

Life quality with more “grip“



LENA KREDEL SUFFERS FROM MULTIPLE SCLEROSIS.

She cannot move her arms and legs, but nevertheless she is working. The literary scholar originates from Bad Segeberg (Germany), and does an apprenticeship as librarian at the University of Bremen. The particularity: She is using the Friend service robot. Its lightweight arm developed by and produced by Schunk allows autonomous environmental interaction. The robot specialists from the Institute for Automation Technology (IAT) Bremen have modified the mechatronic helper so that Lena Kredel can independently catalog the books in the university's library.

["Friend is a stroke of luck for me." \(read on\)](#)

The abbreviation Friend stands for "functional robot arm with user-friendly interface for disabled people". This electrically powered wheelchair is equipped with a monitor, all sorts of sensor systems, and the lightweight arm. With a joystick at her head and via voice recognition, Lena Kredel controls the robot. The motion controllers in the arm are connected via CAN.

When Lena Kredel starts the system, the camera locates the bookshelf, the books, and the storage position automatically. Then the lightweight arm approaches the determined position autonomously. Schunk's LWA 3.10 lightweight arm provides seven degrees of freedom, whereby three are used for orientation, three for positioning, and one for bypassing obstacles. In contrast to classic industrial robots, the lightweight arms are designed for automating changing works in the direct environment of a human. These include inspection and assembly tasks, and also the use of assistance systems. A permanent repeatability of $\pm 0,1$ mm ensures optimum preconditions for gripping operations.

Normally lightweight arms are portable, or designed for mobile utilization. The maximum payload of the gripping arm amounts to 10 kg. Using a 24-V_{DC} battery the average current requirement is below 3 A. Since the power consumption of the gripping arm is below 100 W, the risk of injury is very low. In order to exclude even this risk, the IAT Bremen has equipped the assistance robots with force-moment sensors and sensors for monitoring. Since the drive amplifier and controller are directly integrated in the lightweight arm, the system does not require a control cabinet. The complete control and regulation electronics are integrated in the joint drive. Position, speed, and torque can be flexible adjusted. This is controlled via an embedded PC. A change to the more compact Powerball Lightweight Arm (LWA) 4.6 is possible. However, the wheelchair would have to be continuously repositioned for gripping a book from the front side. Therefore the institute wants to adhere to the larger solution.