clearview

case studies

Medical Imaging | Eye Tracking

The Centre for Clinical Neurosciences has developed a unique and award-winning camera system called that mimics the motion of human eyes in real-time.

Figure 1: As the patient's eye moves, the cameras mimic the movement in real time.

The camera system, using a 0.3 MP Firefly machine vision camera by Teledyne FLIR, can point in any direction and is capable of imitating the fastest human eye movements, which can reach speeds of 500 degrees per second. Unrestricted user mobility and field of view as well as the utilization of biological image stabilization reflexes are main benefits of the system.

The system combines two technologies – an ultra-mobile eye tracker that measures 3D eye position at unprecedented frame rates of up to 600 Hz as well as a 3DOF motion control unit with 3 ultrasound servo motors that steer a head-mounted Firefly machine vision camera running at 60 fps to the target of gaze. The motion control unit has been developed in collaboration with the Institute of Applied Mechanics. The system precisely reproduces the eye movements using a superfast actuator-driven mechanism with yaw, pitch, and roll rotation, like a human eyeball. When the real eye moves, the robot eye follows suit.

An off-the-shelf notebook records video files with resolutions of up to 752×480 pixels to hard disk. A novel picture-in-picture functionality combines the image of the gaze camera with another image from a wide-angle scene camera. Just as a magnifying lens, this "hybrid perspective" gives the impression of a sharp image at the target of gaze.