

Transforming robotic components into innovative medical solutions

Since its inception, **KUKA'S MEDICAL ROBOTICS DIVISION** has collaborated with medical manufacturers to ensure that doctors, therapists and, above all, patients can benefit from its robotics expertise.

For over 100 years, KUKA has stood for customer service, added value, innovation, and quality. As one of the world's leading suppliers of intelligent automation solutions, we offer everything from a single source: from components, to cells, to fully automated systems. Building on KUKA's experience and innovation, our Medical Robotics team precisely adapts robot systems to meet the emerging requirements of the medical sector, so that the robotic component can be integrated by the medical device manufacturer. Modern medicine has an increasing need to continually improve the quality of diagnosis, therapy, and patient care. Today's most promising application areas are imaging, surgery and rehabilitation. KUKA, a leader in the use of robots in medical technology, is positioned to assist in resolving these modern medical challenges.

ARTIS PHENO: X-RAY IMAGING DIRECTLY IN THE OPERATING ROOM

Medical robot applications that require a high payload capacity delivered very precisely rely on KUKA's KR

QUANTEC Robot. The KR QUANTEC encompasses special mechanical systems which enhance its precision while carrying a high payload, making it the core robotic component of the Siemens ARTIS pheno X-ray system. The robot automatically moves an X-ray C-arm around the patient, thereby permitting the generation of CT-style 3D images directly in the operating room, without the need to relocate the patient. The ARTIS pheno is used in operating rooms around the world for minimally invasive surgery, interventional radiology, and cardiology.

CYBERKNIFE: PRECISE AND CAREFUL

It was a close partnership between KUKA and the medical product manufacturer Accuray that led to the creation of the first commercially available robot-guided radiation surgery system: the CyberKnife. An X-ray beam replaces the scalpel, and is guided around the patient by KUKA's KR QUANTEC robotic arm. The precise movement of the KR QUANTEC focuses the radiation dose directly



Siemens ARTIS pheno © Siemens Healthcare GmbH

on the tumor. An imaging system detects the position of the tumor and signals any movement – such as motion due to breathing – to the robot. If there is any movement, the CyberKnife compensates for it. The robot is thus able to hit tumors with pinpoint accuracy, leaving healthy tissue undamaged.

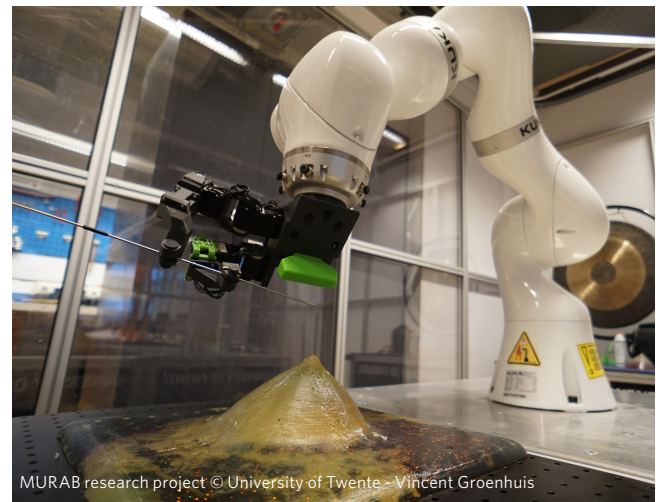
LBR MED: HUMAN AND ROBOT WORKING “HAND IN HAND”

The ultimate robotic innovation for the medical sector is LBR Med – a lightweight robot from KUKA that can be easily used as a component of an innovative medical solution. It complies with ISO 60601 and 62304, which makes it the first

robot worldwide to be certified for integration into a medical product. This certification significantly reduces the complexity of the global approval process for manufacturers of medical products that incorporate the LBR Med. With its sophisticated sensor, control and safety systems, the KUKA LBR Med enjoys several unrivaled advantages for medical robotics solutions. First, the LBR Med can assist surgeons in the operating room by providing precise positioning. Second, its sensitivity and responsiveness enable it to work “hand in hand” with the surgeon, therapist or medical specialist. Third, thanks to its special surface coating, it is suited to the hygiene requirements in hospitals.



Accuray CyberKnife © European Cyberknife Center Munich



MURAB research project © University of Twente - Vincent Groenhuis

The LBR Med thus meets the requirements not only for safe human-robot collaboration, but also for its tasks in therapeutic and clinical operating room applications.

RESEARCH MEANS PROGRESS

KUKA partners with universities, research institutes, technology providers, system integrators and end users to develop innovative robotic solutions for various application domains. Especially in the medical field, KUKA's partner network helps to ensure that its medical robotic components are innovations on the cutting edge. For example, KUKA is part of the European research project MURAB*, which is developing solutions

for faster and better diagnoses in the fields of breast cancer and muscle diseases. If a breast cancer screen indicates an abnormality, a biopsy of the suspicious tissue is taken for closer examination, which requires exquisite targeting of the suspicious tissue. A combination of MRI imaging and ultrasound locates the exact target. The KUKA robot then guides the ultrasound probe and aligns the biopsy needle holder with the lesion so that the doctor can insert a needle precisely.

SUSTAINED COMPETITIVE ADVANTAGE

Over the past 18 years, we have gained several unique selling points for our products.

Firstly, we have gained a deep understanding of the medical (robotics) business. Secondly, we are able to develop, produce, deliver and service complex certified medical components on a worldwide scale. And last, but not least, our close ties with academic and research institutions, and with technology and medical device providers, help us to keep a competitive edge for our future developments to the benefit of patients, doctors and therapists. ■

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