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SAFETYWIRE

ICAO Flags Safety Risks as Traffic Sets Record - Agency highlights turbulence, GNSS interference, and runway risks

(**Source:** Amy Wilder, AIN, August 12, 2025)

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Global aviation safety trends remain positive over the long term, but the International Civil Aviation Organization (ICAO) warns that accident and fatality rates rose in 2024 from the previous year despite record-breaking traffic volumes. The agency's 2025 Edition Safety Report – State of Global Aviation Safety recorded 95 accidents involving scheduled commercial flights worldwide, up from 66 in 2023. Ten of those were fatal, resulting in 296 deaths—more than quadruple the 72 fatalities reported the previous year.

The global accident rate climbed to 2.56 per million departures, compared with 1.87 in 2023, even as the industry handled more than 37 million departures worldwide. ICAO Secretary General Juan Carlos Salazar said aviation remains the safest form of transport, but stressed the need for continuous improvement. ICAO Council president Salvatore Sciacchitano called the 2024 data "a tragic and timely reminder" of the importance of collective action toward the goal of zero fatalities.

Four high-risk categories—controlled flight into terrain, loss of control in flight, midair collisions, and runway incursions—accounted for 25% of fatalities and 40% of fatal accidents. ICAO also reported that turbulence was responsible for nearly three-quarters of all serious injuries in 2024, a trend it linked to increasing weather-related hazards.

To address these issues, ICAO is advancing global runway safety action plans, developing enhanced real-time turbulence monitoring systems, and issuing updated guidance to mitigate Global Navigation Satellite System (GNSS) spoofing and jamming. The agency is also expanding data-driven approaches to accident, incident, and wildlife strike reporting, and promoting enhanced civil-military cooperation to reduce conflict-related risks.

Looking ahead, ICAO is preparing safety frameworks for integrating uncrewed aircraft systems and advanced air mobility into traditional airspace. Regional analysis showed the Asia-Pacific and Europe/North Atlantic regions each had three fatal accidents in 2024, while South America recorded one fatal accident with 62 deaths. Asia-Pacific had the highest overall fatality count, followed by South America and Europe/North Atlantic.

The 2025 report also highlights ICAO's 80th anniversary and its continued role in leading the international alignment of technical standards and safety strategies for its 193 member states.

Which Way is Up? Exploring Spatial Disorientation in Helicopters

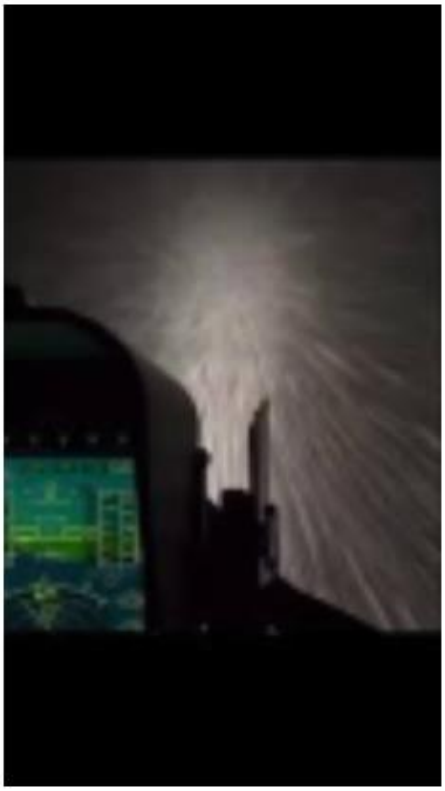
(Source: Alicia Moen, Senior Staff Consultant, Engineering Systems Inc., USHST SUMMER 2025 eNewsletter)

Abstract

Spatial Disorientation has contributed to aviation accidents since the inception of flight and remains an underlying cause today. While the root cause is often flying in a Degraded Visual Environment (DVE) wherein the pilot cannot see the horizon, it is not the only cause. Understanding why spatial disorientation occurs during flight and its effect on human body systems is important in mitigating its onset. Night Vision Devices (NVD) and Helmet Mounted Displays (HMD) were developed to help the pilot keep spatial orientation, enhance situational awareness, and reduce workload when operating in DVE. It is important to note that although NVDs and HMDs can assist in this area, if used incorrectly, they can be one of the causes of spatial disorientation onset. Given the complex nature of rotary-wing flight and the risks associated with flying in a DVE, additional studies are needed to elicit the best and most effective mitigation strategies.

