Going Way Off-Road

The age of the flying car may arrive sooner than you think.

By CHRISTOPHER MCDougall

Illustrations by eBoy.com

The world has never been kind to flying-car dreamers like Henry Smolinski, who died in 1973 when his Ford Pinto with the welded-on Cessna wings crashed; or Paul Moller, who balances work on his multiengine Batmobile with life-extension experiments so he will still be alive when Sky cars fill the skies over Los Angeles; or Rafi Yoeli, who built CityHawk in the living room of his second-floor apartment and had to remove a wall to get it out.

Major automakers don’t let them through the door, nor do they get any respect from the earthbound drivers they hope to liberate from traffic. Probably the nicest thing anyone has ever called Rafi Yoeli is “Don Quixote”—but it wasn’t by the neighbors, who couldn’t help hearing the constant hiss and crackle of his all-night welding.

“People like to call us nuts,” Paul Moller says. “I don’t care. What innovative thinker hasn’t been called a nut?” Moller, who has gambled millions of dollars and his 40-year reputation as an ace aerospace engineer on getting Sky car into the air, pauses for a second, then repeats the word with unmistakable pride: “Nut!”

But that was the world of the past, before a troubled
freeway system and new security concerns prompted NASA to start taking the flying-car dreamers more seriously. Over the past few years, NASA has quietly shifted some of its attention from space exploration to the space right over our roots. Not only is NASA developing its own flying cars, but it's also working on a collision-detecting navigation system that could make skyscrapers safer than highways.

"You can say our goal is to make the second car in every driveway a personal air vehicle," says Andrew Hahn, an analyst at NASA's Langley Research Center in Hampton, Va. Hahn's engineers are already committed to a 15-year time line for three successive generations of flying cars. The first will resemble a compact Cessna with folding wings that converts to road use; it should be available as a graduation gift when this year's freshman class leaves high school. The second, with a rollout planned for 2015, is a two-person pod with small wings and a rear-mounted propeller. The third will rise straight up like a mini-Harrier jet and should be on the market by the time your newborn has a learner's permit. The first of the three vehicles shouldn't cost more than a Mercedes.

An affordable flying car within five years is a dizzyingly fast evolution — for everyone except Yodi and other do-it-yourself auto pilots. They've been preparing for this future for decades, and unlike NASA, they can't afford to wait much longer.

Sweeney has had the longest and most frustrating wait, because he is one of the few flying-car men who has already been there; thanks to a lucky encounter years ago, he knows firsthand what it feels like to drive a car into the clouds. In 1959, he was a 17-year-old who flew his radio-controlled model planes on a small airfield in Longview, Wash. While Sweeney played outside, an inventor and Navy pilot named Mouton (Moli) Taylor tinkered in a hangar nearby.

Inventors have been trying to cross-pollinate cars and planes since the early days of both, but they always ran up against the difficulty of designing a vehicle light enough to achieve lift with a wing that was both small enough to fit on a street and sturdy enough for stormy skies. Miscalculations were often deadly. The ConvAirCar crashed in the desert on its third flight; the Roadable III smashed into the ground, as did Smolinski's airborne Pinto after the wing struts collapsed.

But a planemobile, Taylor reasoned, didn't have to be both car and plane at the same time. What if the wings and propeller were just accessories that could be put on before takeoff, then removed after landing? You could tow the wings back home, or leave them at the airfield until the next flight. Beginning with a little yellow car that looked like a Mini COO-

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per, Taylor made a detachable wing-propeller combo that could be bolted snugly onto the back of his car in five minutes.

After several solo test flights, Taylor took Sweeney up for a ride and even let the teenager pilot the car. They reached the end of the runway at a legal driving speed of 35 miles per hour, got lift and kept climbing. After a while, Taylor looked down and decided they had gone high enough. He had Sweeney guide the little yellow car through a few basic maneuvers, then bring it down for a landing. After hitting the runway smoothly, Sweeney braked as if he were parking his car in the driveway.

