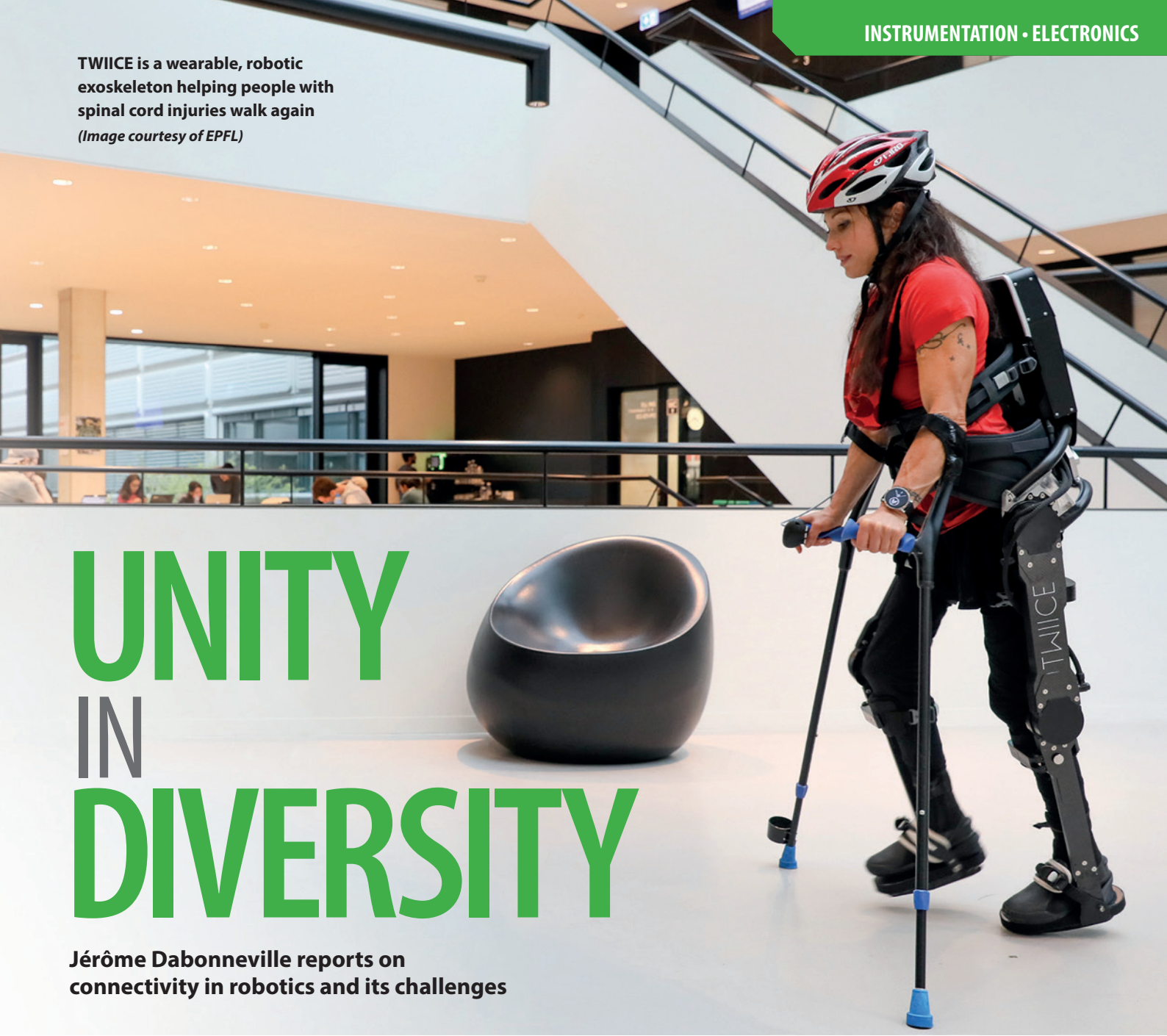

TWIICE is a wearable, robotic exoskeleton helping people with spinal cord injuries walk again
(Image courtesy of EPFL)

UNITY IN DIVERSITY

Jérôme Dabonneville reports on connectivity in robotics and its challenges

Robots are on the move. According to the International Federation of Robotics (IFR), more than two million new robotic systems will be installed worldwide between 2020 and 2022 alone. This is no longer just about robotic arms on assembly lines that perform repetitive tasks. In fact, the systems themselves are just as diverse as the fields of application – whether medical technology, process automation or defence.

