

Think of modern air travel, and you probably picture frustrating delays, absurd security theatre and – even more painful – having to turn your devices to airplane mode. So this month, to reward your loyalty, we've moved you up to seat A1 with a window view on the future of aviation. Flying cars, city-centre runways, vertical-take-off volocopters, the return of supersonic flight, even personal jetpacks – a surge in engineering innovation is about to transform what it means to fly in the 21st century.

We first covered Bertrand Piccard in WIRED six years ago, when he had the audacious notion of piloting a solar-powered plane around the globe. Reality – in the form of gravity, drag, lack of sleep and all the other impediments facing a pilot carrying zero fuel – was always going to prove a challenging obstacle. Which is why, when Piccard landed in Abu Dhabi in July at the end of his exhausting but successful circumnavigation, we had to embrace him as a WIRED hero. Not only has he carried forward his adventurer family's traditions of pushing boundaries, he's also created an important conversation about sustainability in air travel. And now that his near-neighbours at SolarStratos in Switzerland are planning to take their own solar-powered craft to the edge of space, it looks like we're finally accepting that fossil-fuel engines are no longer the only way to get us up in the air.

It's that time of year when the great minds of the WIRED network set down their forecasts and reflections on the year ahead. The fifth annual edition of our yearbook, *The WIRED World in 2017*, hits newsstands and app stores this month. We've given you a sneak

preview in this issue to see where virtual reality, post-reality, CGI celebrities and contagious diseases are going to start making news.

As you read this, there's a very good chance I will be onstage hosting WIRED2016, our annual London festival where we bring alive the stories and heroes of the magazine. In fact, if you can get to Tobacco Dock on November 3 and 4, you can meet not just our cover star, Bertrand Piccard, but also Yves Rossy, the inspiring "Jetman" who enjoys nothing more than falling to Earth wearing carbon-fibre wings of his own design (he's interviewed on p135). I hope to see you there (wiredevent.co.uk/wired2016).



Above: SolarStratos initiator and pilot Raphaël Domjan with one of the photovoltaic cells that will power his craft to 25km high

FROM THE EDITOR



David Rowan

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DMA MAGAZINE OF THE YEAR 2015 • DMA COVER OF THE YEAR 2015 • DMA TECHNOLOGY MAGAZINE OF THE YEAR 2015 • DMA MAGAZINE OF THE YEAR 2014 • BSME ART DIRECTOR OF THE YEAR, CONSUMER 2013 • PPA MEDIA BRAND OF THE YEAR, CONSUMER 2013 • DMA TECHNOLOGY MAGAZINE OF THE YEAR 2012 • DMA EDITOR OF THE YEAR 2012 • BSME EDITOR OF THE YEAR, SPECIAL INTEREST 2012 • D&AD AWARD: COVERS 2012 • DMA EDITOR OF THE YEAR 2011 • DMA MAGAZINE OF THE YEAR 2011 • DMA TECHNOLOGY MAGAZINE OF THE YEAR 2011 • BSME ART DIRECTOR OF THE YEAR, CONSUMER 2011 • D&AD AWARD: ENTIRE MAGAZINE 2011 • D&AD AWARD: COVERS 2010 • MAGGIES TECHNOLOGY COVER 2010 • PPA DESIGNER OF THE YEAR, CONSUMER 2010 • BSME LAUNCH OF THE YEAR 2009

ON THE EDGE OF AN INDUSTRIAL ESTATE IN YVERDON-LES-BAINS, SWITZERLAND, A SMALL TEAM OF ADVENTURERS IS PREPARING FOR A MISSION TO THE EDGE OF SPACE.

If they succeed, their solar-powered aircraft will fly higher than any plane before it and show that renewable energy can not only match fossil fuels but surpass them. "Our goal is to be the highest plane ever, not only solar and electric," says Raphaël Domjan, 44, initiator and pilot of SolarStratos. Echoes of Bertrand Piccard are everywhere: both are Swiss, both are based near Lausanne and both believe adventure can inspire people to take action to tackle climate change.

"With this project we take technology you can find in the supermarket and we push it to the limit," Domjan says. If a solar-powered plane can take a human being to the edge of space and back again, he continues, it could send a very strong message about the potential of clean technology. "We still have so many things to explore. Maybe exploration can be used to protect our planet."

Domjan's mission is a daring one. In late 2018 he plans to climb into SolarStratos and take two hours and 30 minutes to ascend to 25,000m. There, on the edge of space, he hopes to spend 15 minutes in the stratosphere before slowly spiralling back down to Earth. He will do so without using any fuel. "It's like the Icarus flight," Domjan jokes. "But I hope I will not lose my wings."

