A robot that identifies doors from their handles

August 16 2010

The intelligent robots that appear in the movies have little relation to real life, although the tendency in current robotics to create machines that are as independent as possible is a fact. "The robot has to be aware of what it is doing and, more and more, be capable of improving its behaviour, its learning". This, according to Mr Basilio Sierra, leading the Robotics and Autonomous Systems Group at the Computer Sciences Faculty of University of the Basque Country (UPV/EHU), sums up the tendency known as cognitive robotics, and his team aims to make a contribution in this direction.

Autonomous robotics deals with various materials simultaneously: "On the one hand, the sensors that a robot has (cameras, laser rays, ultrasound , infrared, etc.) to perceive the world and the interpretations of that perception. On the other hand, given the motor and the ability for movement, the robot is mobile." To respond to such diverse needs as these, Mr Sierra leads a multidisciplinary research team, made up of computer scientists, mathematical experts in statistics and some engineers.

"Open the door, please"

Amongst other things, a robot has been recently provided with the capacity to see doors and they are now working on improving this skill. Ms Elena Lazkano, member of the team, provided details about the robot, called *Tartalo*: "The robot does not have hands but, when it

approaches the door slowly, it knocks on the door and asks in Basque: 'Atea ireki, mesedez' — 'open the door, please'. And it waits to see if someone opens the door". For the robot to be able to fulfil this function, they have incorporated a programme that identifies door handles, and a number of difficulties have arisen: "The door handles can have very different shapes. So, what is needed is a generalised system and not one that identifies just one specific handle". They were able to verify that the system developed was "quite solid". In fact, the Computer Sciences Faculty itself has been revamped recently, including door handles, and trials with them have proved positive.

In order to develop this and other systems, they work in their own laboratory in the Faculty; they use commercial robots as a starting point and, based on these, programme or create software and special libraries, adapting them to the desired targets. That is to say, they do not construct a machine, but they purchase one and use it as a base, adding devices to it. "In the last analysis, what is a robot? It is a series of motors and sensors and has wheels, connected to one or more computers. And, as we are computer scientists, this is exactly what we deal with in our work", explained Ms Lazkano.

The clear aim of the team is research, rather than business. Nevertheless, they have developed a project together with Tekniker with a more commercial goal, although currently on hold: the NOA wheelchair - having optimised the system for ascending steps that this wheelchair already has. So that the system functions efficiently, the wheelchair has to be placed at an almost perfectly perpendicular angle to the footpath. Thus, to facilitate this position, the research team added sensors to the wheels. "The disabled person approaches the sidewalk and, when she or he is ready, pushes a button. The wheelchair, being electric and with the sensors that we have fitted, mounts the sidewalk", explained Mr Sierra.

Social robotics

The two mentioned applications of the team are just two examples of social robotics, a trend that is gaining ground. According to Mr Sierra, robotics will soon be used for disabled and elderly persons, above all because the researchers in Europe are focusing on this: "The end goal would be to buy yourself a robot, activate in your home, being capable of getting around by itself, seeing rooms and being aware of what the dwelling is like; being capable of moving about the house by itself and helping to do household chores".

The Basque Government recently awarded category A to the Robotics and Autonomous Systems Group and which will act to open more doors for them to initiatives like this: "We have funding for six years and so we can generate projects with greater ease of mind", stated Mr Sierra. For example, one of the largest projects is within ETORTEK, a programme promoted by SPRI, the Basque Development Agency. This involves a project on transport, undertaken jointly with the majority of research centres and universities in the Basque Country. They are also awaiting an answer from Madrid and Brussels (for the latter they have formed a consortium together with other European partners), regarding a number of applications carried out in order to develop projects. To all this the interaction with the outside world has to be considered and, in fact, the team is a member of the research networks in robotics in Europe: EUROP and EURON.

Provided by Elhuyar Fundazioa