

THE SOUND of SAFETY

FLIGHT-DATA RECORDERS FOR LIGHT AIRCRAFT CLOSE
THE INFORMATION GAP, AFFORDABLY AND RELIABLY

When 18-year-old Jordan Wells saw the Maryland State Police helicopter land that foggy night in 2008 she probably breathed a sigh of relief. Having just survived a violent car accident, she had every reason to believe she was finally safe. In moments, she and her friend Ashley Younger would be airlifted to the hospital to be patched up, and if lucky, released to go home. Unfortunately, Jordan's problems were only beginning.

The flight began uneventfully, but the pilot soon announced that a thick layer of fog would force them to land at nearby Andrews Air Force Base. Ambulances could transfer the injured girls to the hospital from there. But the helicopter went down in a wooded area a few miles from Andrews, and of the five people on



board, Jordan—who lost her right leg in the crash—was the only survivor.

Such accidents involving medical helicopters are not only tragic but have been disturbingly common, with the National Transportation Safety Board (NTSB) long expressing concern over the safety of medical helicopters and their operations. Compounding the problem, the causes of such accidents have frequently remained unsolved because flight data recording (FDR) systems, such as those used on commercial airliners, were too large, mechanically complex, and costly for use on smaller aircraft. That not only deprived bereaved families of some degree of closure, but also deprived the NTSB and flight professionals of crucial lessons that could be used to improve the safety of future operations.

Thanks to North Dakota-based Appareo Systems and the Air Force Small Business Innovation Research (SBIR) Program, this dangerous information gap is now being closed by Appareo's Vision 1000, a compact, low-cost flight data recorder for light aircraft. Because the innovative technology made FDR systems practical for smaller aircraft, such systems, from Appareo or other manufacturers, are now legally required on all medical helicopters in the U.S.



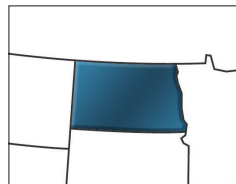
The Vision 1000 has its roots in a helmet-mounted head-orientation system that Appareo was originally working on for the Air Force.

“What we did was develop a bunch of really, really cool stuff for figuring out where a thing is in the world, and which direction it’s pointing—‘Where am I? Am I at ground level, or how far off ground level? Am I leaning to one side, am I leaning forward or backward, am I moving sideways?’ These are some of the spatial dimensions we can figure out,” Appareo President and COO David Batcheller said.

What made the Vision 1000 a game-changer, added Batcheller, is that unlike traditional FDR systems, the device does not rely on data from other aircraft avionics. Instead, the software-driven camera inside the nine-ounce unit collects, interprets, and records critical flight information itself.

“This lets us view a lot of data acquisition from the aircraft without having to touch flight-critical instrumentation. When you do that in the aviation world, it drives the cost way up and drives the certification burden way up,” Batcheller explained.

Only four inches wide, the Vision 1000 is unobtrusive and easy to install. The device is now FAA-certified for use on a range of light aircraft, including popular makes such



as Cessna, Piper, and Airbus Helicopters, which is a major client. “The product is standard equipment on most of their light helicopters,” Batcheller said.


While the Vision 1000 has been successfully used for accident reconstruction, it’s finding important and far more common use in helping prevent accidents in the first place. During pilot training, its software not only records flight data, but allows 3D playback including audio and synchronized imaging. The software also analyzes flight data, generates written flight records, and flags anomalies. These features have made the Vision 1000 popular with flight instructors and fleet operators, who have incorporated the playback functions and reports into their pilot training and monitoring, giving them the power to identify and correct dangerous habits and practices before they become safety issues.

According to Batcheller, none of this would have been possible without the support of

the Air Force SBIR Program. When their funding began in 2008, Appareo had 20 employees, ten of whom worked on the SBIR project at any given time. The company now employs 180 workers.

“This SBIR gave us the ability to put capital and time into the project,” Batcheller said, adding that the program offers a unique opportunity to small businesses that are committed to finding broader applications for their technologies.

With SBIR support, Appareo created a product that set a new legal standard for medical helicopter safety and became a powerful, widely used tool for ensuring

pilot readiness and flight safety. While no technology can stop all air accidents, those being airlifted to safety today have the comfort of knowing the helicopter carrying them is safer than ever. 

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Appareo Systems, LLC • Fargo, ND

SBIR contract: FA8650-08-C-6839 • Agency: Air Force • Topic: AF071-020, Head orientation sensing system