

B O D Y



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B U I L D E R S



Florian Hauser is racing up a ramp like there's no tomorrow. The four small wheels on his Mars rover-like wheelchair don't look up to the task, but they devour one, two, three steps like Pac-Man on Power Pellets. He reaches the top, looks at the descent in front of him, and – without so much as a hint of hesitation – accelerates.

Suddenly, he plummets. The crowd screams. Ten seconds stretch into an eternity.

Eventually Florian recovers and continues – this time a little more gingerly. A collective sigh of relief, followed by roars of celebration as he crosses the finish line, his wheelchair's complex array of exposed wires, cables, hydraulic arms and cylinders working in glorious, engineered harmony.

It's a balmy, early-October afternoon in Düsseldorf and we're standing in Hall 4 of Messe Düsseldorf, bathed in sunshine as the golden light streams through the building's huge windows. The sprawling, aircraft hangar-like space is home to the annual REHACARE rehabilitation trade fair, also featuring Cybathlon Experience: a showcase of assistive technologies for those with disabilities.

As a competitor in an exoskeleton marches confidently past, mechanical legs whirring, Florian poses for a pack of press photographers, then glides towards us for our photoshoot. 'Shall I get naked?' he jokes, taking off his helmet. >>



Name – FLORIAN HAUSER

Discipline – POWERED WHEELCHAIR RACE

Team – HSR ENHANCED



Name – IURII LARIN

Team – HSR ENHANCED

Discipline – POWERED WHEELCHAIR RACE

Sporting closely cropped brown hair, stubble and a black scarf, the 28-year-old from Zurich has an infectious smile and a rock star attitude. ‘This will be the future,’ he says, pointing to his wheelchair, designed by his Swiss-based team, HSR Enhanced. ‘It’s a prototype; a little bit big, a little bit heavy. But for the future, the big thing is to bring this technology to normal hand wheelchairs.’

Florian was injured in a high-speed motorcycle accident that broke his neck in two places and left him tetraplegic. Unable to feel his legs, he has limited use of his arms and hands and can only move his head slightly. The Cyathlon is designed around people like him. The event launched in October 2016, when 66 ‘pilots’ representing 56 teams from 25 countries descended on the Swiss Arena in Kloten, Switzerland. They competed in six different disciplines, each one using advanced robotic technologies to navigate obstacle courses based on real-world challenges.

‘As a developer, I was annoyed with all this bad technology for people with disabilities,’ says Professor Robert Riener, Cyathlon’s founder and Professor of Sensory Motor Systems at ETH Zurich. He cuts a dapper figure, silver-haired and dressed in a fitted brown jacket, tie and pink shirt. ‘There might be a good idea, but the developers never talk to the users. Take, for example, the arm prosthesis. They take care of making it so robotic that they can do nice challenges with the arm, but the patients don’t need it because they can use their other arm to complete the tasks!’ He throws his own arms in the air to display his incredulity. ‘And then they fail to carry simple objects where you need both hands because the weight is too much.’

Professor Riener was inspired to combat these problems himself after witnessing an event that changed his life. In Chicago’s Willis Tower in 2012, 31-year-old software engineer Zac Vawter climbed 103 flights of stairs using a powered knee prosthesis – controlled by his mind. He was the first person in history to do so. And seeing him attract so much positive media attention, Professor Riener decided to create his own event: a competition that would spark international public interest and spotlight the issues close to his heart. And so the Cyathlon was born.

But accelerating the development of assistive technologies wasn’t the only motivation for creating the Cyathlon. ‘There’s too little contact,’ he says. ‘Children grow up without ever meeting a person in a wheelchair or prosthesis. I saw my first patient in a wheelchair when I was already doing research. I was 24. And then you’re shy, you’re afraid – you think it’s another kind of person. >>



Children grow up without ever meeting a person in a wheelchair. I saw my first patient when I was 24. And then you’re shy, you’re afraid – you think it’s another kind of person

Professor Robert Riener – CYBATHALON FOUNDER

‘The problem is that we never share the experience,’ he continues, ‘and then we start to behave strangely – in the worst cases discriminating against these people. One of the main driving forces behind the Cybathlon is to bring people together.’

