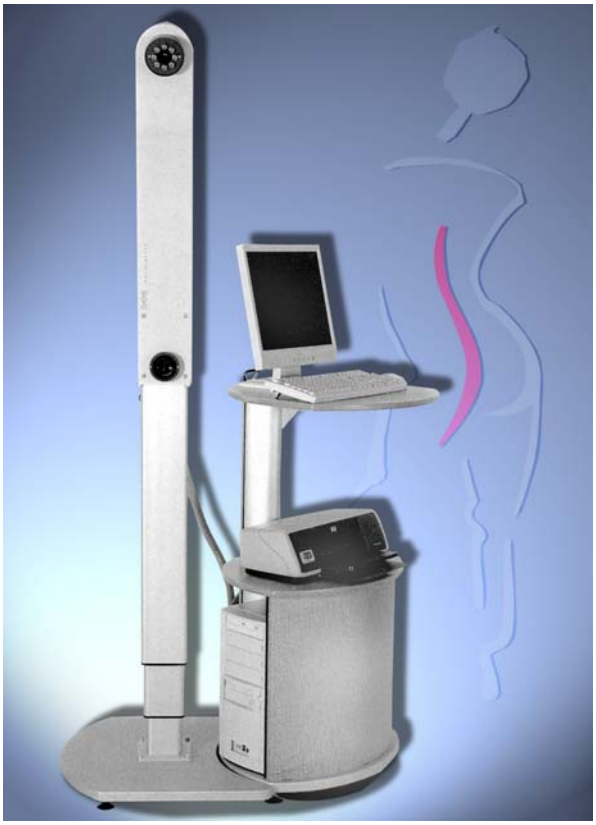
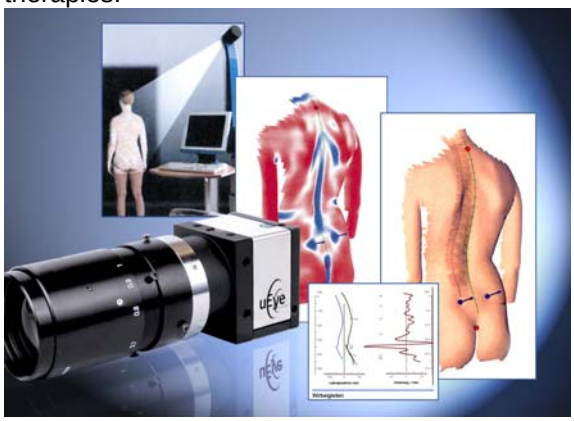


Tackling Back Pain

Digital USB 2.0 Camera replaces analogue Frame Grabber

Every second person over 30 years of age in Germany has back problems. Back pain has become so widespread that it is meanwhile the most common cause of inability to work and early retirement. And the patients are younger and younger: Children are diagnosed with postural deformity, tilted pelvis, scoliosis or kyphosis already at preschool age. This calls for urgent action. To help physicians find the exact cause of the pain and prescribe effective therapies, Diers International GmbH has specialized in the development of new examination methods: The three- or four-dimensional measurement of the spine with "Formetric." This method takes a stereographic image of the back with a high-resolution USB camera from IDS.

Fast, contactless and radiation-free, the "formetric 3D/4D" analysis system examines the correlations of the body statics. A grid is projected on to the patient's back with a light beam and scanned with a camera. From the image the system calculates anatomical landmarks, such as the seventh cervical vertebra or the "pelvic dimples," and derives the spine posture from this data at an accuracy of 1-2 tenths of a millimetre. Be it blocked vertebrae, herniated disks, tilted pelvises, static pain or postural syndromes—the results of the formetric go far beyond the findings achieved with conventional X-ray, computer tomography and magnetic resonance imaging technology, and ensure a high success rate for the prescribed therapies.

