Opportunities for the use of UAV in aircraft inspection

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Contents

Introduction

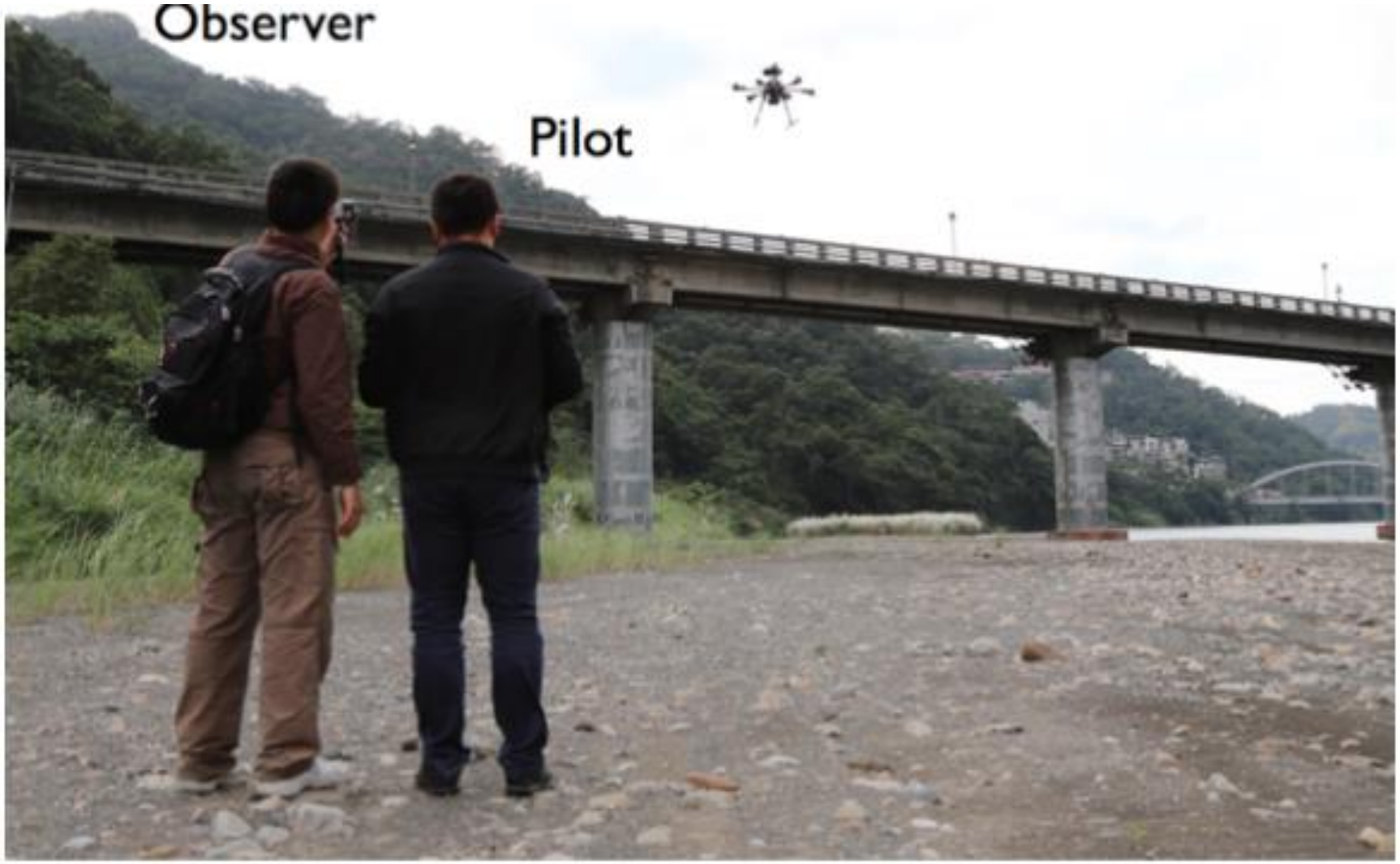
- The key issue is that a lightning strike, a collision with hail or a bird results in an aircraft on the ground
- An aircraft is inspected 30 times per year or every 100 hours of flight
- Human errors and operating inappropriate interventions are being pinpointed to be the reason behind 17% of the aircraft accidents.
- It can take 1 day or more to do an inspection
- UAVs can be used for faster an safer inspection of the upper parts of the wings and the fuselage
- Mobile ground robots can be used to inspect the aircraft from above

