



DLR presents innovations in robotics at AUTOMATICA 2012

22 May 2012

The Robotics and Mechatronics Center (RMC) at the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) is exhibiting at AUTOMATICA, the leading international exhibition for automation and mechatronics, which is being held in Munich from 22 to 25 May. A total of 15 exhibits demonstrate some of the cutting-edge research in the current RMC portfolio, including cross-disciplinary areas such as spaceflight robotics, medical robotics and industrial robotic assistance. Live demonstrations are conducted several times a day for all tradeshow visitors at the DLR stand (Hall B3, Stand 520/521). Here is a selection of the most significant exhibits:

Humans and robots

The RMC is currently developing a new generation of assistance robots for the area of safe, intuitive collaboration between humans and robots; the two-armed 'co-worker' places the human at the focus of the robotic system. The new robotic assistant automatically adjusts its activity and the level of safety to suit the distance from its human colleague. This means that the human can interactively and very easily reprogram the robotic software at any time – just by moving. The plan is for assistance robots to aid humans in industrial manufacturing. Other usage scenarios involving hospitals, where medical personnel and robots interact while carrying out everyday tasks, will be implemented at a later stage. An initial prototype can be seen in action at AUTOMATICA – under the control of trade show visitors, the robot assembles a model railway and drives a train along it.

Controlling robotic systems with the mind – this is not wishful thinking, but is already a reality. In a unique experiment, DLR collaborated with partners in the United States to enable a quadriplegic patient to control a lightweight DLR robot with her mind. For the first time in almost 15 years, the patient was able to take a drink without assistance. A demonstration at AUTOMATICA will show how measuring muscle activity is sufficient to control a robot hand with great precision.

From a safe distance – thanks to telepresence technology

The robotics expertise at DLR is also demonstrated in telepresence; transparent data transfer for the visual, auditory and tactile senses enables a human to control distant robots as if they were actually there. As has been successfully demonstrated during experiments in space, humans can carry out complex tasks in a hostile environment from a safe distance. Such technology can also be used on Earth – for inspecting, maintaining and repairing unsafe or inaccessible industrial facilities such as oil platforms or wind turbines. At the DLR exhibition stand, trade show visitors can witness the humanoid upper body 'Space Justin' operating in two different industrial scenarios.

Humanoid walking machine – striding into the future

One RMC exhibit is literally making strides forward – the humanoid walking machine. The lightweight system was initially presented at the previous AUTOMATICA, two years ago. Now, the two flexible legs are striding out again, this time enhanced with an upper body. The arms are added for dynamic stabilisation of the system. It will be used primarily to investigate bodily movement and multiple contact situations, for example while leaning on an arm.

Robots in motion – carrying, throwing and catching

Another DLR humanoid robot is sure to be the public's favourite in 2012 – Justin. 'Agile Justin' is a wheeled lightweight robot. It is more manoeuvrable and agile than its predecessors. The developers in Oberpfaffenhofen can precisely control the torques applied through all 51 degrees of freedom – from the wheels to the fingertips. The real-time software and middleware has been reworked to enable fine-tuned, complex movement processes, such as catching balls and throwing them back. At AUTOMATICA, Agile Justin will be demonstrating things such as how he plays 'catch' with HASy, the DLR Hand-Arm System.

