Aerial Robots

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Applications

Civil Applications

• Wildfire Mapping Needs
• Agricultural Monitoring
• Disaster Management
• Highway Speed Control
• Telecommunications
• Weather Monitoring
• Aerial Imaging/Mapping
• Thermal Infrared power line surveys
• Environment Monitoring....

Monitoring of Flood Barriers and Bridges: Facts

• Surveying every 3, 6, 9 years
• Potentially dangerous for the inspectors, very specialized team
• Expensive, (>15k€ for 7 days of monitoring of a 60m long bridge)
• Traffic shutdown
AMBITION

- Improve operational efficiency
- Increase the frequency of operations
- Improve staff safety
- Easy way of testing in normal use or emergency
- Sustainability of testing (no traffic shutdown)
- Cost-Effectiveness
Proposed Solution: Monitoring By Aerial Hovering Robots

- Unmanned Aerial Vehicles: used with success in the military area
- Increased use in Civil area
- Missions more efficient and less expensive than with manned aircraft
- Alternative to manned visual inspection

- Multidisciplinary research:
  - Information and Communications Technologies
  - Civil Engineering
  - Aeronautical Engineering
  - Energy
  - Integration in the National Airspace
  - Societal Acceptance
TECHNICAL RESEARCH IN ICT

- Aerial Robot in a windy environment
  - Autopilot
  - Flight Management System
  - Mission Planning
- Vision Device dedicated to Flood barriers and Bridges: gyro-stabilized turret
  - Limiting vibrations by passive filtration
  - Active control of the optical sensor
- A chain of treatments to follow the evolution of defects, the data processing and presentation defects
  - Real-time visualization of the bridge for the overall tracking disorders and navigation control vector optimizing the real-time positioning
  - Processing for an image metrologically exploitable
  - Reconstruction of defects on multiple photos
  - Identification of the disorder compared with a database
  - Location of disorder on the structure
  - Development of the disorders....
IMPACT (2020+, B€)

• In France
  – Flood barriers (> 10.000Km)
  – Bridges 22000 (>60m), 80000 (<60m), 100000 (<20m)...

• In Europe (civil engineering structures)
  – Belgium: > 5000 bridges
  – Finland: > 15000
  – Germany: > 35000
  – Norway: > 17000
  – Spain: > 15000
  – Netherlands: > 5000Km