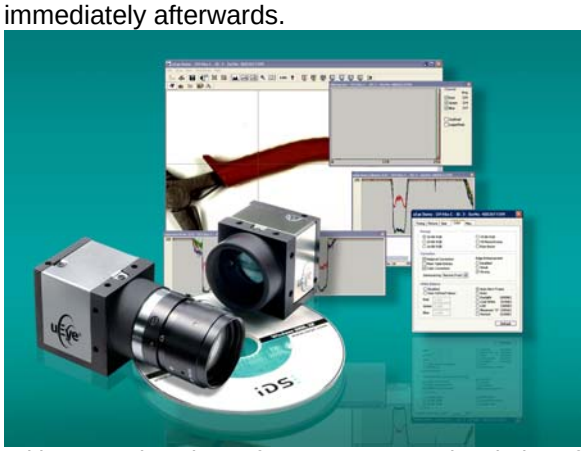


Diers International GmbH started the "static 3-D measuring process" research project approximately nine years ago, in close cooperation with leading universities and the European Union. The objective at that time was to develop a radiation-free biomechanical measuring method which was particularly intended to spare children with scoliosis from frequent X-ray exposure. Clinical trials had shown that the children had a much higher cancer risk due to the X-ray examinations, which were necessary every 3 to 6 months. The most widespread system for three-dimensional optical spine and postural analysis today, the formetric measuring method is used in hospitals, rehabilitation centers and orthopedic practices worldwide. It is suitable not only for screening, monitoring and measuring the results of therapeutic measures, but also for medical opinions and many other application areas.

With the help of special software, the static measuring method can create a complete 3-D model of the spine from the captured image of the back surface. The method offers even greater potential, however. Already in 2002, Diers proceeded to the next development stage: the dynamic representation and analysis of the musculo-skeletal system. The sophisticated 4-D technology has since offered the possibility of acquiring and documenting back and spine motion. To open up further clinical application

areas in future, a new EU research project was started in 2004 to include foot and gait analysis.

During the measurement, the patient stands in an upright position about 2 meters away from the height-adjustable 3-D scanner. The image acquisition time of only 40 milliseconds accommodates the fact that children, in particular, never stand absolutely still. The results are calculated and the analysis logs printed immediately afterwards.



With comprehensive software support and a choice of over 60 different models, the cameras of the uEye® series easily integrate with custom applications

Until recently an analog camera and a frame grabber from the proven FALCON series of IDS Imaging Development Systems had been used for image acquisition. Meanwhile Diers has switched to a digital camera solution. The reason for the change was a need for high-resolution images for the dynamic measurements. As Diers wanted to keep development time and cost as low as possible, a smooth integration was a key factor in the selection of the digital camera. The decision was again made in favor of IDS due to its excellent software support as well as its software development kit and universal drivers. With the uEye series, the German machine vision specialist offers a complete range of digital industrial cameras designed for professional use. Their design and performance as well as their USB2.0 interface consistently meet the market requirements.

From the over 60 different cameras with CMOS or CCD sensors, with image resolutions from 640 x 480 to 2048 x 1536 pixels, with or without memory, the UI-1540-M model was selected for use in the formetric. Besides cutting-edge features such as a high resolution (1280 x 1024 pixels SXGA), high-quality CMOS sensors with square pixels, C-mount lens connection, a universal trigger input and digital output, the IDS camera's free software development kit (SDK) that comes with every uEye® was one of the primary decision making factors. The SDK significantly cuts the time required for integration with the application and provides demo programs for image acquisition and analysis, together with the corresponding source code written in C/C++. The SDK also allows control of all camera-related parameters. With its DirectDraw interface it is possible to achieve non-flicker insertion of individual information (e.g. date, time, graphics) in the live video. The SDK is identical for all uEye camera models, thus eliminating the need for reprogramming after a change of model. As it is also compatible with the FALCON series from IDS, applications based on these frame grabber boards—as in Diers's case—are fast and easy to adapt for use of the USB2.0 camera.

With their design and cutting-edge features, the uEye® cameras are ideally suited for professional use

For the dynamic measurements on the treadmill, the formetric requires high-resolution cameras with a frame refresh rate of over 10 frames per second. This is easily accomplished by the UI-1540-M, with its 25 frames per second in full-frame mode and over 100 frames per second in the Area of Interest (AOI) mode. Progressive features such as binning, subsampling and image mirroring in the x and y directions complement the camera's scope of functions.

The change from analog to digital technology required only few modifications for Diers International GmbH. The strategic decision to choose a camera that is compatible with the previously used frame grabber proved right: The changeover involved minimal development costs and short conversion times.

Contact:

IDS Imaging Development Systems GmbH
Dimbacher Strasse 6
74182 Obersulm
info@ids-imaging.com
www.ids-imaging.com