# Co-Pilots on Board

High-resolution USB cameras help develop driver assistance systems:

In 2006 more than 5,000 people in Germany were killed in traffic accidents. The major accident causes were unsafe lane changing, lane departure and following too closely. In view of these statistics the automotive industry is pushing to develop intelligent driver assistance systems, such as brake assist, distance control and lane keeping systems. These solutions are designed to assist the driver and improve road safety. With its CANape measurement, calibration and diagnostic tool, Vector Informatik supports the development of these systems and, based on a USB camera from IDS, offers a solution for verifying object detection algorithms.

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Besides ultrasonic and radar sensors, video sensors will play a key role in future driver assistance systems, as they allow the precise interpretation of visual information. Camera-based assistance systems cover a wide range of application possibilities—from detecting lane changes, the driver's line of sight through to the interpretation of traffic signs.

Vector Informatik GmbH located in Stuttgart, Germany, supports the manufacturers and suppliers of the automotive and related industries with flexible tools, software components and services for the development of camera-based driver assistance systems and other applications. Its CANape tool, for example, has been designed for testing and calibrating these systems. CANape is a universal tool for ECU applications, offering an easy-to-use solution for all the tasks involved—from the function development of the software to road tests for ECU and vehicle diagnostics and the verification of object detection algorithms with the Advanced Multimedia option.
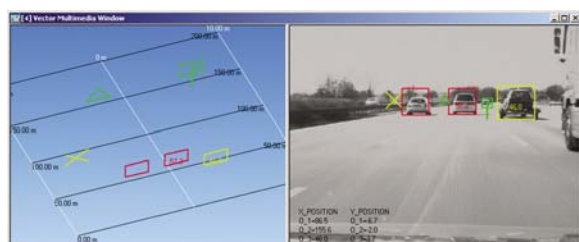
CANape enables the user to time-synchronously log and display ECU parameters, CAN/LIN/FlexRay bus messages and any analog/digital, GPS, audio and video signals. With CANape's Advanced Multimedia option, the objects detected by ECUs can be additionally displayed in a video image recorded synchronously with the measurement. Based on the object data calculated by the ECU, geometric symbols or bitmaps are superimposed on the video image at the corresponding positions. The user can then check the ECU's object detection algorithms by comparing the objects detected by the ECU with the actual surroundings. CANape offers a wide variety of display and evaluation options. The object representation is steplessly adjustable from lateral view to bird's eye view. In addition, objects, texts and parameter values can be inserted in the video image at a fixed or variable pixel position.

For recording the video images, Vector Informatik recommends the small USB cameras of the uEye® series from IDS Imaging Development Systems. This is for three good reasons: Firstly, the cameras have a very compact design, with the smallest version being only 34 x 32 x 27.4 mm in size and weighing just 62 grams.

Screenshot CANape

Secondly, the USB interface ensures easy implementation and use. Thanks to the USB 2.0 port, the cameras need no additional hardware and allow instant connection to any embedded computer or notebook. With its maximum data transfer rate of 480 MB/s and its high bandwidth, the bus can even simultaneously record and display the images from multiple cameras on the computer. Power supply to the uEye® models is also via the Universal Serial Bus; the permissible cable length of up to 5 meters is sufficient not only for this application, but also for many other optical test systems.

Last but not least, Vector's developers were looking for a camera with a powerful Direct Show driver, as provided by IDS in the software package for its uEye® models. With the Direct Show interface, individual information (e.g. date, time, bitmaps, etc.) can be inserted into the live video without flicker. The software package also includes a universal software development kit and drivers for all current Windows operating systems as well as Linux. The cameras thus can be integrated with nearly any application in little time. The software development kit (SDK) comprises demo programs for image acquisition and analysis, complete with the corresponding source code written in C/C++. Developers can quickly adapt the source code to the specific requirements and integrate it into their own programs.

Besides control of all camera-related parameters, the SDK allows efficient memory management with ring-buffer and double-buffer administration.

The SDK is identical for all uEye® camera models and thus offers a key advantage particularly for OEMs.

"It's so easy" is IDS's corporate motto, which becomes manifest in their cameras and software. The same maxim also applies to Vector Informatik's CANape tool: It is easy to use and configure, and highly flexible. The German specialist covers a wide range of applications for the development of driver assistance systems:

• Verification of object detection algorithms for ACC (adaptive cruise control), stop & go s systems and parking assistants with the aid of object overlaying
• Development of lane keeping systems and adaptive curve lighting by representing the l lanes as curves
• Support for testing traffic sign recognition systems through easy integration of bitmaps

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