



RACE BY WIRE

New Dimension Driving Experience

Executive Summary

RACE-BY-WIRE GMBH

IS A TECHNOLOGY COMPANY WITH ULTIMATE COMPETENCE IN
HUMAN MACHINE INTERFACE (HMI) AND VEHICLE DYNAMICS TECHNOLOGY

Adressing current Challenges

- Take-over from autonomous driving
- Fixed seating position
- Limited options on new steering experience
- Active & Passive safety are compromised by steering wheel

Unique Product

We utilize two electronically coupled sidesticks resulting in a revolutionary steering solution for

- a pilot-like driving experience and
- the transition towards autonomous driving

Facilitating future revolutionary solutions

- Sidesticks consume little space facilitating new degrees of freedom in interior design
- Sidesticks allow to control an additional degree of freedom: the **attitude angle** of the vehicle

Active Stick Control (ASC)

Our Product

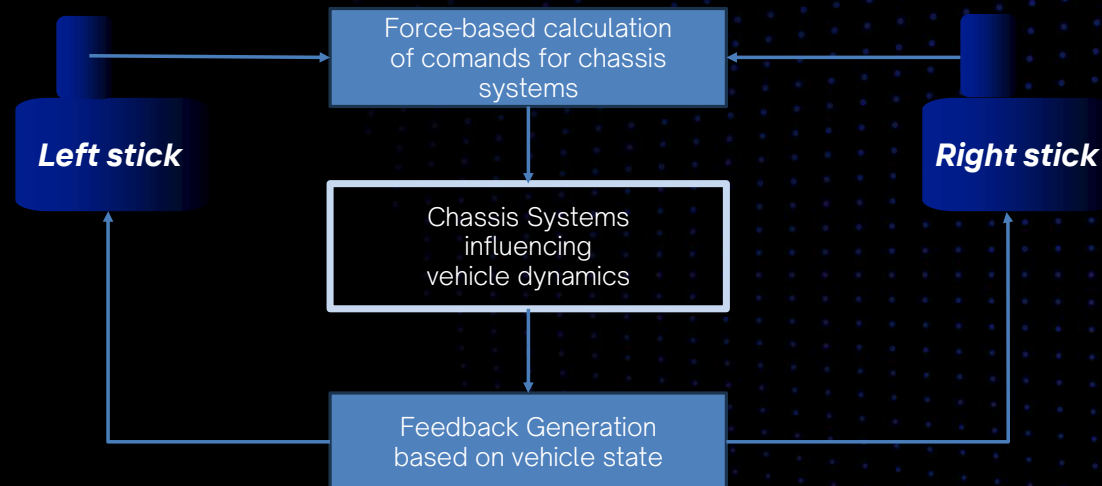
Active Side Sticks, featuring two electronically coupled sidesticks with force command control similar to those in aviation, like the F-35, provide an active feedback to enhance controllability and performance. This revolutionary steering technology combines advanced control with a tactile response for an intuitive driving experience, opening up a whole new set of opportunities to redefine steering and its components.



- Very high dynamic due to torque control
- Customized application based on software and electronics
- High level of functional safety due to intelligent redundancy concept
- Fail operational design
- Granted Patents in EU, US and CN on technology and algorithms

Our Control Philosophy

In contrast to gaming and upcoming steer-by-wire systems,
we amplify human forces and
provide a naturalistic feedback



Our customer targets

Our innovative solutions resonate across diverse industries, showcasing our adaptability and expertise in meeting a broad spectrum of unique challenges and needs.

PERFORMANCE

- Racecars
- Hypercars
- Rallye Cars
- Offroad Cars

OEMs

- Commercial Vehicles
- Agriculture / construction site vehicles
- Sportscars
- Automated cars
- Urban Vehicles
- Showcars

BEYOND AUTOMOTIVE

- Leisure Vehicles
- New Mobility Vehicles
- Speed Boats

Competitors

No market-ready products
- only concepts

Ferrari has filed patents on sticks and vehicle attitude control by using pedals



<https://berlin.ferrariidealers.com/de-DE/articles/DAS-ERSTE-VIRTUELLE-MOTORSPORT-CONCEPT-CAR-AUS-MARANELLO>



