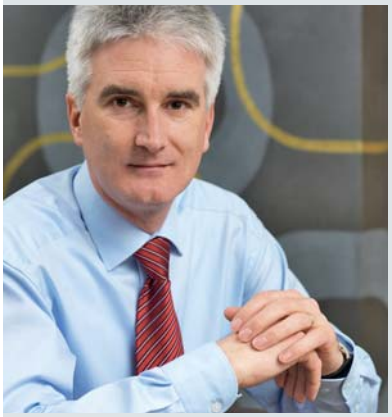
EtherCAT: **the** communication standard for robots

Whether industrial robots, service robots or humanoid robots, and whether featuring articulated arms, SCARA, gantry, delta, H-Bot or hexapod configuration, whether they are mobile or stationary: many robots use EtherCAT today. EtherCAT initially made inroads into robot research projects, for example, in 2004 in the BMBF project 'PAPAS' by DLR, Kuka, Trumpf Laser, Schunk and Lenze, in 2005 with mobile research robots at the Suncheon University in Korea as well as in 2007 in the University of Lund's Java robot and in the Fraunhofer IPA Institute's 'Secur-O-bot' surveillance robot. The successful football robots of the TechUnited team from Eindhoven also rely on EtherCAT – they were runners-up in the world championships and have just won the German Open once again. The "actor robots" from the University of Shanghai, which perform a Beijing opera at the World Exhibition, were already the subject of an article in the previous issue of PC Control. We know of 15 development projects for humanoid robots in the United States, Japan, Korea, Italy and Germany that have decided to utilize EtherCAT.



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However, EtherCAT robots are in use not only in research, but long since in industry as well: they weld ships in the shipyards of Korea and cars at the Chinese auto manufacturer Chery, remove parts from plastics machines, pack foodstuffs and can be found in a Volkswagen vehicle assembly plant in Wolfsburg, Germany.

Why is EtherCAT **the** communication standard for robot projects? Because robots and their controllers benefit particularly from EtherCAT's unique features: no other bus system offers the shortest cycle times, precise synchronization and flexible topology – and all of this without special hardware requirements in the controller, implemented purely in software. As a result, IPCs become robot controllers without additional hardware.

TwinCAT demonstrates how this works: SCARA, gantry robots, articulated arms or parallel kinematics; a suitable robot for every task – any of these can have one PC-based automation platform and naturally only one bus system. Not only are the demanding Motion Control tasks of the robot application taken care of and the I/Os for the sequential control operated via EtherCAT, but the functional safety of the plant is also ensured at the same time – TwinSAFE also "speaks" EtherCAT, of course. Details regarding TwinCAT as a robot controller can be found in the article from page 10 onwards.

A further outstanding characteristic of EtherCAT benefits Justin, the humanoid robot from the Institute of Robotics and Mechatronics at the German Aerospace Center: the seamless integration of other bus systems. The makers of Justin were faced with a challenge that many system integrators are familiar with: the selection of the most powerful technology for new systems while at the same time being able to continue to use already existing systems. Both challenges are solved with EtherCAT. Fieldbus gateways with uniform interfaces defined by the EtherCAT Technology Group (ETG) facilitate the simple integration of other fieldbus worlds, enabling smooth migration from traditional fieldbuses to the newer EtherCAT fieldbus. Even better, all new devices benefit immediately from the improved performance. Justin is introduced to you from page 28 onwards – and you can see Rollin' Justin dancing on YouTube!

I hope you enjoy reading this issue very much.

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