For example, there are unmanned systems such as unmanned autonomous vehicles (UAVs) that move in places that are inaccessible or too dangerous for humans – whether underwater or in military operations. Portable systems such as exoskeletons, which are specially designed to support people with physical disabilities or involved in heavy physical work, are also becoming increasingly widespread.

As varied as these systems are, they all serve a common purpose: they should help people. "The fact that robots are taking over tasks that were previously performed by humans is often misinterpreted," says Martin Wimmers, managing director of Fischer Connectors Germany. "Of course, new types of robotic systems are intended to replace humans to some extent, but not to make them superfluous – rather to protect them and make their everyday lives easier."

ROBUST, SMALL, LIGHT – AND ALSO VERSATILE

As the diversity of applications grows, so do the demands on connectivity solutions such as connectors and cable assemblies. So, regardless of the specific application, the goal is to make the components for robotic and automation solutions as durable, resilient and robust as possible. Whether the robot is permanently installed in a production hall or moves around autonomously outdoors, in the air or underwater, an interface should always function for at least as long as the device in which it is installed. This is particularly true for systems that are used in harsh and/or hazardous environments – such as explosives robots.

Within robotics, size, weight and power (SWaP) also plays a key role. This applies to military robotic applications, as well as to medical and industrial robots. The weight and size of components are especially relevant for mobile applications. For example, to avoid unnecessarily weighing down a robotic system, such as the wearable robotic exoskeleton made

by TWIICE for people with spinal cord injuries, and to make it comfortable to wear, it is important to keep the designs, and therefore the connectivity solutions, as small and light as possible. A further advantage is that payload, range and operating time can be maximised by reducing the overall weight.

But miniaturisation is just one side of the coin. Intelligent robotic applications such as UAVs require not only connectors that are as small and light as possible, but also components that guarantee an adequate power supply and – in the best-case scenario – are also capable of transmitting data or other signals.

Nevertheless, we should never forget that behind every robotic system – no matter how intelligent – there are always people. However small and powerful the components for robotic applications may be, the human being must always remain the focus of their development – i.e. human factors design engineering. It is not just a question of people's safety when interacting with robots, but above all, of easy handling. An extremely small, high-performance connector is useless if its size makes maintenance difficult or if it cannot be operated while wearing work or surgical gloves. Here, manufacturers should not lose sight of keeping the right balance.

FLEXIBILITY AS A STANDARD

"The 'one and only' robotic connector doesn't exist and never will," says Earl Kneessi, head of engineering at Fischer Connectors North & South America. "The applications, the requirements associated with them, and the markets are too heterogeneous for that."

Among these niche markets are marine and underwater applications that require not only very high-performance but also high-density and corrosion-resistant products. With customised connectivity solutions from Fischer Connectors, Strategic Robotic Systems, for example, has managed to develop an underwater drone that can transmit HD-quality video from a depth of up to 300m.

'Off-the-shelf' products hardly play a role in such projects any more. What modern robotic systems need are components that are specially tailored to their specific requirements. This is impossible without close cooperation and partnership. To be able to offer customers the solutions they need to ensure a successful project, it is becoming increasingly important for manufacturers to understand the respective application and think outside the box. In addition to a wide range of products, this requires flexibility, broad know-how and a high level of consulting expertise.

CHALLENGES OF COMMUNICATIONS

In addition to miniaturisation, the increasing integration of communication into applications represents a technical challenge. The internet of things (IoT) requires ever-more compact products that combine more and more functions. On the application side, there is a trend towards wearables, i.e. robot-supported products such as vests, headlights or glasses that directly support people. "Instead of moving away from humans, robotics is increasingly focusing on humans," concludes Martin Wimmers. "And what an 'internet of human beings' needs is solutions, not components."

