

“Iedereen wil wel een robot in huis, maar dat is technologisch nog te ingewikkeld”

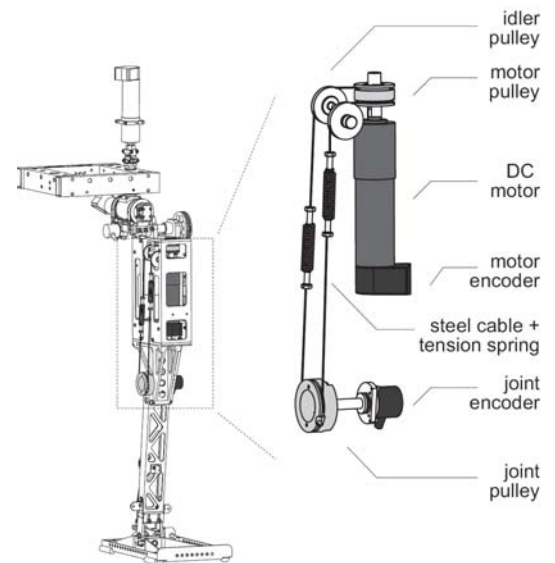
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Let's win RoboCup 2009

To pave the way to highly versatile humanoid robots, there are yearly international robot soccer competitions, RoboCup. The 3TU federation will participate in the next games in June 2009, and we intend to win.

Innovative technology

The 3TU humanoid is highly innovative compared to its competition. We did not win in 2008, but the currently leading teams (mostly German and Japanese) said to expect our robots to soon take the lead. The main reason is the innovative motion control, as well as the professional approach to research and design.



Professional development

The hardware and software is being developed according to the high 3TU standards. We can proudly say that the mechanical design, the electrical design, the real-time software, and the vision software and hardware are all of better quality than most of the RoboCup competitors.

A project that unites

This project does not only draw enthusiasm from the joint 3TU researchers, it also provides a strong link between research work of MSc students, PhD students, university staff, and scientists. The project is currently supported by Philips, Maxon, and StuD, and is expected to draw more industrial attention. Moreover, we hope that this 3TU project can be the catalyst for joint research on a national level. The research is financially supported by the 3TU Centre of Intelligent Mechatronic Systems.

Human-like motion control

Humanoid robots for household tasks (and for soccer) differ from standard industrial robots. Their motions do not need to be as precise. This allows for a different design of the actuation and motion control. Instead of speed and accuracy, we can now optimize for:

- Efficiency
- Naturalness
- Safety
- Versatility

The key is to use force control by means of Series Elastic Actuation [1]. The motor is connected to the joint via springs. The springs serve as force sensors and as mechanical low-pass filters that protect the gears from impacts, and that result in smooth natural motions. Such actuation has already resulted in unprecedented natural walking motions [2].

References

- [1] Gill A. Pratt and Matthew M. Williamson. Series elastic actuators. In IEEE International Conference on Intelligent Robots and Systems, volume 1, pages 399–406, 1995.
- [2] Daan Hobbelen, Tomas de Boer and Martijn Wisse. System overview of bipedal robots Flame and TULip: tailor-made for Limit Cycle Walking. In IEEE/RSJ International Conference on Intelligent Robots and Systems, 2008.

