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## **HARVIS: smart assistant for Non-Stabilized Approaches**

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Within the CleanSky 2 framework, the HARVIS project aims to identify how cognitive computing algorithms implemented in a digital assistant could support the decision making process of a single pilot in complex situation at 2035+ horizon.

SPO introduce new challenges during the final approach:

- ▷ No flight parameters monitoring by another crew member.
- ▷ No workload sharing, making the single pilot more vulnerable to task interruptions.
- ▷ No possibility to discuss opinions for complex decision making.

## Go-around prediction

Thanks to machine learning algorithms, the assistant detects situations in which a go-around is needed.

Its training is based on the classification of over 750 final approaches by 28 Commercial Air Transport pilots.

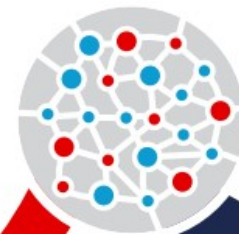
- ▷ Dataset filtering could permit to tailor the assistant to a specific airline or, even more, to a specific user.
- ▷ Extension to more flight parameters could improve the relevancy of go-around predictions.



FLIGHT DATA RECORDS

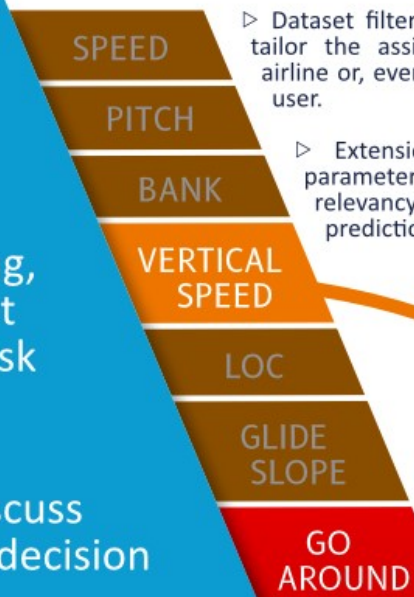


CLASSIFICATION BY EXPERT PILOTS



GO-AROUND PREDICTION MODULE

**Flight parameters**  
Altitude, Pitch, Roll, Ground Speed, Vertical Speed, Indicated Air Speed, Localizer Deviation, Glide Slope Deviation, Distance to Runway



Go-around alert

Adaptive callouts

Gaze monitoring

Deviation monitoring

## Intelligent callouts

Thanks to an eye tracking device, callouts are emitted only when pilots do not pay attention to a flight parameter deviation.

- ▷ Monitoring the situation awareness through the gaze position is limited. Broadening pilot monitoring with other physiological parameters could be interesting.

