All-terrain robot for nuclear decommissioning

December 2 2015, by Cécilia Carron

ROVéo is a robot whose unique four-wheel design allows it to climb over obstacles up to two-thirds its height. Rovenso, the start-up that developed this prototype, aims to produce a larger-scale model equipped with a robotic arm for use in dismantling nuclear plants, for example.

Steps, rubble and rocks: nothing seems to stop ROVéo, whose legs move in response to the obstacles it encounters. ROVéo is a rolling robot that can get past objects up to about two-thirds of its height without breaking stride.

The device, which looks like an armadillo, is surprisingly adaptable, thanks to its unique mechanical design and the presence of a motor on each leg. The wheels at the end of each leg operate autonomously, and the legs themselves – which jut directly downward from the shell – are linked together by only one degree of freedom. This configuration allows the robot to handle uneven terrain just as easily as it cruises over uniform obstacles like a staircase.

Rovenso is also developing a remote-control system combining immersive vision and force feedback. Steering is done by synchronizing the rotation of the front and rear wheels. This allows for high-precision maneuvers, including effortlessly reversing course to get out of a dead end. "The device has no trouble moving on both convex and concave surfaces, whether solid or loose," said Thomas Estier, the start-up's co-founder.

A 500-kg model equipped with a robotic arm

"Our prototype was built in six months by a talented Master's student using only sketches and texts written for the patent filing," said Lucian Cucu, Rovenso's other co-founder. The company is preparing to raise half a million francs, in part to complete a 500-kg model based on a similar underlying mechanism. Its properties will be the same, including the ability to negotiate obstacles that are one and a half times as tall as the robot's ground clearance, i.e. the distance between its chassis and the ground.

The heavyweight version will also come equipped with a robotic arm for remote handling operations. The robot's main vocation, in the view of its designers, will be to conduct dangerous operations in hard-to-reach places, such as nuclear decommissioning and emergency response.

Provided by Ecole Polytechnique Federale de Lausanne