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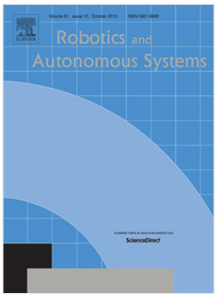

An autonomous stair-climbing wheelchair

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An autonomous stair-climbing wheelchair

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Abstract

Demographic change is making more and more elderly people dependent on care. As a result, there are staff shortages at nursing homes, which now require technical aid. Mobility is considered an essential component for ensuring quality of life, social contact, and a self-determined life. With the introduction of the autonomous stair-climbing wheelchair, unlimited and independent mobility is ensured for movement-limited people. Because of dynamic stabilization, the wheelchair moves on only one axis. Thereby, it has highly agile driving behavior and is compact in size. The autonomous climbing system is based on a leg mechanism that consists of two legs with lower and upper leg support. While climbing a stairway, the legs push the wheelchair on the next higher situated step. Afterwards the legs are pulled successively on to the next step as well. While climbing down, the opposite sequence of movements occurs.

Keywords: stair-climbing, wheelchair, autonomous climbing, one-axis, inverse pendulum

Highlights:

- An autonomous stair-climbing wheelchair was developed
- The climbing mechanism is leg based
- The wheelchair drives on only one axis and is balanced by dynamic controlling
- Therefore, a HMI which is intuitive and irrespective of age was designed