**Hyundai
Prophecy
concept**

<https://ifdesign.com/de/winner-ranking/project/hyundai-prophecy-concept/309636>



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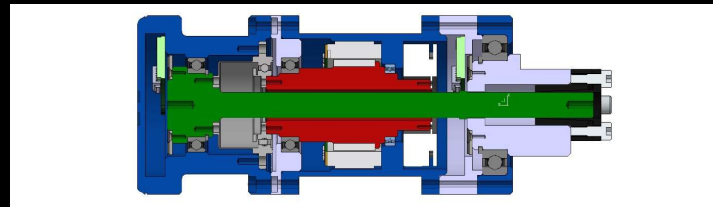
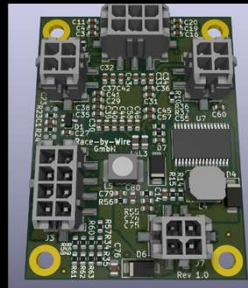
Our Strategy

- 4 Steps to future controls and cockpits

- | | | |
|----------------|--|--|
| Phase 1 | Race car or prototype with 2 sticks → | demonstrate the potential of active sidesticks on race tracks to convince investor |
| Phase 2 | Small series of track cars like Ferrari XX (not street legal) → | Project contracted by OEM, RbW invests in technology
B-Sample of sticks + ECU |
| Phase 3 | Small series of Supercars street legal, ca. 100 / a → | Project contracted by OEM
Certification of technology |
| Phase 4 | All automotive segments → | Joint Venture with established Supplier
all levels of automation |

Stick Development

New Concept



New Concept:

- Advanced Technology
- Higher Performance
- Developed Algorithm
- Smaller
- Lighter

Marketing Activities

Positive feedback from the biggest German automotive community

“ @stepstv4466 2033 likes
If autonomous driving eventually becomes so strong that steering wheels become obsolete, a joystick as a stopgap solution for direct driver control would be cooler than an unused steering wheel.”



JP Performance - Eurofighter für die Straße? | RACE BY WIRE zu Besuch!
602.543 Aufrufe · vor 1 Monat
JP Performance GmbH
Fahren wir bald alle ohne Lenkrad? ... #jpperformance Diese Produkte nutzen wir alltäglich!
4K

@ JP Performance GmbH

<https://youtu.be/1zgnL-fkw5A?si=9b1aTomNQ3wM8uXK>



2,55 Mio follower on YouTube



+ 600 000 views



> 3000 comments



Extremely positive community feedback
81% neutral / discussion-based comments
17% positive / praising comments
2% negative comments

Feedback from the general public

- **Innovation potential:** The new control concept is seen as innovative and forward-looking, particularly in the context of autonomous driving
- **Accessibility:** Advantages for people with disabilities are emphasized several times
- **Comfort:** Some users appreciate the potential comfort and simplicity of joystick control
- **Comparison:** There are positive comparisons with other existing control systems, such as in wheel loaders or airplanes
- **Safety concerns:** Several comments express concerns about the safety and reliability of the joystick system.
- **Comparison with traditional systems:** Skepticism as to whether joystick control can replace traditional steering wheels in all scenarios.

Partnerships

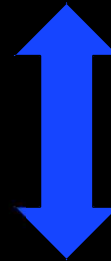
Technology Partner fka & Research Partner ika



Cooperation Contract
RbW – fka



Cooperation Contract
fka – ika



As a partner to the automotive industry, fka has been developing innovative solutions and offering strategic advice on all aspects of motor vehicles since 1981. The fka is a research institute, creative idea generator and innovation driver and employs 150 people

Institute for Automotive Engineering at the RWTH Aachen University
The Institute of Automotive Engineering (ika) was founded 120 years ago and employs over 300 people



Our Founder Team



Hubert Hügler
Co-Founder

**More than 25 years of
expertise in Race Car
Engineering.**



Lutz Eckstein
Co-Founder

**More than 25 years of
expertise in steer-by-wire
technology**



Klaus Graf
Co-Founder & CEO

**More than 25 years of
expertise as Race Car Driver
and Automotive expert**



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