Starting an event from scratch is never easy; the biggest challenge for Professor Riener and his team was making the event credible. If not, they would be faced with an empty 8,000-seat stadium. To add to that pressure, there was a very real danger of accidentally turning a positive showcase into its complete opposite. ‘Not turning the pilots into a freak show was a challenge,’ he explains. ‘So we were very careful to make it serious and to target the real problems.’

Mission accomplished. They filled all 8,000 seats in the Swiss Arena in 2016, the audience fervently cheering its favourite pilots to the finish line. ‘As an event, it’s very much focused on that matching up of end users with novel technology, and then focusing it on problems that are based on the real world,’ says Dr Ian Radcliffe, Imperial College’s Cybathlon team co-ordinator. Entering five pilots in four of the competition’s six races, Team Imperial finished 11th and eighth in the powered wheelchair category, fifth in the arm prosthesis category and second in the electrical stimulation bike category. Unfortunately, their pilot for the brain-computer interface race couldn’t compete on the day.

‘It’s not about who can squeeze the hardest with a prosthetic hand or how much weight you can lift,’ Dr Radcliffe points out. ‘It’s not based purely on technical performance, but around the ability to achieve everyday tasks – which is really exciting and new.’ While the Cybathlon may not boast superhuman feats of speed and power, its real-world foundation has a much more profound impact. It has the potential to transform immeasurably how people with disabilities the world over live their lives.

‘What was most surprising and fun for me was seeing all these positive emotions,’ Professor Riener says. ‘Of the pilots, of the teams, but also the audience.’

What he’s describing becomes clear when we speak to Silke Pan, a trapeze artist turned champion para-cyclist who has been in a wheelchair for the last 10 years as a result of a fall during one of her circus acts. ‘I feel a bit more normal again,’ says Silke, standing tall in her Team Twice exoskeleton,

Cybathlon 101

What is it?

An international championship, inviting people with disabilities and the teams that develop their assistive technologies to compete in six disciplines.

When is it?

2-3 May, 2020

Where is it?

The Swiss Arena, Kloten, Switzerland.

What are the six disciplines?

1. Brain-computer interface race
2. Functional electrical stimulation bike race
3. Powered arm prosthesis race
4. Powered leg prosthesis race
5. Powered exoskeleton race
6. Powered wheelchair race.

How many participants?


100 pilots over two days.



her powerful hands resting on crutches. ‘Because of the Cybathlon, I began standing up again. Being in that exoskeleton, I’m a part of society.’ She pauses. ‘I can talk to you without looking up as if I were a child of five years. I can see the world as everyone else sees it. It might seem a small thing, but for people like me it’s very important.’

What Professor Riener couldn’t possibly have imagined was how inspiring the Cybathlon would turn out to be. While the event advanced the development of new technologies and kick-started that all-important discourse, it has also encouraged teams across the world to start their own mini-Cybathlon events. New technology companies are even being founded because of it. ‘It’s sparked a lot of potential collaboration,’ says Dr Radcliffe. ‘One of our pilots has applied to do a PhD with the team from Pittsburgh, so there’s this crossover where you start speaking and engaging with other people.’

For Professor Riener and his team, the even bigger, better 2020 Cybathlon is fast approaching. With double the teams and more advanced technology enabling faster, more dynamic races, the event will expand to two days. And a full-blown Cybathlon Experience the size of REHACARE is scheduled for autumn of that year, organised by the company behind the Tokyo 2020 Olympics.

The fair is starting to wind down for the day and a man in a sleek, black, minimally designed wheelchair zips nimbly around us. ‘People need to get together, to accept somebody with a disability as a normal person,’ says Professor Riener as he watches the man retreat neatly through the thinning crowd. ‘For the competition, we have steps and ramps and doors – physical barriers. But we have even more barriers in the heads of people without disabilities. We have to get rid of these barriers, and that’s a long process.’  For more on Cybathlon, visit cybathlon.com

Team – TEAM TWICE



Name – SILKE PAN

Discipline – POWERED EXOSKELETON RACE