

Call for Master Thesis

Preliminary title:

Optimizing Aircraft Inspections: Augmented Reality (AR) and Artificial Intelligence (AI) for Enhanced Detection of Aircraft-Specific Regions.

Motivation:

Visual inspections¹(see Figure 1) are crucial for ensuring the safety and reliability of aircrafts in the aviation industry. Despite their importance, visual inspections are frequently conducted manually and thus, may fall short of effectively detecting anomalous parts or regions within an aircraft. The absence of a standardized and qualitative procedure highlights the necessity for innovative solutions to strengthen maintenance practices. The integration of a system to support visual inspections holds significant promise in elevating the accuracy and efficiency of aircraft maintenance by utilization of images as data source. Such a system applies cutting-edge technologies, such as AI, computer vision and AR, to check visual data and pinpoint irregularities that may escape the human eye. By doing so, it contributes to the proactive identification of potential issues, reducing the likelihood of unforeseen failures and improving overall safety.



Figure 1: Aircraft Inspection¹

Goal:

The primary goal of this thesis is to address the current limitation in aircraft inspection technology, specifically the inability of existing devices to detect different regions of aircraft structures. The overarching objective is to develop a robust aircraft region detection system, serving as the foundation for a decision-support system. This will lay the groundwork for future projects aimed at improving visual inspections in the aviation industry.

Tasks:

- **Principles:** Familiarize with Deep Learning (DL) (*i.e.*, especially scene classification), DL frameworks such as *Pytorch* and Augmented Reality (AR) headsets such as *Microsoft Hololens 2*.
- **State Of The Art:** Literature review on various neural network classification approaches.
- **Practical:** Generating of a new dataset for aircraft-region detection, development and training of the most-promising neural network, deployment of the system onto an AR headset.
- **Use Case:** Conducting system tests on an aircraft within the Vienna Airport hangar.

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¹ <https://www.linkedin.com/pulse/general-guide-effective-aircraft-inspection-steve-bentley/>, last accessed 28.12.2023