Which way is up? Exploring Spatial Disorientation in Helicopters

Encyclopedia Britannica defines Spatial Disorientation as “the inability of a person to determine his true body position, motion, and altitude relative to the earth or his surroundings.” Degraded visual environment (DVE) conditions reduce the pilot’s ability to see the horizon and ultimately lose the ability to determine body position, motion, and altitude relative to the Earth. DVE typically includes but is not limited to dark conditions (night), ambient moisture, or other particulates like dust. Despite the increase in technology to combat spatial disorientation, especially for helicopter pilots under DVE conditions, it remains a significant threat in helicopter operations[1]



Understanding Spatial Disorientation

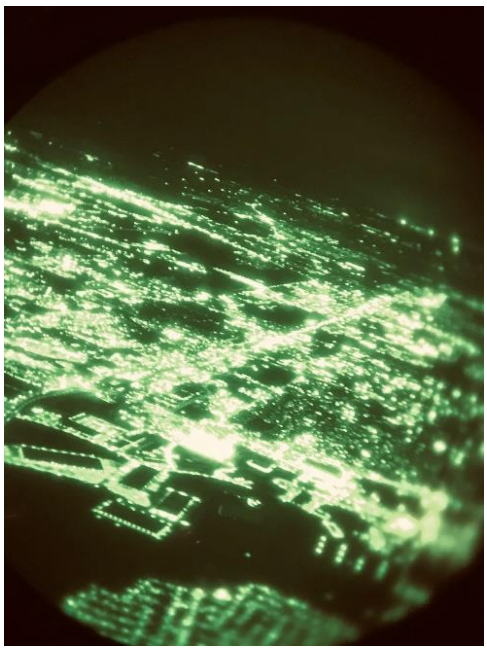
Visual and vestibular cues are needed to maintain orientation. The vestibular system, like an internal GPS, tells the body which way is up, down, left, and right, even when visual cues are reduced or absent. Combined with the visual system, the human body can detect angular and linear accelerations. The proprioceptive system is also essential, telling the mind where body parts are relative to each other to support spatial orientation. During flight, one of these systems can be misled, resulting in conflicts, illusions, and misperceptions. DVE conditions can occur at night, in low visibility, over water, in dusty or snowy conditions, or in any situation where the pilot cannot maintain visual reference with the horizon[2]. Losing visual cues contributes to Spatial Disorientation, which manifests while flying in complex conditions such as hovering, low-altitude flying, or landing in confined areas1.

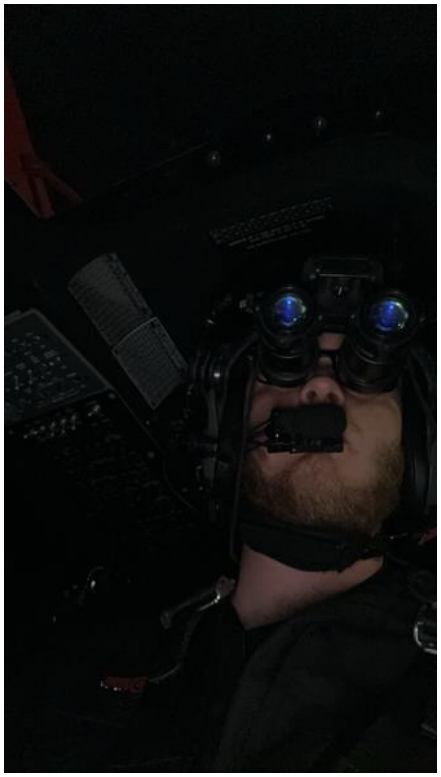
The Evolution of Spatial Disorientation in Human Flight

