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Monitor

The right trousers

Robotics: An artificial exoskeleton, akin to a pair of robotic trousers, promises to bring hope and dignity to paraplegics by letting them walk

Mar 10th 2011 | from the print edition

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CONFINEMENT to a wheelchair is not merely frustrating and degrading. It is positively bad for the health. People confined to wheelchairs often suffer urinary, respiratory, cardiovascular and digestive-system problems, as well as osteoporosis and pressure sores. Amit Goffer, an Israeli engineer, knows this all too well. In 1997 Dr Goffer had an accident that left him partially paralysed. Being an engineer, he decided to do something about it. The result is a pair of "robotic trousers" that he calls ReWalk.

The idea of a powered, artificial exoskeleton will be familiar to cinema-goers from films such as "Aliens" and "Avatar". In both of those movies, however, the device amplifies the user's power and strength. ReWalk, an exoskeletal version of the pelvic girdle and the legs' bones and muscles, has a more modest aim: to restore power and strength to the user's legs.

ReWalk consists of a set of plastic-covered aluminium struts, linked by actuator motors, that are strapped to the legs and waist, and a backpack. With these, and a pair of crutches for backup, a user can walk around. An array of sensors distributed along the struts and around the wearer's body feeds information to a computer in the backpack, which tells the actuators what to do.

The wearer starts by telling the computer what he is trying to achieve. A remote control strapped to one wrist offers several modes of action: "stand", "sit", "walk", and "ascend" and "descend" for staircases. Once strapped in, the user chooses "walk" mode, pushes his crutches outward and is off. Algorithms devised by Dr Goffer's colleagues at Argo Medical Technologies, the firm he founded to develop ReWalk, analyse the data from the sensors and use the result to operate the actuators. Experience shows the device can be worn all day without discomfort.

ReWalk is now undergoing trials in Israel, America and Europe. Two versions of the device are being developed. One, for supervised use in hospitals and rehabilitation centres, is already available for sale in Europe for €87,500 (\$120,000) and has just been approved in America. The other, for the unsupervised use of those who have undergone such training, is still under scrutiny, but Dr Goffer hopes it will be cleared for sale by the end of the year.



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Dr Goffer says his aim is to enable paralysed people to lead normal lives. As well as giving users the ability to walk, the device also helps them regain their dignity. When someone is in a wheelchair his head is at the height of an average person's waist. This literal diminution of his stature can reduce his metaphorical stature, too. Once able to stand up, his stature, in both senses of the word, is restored—and that can be just as valuable as the health and mobility benefits.

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