Robots are designed to take a hike with walking poles

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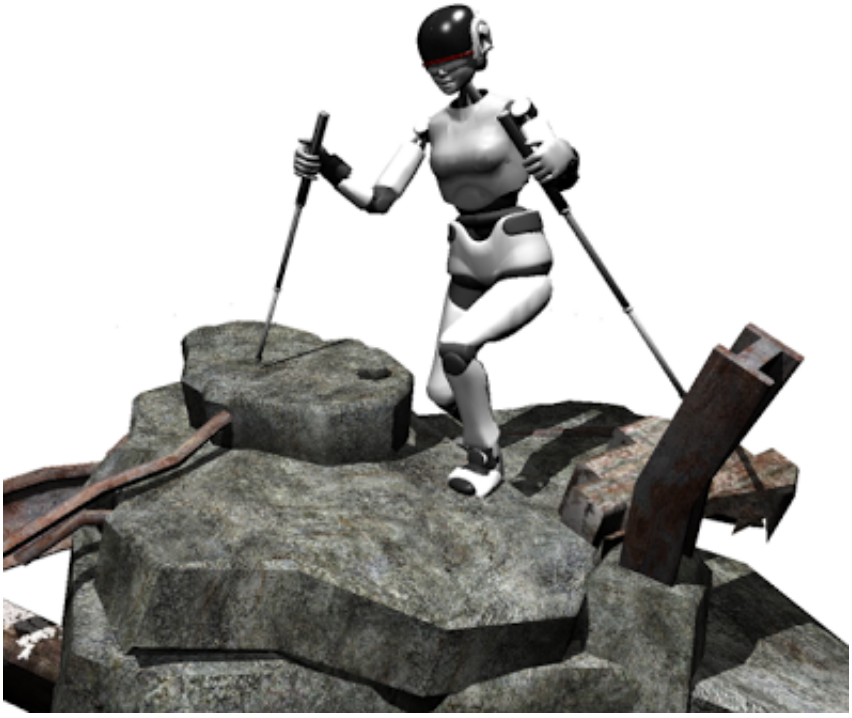

Two Stanford researchers presented their concept of walking robots using special poles for danger-wrought trekking, IEEE Spectrum reported Wednesday. Welcome to the humanoid world of SupraPeds.

The robots are designed by researchers, Oussama Khatib and Shu-Yun Chung. Their interest is not just in locomotion; it is in contact-supported

locomotion. They are out to overcome the limitations robots may have in making their way in unstructured environments—think of sites where one has to navigate over rubble and dangerous, unsafe surfaces. When put to the task of navigating uneven terrain, robots lack tactile sensing; instead they require complex task-specific controllers to integrate information from multiple sensors. Are there advanced techniques that can help robots move safely in such environments? Khatib and Chung have attempted to provide such a system. "We proposed to incorporate a pair of actuated smart staffs with vision and force sensing that transforms biped humanoids into tripeds or quadrupeds or more generally, SupraPeds." They delivered their presentation at the IEEE International Conference on Robotics and Automation in Hong Kong, which took place from May 31 to June 5.

"SupraPeds: Humanoid Contact-Supported Locomotion for 3D Unstructured Environments," demonstrates SupraPeds reason for being as a system to allow bipedal robots extra stability by giving them a pair of walking sticks— "smart" poles—to steady themselves.

The authors described the advantages of making the special poles part of the system. They said the walking staff improves support and enables load redistribution to the upper body. They said the pole can also be used as a sensor to probe the stability of planned footsteps. "In order to advance the primary goal of humanoid robots—emulating human capabilities— we propose to develop smart staffs that can integrate with any humanoid robotic platform, and augment the ability to operate in unstructured environments."

The authors explained how the robots would be managed. The robots would have a sufficient level of autonomy but would not act solely on their own. "A human operator will be in the loop, receiving 3D visual information along with his haptic feedback. In order to enable operators to perform dexterous manipulation motions with the robot arms while

the robot body and perhaps parts of the arms are in contact with the environment, a bimanual haptic interface is introduced. With this, operators are able to physically feel external forces that are acting on the robot arms during manipulation tasks and get intuitive haptic feedback during navigation."

Looking beyond their work, Evan Ackerman in IEEE Spectrum summed up technology progress that robotics research has made so far in robots designed to walk. At the moment, "even the best robots are working up to the level of a toddler." He said that "Some of them aren't bad at flat terrain, but as we saw in the DARPA Robotics Challenge Trials, varied terrain is very, very difficult. It doesn't just require the physical ability to move and balance, but also the awareness to know what path to take and where feet should be placed."

More information: Paper: sites.google.com/site/shuyunfi …r/icra2014_final.pdf