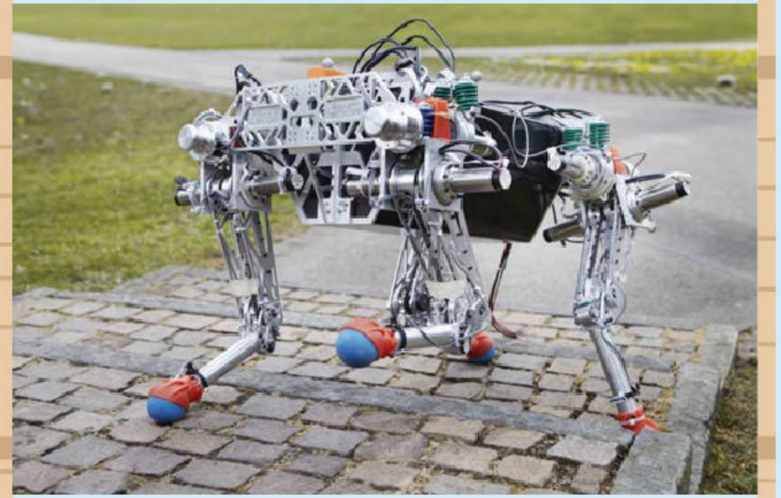
IEEE | Helwan Student Branch

Walking robots



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Intro to the ARTICLE

For many people Robot is a machine that simulate the Human in some of his tasks in real life, people still haven't been able to give a robot enough common sense to reliably interact with our world especially when it be Robot. So, what is Robot?

AWESOME

As strange as it might seem, there really is no standard definition for a robot. However, there are some essential characteristics that a robot must have and these are:

•Sensing: First of all your robot would have to be able to sense its surroundings. It would do this in ways that are similar to the way that you sense your surroundings. Giving your robot sensors: light sensors (eyes), touch and pressure sensors (hands), chemical sensors (nose), hearing and sonar sensors (ears), and taste sensors (tongue) will give your robot awareness of its environment.

•Movement: A robot needs to be able to move around its environment. Whether rolling on wheels, walking on legs or propelling by thrusters a robot needs to be able to move. To count as a robot either the whole robot moves or just parts of the robot moves.

Energy: A robot needs to be able to power itself. A robot might be solar powered, electrically powered, battery powered.

The way the robot gets its energy will depend on what the robot needs to do.

•Intelligence: A robot needs some kind of "smarts." This is where programming enters the pictures. The robot will have to have some way to receive the program so that it knows what it is to do.

During the last years, important researches had been formed in this field in which a number of progresses have been made to develop its mechanism to be similar to Human and Animals, so the idea of Walking Robots was appeared.

But Why Walking Robots?

As compared to a wheel, a leg mechanism is potentially better fitted to uneven terrain, as it can step over obstacles as leg mechanism is an assembly of links and joints intended to simulate the walking motion of humans or animals. Mechanical legs can have one or more actuators, and can perform simple planar or complex motion.

Follow

This fully actuated robot features four identical, completely symmetric articulated legs connected to a single rigid main body. To achieve fast swing leg motion, the emphasis was put on a lightweight construction with all actuators tightly integrated at the main body. Using rotational actuators in all joints makes a large range of motion possible, so that the leg can be fully retracted and extended. Having a body length of about 0.5 m, segment lengths of 0.2 m, and a total weight of 23 kg, this robot is comparable to a medium-sized dog. StarlETH is driven by highly compliant series elastic actuators which have very similar properties of our muscles and tendons.

They act as compliant elements to temporarily store a large amount of energy. Mechanical springs decouple the motor and gearbox from the joint to protect the gearbox from impact loads at landing, to store energy, and most importantly, to allow for high fidelity joint torque control. The system is equipped with an inertial measurement unit (IMU) that allows, in combination with the accurate kinematic information from the joint encoders, to estimate the accurate state of the robot. Hence, all maneuvers can be executed without additional perception or using a motion capture system.