Taylor worked to come up with a commercial version of the Aerocar and, according to Sweeney, was eventually on the verge of a deal with Ford in the early 1970's. Apparently the automaker got last-minute jitters about linking its name to what could become an expensive flop and legendary joke and killed the deal. Sweeney was later surprised to find the Aerocar for sale in the classifieds. He bought his old hero's dream and has since become obsessed with applying Taylor's original design to the lighter, more aerodynamic Lotus. By the end of this year, Sweeney says, he hopes to finalize a deal with a major aerospace company and have a production model of the Aerocar ready for testing.

The reason Taylor failed, Sweeney came to understand, was that the Aerocar was stuck in a sort of dead zone between two types of potential customers. Pilots didn't want the boxy vehicle because they could get a far cheaper plane for the same money; car drivers didn't want it either, because the Aerocar red-lined at 60 miles per hour on the road and couldn't be flown without a pilot's license. And once drivers learn to fly, they become pilots and are right back in category No. 1. To succeed where Taylor failed, Sweeney would have to make his Aerocar fly and drive faster than Taylor had ever planned. And the new generation of do-it-yourself makers of flying cars now actually has a chance of doing just that. Until the recent rise of the Hummers and S.U.V.'s, the guiding principles of late-20th-century auto design were aerodynamics and superlight compound shells. It's almost as if Detroit were drafting its new models with men like Ed Sweeney in mind.

The next crucial step was simplifying the controls. Sweeney would never make the Aerocar fly better than a plane, so he would have to make it elementary enough for the average commuter to master without full pilot's training. Here again, technology is paving the way. With radar, autonomous transmissions and Global Positioning System navigation, there's no reason a flying car can't be as easy to handle as any VW, maybe even easier: your car can't help you merge on the freeway, but according to Andrew Hahn of NASA, most flying smart cars will be controlled by a simple joystick and come preprogrammed with anticollision technology and self-correcting flight controls.

"We don't want someone to look at the dash panel and say, 'Oh, my God,' and get right out," Hahn says. "With single-lever acceleration, pilots won't have to go through such rigorous training to get accredited." Hahn estimates that training on flying smart cars could be done in five days for about $1,000 — about what it now costs a 15-year-old to complete driver's ed. Automated flight controls will be unnoticed if you do everything perfectly, but they will override an incorrect manual landing plan. "It's like an
agency expects to have it ready for the debut of its flying car, the EQuiPT, within five years.

instructor-pilot backup," Hahn says. "Even if you have a heart attack, the computerized backup will complete the flight for you.

One beneficiary of computerized navigation is national security; thanks to GPS and cellphone technology, flying cars could be tracked more easily than any road vehicle. NASA is already at work on a device that will function as an on-board air-traffic controller, and the agency expects to have it ready in time for the debut of its first flying car, the EQuiPT, or Easy Quiet Personal Transport. (NASA prefers the term "personal air vehicle" to "flying car.”) The vehicle will automatically broadcast information on its location, so ground monitors and every other aircraft in the sky will know exactly who and where you are. (Any rogue vehicle ought to be easily spottable; another driver who sees a car that is in the air but not on his monitor can be expected to sound the alarm.)

Automated navigation will also keep airborne drivers from smashing into one another. If the computerized navigation system senses a tree, or another plane, or the White House, it won’t let you steer in that direction.

"The technology already exists in the military, and we’re adapting it so it can come standard on any personal air vehicle and still be affordable," Sally Johnson, the technical leader of NASA’s Small Aircraft Transportation System (SATS) project, says. "It’s not a big jump to put these on flying cars," adds Johnson, who is in regular communication with Hahn and his EQuiPT team. "We talk to them and make sure that what we’re doing dovetails with what they’re doing, and we’ve found the two are very complimentary and synergistic."

"SATS is what will make flying cars possible," says Yoeli, who started with the simplest flying-car concept of all. His first major invention, a flying boogie board he called the Hummingbird, came from the realization that getting lift isn’t really hard. Push air down, and up you go. So he built a fan, pointed it at the ground and shot up into the air. To steer, he leaned right or left. The whole thing was so easy to assemble and such a breeze to fly. Yoeli says, that he became nervous about releasing it to the general public. He had planned to make his fortune from it, but when most of the 1,600 people who replied to his first ad sounded like "Jackass"-style daredevils, he decided he had to first find some way to make the Hummingbird safer.

