

# Al Applications in Aviation

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### Why Al?



(Statista, 2024)

### Why Al?



"The market value is expected to increase from USD 5.41 billion in 2021 to USD 23.21 billion in 2028" – NASDAQ OMX (2022)

"Create an image depicting an air traffic control tower in comic style."



### Background



Aviation BSc - FH Joanneum, Graz, AT

# FH JOANNEUM Luftfahrt / Aviation

### Background



#### Flight Control Systems Eng. – AutoFlight, Augsburg, DE



### Background



Uncrewed and Autonomous Systems MS – Embry Riddle Aeronautical University, Daytona Beach, FL



#### Karman Aerc space





#### Unmanned Systems

Avionics Software





#### Karman Aerospace

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# Safety = Certification

### EASA AI Roadmap 2.0



May 2023 High Level No Formal Methods

Part-Al AMC & GM



#### **EASA Timeline**

2019 - First AI IPC applications 2025 - approvals of Level 1 AI/ML 2035 - approvals of Level 2 / 3A AI 2050+ - autonomous AI

March 2024 – GM Lvl 1&2 ML



#### FAA



#### Roadmap for Artificial Intelligence Safety Assurance Workforce by Q32025

#### EUROCAE



WG-114 Artificial Intelligence ED-324 / ARP6983: AI/ML standard in aviation Open Consultation in Q3 2025



#### **Neural Networks**





### **Anomaly Detection**





### **Anomaly Classification**





### **Anomaly Classification**



Air Transat Flight 236 Toronto to Lisbon 2001

Right engine fuel leak 65nm (120km) Longest glide





# Simulation

#### Simulation









Course Speed Range Altitude





(Defining well clear for Unmanned Aircraft Systems, 2015)





(NASA Langley Research Center, 2017)



Predictive Airports Airspace Other Traffic Obstacles



(NASA Langley Research Center, 2017)



# DAA Simulation

#### **DAA Simulation**





#### DAIDALUS open source

#### **DAA Simulation**



PolyCARP ICAROUS RTCA DO-365B MOPS for DAA / UAS





# Integrated AI

#### Integrated AI





#### Contact





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#### References



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Balachandran, S., National Institute of Aerospace, Narkawicz, A., Muñoz, C., Consiglio, M., & NASA Langley Research Center. (n.d.). A path planning algorithm to enable Well-Clear low altitude UAS operation beyond visual line of sight. In *Twelfth USA/Europe Air Traffic Management Research and Development Seminar (ATM2017)* [Conference-proceeding]. https://shemesh.larc.nasa.gov/fm/papers/ATM-2017-16-draft.pdf