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Aircraft Dynamic Rerouting Support

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Content

In the frame of Clean Sky 2 JU, the HARVIS (Human Aircraft Roadmap for Virtual Intelligent System) project introduces a cockpit assistant committed to help the pilot to reroute the aircraft in single-pilot operations. A relevant scenario for this AI assistant is that in which diversion to alternate airfield is required after an emergency. Another interesting scenario is the anticipation of radar vectors in the arrivals with time enough to safely configure the aircraft for the descent. A demonstrator is being developed for this second scenario in the context of Project HARVIS (www.harvis-project.eu).

Diversion is often required after system failure, medical emergency, or just for weather phenomena (dense fog, storms, etc.) in the approaching. During regular operation if a diversion is needed the pilot in command and first officer discuss on the multiple options they have and try to find out the one they think is the best. The AI assistant will take into account characteristics of nearby airports, METAR at destination, and facilities to take care of passengers, among other factors. It may then consider several options, assess the risks and benefits of each one, and finally inform the pilot accordingly. In this scenario, the digital assistant takes care of the Options and Risks in a FORDEC procedure.

Besides diversion, changes to the flight plan are common during the flight, especially in the arrival. Variations to the standard arrivals are often due to air traffic congestion, weather phenomena, maintenance operations at the airport, emergencies, etc. Pilots become aware of these facts only after the Air Traffic Controller contacts them. This situation increases pilot workload in a critical flight phase. In a high energy state of the aircraft for example, pilots can be forced to ask for a holding to slow down and descent. The AI Assistant will assist the pilot during the descent, by anticipating the possible variations in the arrival routes. In this scenario, the assistant will provide the most likely arrival routes that the ATC would suggest, so that pilots can act accordingly with anticipation, which leads to reducing their workload and stress.

The AI Assistant first requires to know the cause for the rerouting, either by its own means or from a member of the crew. The main inputs required are: a stream with the aircraft route, the aircraft's state and position, the status of the crew and passengers, a database of the terrain, airports and airlines facilities available, among others.

HARVIS is committed to develop a use case demonstrator for the arrival rerouting. Two technical challenges are contemplated: Firstly, the collection of a relevant and representative dataset to train the AI from real flights and secondly, to develop the proper human-machine interface between the virtual assistant and the pilot for a satisfactory experience.

Keywords : Intelligent assistants, Virtual assistants, Simulation, Virtual reality