Instrument scan monitoring in multi-crew flight decks

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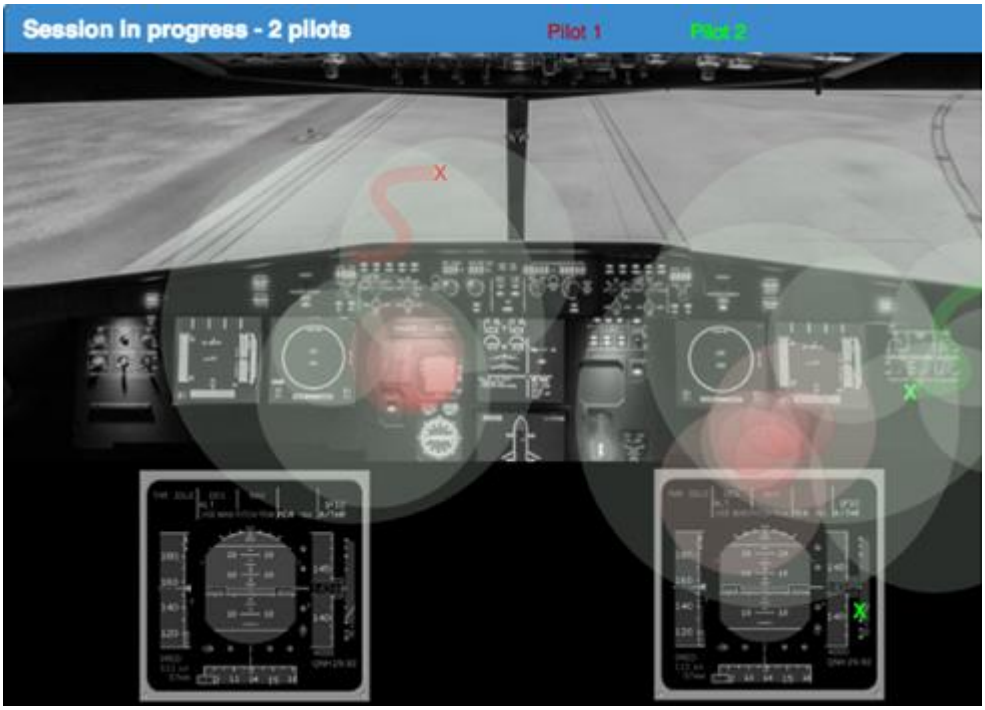
Improvement of training quality in flight training industry is a continuous demand for the participants. Flight simulation is an inevitable component of practical flight training, the development of its subsystems can add new features that serves the essential goal. Project NGFNPT develops an eye tracking based platform for multi-crew flight decks to support regular Multi Crew Cooperation trainings with advanced technology, providing objective measurement data for flight instructors.

Despite the fact that flying is the safest transportation mode carrying more than 3 billion people safely every year, the aviation industry permanently seeks improvements in technology, processes and skills to decrease the number and impact of accidents. As the human factor is ~~a~~ critical in ensuring safety, training of excellent flight crew is getting more and more important.

Technologies related to evidence based training (EBT) have already been introduced in the training regime, and handled as a fact across the industry. Simulator manufacturers and operators are all preparing for the new regulation and are creating (or even implementing) training programmes fitting to the new regime. Frameworks of EBT are wide open. New technologies serving objective data collection are welcome and available for implementation in simulation environments. Although a certain number of scientific research projects deal with the measurement of pilots' skills and performance, objective measurement methods of pilots' behaviour are not widely spread on the market yet. Currently the most widely applied methodology is the observation and judgement of a trainer and the objective recording of the actions the trainee is doing.

The results of the project NGFNPT creates the basis of a complex hardware and software system that provides data for flight instructors throughout the entire training. The eye tracking based solution helps the instructor evaluate the level of procedure tracking by the flight crew. The excellence of ~~a~~ practiced training instructor is essential to identify the strengths and weaknesses of the members of the flight crew, but objectively expressed data can point out the mistakes and deficiencies and support them in grading of the skills. The system can be treated as a third eye (or sixth sense) of the trainer during the examination of the trainees.



The simulation environment was built by integrating eye-tracking cameras into a multi pilot flight deck, monitoring both pilots eye movement on the instruments and the projected environment without disturbing the flight crew by wearing additional equipment. The prototype of the system was installed in a FNPT II MCC level training device, and the functionalities were tested and evaluated during multi crew cooperation and jet orientation training sessions with the consent of the trainees. The tracking of the instrument scan of individuals has been evolved by combining flying and non-flying pilots' roles to evaluate performance of the crew simultaneously.

The implementation of the current monitoring system was transformed to a development framework for the next stages of multi crew training support system that aims to provide data for the following aspects of competency based grading system:

- Application of Procedures
- Communications
- Flight Path Management – Automation
- Flight Path Management – Manual
- Knowledge
- Leadership and Teamwork
- Problem-Solving and Decision-Making
- Situation Awareness
- Workload Management

The implementation and validation of the prototype of instrument scan monitoring system was carried out within the bscope of international EUREKA project “Next generation flight navigation and procedure training device” (Project ID: E11178).