

A Matter of Sports – Basler GigE scout Cameras Used for Motion Analysis Systems

Customer

- Customer: InnoSportLab 's-Hertogenbosch
- Location: Netherlands
- Industry: Sports
- Year of Realization: 2010

Application

InnoSportNL, the Dutch National Center for Innovation in Sports, worked together with Basler's Dutch distributor, DVC machine vision, to set up technical laboratories for various sporting disciplines such as swimming, volleyball, ice skating, and others. Recently, DVC implemented vision systems containing 20 Basler GigE scout cameras in the six gymnastics training halls of the InnoSportLab 's-Hertogenbosch, which is located in the National Training Center for Gymnastics.

In one of these halls, for instance, multiple cameras at fixed positions record the athletes on the national gymnastics team during their training sessions (Link: [Report in TV](#)). The sessions are recorded at high frame rates to facilitate slow motion and offline analysis. The athletes run through a routine that is immediately followed by a review of their performance with their coach. This review is just a quick visual playback. There are also biomechanical analyses that allow, for instance, the angle of a gymnast's feet to be shown during their floor exercises. In this more detailed review and analysis phase, even small details of the athlete's bodies are important, and thus high image resolution counts.



World Champion Yuri van Gelder on Rings

The systems installed by DVC help to improve the athletes' skills and routines. Jeffrey Wammes, a top Dutch athlete working out at the InnoSportLab 's-Hertogenbosch, stresses the advantages of the video recordings that helped him to improve his exercises instantly instead of waiting to review them later while watching TV. It particularly helped him during the World Championship in Rotterdam in October 2010.



Head Coach of the Dutch National Team Bram van Bokhoven analyzing former World Champion Yuri van Gelder on Rings

Solution and Benefits

In the men's gymnastics hall alone, nine cameras associated with four acquisition systems were installed to meet the requirements of the InnoSportLab 's-Hertogenbosch. In total, i.e., in all of the halls on three floors, 19 cameras were set up and one camera was provided as a portable solution to be taken abroad to local halls. Over four kilometers of cables were laid to set up the complete system, including not only the cameras but also a central server and 11 touch screens. The cameras in the men's gymnastics hall are directed at the athletes from one to four different angles, depending on the system.

High image quality and color are required because detailed images are needed for the analysis. VGA resolution, therefore, is not sufficient and 1.3 megapixel scout GigE cameras were selected as the best balance between resolution and frame rate.



Operating the Cameras by Touchscreen in Daily Use

For high resolution motion capture, the frame rate was set to 50 fps. To achieve this high frame rate, the each camera's area of interest (AOI) was slightly reduced and adapted to the 1292 by 570 line resolution of the HDTV touch screens.

Since a loss of a single frame was not acceptable, a sequential file format was used. This excludes JPEG format from the list of possible transfer formats and suggests GigE Vision as the appropriate interface.

The application was challenging just due to the amount of data produced – up to 22 MB/s from each camera – and the images from numerous cameras are often combined. With regard to processing the data, additional requirements had to be taken into account. The gymnasts have up to two training sessions a day. The sessions are recorded and by the end of the day, the trainer selects, for example, two good runs. Overnight, a server routine automatically converts the selected files to the AVI format. The next morning, the gymnast can view his or her AVI file. The files are uploaded to a special web site, so the athletes can even view the files at home.

Technologies Used

- 19 scA1300-32gc cameras with nine located in the men's gymnastics hall
- 1 scA640-120gc camera as a component in the portable solution
- 11 touch screens with four located in the men's gymnastics hall
- A central server
- Setups to allow one gymnast to trigger a combination of cameras
- Software: Real-time recording by Streampix 5 (Norpix), image analysis by Labview (National Instruments)



Basler scout



Basler AG
Germany, Headquarters
 Tel. +49 4102 463 500
 Fax +49 4102 463 599
 bc.sales.europe@baslerweb.com
 www.baslerweb.com

USA
 Tel. +1 610 280 0171
 Fax +1 610 280 7608
 bc.sales.usa@baslerweb.com

Asia
 Tel. +65 6425 0472
 Fax +65 6425 0473
 bc.sales.asia@baslerweb.com

