INTEGRATION OF RADIOMETER IN UAS FOR RESEARCH

INTA-Universidad de León

ISARRA
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**Objectives:**
- Train UAS to fly in Airspace
- Benefits of UAS in the civil field
- Promoting technological development
- Promoting industrial development
- Promoting Innovation
- international collaboration
- Knowledge Dissemination
- Development of standards for UAS

**Approximated size:**
- 4x3km
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- **Adaptation:**
  - Control Tower
  - Building for offices, laboratories...
  - Urbanization, parking...
  - Hangar, platform,
  - Runway
  - Fence

- **General Services:**
  - Fuel
  - Fire extinguish
  - Equipment:
    - APU
    - UHF and VHF
    - Radar
    - Meteorological Station
    - GPS differential
  - Communications and navigation
In CIAR we are doing the following activities:
- Flights for the development of SIVA
- Flights for the development of Atlante (CASSIDIAN)
- Flights for the development of ALO
- Flights for development and verification for Fly-tech, in collaboration with Civil Aviation.
- Flights for the development of helicopter UAV TEKPLUS
CIAR
- Description
- Refurbishment
- Activity

ALO
- Description
- Capability

Equipment
- Description

Results
- Runway
- Landscape
- Infrastructure

Conclusion

**ALO**

- Lightweight system
- Short to medium range,
- Composed of three UAVs and a mobile station
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ALO

<table>
<thead>
<tr>
<th>Description</th>
<th>ALO</th>
<th>SIVA</th>
<th>MILANO</th>
<th>DIANA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>2.33m</td>
<td>4.03m</td>
<td>8.52m</td>
<td>3.47 m</td>
</tr>
<tr>
<td>Wing span</td>
<td>3.48m</td>
<td>5.81m</td>
<td>12.5m</td>
<td>1.84 m</td>
</tr>
<tr>
<td>Height</td>
<td>0.98m</td>
<td>1.03 m</td>
<td>1.44m</td>
<td>0.67 m</td>
</tr>
<tr>
<td>MTOW</td>
<td>55 kg</td>
<td>300kg</td>
<td>900kg</td>
<td>160 kg</td>
</tr>
<tr>
<td>MPL</td>
<td>4 kg</td>
<td>50 kg</td>
<td>150 kg</td>
<td>20 kg</td>
</tr>
<tr>
<td>Vmax</td>
<td>180 km/h</td>
<td>190 km/h</td>
<td>230 km/h</td>
<td>800 km/h</td>
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<tr>
<td>V cruise</td>
<td>115 km/h</td>
<td>115 km/h</td>
<td>575 km/h</td>
<td>720 km/h</td>
</tr>
<tr>
<td>Autonomy</td>
<td>8h</td>
<td>7h</td>
<td>+20h</td>
<td>1 h</td>
</tr>
<tr>
<td>Scope (Data link)</td>
<td>100 km</td>
<td>150 km</td>
<td>2000 km</td>
<td>100 km</td>
</tr>
<tr>
<td>Flight roof</td>
<td>4270m</td>
<td>4270m</td>
<td>7500m</td>
<td>8000m</td>
</tr>
</tbody>
</table>

- Missions: reconnaissance, surveillance and target acquisition.
- Low cost and maintenance
- Easily operable
- Capable of performing autonomous missions with a short time-to-flight.
- The system has an Experimental Airworthiness Certificate (CAE).
The Atmospheric Physics Group of the University of León, Spain, has a lightweight OPTRIS radiometric camera (220g),

- Spectral measurements in the 7.5 to 13 micrometre range
  - Resolution of 382x288 pixels
  - FOV of 38° X 29°
  - Precision of 0.04K with 38°C (311.15K).
Radiometric measurements on the track. Lower values indicate the presence of water on the asphalt.
Radiometric measurements. The high values show an un-asphalted road, while the lowest values indicate the presence of accumulations of water in the farmland close to the runway.
Radiometric Measurements on the infrastructures
The use of UAS for these measurements allows the comparison of the three sources of data (ground, satellite and UAS) being cardinal to the study of the radiative properties of each kind of clouds.
Thank you

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