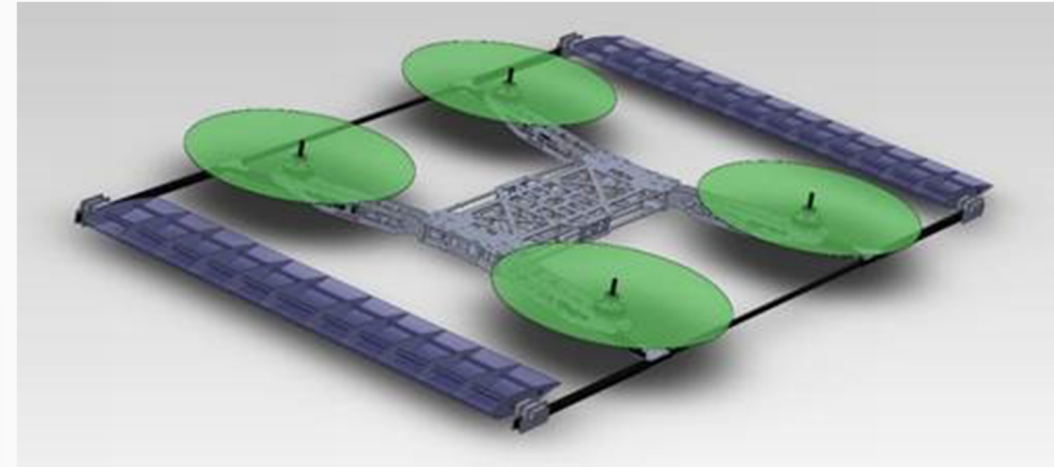
SUGGESTED APPLICATIONS

- Surveillance
- Inspection of structures (electric lines, railroad lines)
- Aerial photography



DEVELOPMENT STATUS

A functional prototype has been developed.



COMPETITIVE ADVANTAGES

- **Energy efficiency during fast flight:** the addition of wings allows to increase autonomy during fast flight, while keeping the system capacity to make some hover flight
- **Flight Stability:** the articulation at the level of wings allows to control their frequency. The latter can be completely disassociated from the pitch angle of the structure, allowing to obtain easily a great flight stability.
- **Flexibility for positioning the embarked payload:** the proposed structure is based on a quadrotor structure
- **Scalable structure**