Yoeli figured that he could make a stable, hovering, unpiloted flying platform by bolting two Hummingbirds together. "I’ve been involved in vertical takeoff and landing all my life," Yoeli says. He was an aerospace engineer in charge of a design team for Israel Aircraft Industries before going to work for Boeing; later he returned to school for a Ph.D. in artificial intelligence. He started his own aerospace consulting company, which built prototypes of unmanned vehicles and helicopters, but once the idea of a flying car came to him, he sold his share in the company to devote himself to it full time.

Yoeli was deep into the construction of CityHawk, which looked a little like an Everglades airboat and a lot like Luke Skywalker’s landspeeder, when the terrorist attacks happened on Sept. 11. That should have put an end to his flying-car fantasy right there — there was no way anyone was now going to be allowed to drive through the air in a jet-propelled Subaru. And didn’t the police have enough trouble without suspects taking wing during a high-speed chase? Just when Yoeli was finally clearing the technological hurdles, his dream of the future had become stuck in a world of the present.

But Yoeli saw things differently, as any man who builds full-size aircraft in a second-floor apartment would. A year before the attacks, and purely by coincidence, Yoeli imagined CityHawk responding to exactly the kind of downtown disaster he had witnessed on TV on Sept. 11. "Operation close to buildings will be no restriction for the CityHawk, and it will in fact be able to rescue trapped people inside high-rise buildings by hoisting close to a window and allowing a person to step on to the platform," he wrote in an April 2000 press release. CityHawk would be a lifesaver, not a masscter; from the start, Yoeli had designed it for inner-city police patrols navigating urban canyons. It was precisely because of terrorist threats and the emergence of street-by-street urban warfare that flying cars were once infeasible, Yoeli insisted. He contacted high-ranking American and Israeli military friends and asked if they would be interested in a superfast aircraft with a vertical range from mere inches to 12,000 feet. The response, he says, was a unanimous "How soon can we get it?"

Once Yoeli saw the military interest in CityHawk, he immediately began working on a far more powerful version, the X-Hawk. X-Hawk’s propulsion comes from ducted fans, two encased propellers that push air downward. Yoeli’s special innovation was installing hundreds of small vacuums at both ends of each ducted fan, like the slats of venetian blinds. By adjusting the pitch of the vanes, Yoeli says, X-Hawk can make minute adjustments in any direction and instantly adjust to wind gusts. And unlike a helicopter, it stresses, X-Hawk can hover inches from a building because the propellers are encased.

In California, Paul Moller is using similar technology to build his M400 Skyvan, which looks like something that might come roaring out of the Bat Cave. Skyvan has four seats, an in-flight speed of 350 m.p.h., and a range of 750 miles, and it can fit in any standard parking space. Moller figures the first few M400’s will cost about $500,000 — and even at that price he claims he has more than 100 customers already lined up. As production increases, he foresees sticker prices eventually dropping below $100,000. The future of Skyvan, however, depends on whether he can get F.A.A. certification and keep raising cash; Moller claims it has already cost $100 million, and his attempt to raise more by taking the company public saw the stock almost immediately relegated to pink-sheet status.

Yoeli is also in a race against time. To stay afloat, he needs to start selling X-Hawks within the next few years. But he has one enthusiastic and well-financed partner lined up now, STAT MedEvac, an emergency-rescue company based in Pittsburgh, can’t wait to get its hands on the first F.A.A.-approved X-Hawks. "This can be a very profitable investment for us," James Bothwell, the STAT MedEvac C.E.O., says. "When it comes to using helicopters in cities and suburbs, we’re extremely limited in the places we can land, so a paramedic unit on the scene would have to transport a victim two or three blocks to meet the chopper." With X-Hawk, Bothwell estimates, his pilots will be able to fly at least 1,000 missions a year that would otherwise be impossible due to weather or ground conditions.

"I’m always a hopeful kind of guy," says Bothwell, who has been in regular contact with Yoeli’s design team for the past two years. "By 2010, I can see us having five or six X-Hawks in our fleet." But by then, Yoeli reckons, you may already have one in yours.