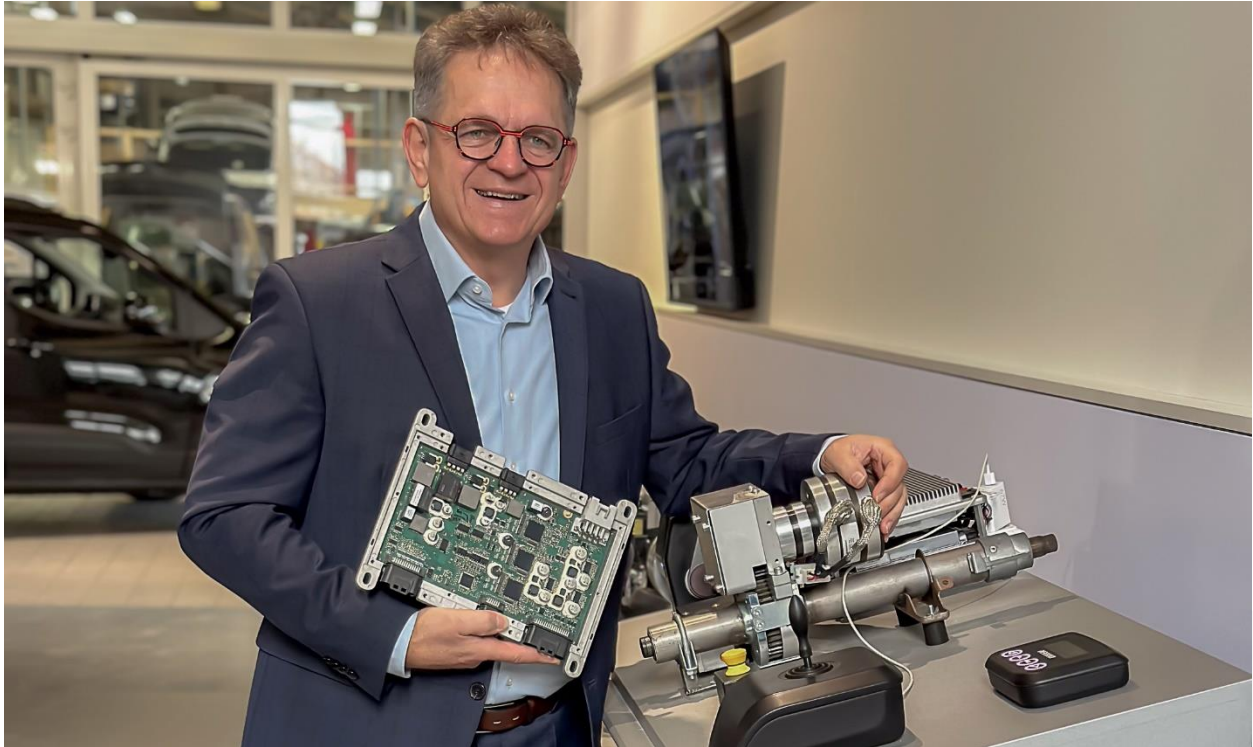


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Drive-by-wire systems for autonomous driving: How Roland Arnold is redefining mobility***From disabled mobility to key technology of the future***

Roland Arnold transformed a small tractor garage in Aichelau, Swabia into a global company and revolutionized the automotive world with "drive-by-wire." What began as a visionary solution for people with disabilities evolved into a pivotal industrial technology: drive-by-wire systems for autonomous vehicles. Arnold's life's work demonstrates how a positive attitude and technical excellence can drive innovation and make mobility more inclusive, safer, and independent.



Mobility Visionary Roland Arnold and the Space Drive System: The control unit lies at the heart of his innovation, which ranges from mobility solutions for people with disabilities to Level 5 autonomous driving. Photo: Paravan

Through the development of the Space Drive drive-by-wire system, Arnold has given people with severe physical disabilities the freedom to drive again. He has also created a key technology for the future of the automotive industry. Originally developed as a customizable driving and steering system for mobility assistance, the Space Drive system is now considered a critical component of autonomous driving technology. It is fail-safe, street-legal, and in use worldwide. People with disabilities are already driving on public roads with the same technology that will be required for future highly automated and autonomous Level 5 vehicles.

From the workshop floor to a world first.

The beginning? It was unspectacular, and that's precisely what makes it significant. In the early 1980s, Arnold set up a small workshop in an old tractor garage on his brother's farm. They sold tires, did bodywork, and had hardly any capital. But later, they had an idea that was bigger than the garage itself. In 1997, when he helped a paraplegic man get into his car, compassion turned into an entrepreneurial vision. In 1998, he started converting vehicles to make them accessible for people with disabilities. In 2005, he founded Paravan GmbH with the clear goal of redefining mobility for people with disabilities.

