

Robots for brain surgery? EU project shows how

European Commission

Led by the Politecnico di Milano in Italy, the ROBOCAST partners targeted the development of ICT scientific methods and techniques for support in keyhole brain surgery. They developed a hardware experts call mechatronics, which constructs the robot's body and nervous system, as well as software that offers intelligence. The software comprises a multiple robot, an independent trajectory planner, an advanced controller and a set of field sensors.

The ROBOCAST consortium developed the mechatronic phase of the project as a modular system with two robots and one active biomimetic probe. These were integrated into a sensory motor framework to run as one unit.

The first robot has the ability to find its miniature companion robot through six degrees of freedom (DOF), and moves from left to right, up and down, and backward and forward. It also has three rotational movements, namely forward and backward, side to side, or left to right. These all work together to locate the robot's companion anywhere in a three-dimensional space. The robot, say the researchers, can also ease the tremor of a surgeon's hands by up to 10 times.

The miniature robot holds the probe that is used through the keyhole. The partners say optical trackers are located at the end of the probe, as well as on the patient. The force applied is managed by the robot, which also controls the position by applying a combination of sensors. This results in determining the trajectory of the surgical work.

The robot was tested for its accurate performance during keyhole surgery tests on dummies. The team believes this robot can be used to help physicians treat their patients for epilepsy, Tourette's syndrome and Parkinson's disease.

The researchers say the path the robot follows inside the brain is determined on the basis of a risk atlas as well as using the evaluation of preoperative diagnostic information.

Presenting a robot model earlier this year, the ROBOCAST team comprises experts from Germany, Israel, Italy and the United Kingdom. Future research plans include investigating robotic neurosurgery for patients who would remain conscious during their surgery.

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