



TECHNOLOGY SOLUTION

Instrumentation



Variable Visibility Glasses for Instrument Flight Training

Safer and more comfortable glasses for selectively limiting the view of pilot trainees

During instrument flight training the pilot must have his/her view through the aircraft windscreen restricted to simulate low / visibility conditions while permitting the pilot to view the instrument panel. In one current method, a hood is draped across the aircraft windscreen, or a face mask or blackened glasses is worn by the pilot. All such current methods create potentially hazardous disorientation and an unnatural environment for the trainee. In particular, the face mask and blackened glasses restrict the pilots peripheral vision and require uncomfortable and unnatural head positions in order to see the entire instrument panel.

Researchers at NASA's Langley Research Center have developed and tested special glasses to be worn by a pilot during instrument flight training. Using novel sensors to determine head position, the glasses restrict the view out of the aircraft windscreen but allow the pilot to clearly see the entire instrument panel, providing a much more realistic low visibility instrument flying experience.

BENEFITS

- Safer - co-pilot visibility is not impeded, and the system is deactivated below a specified altitude
- Improved comfort system - uses conventional eyeglass frames, which are relatively lightweight and do not restrict the pilots movement
- Compatible with existing eyewear - system can be easily modified to fit over prescription eyeglasses or sunglasses
- More natural - natural head movements trigger the system to allow unimpeded visibility of the instruments and cockpit displays
- Improved flight experience - reduces potential for pilot disorientation so the trainee can focus on flying the aircraft



THE TECHNOLOGY

The technology combines electroactively controlled liquid crystal lenses with a means for determining the pilots head position. When the pilots head is positioned to look outside the front or side windscreens, the lenses restrict light transmission. When the pilots head is lowered to view the instrument panel or other cockpit displays, the lenses allow light transmission so that the view of the instruments is unimpeded. Light transmission through the lenses can be selectively controlled by the system, ranging from 0.1% to 10%. The lenses are mounted in conventional eyeglass frames.

The frames include a detection system to determine the position and orientation of the pilots head. Circuits within the frames activate the lenses to restrict light transmission when the pilots head is oriented to look out the windscreen. A PC, linked to the aircraft flight computer or altimeter, is also in the control loop and turns off the system to allow unimpeded visibility when the aircraft is below 200 feet or for other specified conditions.

The technology readiness level of this invention is at stage seven with a prototype having been tested.



Pilots in training could benefit from this NASA technology.

APPLICATIONS

The technology has several potential applications:

- Pilot glasses - for instrument flight training and simulation of reduced visibility conditions
- Military goggles - provide protection to aircrews from lasers or bright detonations
- Gaming and virtual reality goggles - restrict or allow selective vision based on users line of sight
- Transition lenses for eye wear - for lenses that darken when looking toward the Sun

PUBLICATIONS

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