Tradicional inspection of an aircraft

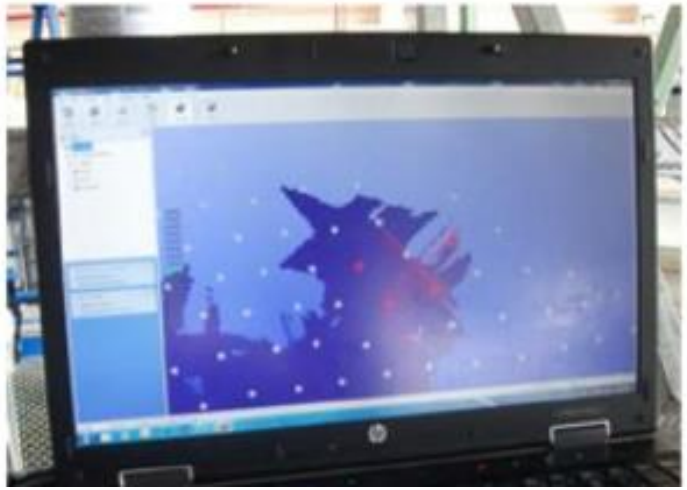
Proposed inspection using a UAV

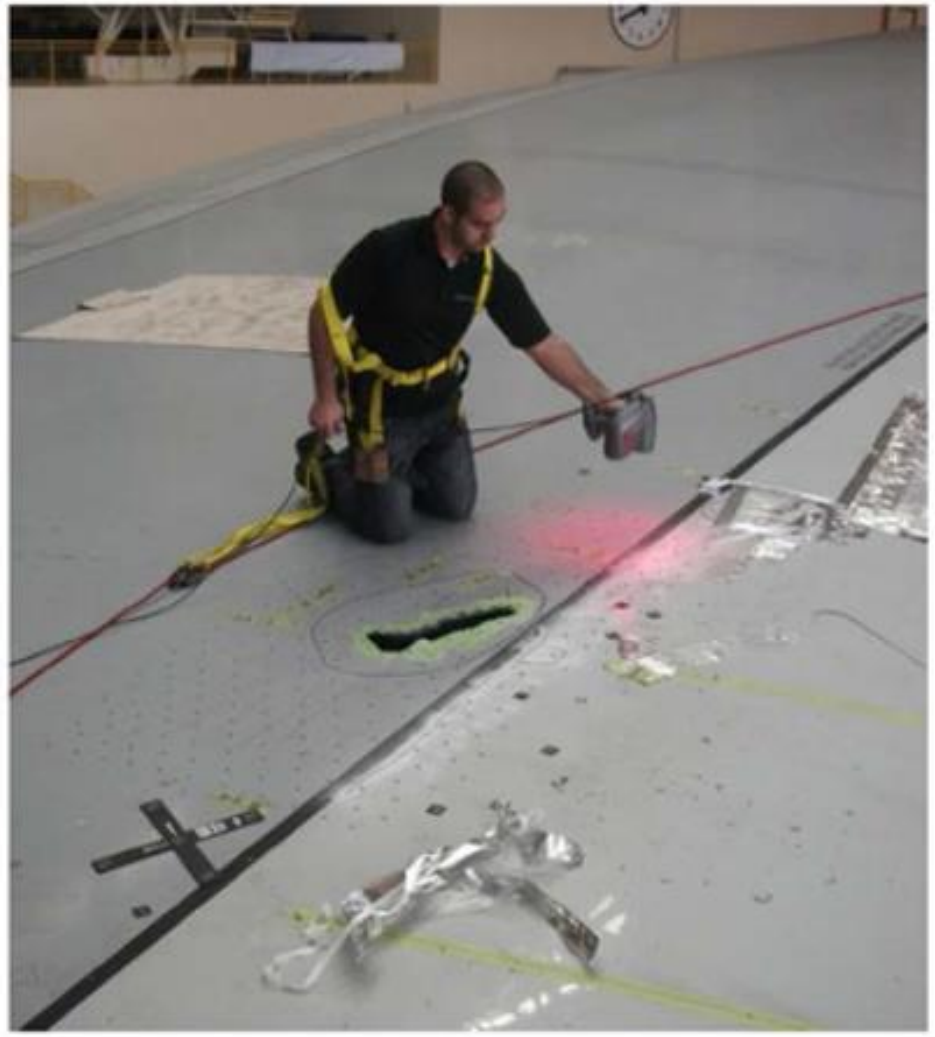
State of the art

- An Optimized Unmanned Aerial System for Bridge Inspection (2015)



