

Lightweight and lean robot breaks from tradition

KUKA Roboticsâ€™™ prototype lightweight safe robot is a metre-tall, 14-kg robot that can be â€œtaughtâ€• a range of tasks and moved fairly easily around a manufacturing floor. Itâ€™™s a real break from the traditional robot: first, instead of heavy-duty industrial steel housing, the safe robot has a lightweight plastic body thatâ€™™s covered with a soft coating and embedded with tactile sensors. â€œIf you push it, it will yield to you,â€• says Kevin Kosuszek, director of marketing with KUKA Robotics.

KUKA sees this technology for the human services market, assisting people in daily tasks. Heavier versions could be used in a range of collaborative manufacturing settings. For example, the robot could be moved to one workstation to bore holes, and easily moved to another task as required.

â€œEnd-users who need to use floor space better will have a lot of use for this kind of robot, because it doesnâ€™™t need as big a workcell,â€• Kosuszek says. The automotive industry will probably be the first to adopt next-generation robotic technology, as it has been in the forefront of robotics for decades, but Kosuszek believes that smaller companies will be able to make use of smaller, more flexible and more collaborative robots.

Service robotics â€” robots that help disabled or older people rise, walk, move or perform other daily chores â€” will be â€œwhere the industry goes as the population ages and the number of young people who can provide personal services decreases,â€• says Kosuszek.

In manufacturing, lightweight and safe collaborative robots and workspaces offer a more viable business case, particularly for smaller operations, he adds.

SICK sees market for collaborative robots

Steve Freedman, director of safety systems with SICK Inc., sees a huge market for robots that can collaborate closely with humans.

â€œThe whole service robot field is going to be a huge growth industry,â€• he says. But where he sees an even greater and more immediate impact will be on small and medium-size manufacturersâ€”once some of the challenges are worked out.

SICK is investing heavily into developing sensor and safety solutions for the â€œnext generation robot,â€• which, among other functions, will be flexible, easier to move than current robots and able to work in close proximity with humans. This would mean that there is no more need for fencing or shielding around a collaborative robot, which would in turn free up a lot of floor spaceâ€”making robots feasible for a lot of smaller manufacturers.

â€œAutomotive manufacturers are the first, big driver for robotics development. They tend to be the early adopters,â€• Freedman says. â€œBut the small and medium-size manufacturers are a big target market for robotics, that havenâ€™™t yet adopted the technology.â€•

One of major obstacles for small and medium-size companies, besides cost, is the big footprint robots require.

The fencing and separation from humans required by the current safety standards means that there just isnâ€™™t room to reap the benefits of robotic automation in many smaller manufacturing plants.

Making a collaborative robot that can work safely alongside a human worker involves several different technologies, Freedman explains. â€œThere are a variety of different types of sensors needed to achieve a safe collaborative robot. You canâ€™™t depend on just one type.â€•

These would include motion detection, laser tracking systems that sense and measure movement of a body and machine vision. â€œThe problem with machine vision is that the better the image, the more data you have and the longer it takes to process,â€• Freedman says.

In addition, the sensor systems must be fully integrated into the systems that control the motion, path and speed of every axis and drive, so that the robot will slow or stop, as appropriate, when a human moves into its path. â€œThe integration of the sensors and the controls has to be safe, as well,â€• he points out. This includes feedback loops that tell the robot controls where it is in space and where the humans are.

Close integration of all these systems is what allows robots and humans to truly work side-by-sideâ€”in close proximity while still allowing the machine to do its job.

â€œWhen a personâ€™s trajectory is known and the robot path is known and you know they wonâ€™t collide, there is no reason to stop the robotâ€™s motion,â€ Freedman says.

A smaller, more flexible robot that can operate without fencing or isolation from other processes also means that a robot could, potentially, be fitted for a variety of tasks in different parts of the plant. â€œIf you could pick up and move the robot from one place to another to do a different job, it would be a lot more viable to implement in a smaller manufacturing plant,â€ says Freedman.

While the basic technology is now available to do all these things, and new safety standards are now in the approval stage to allow it all to happen, Freedman points out that â€œthere is still a lot of up-front engineering work to do to make this real and to make sure itâ€™s safe.â€ He doesn't foresee a commercially viable technical solution for collaborative robotics (meaning an integrated sensor and robotic control solution) off the shelf until late 2009 to 2010, at the earliestâ€”but thatâ€™s not that far off!