

FAST-FORWARD TO THE FUTURE

Robotics is reinventing the world around us in ways unimaginable just a few years ago. Are you ready for the revolution?

In partnership with:





Boeing's unmanned A160T Hummingbird is designed to deliver 2,500 pounds of cargo to frontline bases under battlefield conditions.



OUR ROBOTIC ARMY is set to go. It's ready to help locate insurgents hiding in caves and carry hoses into burning buildings. It's ready to repair underwater

leaks, count the wildlife population, mow lawns, and vacuum our homes. Soon it'll be folding laundry and loading dishwashers.

Okay, maybe that's a stretch—but most any other task you can think of, from the menial to the marvelous, can now be done by today's unmanned systems. They can operate in nearly every environment, for days at a time, with little or no human intervention. In fact, so much progress has been made that we're now waiting for people to catch up with the capabilities of the machines.

"For the first time in 25 years, technology is no longer the challenge," says Michael Toscano, president and CEO of the Association for Unmanned Vehicle Systems International (AUVSI). "We can fly, drive, and navigate these systems from far away and with millisecond timing. The focus now is on the mission—the payload, the communications, the control mechanisms—and integrating it all into our daily lives."

That's a critical hurdle. While the

public is now accustomed to seeing unmanned planes and underwater vehicles that provide battlefield video and assist with ongoing crises like the Gulf oil disaster, the thought of day-to-day interaction remains dicey. But this is likely to happen sooner rather than later. Industry analyst Teal Group estimates that the market for unmanned aerial vehicles (UAVs) alone will more than double over the next decade, from about \$4.9 billion in 2010 to more than \$11.5 billion in 2019.

That means machines will start to cover the news, track drug runners, and even fly into airports with greater frequency. Ground-based systems will also start gaining more traction—vehicles will eventually deliver cargo automatically and drive us to work. Sound alarming? We already have cars that brake in emergencies and nudge us back into our lane if we drift across a double-yellow line. The leap to self-driving cars—which industry experts say will cut accident rates and significantly reduce congestion—really isn't that large.

Nor is the leap to a melding of manned and unmanned flight. Debbie Rub, vice president of Boeing's missiles and unmanned airborne systems division, says the company is working with the FAA to develop the





X-37



SolarEagle



Integrator

A160T



Phantom Ray



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SUGV

TAKING UNMANNED SYSTEMS TO NEW CAPABILITIES.

Boeing is bringing next-generation capability to unmanned systems. From small tactical to high-altitude systems, Boeing is maximizing the performance for remotely-piloted vehicles with greater payload flexibility, secure networked systems, autonomous operations and an open architecture design for built-in growth potential. At every altitude, Boeing is taking unmanned systems to new heights.

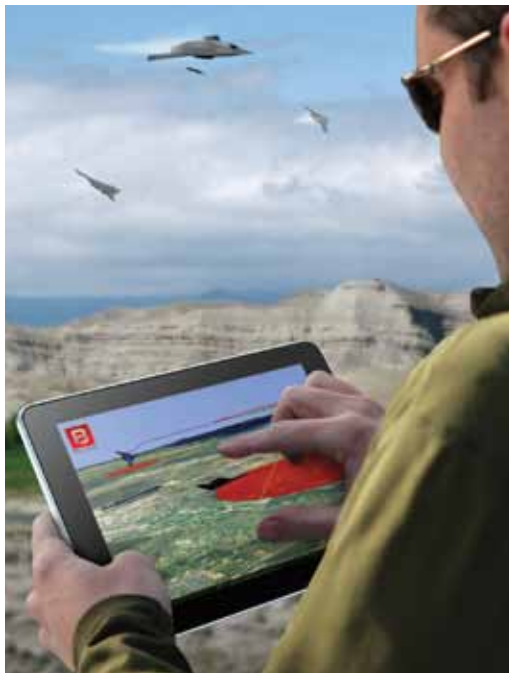


protocols that in the near term will permit UAVs to fly seamlessly amid the chaos of commercial airspace. “The real challenge, as we see it, is how to have safety of flight within well-traveled airspace,” says Rub, whose division has developed an unmanned helicopter, the A160T Hummingbird, and the now-ubiquitous ScanEagle, a small surveillance aircraft used by frontline soldiers in Iraq and Afghanistan. Neither requires an airport or even a runway to operate. “When you’re talking about broader integration, you need precise policies and procedures—the see-and-avoid capabilities, and the rules and protocols that will make this acceptable for everyone.”

GOING MAINSTREAM

One day, perhaps, we’ll even have fully autonomous cargo and passenger aircraft flying the skies. That’s well within the scope of our present system’s capabilities. Not that there aren’t a few hardware challenges remaining, but these are related mostly to power, endurance, and ease of use—not capability. Military and industrial researchers are pouring billions of dollars into research to develop high-power, lightweight energy sources. For more complex systems, such as UAVs that can fly for 30 hours or more, the challenge is to make them accessible to a wide array of users and easily controlled by frontline personnel.

DreamHammer’s control system for unmanned vehicles is designed to enable a single operator to operate multiple ground, sea, and air vehicles at the same time.



It’s this challenge that appeals to the people at DreamHammer, a Santa Monica, Calif.–based software development firm that’s come up with a universal control system for unmanned vehicles. The system, Ballista, could not only help standardize the control systems used by military and industrial operators, but it also will enable a single operator to control multiple ground, sea, and air vehicles at the same time. The common software interface can also host command-and-control tools to boost situational awareness and aid in decision-making.

“We need to make things simple and scalable. For example, it now takes four or five people to operate one unmanned Global Hawk,” says DreamHammer co-founder, president, and CEO Nelson Paez. “That’s more than it takes to fly a manned aircraft. We need a simple, easy-to-use interface that focuses the operator’s energy on the mission, not the vehicle.” Ballista’s modular and open configuration will also allow users to make modifications on the fly. “As things stand, manufacturers build closed systems that only they can modify. If frontline users need a new capability or some adjustment, they have to ask the manufacturers for it,” Paez continues. “Then the manufacturers come back and say it’ll take six months and cost millions of dollars. The users don’t have the time or the money for that.”

Once standardization and ease of use are achieved, the field will become even more exciting. Training needs will be virtually eliminated, and the capabilities of unmanned systems will expand exponentially. “Right now, we’re only limited by our own imaginations,” says Boeing’s Rub. “Every day we see new needs for them—whether it’s security, humanitarian missions, or even basic supply and support.”

Soon the systems will finally become true force-multipliers. Sure, they’ll continue to handle the dirty, dangerous, and dull missions, says AUVSI’s Toscano, “but they’ll also become indispensable aids for all users. We’re envisioning systems transitioning between military and civilian applications and being wielded at a moment’s notice by companies contracted by police and fire departments. They’ll enhance situational awareness and work collaboratively with all the entities. They aren’t replacing people. They’re working with them.” ●

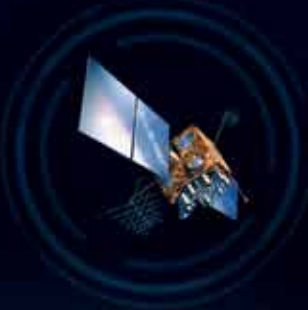
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