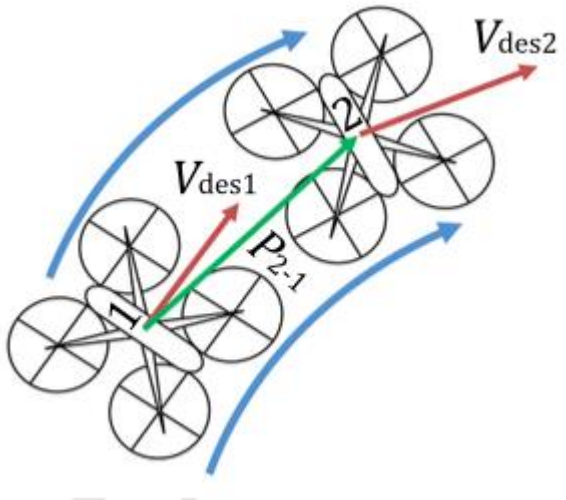
Robotic Laser Inspection of Airplane Wings Using Quadrotor (2015)

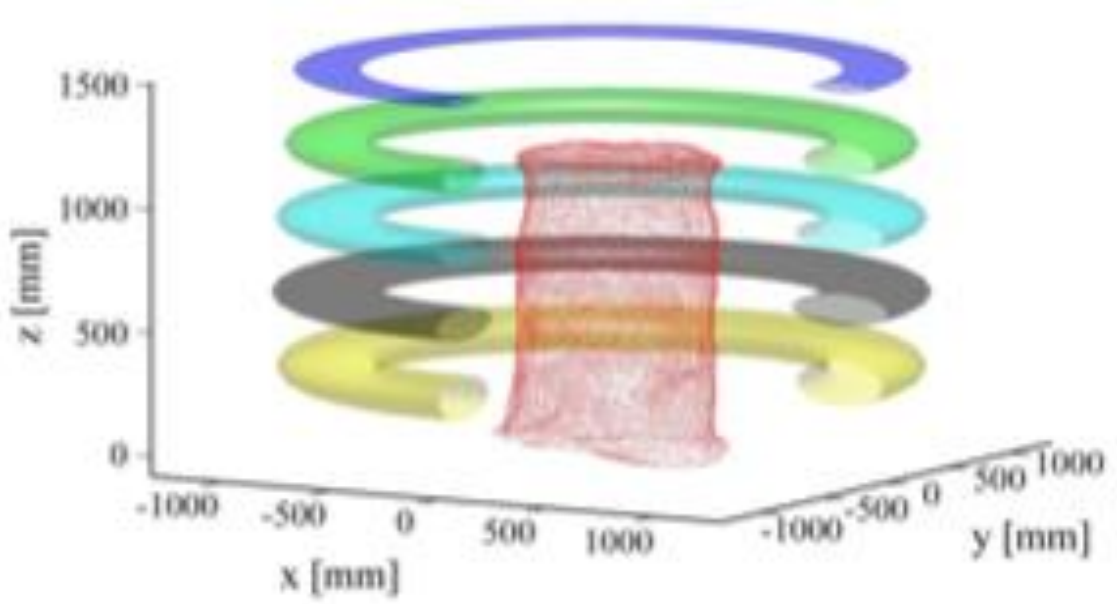




Rahbin: UAV based on a systematic image processing approach toward an automated asphalt pavement inspection (2016)

Autonomous and Scalable Control for Remote Inspection with Multiple Aerial Vehicles (2017)





