

## **Optical wireless headset inside Aircraft cockpit: study of the integration of LiFi technology in the cockpit to ensure robust audio communication**

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*Abstract* - Today, pilots of large aircrafts use wired headsets to communicate with cockpit crew, cabin crew or the Air Traffic Control. They could use wireless headsets, but so far all the available solutions rely on RF technologies such as Bluetooth, WiFi etc. The problem with those technologies is that they are known to be unsecure: signal can be jammed, or eavesdropped. On top of that, they are subject to electromagnetic interferences. Those drawbacks seriously limit the use of such conventional technologies in an environment such as cockpit where security and safety are paramount.

To overcome those issues, the ALC project aims at using a technology based on light: “LiFi”, (that stands for Light Fidelity). The ambition of the project is to bring evidence that this technology is suitable for a cockpit environment. To do so FACTEM is associated to French laboratory “XLIM”, and a Scottish company “PURELIFI” (world leader in LiFi solutions) to develop 3 prototypes to be tested on a cockpit simulator: an “audio headset”, a “tablet” or EFB (Electronic Flight Bag) that is used to display flight charts, procedures, etc. and a headset equipped with physiological sensors.

The main challenge that FACTEM and XLIM have is to design the headset prototype from TRL3 up to TRL5, so that it fully works in any position in the cockpit, whatever the light condition (night, sunlight), or even in presence of smoke. On top of that, we should ensure enough autonomy to ensure a long-haul flight (~12h). Lastly the really critical challenge is that we want to reach an audio latency as low as 2.5ms.

To meet the same performances (audio quality, robustness) of conventional wired headset, an in-lab prototype was developed by FACTEM. In the presentation, the technological choices are justified, and performances reached are discussed, along with first limitations and possible ways of improvement up to TRL5. On the cockpit implementation side, first simulation of optical wireless channel for pilot headset connectivity inside cockpit are investigated, and performance in terms of maximal data rates that can be achieved for a given link reliability are determined.

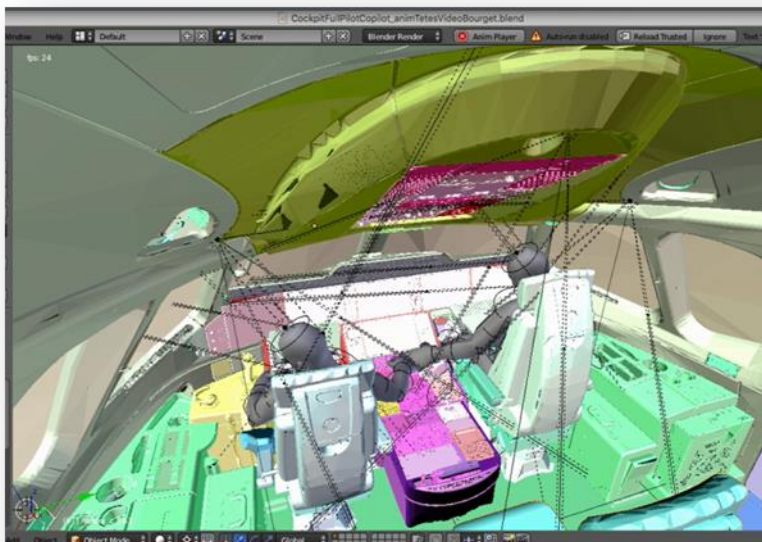
This presentation is performed by FACTEM audio headset Work Pack leader (and project coordinator), and XLIM as major contributor.



- Access point @TRL4



- Headset + Station @TRL4



- Optical simulation with crew animation (movements)



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