PRESS RELEASE

In 2003, Roland Arnold became the first person in the world to receive road approval for an electronic drive-by-wire system, marking a significant milestone. He developed the first version of "Space Drive," patented it in 2005, and brought it to market with TÜV approval. This created the first electronic driving and steering system without a mechanical connection between the steering unit and the steering gear. It marked the beginning of a technological revolution that extends far beyond mobility for people with disabilities.

From Inclusion to Innovation in Industry

Renowned OEMs and major suppliers in the automotive industry have also taken notice of Arnold's drive-by-wire technology. They equip their concept and test vehicles with Space Drive to test autonomous driving functions under real-world conditions, which was made possible by the world's first road approval of such a system. In 2013, the Würth Group acquired a stake in Paravan. For Roland Arnold, this marked the beginning of a decisive phase in which he drove forward the further development of Space Drive II, making it increasingly clear that a key technology for autonomous driving was emerging. The new system is triple redundant, meets the highest safety standard (ISO 26262 ASIL D), is fail-operational, and, in 2013, received TÜV and road approvals in accordance with ECE R10, R13, and R79. Space Drive II is the first drive-by-wire system worldwide to meet the automotive industry's strict requirements, a decisive step toward industrialization.

In 2018, Arnold bought back Würth's shares and founded the joint venture "Schaeffler Paravan Technologie GmbH & Co. KG" with Schaeffler. The goal is to produce a highly secure steer-by-wire steering system for highly automated and autonomous vehicle applications on a large scale. Despite considerable progress, however, the project ultimately failed due to corporate bureaucracy.

To push the technology to its physical limits, Arnold is bringing Space Drive into motorsports. To date, he is the only person to receive approval from the German Motor Sport Federation (DMSB) to use a drive-by-wire system in professional racing. It is being tested under extreme conditions in series such as the DTM and the 24-hour race at the Nürburgring, where it is scoring points. This data is then used to further develop Space Drive, making it one of the most rigorously tested drive-by-wire systems in the world.

The story continues with Arnold's sons, Kevin and Luca, who founded the start-up "Arnold NextG" in 2021. They are developing a new drive-by-wire system with NX Next Motion that is lean, agile, forward-looking, and street-legal.

At the end of October, Roland Arnold will turn 60 and reflect on a lifetime of work that extends far beyond economic success. Over two billion kilometers have been covered worldwide with Space Drive – by people who would never have been able to drive without it. His systems are a building block for autonomous driving, a door opener for new interior concepts, and a bridge between mobility and inclusion.

Through the Roland and Martina Arnold Foundation, which he established with his wife, Martina, Arnold is committed to helping families with children with disabilities, an area where support is urgently needed.

He has received numerous honors for his achievements, including the Rudolf Diesel Medal (2021), the Order of Merit of the State of Baden-Württemberg (2025), the Economic Medal of the State of Baden-Württemberg (2010), and the German Craftsmanship Award (2005). In 2025, his autobiography *Genial gezündet* (Brilliantly Ignited) won the Motorworld Book Prize in the biography category. Paravan GmbH is considered one of the most award-winning medium-sized technology companies in Germany.

More than technology remains: the realization that true innovation often arises where no one expects it – in a small hall from a big heart.



The beginnings: Roland Arnold stands in front of his first workshop in Aichelau in the early 1980s. This small tractor garage would later become a global company. Photo: Private



Technology that Moves: Roland Arnold delivers a vehicle to a customer. It's always an emotional moment when drive-by-wire technology enables individual, self-determined mobility. Photo: Paravan

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About Paravan GmbH:

PARAVAN GmbH is the global market leader in customized vehicle solutions for the disabled people. About 160 employees at the Pfrontstetten Aichelau and Heidelberg sites develop and produce customized vehicle conversions, electric wheelchairs and even specialized driver training. PARAVAN pursues a holistic approach with its "one-stop shop" concept. The technological highlight is Space Drive, an intelligent digital control system based on the drive-by-wire principle. Thanks to the active redundancy of the servo motors, it is completely fail-safe and the first to be approved for road use. This innovation enables severely disabled people, some of whom have no arms or legs, to drive independently and safely. It is not possible for these drivers to simply take control of the steering wheel. Over the past 20 years, Space Drive has been proven on more than one billion kilometers of roads worldwide and is used by numerous industrial customers for test vehicles in the field of autonomous driving. The system is available as a retrofit kit with an open interface for all known vehicle types. www.paravan.com