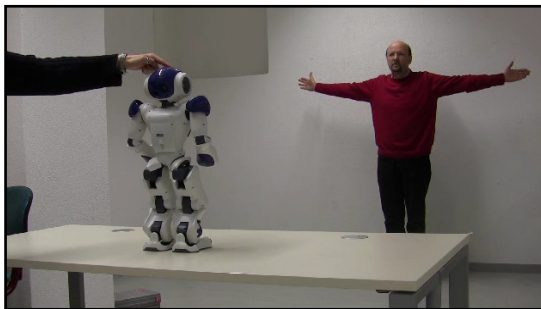




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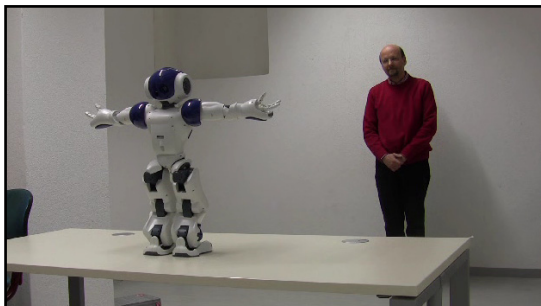
Pr. Axel Pinz **Vision-based Measurement Group** **Graz University of Technology** **Graz (Austria)** **control**

I am heading the Vision Based Measurement Group at Graz University of Technology. Recently we acquired two Nao Academic Edition robots for research and teaching purposes. The research group is focused in two main areas. First: Object Category Recognition & Detection, and second: Structure & Motion Analysis. We have algorithms for «online structure and motion». This means we could reconstruct arbitrary camera trajectories, and at the same time take care of independent foreground motion (other objects moving in the scene while the camera is moving itself).



Chat about **Nao's role in your research**

Nao is used in Education. This demo shows the results of a student project that was carried out last winter semester by three of my students in image understanding. When you press the touch sensor on the back of Nao's head, the robot takes a background image. When you press the other one in the front, then the robot assumes taking a foreground image. The assumption is that there is a person standing in front of the robot taking some body postures and the robot will then try to understand the posture and to mimic this posture. A valid posture can be composed from a basic alphabet of poses of individual body parts (see figures below).



Chat about **Nao's programming**

This is code that has been implemented by my students. Motion is done in Choregraphe, vision input is done in C++, with processing using OpenCV.



Chat about **Results and expectations**

The main result of this student project is a very nice demo (see the video). Once the demo has been started, the robot acts completely autonomous. The demo is quite robust and can be shown in almost any environment. The next step is to eliminate the need for touch sensor input by direct interaction between Nao (voice command or sound feedback) and the person posing in front of it. In the future we like to do more work in this direction. One can expect stunning motion (and also sound) output from Nao, based on rather simple sensory input. The project attracts many students, and it nicely shows unexpected psychological effects, when humans directly interact with humanoid robots «in the loop».



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