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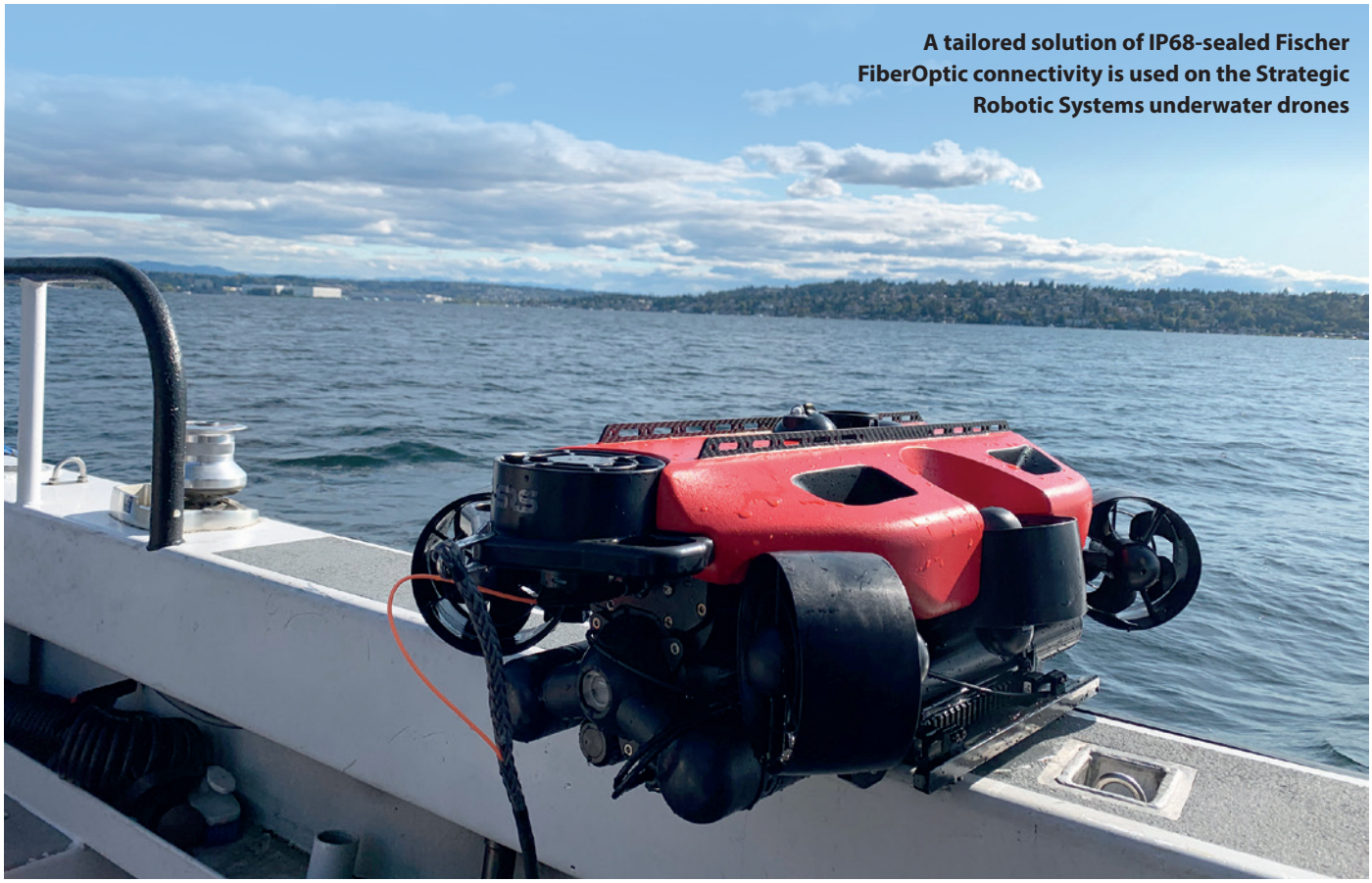
www.fischerconnectors.com



A tailored solution of IP68-sealed Fischer FiberOptic connectivity is used on the Strategic Robotic Systems underwater drones