Humans are not adapted for aerial flight based on the orientation systems within the body. Human sensory systems struggle between their capabilities and flight demands. As a result, the human vestibular system is unreliable in flight due to sensory conflicts. What is seen (visual) versus what is felt (vestibular) proves problematic when visual cues are missing or misleading2. In DVE, the optical cues that help maintain spatial orientation are absent. Helicopter pilots face specific challenges due to their operations. Most helicopter flights in the United States are medical evacuation flights (FAA, 2023). The FAA reported that 43.8% of all air ambulance hours were flown at night or in DVE. The lack of a visible horizon increases susceptibility to spatial disorientation1. The increased cognitive demands of mission-related tasks while navigating complex conditions compound the effects, contributing to spatial disorientation.

Night Vision Devices and Helmet Mounted Displays

Although designed to aid pilots flying at night, Night Vision Goggles (NVG) have reduced fields of view, altered depth perception, and the potential to worsen visual illusions, contributing to spatial disorientation[3]. More advanced systems, such as helmet-mounted displays (HMD), may not fully compensate for flight conditions, leading to an over-reliance on systems. Using such systems without proper external visual cues can also cause spatial disorientation1





Mitigation Strategies

Strategies have been developed and utilized to combat spatial disorientation in helicopters. Experimental research, enhanced training programs, workload management strategies, and improved visual cueing are tools designed and used to reduce the rates of spatial disorientation in helicopters, leading to accidents[4].

Experimental Research

Simulator-based studies recreate challenging flight conditions such as DVE to assess the pilot's workload and performance1. The studies can then be used to drive simulator training, replicating realistic flight conditions, profiles, and illusions, which could contribute to the onset of spatial disorientation. This resource has shown promise as a training tool to teach how to survive once spatial disorientation has occurred. Other systems exist that provide an additional training element that can be used without the use of a simulator. Pictured below is a training device by AT Systems. [5]This is a stand-alone device operated through an iPad. It has its own AHRS box and can simulate a degraded visibility environment. This is a great tool that can be utilized in the aircraft to create vestibular illusions and cause spatial disorientation with a safety pilot/instructor on board. Additionally, this device can simulate low visibility in one-half-mile increments and be used with NVGs.

Other training perks are brown/white-out condition training and IFR training. Unlike the simulator, this device provides vestibular illusions similar to those in the actual aircraft. Elevating the quality of training received. NVG training to manage the unique challenges of NVG use has also been researched3

Workload Management Strategies

The workload demands of operating a helicopter in DVE are higher in most cases. As a result, the need for an optimized cockpit design to reduce the cognitive demands of the pilot during critical phases of flight is important. An optimized cockpit design improves how essential flight data is relayed and displayed to the pilot, reducing the number of head and eye movements needed, and the likelihood of spatial disorientation1 and 4. If an optimized cockpit design is not possible, then proficiency training must be considered, as experience is shown to reduce the severity of SD onset. Robust training with all crewmembers (flying and non-flying) is essential to enable the entirety of the crew to be prepared for situations where SD may arise. The FAA (2024) states that if one pilot experiences visual illusions, they should transfer the controls since pilots seldom experience visual illusions simultaneously. But what if the other front seat is occupied by a non-pilot? Awareness of the risks by non-pilot crew members can help avoid the threat from visual illusions. Verbal reports have also been shown to positively impact overcoming SD when aeronautical systems are either not there or are being challenged by the pilot's vestibular system[6]. Systems on board are only useful if the pilots and crew routinely practice how to use and disengage them. You can have the most advanced technology onboard, but if used incorrectly, the results could be catastrophic.

Improved Visual Cueing

Spatial disorientation can occur when the pilot loses sight of the horizon, and conflicting information is provided to the brain by the vestibular, proprioceptive, and visual systems. Improved visual cueing through better visual aids is aimed at providing critical orientation cues during high workload or DVE to reduce the onset of spatial disorientation2 and 4. Spatial disorientation continues to threaten helicopter operations, especially in DVE conditions. Although technology like NVGs and HMDs help, they can also contribute to disorientation if used incorrectly. Continued research, improved spatial disorientation training, and modernized visual cueing systems are critical in mitigating the risk of spatial disorientation in rotary-wing operations.