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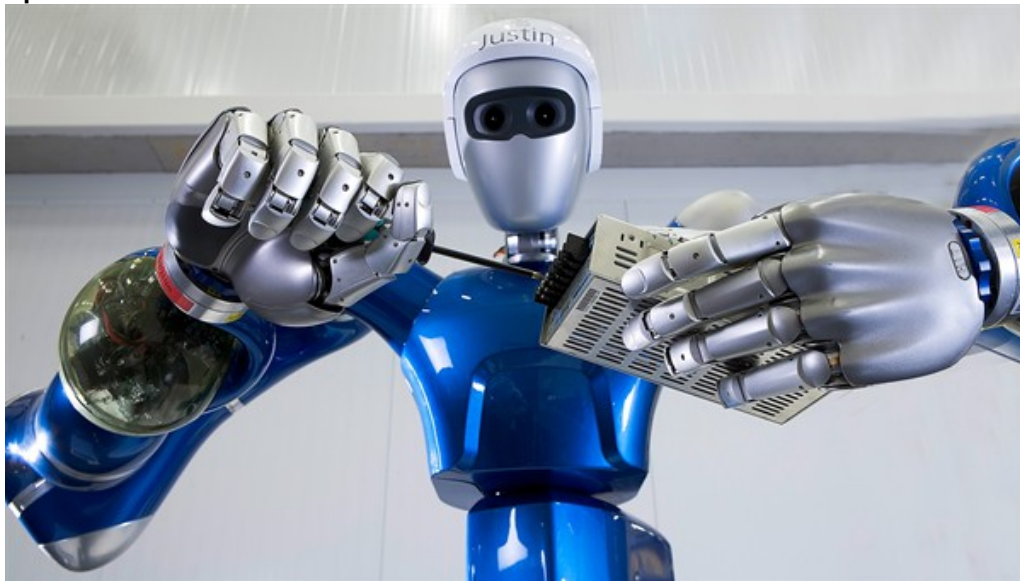
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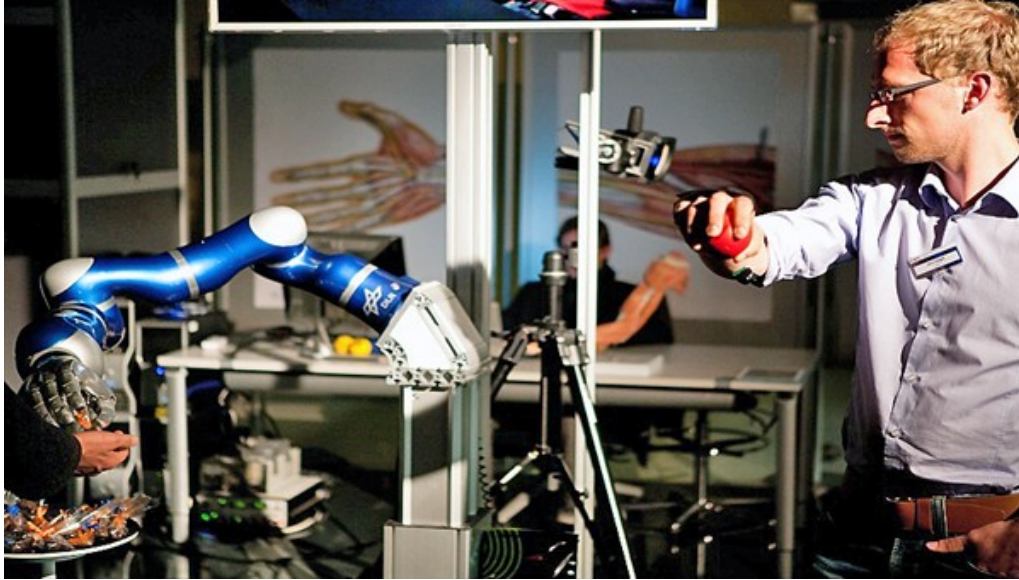
Space Justin



Telepresence technology can be used to inspect, maintain and repair unsafe or inaccessible industrial facilities from a safe distance. Transparent data transfer for the visual, auditory and tactile senses enables a human to control a robot such as Space Justin remotely, as if it was right there.

Credit: DLR (CC-BY 3.0).

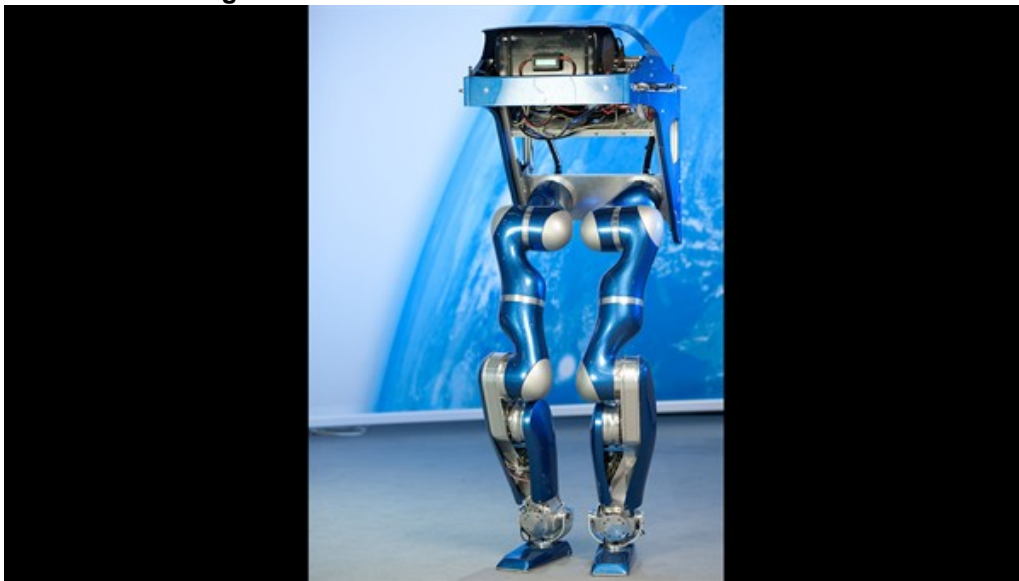
Bionic innovation – controlling robots with the mind



