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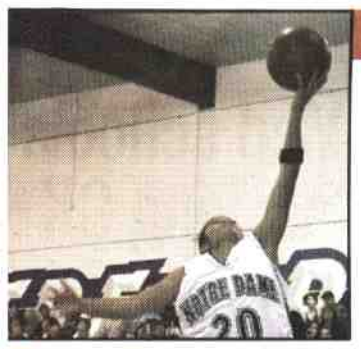


Sports

Benavente leads Spirits to NorCal win, C1

Local

Salinas High principal get to keep job,

Taste

Local firefigl fire it up in the kitche

The prototype aircraft, built by Kevin Jones, has a 10-inch wingspan and weighs 14 grams — just under half an ounce.

MONTEREY

ROBOTIC BIRD TAKES FLIGHT

By KEVIN HOWE
khowe@montereyherald.com

The first of what scientists hope will become swarms of tiny robot spy planes fluttered around a Monterey parking lot Tuesday to demonstrate a breakthrough in the centuries-old concept of flapping-wing flight technology.

It's not quite an ornithopter, an aircraft that imitates the flight of birds. It looks a bit like a miniature model of the 1903 Wright Flyer, the first motorized airplane flown.

But the "Flapping-Wing Micro Air Vehicle," developed by scientists Kevin Jones and Max Platzer at the Naval Postgraduate School in Monterey, can fly at extremely low speeds and maneuver at all angles. Jones and Platzer are working on making it hover like a helicopter.

"Max Platzer is one of a small number of distinguished professors on our campus. He is an outstanding teacher, researcher and expert on naval aviation."

Richard Elster
provost and academic dean of the Naval Postgraduate School

It's powered by the same type of $2 battery-driven motor that runs the vibrate function on a cellular phone. The body and wings are made of tissue paper, plastic film, balsa wood and carbon fiber.

Jones, a research associate professor at NPS, and Platzer, chairman of the Navy school's aeronautics and astronautics department, have been working together on flapping-wing technology since 1994.

The idea of birdlike flight has intrigued humankind for centuries. Artist and inventor Leonardo Da Vinci sketched a human-powered ornithopter in the 16th century, but most of the significant theoretical work on the subject wasn't developed until a century ago at Platzer's alma mater, the Technical University of Vienna, Austria. There, aeronautical engineering pioneers Richard Knoller and R. Katzmayr wrote papers calculating thrust developed by flapping wings in wind tunnels.

ORVILLE MYERS/The Herald

Naval Postgraduate School professors Max Platzer, left, and Kevin Jones demonstrate their "Flapping-Wing Micro Air Vehicle," which flies by flapping its wings like a bird.

In the 1870s, rubber-band-powered airplane models were developed, and many of the first types were ornithopters, Jones said.

One aviation pioneer, Otto Lilienthal of Berlin, began developing manned versions in the 1890s and was killed trying to fly one in 1896.

Duplicating bird flight, however, has been an extremely difficult and complex engineering problem, Platzer said. Flapper aircraft were relegated to hobby status as conventional propeller- and jet-driven fixed-wing planes and helicopters were developed.

Platzer said the earlier research on wing-flapping flight caught his eye during his work with NASA at the Marshall Space Center in Huntsville, Ala., in the 1960s. He was taken with the efficiency of flapping-wing power demonstrated in those works, and he filed away the idea so that he could eventually pursue it further.

When he and Jones linked up at NPS, they received a grant from the Office of Naval Research to develop a micro-aircraft that could be remotely piloted to fly sensors into caves, buildings or other restricted spaces.

A number of projects aimed at micro-air vehicles have used helicopter and airplane designs as a starting point, but the problem with such small machines is that wind gusts have a devastating effect on them and they are prone to stalling and crashing during low-speed flight.

Their Flapping-Wing Micro Air Vehicle — Jones and Platzer haven't thought up a snappy, short name — is almost stall-proof, because the twin biplane rear flappers actually draw air over the forward wings, providing lift at

Please see **Robotic page A12**

U.S. test powerfu non-nucle bomb

WHITE HOUSE WARNS THAT GROWS SHORT FOR SADD

By TOM INFIELD, DIEGO IBARGUEN and MARTIN MERZER
Knight Ridder Newspapers

WASHINGTON — Diplomats analyzed the nuances of a proposed U.N. resolution Tuesday as the White House warned that time grows short and the Pentagon sent a more intimidating message to Iraq: It tested the world's most powerful non-nuclear bomb.