Alicia Moen
Senior Staff Consultant, Engineering Systems Inc.

Keywords: spatial disorientation, degraded visual environment, night vision devices, helicopter operations

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Drones Flying Too High, FAA-backed Study Finds - Data suggests new rules needed as drone use expands

(**Source:** Amy Wilder, AIN, July 16, 2025)

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An FAA-funded nationwide study led by Embry-Riddle Aeronautical University (ERAU) has found that small uncrewed aircraft systems (UAS) are frequently flying above the 400-foot ceiling established for drones, raising concerns about potential mid-air conflicts with crewed aircraft. The report used Remote ID signals collected from sensors across the U.S. to analyze flight activity at 43 aerodromes, including airports and heliports.

Because the study did not distinguish between authorized flights and violations, some high-altitude flights may have occurred under FAA waivers or certificates. However, researchers noted that flights above 500 feet were likely recreational, based on the types of drones identified.

Researchers documented 6,037 drone flights with altitude data, of which at least 573 reached between 400 and 500 feet, and 781 exceeded 500 feet. Factoring in duration, drones were found to be flying in airspace used by crewed aircraft for roughly 10% of the cumulative flight time observed.

“Study data suggests that a sizable number of small UAS flights take place above that altitude, which could impact the operation of manned aircraft,” said Ryan Wallace, associate professor of aeronautical science at ERAU and principal investigator on the project.

The study also noted heightened risk near airports, particularly heliports. Small UAS were detected within 0.5 nm—about 3,000 feet—of heliports, which are often omitted from aeronautical charts and obscured, and “are often hidden within urban sprawl,” Wallace noted. The report recommends updating aeronautical charts to include heliport locations and reduce unintentional proximity by drone operators.

Embry-Riddle faculty involved in the project emphasized that the findings will help inform future FAA rulemaking, especially as beyond-visual-line-of-sight operations and commercial drone applications continue to expand.

“This research helps inform both current policy gaps and future regulatory priorities,” aviation doctoral student Sang-A Lee said.

Research was conducted with support from Kansas State University and Wichita State University’s National Institute for Aviation Research. Remote ID signals—required by the FAA since 2023 for most registered drones—provided flight data that enabled the team to map hot spots and risk zones across the National Airspace System.

SAFETY MANAGER'S CORNER

PRISM SMS: Customer Survey

Thank you to everyone who completed our PRISM SMS Customer Survey!!

Our aim is to constantly improve the user experience within the PRISM SMS platform, further establishing it as an invaluable tool within the Safety Management ecosystem. Your feedback & participation in the survey, and within your day to day, is a key component of our own improvement process and we greatly appreciate your support.

One of the questions in the survey asked: "*What integration do you feel would provide the most value to your operation in PRISM SMS?*". The top three responses were:

- ASAP
- Emergency Response
- Fatigue Management

Did you know that **PRISM SMS already includes ASAP**? Whether your ASAP program is 100% in-house or you use a third party facilitator like Air Charter Safety Foundation (ACSF), PRISM has you covered. PRISM SMS includes a dedicated **ASAP Tool** that keeps ASAP reports separate from other reports being submitted through the Reporting Program Tool (RPT). Each operator is able to designate their ASAP Manager and ERC Members. And great news for the submitters, ASAP reports **can be submitted through mobile devices** which makes it super convenient.

In the near future, PRISM will be adding an integration with MITRE for the ASIAS program which will allow operators who are participating in ASIAS to send their ASAP reports directly to MITRE without having to submit a second report.

If you are interested in adding ASAP to your account in PRISM SMS or have any questions about ASAP, please reach out to PRISM Support (prism@argus.aero).

Once again, thank you to all who participated in our survey; we greatly appreciate your feedback.

If you were not able to complete the survey or if you have additional feedback that you would like to provide, please do not hesitate to reach out to us. We welcome the feedback.

Quote of the Month

Personality has power to uplift, power to depress, power to curse, and power to bless.