Founded in March 2014, SolarStratos has already raised \$5 million (£3.8m) from sponsors and work is underway to manufacture the experimental aircraft. A further \$5 million will be required to get the mission off the ground. Solar-powered aviation specialist PC-Solar is expected to deliver the completed aircraft by the end of the year.

Everything about the project is incongruous: Domjan himself is understated

and quiet; he wears a blue bomber jacket with a SolarStratos patch on the arm, his hair gelled into spikes. His office in the Y-Parc incubator is flanked by software firms and app startups.

Domjan, who previously worked as a mechanic and paramedic, now dedicates his life to exploring and promoting clean technologies. In 2012 he completed the first circumnavigation of the globe in a solar-powered boat dubbed PlanetSolar. In 2003, he coated the roof of his parents' house in solar panels and founded a solar-powered web-hosting company. It was his work as a mountain guide that

inspired his fascination with solar energy. "When I was in Iceland for the first time, in 1993, we stayed next to a big glacier," says Domjan, searching on his computer for a picture he took. "When I came back 11 years later, the glacier wasn't there any more."

The finished SolarStratos aircraft will weigh 450kg and be coated in 22m² of solar panels. Its wings will measure 24.8m across and it will have just two seats. But for his record-breaking attempt into the stratosphere, Domjan will be completely alone. SolarStratos's two 19kW motors produce around 50 horsepower, the same amount as a

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small scooter. To get up to 25,000m they need all the help they can get. Domjan himself will have to lose ten kilos before take-off. "We have to be careful with the weight, it's a big, big challenge," Domjan says. Another big challenge: keeping Domjan alive. At 25,000m there is two per cent of the oxygen available at sea level, temperatures plummet to -70°C and air pressure falls to 0.019 atmospheres. At these altitudes Domjan will have to wear a pressurised spacesuit to keep

him alive. Russian spaceflight specialist Zvezda has agreed to develop a specially adapted, lightweight suit for the mission. The suit, costing around \$1 million (£780,000), is being donated to SolarStratos free of charge.

Although most parts of the plane will be off-the-shelf, some parts are being developed from scratch. Austrian battery firm Kreisel Electric is working on an experimental 20kWh lithium-ion battery that can operate safely in the

BELOW Domjan at the SolarStratos HQ in Yverdon-Les-Bains; a 500m² hangar is being built at nearby Payerne

harsh stratospheric conditions. "If we have a problem with the battery in the stratosphere, it's finished," says Domjan, nervously. If the mission goes as planned, SolarStratos will take off and land with its batteries almost fully charged using only solar energy.

The first test flight is scheduled for the end of the year. In the second half of 2017, SolarStratos plans to make its first record-breaking attempt: to climb above 9,420m, the highest altitude achieved by Piccard's Solar Impulse. But Domjan doesn't intend to take this flight alone. "My goal is to make this flight with [Piccard] on board. I think that could be a nice message," says Domjan of his friend. "We are not in competition."

Although Solar Impulse has completed its round-the-world flight, for SolarStratos there remain many unknowns: can it raise the extra \$5m it needs? Will the battery hold? How will the plane operate in the stratosphere? If successful, Domjan has ambitions to turn SolarStratos into either a specialist solar-powered drone manufacturer to compete with the likes of Facebook's Aquila programme or, more ambitiously, to launch a solar-powered stratosphere-tourism business.

"Our aeroplane will be the first step before the commercial stage," he explains. The plan is to construct a three-person, solar-powered aeroplane with a pressurised cabin and start operating commercial flights with one pilot and two paying customers by 2021. "You need much more power," he continues. "It's a big challenge. Much more difficult, much more expensive." And Domjan's potential SolarStratos tourism venture won't be alone: Zero2Infinity, Space Vision and WorldView are all working on stratospheric balloon rides priced at between \$75,000 and \$120,000.

"The goal is to be cheaper than the balloon," he says. The company is already offering those willing to pay \$60,000 a chance to fly into the edge of the stratosphere in the first SolarStratos plane, though nobody has stumped up yet. But Domjan is hopeful that whisking more people to the edge of space using solar power alone can be a powerful tool for promoting clean technologies. "We can change and we can be optimistic," he says, echoing Piccard. "It could be a huge opportunity for mankind to change, to use what we get from the sky for free." ■

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