In a unique experiment DLR has collaborated with partners in the United States to enable a quadriplegic patient to control a lightweight DLR robot with her thoughts. The RMC is also using an innovative learning method for robotically supported rehabilitation. At AUTOMATICA, the researchers are demonstrating how measuring muscle activity is sufficient for controlling a robot with a hand in order to move and grip with agility and great precision.

Credit: DLR (CC-BY 3.0).

Humanoid walking machine



The humanoid walking machine shown in this image was first presented at the last AUTOMATICA, two years ago. This time, the two flexible legs are striding out again – enhanced with an upper body.

Credit: DLR (CC-BY 3.0).

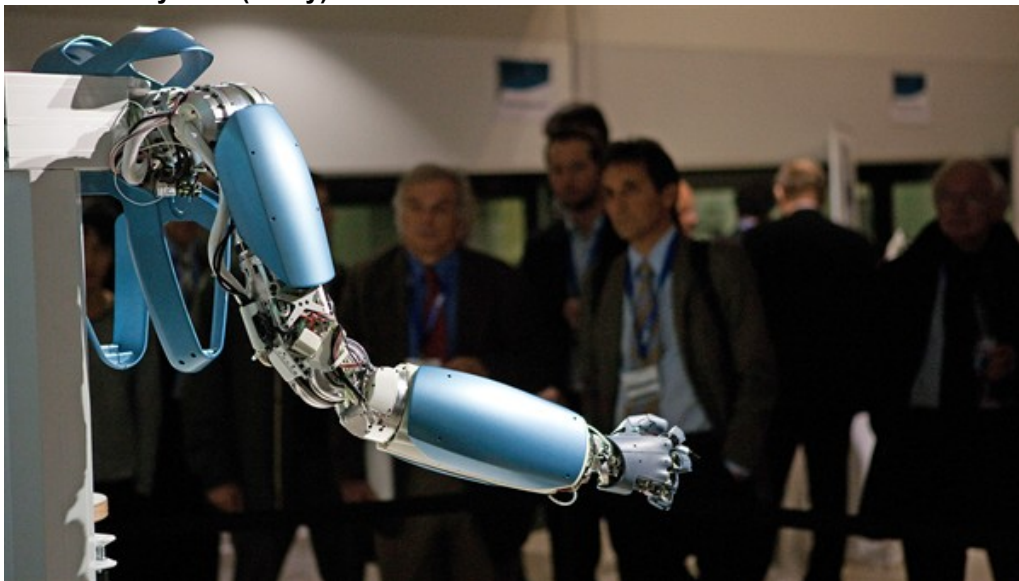
The human at the centre – safe, intuitive collaboration with robotic systems



The RMC has introduced a paradigm shift in the area of safe, intuitive collaboration between humans and robots; the new generation of robotic assistants puts the human at the core of the robotic system. The two-armed 'co-worker' automatically adjusts its activity and the level of safety to suit the distance from its human colleague. This means that the human can interactively and very easily reprogram the robotic software at any time – just by moving.

Credit: DLR (CC-BY 3.0).

Hand-Arm System (HASy)



The DLR Hand-Arm System does not only look human-like – thanks to its flexibility it can also be moved like a human arm. Those at AUTOMATICA will be able to see how HASy catches balls thrown by humanoid robot Agile Justin.

Credit: DLR (CC-BY 3.0).

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