Florian Hauser is the race pilot of HSR enhanced. He won the gold medals at CYBATHLON 2016 (Zürich) and at CYBATHLON Series 2019 (Kawasaki, Japan).

After a motorbike accident in 2014, Florian has complete sub-C5-quadriplegia and sits in a wheelchair. In 2017, he graduated from construction management school. Since then, he works in this role for a major Swiss building company.

“I enjoy new experiences and participating in challenges like the Powered Wheelchair Race. Furthermore, I am very interested in advancing the technical development in the field of assistive technology.”

Project engineers at the ILT are the core team. Every academic year, they are enhanced by bachelor and master engineering students from HSR. Since team HSR enhanced was founded in 2016, more than 20 students have contributed with their thesis projects. In their diploma thesis, the students work on important new developments for wheelchair modules. The ILT engineers then further develop these modules, making them ready and robust for the competition.

What is sub-C5-quadriplegia?
In medical terms, pilot Florian Hauser is a complete sub-C5-quadriplegic. Quadriplegia, also known as tetraplegia, refers to a spinal cord injury above the first thoracic vertebra T1 (ribs, top blue), or within the cervical vertebrae C1-C7 (neck, light blue). Accordingly, sub-C5 indicates a spinal cord injury between cervical vertebrae C5 and C6.

The result: partial paralysis of hands, arms and upper body AND full paralysis of the lower body and the legs.

This limits Florian’s upper body rotation with drastic influence on the wheelchair’s engineering requirements: all obstacles must be tackled in forward gear, since looking behind his back is nearly impossible for Florian.

What we need
Our activities and further development of robotic wheelchairs are only possible with your support. We permanently look for:

• Sponsoring partners
• Partners for commercializing wheelchair technology
• Public outreach, supporters and fans of HSR enhanced

What you can do
There are lots of possibilities how you can support us:

• Bookmark www.hsr-enhanced.ch, share and like us on social media
• Visit HSR or CYBATHLON events in Switzerland and worldwide
• Get us as speakers or for a demonstration at your next event
• Contact team leader Prof. Dr. Christian Bermes for all questions and sponsoring ideas: +41 (0)55 222 4712 | christian.bermes@hsr.ch

CYBATHLON highlights 2019/2020
5-6 May 2019 Powered Wheelchair Series Japan, Kawasaki
27 Aug 2019 Experience at Weltklasse Zürich
29-30 Nov 2019 Experience at Swiss Handicap, Lucerne
2-3 May 2020 CYBATHLON 2020, Zürich

Go to www.hsr-enhanced.ch and check out our Youtube Playlist for the latest updates. GO ENHANCED!
What we do

Team HSR enhanced creates innovative robotic wheelchair technology. We develop and test with our quadriplegic pilot Florian Hauser. Florian competes at CYBATHLON championships worldwide. Our wheelchair development is guided by his requirements to solve all tasks of the Powered Wheelchair Race at CYBATHLON.

Just like in Formula 1 racing, we transfer our research and development results from the race track to the world of commercial products. In doing so, we enhance everyday independence and inclusion of people with disabilities.

Our main activities:
- Competitive CYBATHLON Powered Wheelchair racing worldwide
- Robotic wheelchair research and development
- Technology transfer to commercial products
- Promotion of handicapped sports

The Powered Wheelchair Race

Team HSR enhanced participates in the Powered Wheelchair Race, an obstacle course of everyday challenges encountered by wheelchair users. The goal is to overcome each of the six obstacles (see below) with full score in less than eight minutes. The pilot with the highest total point score wins the race. Only in case of a tied score, the pilot with the faster time wins.

It is not a problem to overcome these obstacles if your body is fully functional. Just imagine solving the tasks sitting in a manual wheelchair!

Technical features of the robotic wheelchair ZED evolution

Stressful race situations:
- Ergonomic cockpit tailored and tested by the quadriplegic race pilot. Highlight features:
  - two joystick control in every operating mode
  - custom smartphone app to switch operating modes, e.g. wheel driving, stair climbing or engaging the robot arm
  - arm and upper body stabilisations for pilots with quadriplegia

- Ramp & Door:
  - Seven-axes robot arm
  - with semi-automated motion sequences
  - a passive gripper to open doors
  - a suction cup to close doors behind the quadriplegic pilot’s back

- Stairs:
  - Stair-climbing module
  - using a switchable caterpillar drive
  - two pivots in the lowering mechanism enable stair climbing and descending in forward gear

- Table, Slalom, Ramp & Door:
  - Single wheel steering enables omni-directional driving in angled and narrow situations

Stairs, Ramp & Door, Table:
- Longitudinal seat adjustment
  - prevents tipping by shifting the center of gravity
  - enables variation of traction between frontal and rear wheel set
  - changes height and length of the man-machine unit

What is the CYBATHLON

Climbing stairs, going through a door, sitting at the table – everyday tasks, nothing special for many of us. But what if you are in a wheelchair?

CYBATHLON faces these challenges with a unique championship. Pilots with disabilities compete in solving everyday tasks and are assisted by the latest robotic technology. Engineers and pilots collaborate in a team from the early stages of technology development until the championship. The CYBATHLON aims at:
- Promoting research, development and implementation of assistive technology for people with disabilities
- Building a platform for technology developers, people with disabilities and the general public
- Stimulating a discussion on inclusion and removing barriers between general public, technology users and developers

www.cybathlon.ethz.ch