General objective

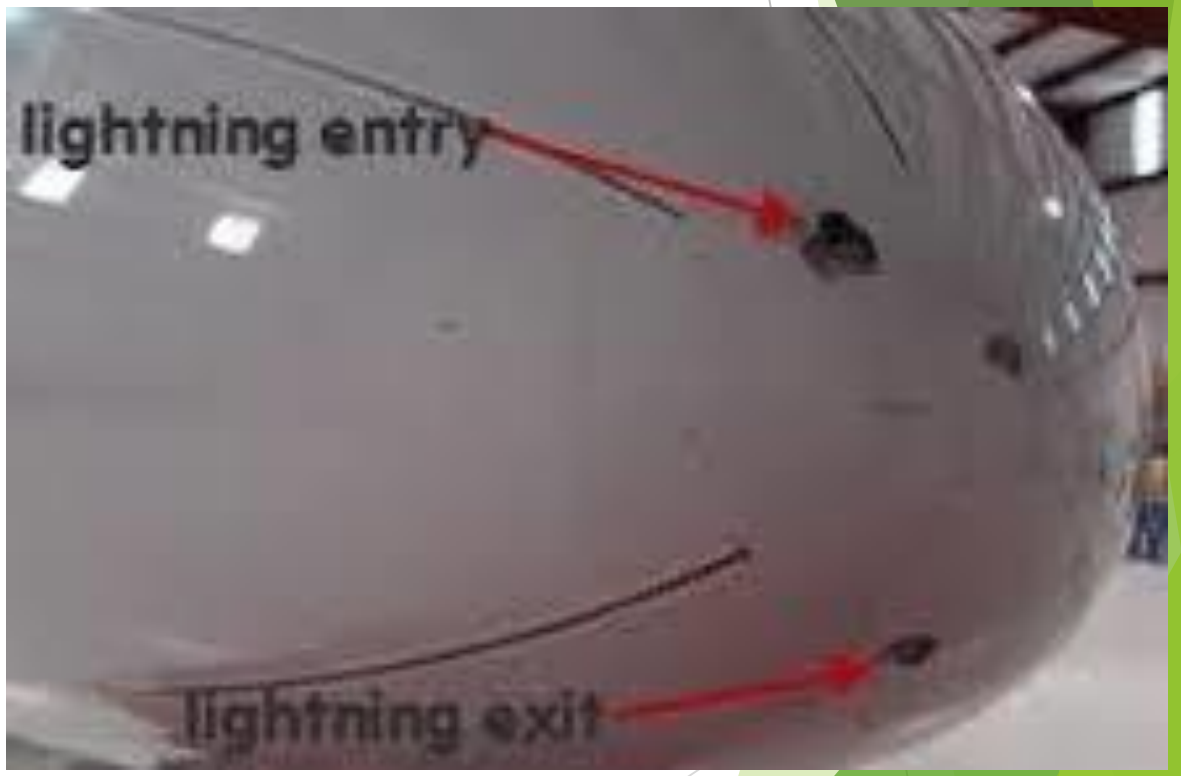
The main objective is to develop a UAV system which can fly at a safe distance on top of the wings and on the fuselage of the aircraft and send images to the operator to detect damages on the airplane when:

- - The aircraft is struck by a lightning
- - The aircraft is hit by hail
- - The aircraft collides with birds
- - There is a crack on a wing

Aircraft struck by a lightning

Cracks on an airplane

Aircraft struck by lightning



Aircraft hit by hail

Aircraft hit by a bird

UAV specifications

The UAV has to be equipped with:

- IMU
- ultrasonic sensors
- laser scanner
- high precision camera
- communication link
- GPS is not normally available

- Mobile robots could be used to inspect to lower part of the aircraft.
- Key to this is making the system simple and safe to operate.
- Quadrotor with caged props for safety.
- The vehicle carries high-intensity lighting and a high-definition camera and uses a laser system for navigation indoors (where GPS is not available) and collision avoidance.
- the vehicle automatically maintains a safe stand-off distance from the aircraft

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Conclusions

- The need for the development of specific UAV for aircraft inspection has been presented
- The type of aircraft damages which can be detected has been described
- UAV can improve aircraft inspection to obtain faster an safer inspection systems
- Some companies have already started the development of such UAV systems like Boeing, Airbus and Easyjet.