BY: Paul Harris

Attitude- a settled way of thinking or feeling about someone or something, typically one that is reflected in a person's behavior. Some emphatically state, “attitude is everything,” ranging from extremely negative to extremely positive. Either way, whatever you take into the workplace has significant impact. Even when negative topics or situations present themselves responding with positive reaction yields a better outcome. Consequences being what they are, they cannot be eliminated or undone, but positive reaction can make the necessary steps forward beneficial and meaningful and provide for improvement. The best personalities act and react from positions of knowledge and understand that ignorance has serious repercussions. Understand perspectives, gather all available information, analyze outcomes, receive input and then move towards decisions. Positive influence requires the right personality so make sure yours has the right sort of power.

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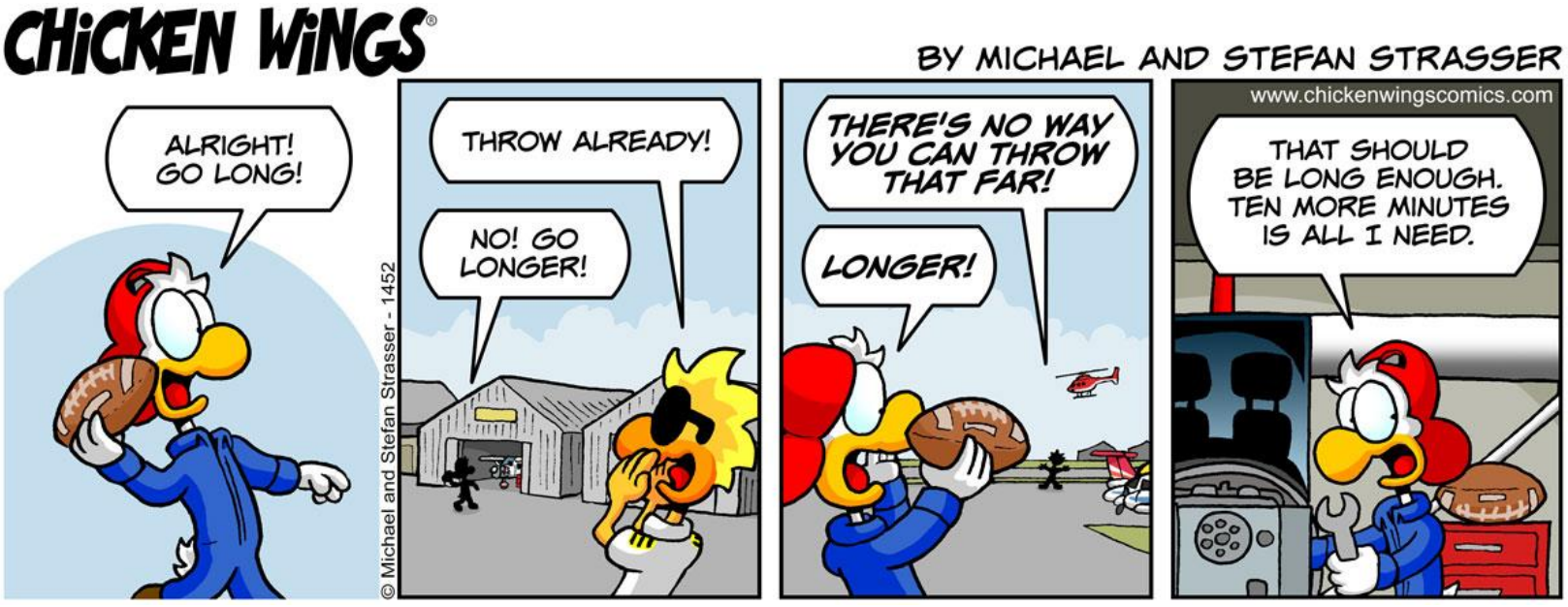

CONTACT LIST

Jenna Albrecht

Jenna.albrecht@prism.aero

Director, SMS Services

Wayne Ehlke

Wayne.Ehlke@prism.aero

Safety Analyst, SMS Services

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Nov 11-13, 2025—PROS Course
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Dec 9-11, 2025—PROS Course
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