In another development, Defense Secretary Donald Rumsfeld left open the possibility that the might invade Iraq ish forces, if Pri Tony Blair cann antiwar pressure f his public and mu Labor Party.

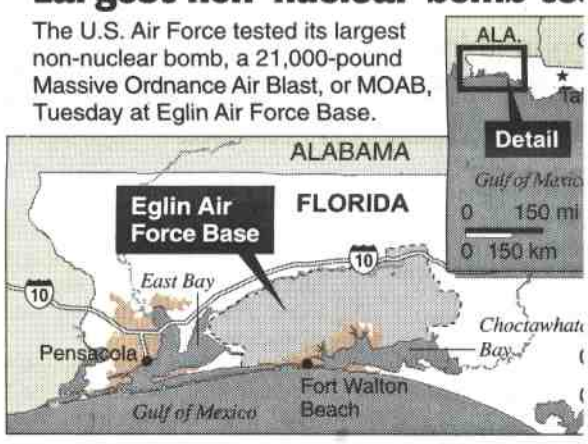
"There are v Rumsfeld said. La tracked, emphasiz still believes that make "a significant tribution" if war is n

The huge

Please see **Bomb**

Largest non-nuclear bomb te

The U.S. Air Force tested its largest non-nuclear bomb, a 21,000-pound Massive Ordnance Air Blast, or MOAB, Tuesday at Eglin Air Force Base.



The strength of an explosive is often measured by its weight in pounds of TNT. By this measure, the Massiv Air Blast is 40 percent larger than the previous most conventional bomb, the BLU-82 "daisy cutter." The s nuclear weapons have the explosive equivalent of abo pounds.

Type of bomb	Pounds of
Tomahawk cruise missile warhead	
BLU-82 "daisy cutter"	
Massive Ordnance Air Burst	
Hiroshima bomb	

SOURCES: Center for Defense Information; GlobalSecurity.org; Jane's Information Group; ESRI

"It's not something you want to do, put the hospital on a cash-flow watch. But we have to in this case because there's just not that much money left."
— Lou Solton, county treasurer

Natividad financial woes put added strain on county budget

By JOE LIVERNOIS

Worries of w

RUMSFELD CONTINUALLY RE LIST OF WHAT COULD GO W

By DEB RIECHMANN
Associated Press

WASHINGTON — Prewar jitters military minds are trained not only everything goes right but also to

Robotic

From **page A1**

almost any angle. The fluttering is virtually noiseless, compared with the buzz or whine produced by rotors or propellers.

Tiny microchip-size sensors — cameras, radiation detectors, motion detectors, etc. — can be fitted onto such aircraft, and the inventors picture them being deployed in swarms to penetrate al-Qaida caves or enemy bases and installations, each carrying a different kind of sensor, all relaying information to a nearby "mother ship."

The micro-air vehicles would be expendable and quite difficult to detect or shoot down, Jones said. Partly because they are still too susceptible to winds, they are ideal for indoor flying.

After completing most of their theoretical work last fall, Jones and Platzer developed early models that flew on a supporting arm or wire.

As they were preparing their final paper on the project, he said, "the pressure was on" to build a free-flight, radio-controlled model, which they finished in December.

That prototype aircraft, built by Jones, has a 10-inch wingspan and weighs 14 grams — just under half an ounce.

It made its first public demonstration flight in the giant wind tunnel at NASA Ames Research Center in Palo Alto, "the smallest aircraft in the world in the biggest wind tunnel in the world," Platzer said.

Significant as it could prove to be, the flapping mini-plane may be the last hurrah for the Naval Postgraduate School's aeronautical engineering program.

The program is being moved next fall to the Air Force Institute of Technology at Wright-Patterson Air Force Base near Dayton, Ohio, under a deal struck between the Air Force and Navy.

Platzer, who has been with the department for 33 years, said he doesn't see how students at NPS can study complete naval systems without including aircraft, nor does he understand how the Navy can dismantle the laboratory facilities, expertise and capabilities that have been built up over decades.

He and Jones are considering taking the project elsewhere to see it through to final development rather than moving to Dayton, Platzer said.

The decision to move to Dayton was not welcomed by the Navy school's superintendent, Rear Adm. David Ellison, or its provost and academic dean, Richard Elster.

"Max Platzer is one of a small number of distinguished professors on our campus," Elster said. "He is an outstanding teacher, researcher and expert on naval aviation. I hope he agrees to take those skills, ability and energy to Wright-Patterson and continue educating aviators for all the services."

A board headed by a Navy rear admiral will oversee the Dayton program, Elster said, and he expects the Air Force to provide comparable facilities to those being left behind at NPS.

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