

## LIFE

### These droids are made for walking HAMBURG

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THE droids of the Star Wars movies are advancing a step closer to reality in the form of machines which "learn" to stand on two legs and walk. "RunBot", built by robot engineers in Germany, learns to walk like a human toddler, first losing its balance and falling, until it learns to correct itself and stay upright by taking shorter steps and leaning forwards to walk up ramps. On reaching another flat surface, the robot adjusts its gait again.

Robots in the movies always walk upright with ease. But in reality, the task is far more challenging, according to the German experts.

RunBot already holds the record for robot speed-walking and can barrel along at more than three leg-lengths per second. The German team upgraded the machine by giving it an infra-red eye and an "accelerometer sensor" which acts like the balance mechanism in the human inner ear.

Both are linked to an artificial "brain" or neural network which decides how the robot should respond when it spots a slope ahead and feels its balance slipping.

RunBot has jointed hips and knees, each driven by a servo motor. Seventy per cent of the robot's weight is concentrated in its trunk. Shortening its stride and leaning forward by just the right amount enables the machine to race up slopes without falling.

The brain learns from experience, so the robot's performance improves over time.

Professor Florentin Worgotter and colleagues from the University of Goettingen described RunBot's progress in the online journal PLoS Computational Biology.

"This robot can walk with a high speed, self-adapting to minor disturbances, and reacting in a robust way to abruptly induced gait changes," they wrote.

"At the same time, it can learn walking on different terrains, requiring only a few learning experiences.

"This study shows that the tight coupling of physical with neuronal control, guided by sensory feedback from the walking pattern itself ... may be a way forward to better understand and solve coordination problems in other complex motor tasks."

RunBot has brought "the goal of fully dynamic and adaptive biped walking in artificial agents a little bit closer," the scientists added. DPA