Speech Takes Flight Among Pilots and Tower Personnel

When you think of speech technologies in the travel industry, a likely image that comes to mind is of a frantic business traveler in a cab on his way to the airport, calling his carrier's interactive voice response (IVR) system to check the status of his flight. And rightly so: The airline industry, in particular, is a huge IVR user, not just for flight status inquiries, but also for booking reservations, checking in, changing flights, and obtaining boarding passes. But the travel industry, in general, is finding that speech is also the ticket for so much more.

Of particular note are speech recognition technologies that are helping pilots fly planes and air traffic control tower personnel more safely monitor and communicate with planes, both in the air and on the ground waiting for clearance to take off.

In the cockpit, speech is allowing pilots to voice-control several key functions of the plane and its instruments; in the air traffic control tower, speech systems listen to communications between the control tower and planes in the air, and automatically update flight information for each plane. Speech is also being used in flight and air traffic control simulators to train new pilots and tower personnel.

Adacel Technologies, a company based in Orlando, Fla., provides these kinds of systems to commercial and military aviation, and the technology is being embraced around the world. "If you fly anywhere overseas right now, more than likely some part of your flight will be controlled by Adacel technologies," says Gary Pearson, the company's vice president of advanced programs.

The company uses SRI's speech engine as its underlying technology, but had to make many modifications for the transportation industry. Designing systems for this environment has its share of challenges, the least of which is noise. There are also language and accent considerations, co-articulation at Adacel. "There are so many things the pilots have to do in the cockpit, and the propensity for errors when they're so busy is high, so with speech we're hoping to alleviate some of that workload."

On the training front, in addition to its voice-driven systems for cockpit and tower simulators, Adacel has also developed speech recognition technologies to help aviation personnel learn English. English is the official language of the air, as mandated by the International Civil Aviation Organization (ICAO), and everyone must achieve proficiency in English before being allowed to fly or control an airplane anywhere in the world. The test that such personnel are required to pass also involves understanding industry-specific terminology.

While the ICAO mandate is designed for safety, it does create problems for speech recognizers that must accommodate hundreds of accents from all over the world.

Another area of development is in voice control of unmanned aircraft, which is gaining momentum in the military. According to Pearson, that's an area "that will keep [Adacel] busy for quite some time."

To help with all of this, Adacel developed a proprietary Speech Integrated Development Environment (SIDE), which combines a number of speech recognition technologies for the design, development, testing, optimization, deployment, and support of speech applications. SIDE includes tools for grammar development, dictionary development, automated batch grammar testing, grammar coverage queries, phonetic distance analysis, perplexity analysis, and co-articulation handling. Additional Adacel speech intellectual property includes the Command-Based Confidence Algorithm, Accent Tolerability Handling, State-Based Dynamic Grammar, Press-to-Recognize Detection, and Clipped Audio Recovery Processing. —Leonard Kle