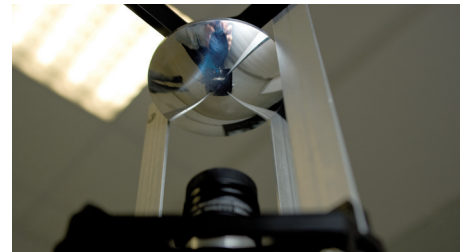


## IAISVision

A Cost-Effective Omnidirectional  
Camera System



IAISVision: Camera system with omnidirectional mirror

IAISVision is a cost-effective omnidirectional camera system. The basic version consists of a hyperbolic mirror and a CCD camera. The mirror is mounted on the camera by way of a torsion-proof and almost vibrationless frame construction so that, in contrast to conventional glass cylinder solutions, problems due to light scatter and reflections are eliminated once and for all.

There is an alternative version of IAIS Vision available, consisting of a cube with eleven different cameras.

IAISVision is the basis for reliable image processing, as can be inferred from its being used on the Fraunhofer IAIS VolksBot®.

### Mirror

The mirror is made of a solid aluminum alloy. The surface of the mirror, after having been processed and coated, is

passivated by way of a special procedure, thus providing a scratch-resistant surface that is well protected against corrosion and can be cleaned easily. For the VolksBot® mission, the form of the mirror was improved. Besides, it can easily be customized to the specific needs of the user for other applications. In such a case, the mirror is simulated within its planned environment and improved step by step in the course of the simulation.

### Camera

IAISVision uses compact FireWire or USB cameras. The camera systems deliver high-resolution images (1300 x 1000 pixels) and they are able to transmit uncompressed image data at a frame rate of 30 fps. The cameras deliver a clear-cut image with a colour depth of 24 bit.

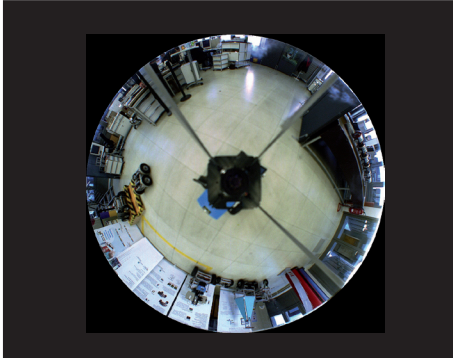
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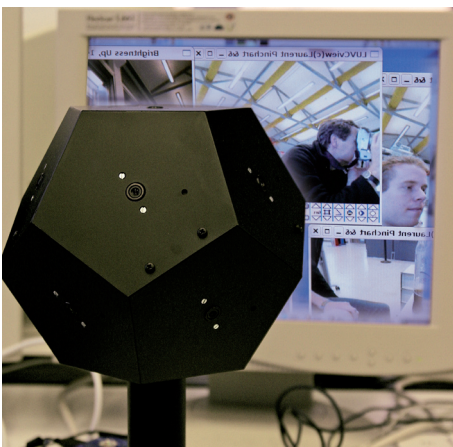
www.iais.fraunhofer.de



View through the camera. The mirror enables an omnidirectional picture.

### Technical Data

- Mirror camera system:
  - Diameter: 70 mm
  - Pitch: 0°-40°
  - Weight: 400 g
  - Dimensions: 200 x 100 x 100 mm
- Cubic camera system:
  - 360° panoramic view
  - Weight: 1800 g
  - Dimensions: 380 mm x 215 mm



IAISVision: Cube camera system, consisting of eleven different cameras.

### Software

The software component of IAISVision is based on an image processing library which is particularly suitable for mobile autonomous robotic applications. It follows the basic principle that certain areas of an image are more relevant than other areas. This software component devotes particular care to the relevant areas of the image.

### Software Technology

IAISVision uses pixel sampling technology. This procedure decomposes the image by way of representative pixels which are then translated into a non-square pixel structure. All methods of classical image processing such as morphological image operations or thinning can then be applied to this structure. In the images shown as examples on this page, not more than about 0.4 % of the total pixels were used for the samples.

The type of sampling depends on the specific application. For conventional camera systems, for instance, Delta

Sampling is the most suitable solution, whereas Radial Scanline Sampling is perfect for omnidirectional picture recording. Each single method is parameterizable and may therefore be improved for special applications involving the recognition of objects either very close to or very far away from the camera in particularly high resolution.

### Features

The image processing library offers the following features:

- parameterizable pixel sampling technology
- radial scanline sampling or delta sampling
- colour calibration a priori
- various methods for brightness balancing
- colour blob analysis including flood filling and perimeter recognition
- parameterizable sampling density
- available as software module for ICONNECT™
- high-precision colour space transformation:
  - $Y C_r C_b$  (4:1:1, 4:2:2)
  - CIE LAB & XYZ
  - HSV, HSI,  $c_1 c_2 c_3 / l_1 l_2 l_3$
  - r'g'b', RGBI

### System Requirements

Hardware: 64 MB RAM minimum,  
IEEE1394 camera recommended  
OS: Windows9x/NT or Linux

Please contact us for prices, individual configurations and terms of delivery.

