Embedded vision gains traction

The rapid evolution of computing power in embedded, single board computer systems is providing new, exciting possibilities for vision. Embedded vision systems based on platforms such as NVIDIA® Jetson, Raspberry Pi®, CompuLab and ODROID are the newest variants of intelligent vision and are finding increasing use in applications where space is constrained, cost is an issue and a self-contained vision solution is required.

With embedded systems already controlling many devices commonly used today in consumer, industrial, automotive, medical, commercial and military applications, the principle of using an embedded vision system is particularly attractive. Precisely configured designs are less costly both from a production point of view and ongoing support and service. Embedded vision is also an obvious platform for large volume solutions where economy of scale can have a real impact.

For example, the Raspberry Pi 3 has a quad core CPU which offers a level of processing greater than that available on most laptops not so long ago - and all for around $35. In order to take advantage of this processing power, many of the leading image processing libraries are now providing interfaces to a wide range of camera types. A powerful image processing solution can be developed on a PC and then transferred to the embedded system where it will run independently. In addition, there are a variety of software development kits available that will provide interfaces to a wide range of camera types.

Scaling vision to your needs

An embedded vision system essentially utilises any microprocessor-based platform that isn’t a general-purpose computer. Smart cameras contain the image capture and processing capabilities within the camera unit itself, while compact, or multi-point imaging systems feature a self-contained unit for image acquisition and processing that can control multiple cameras.

With the recent introduction of smart vision sensors as well, there is a real scalable choice of embedded vision solutions and the goals of the application must be used to drive the selection. In our centre page feature, we take a closer look at these different types of ‘embedded’ vision systems and how they can be used.

Thanks are due to UKIVA members Alrad Imaging, Baumer, IDS Imaging Development Systems, Multipix Imaging, Sick and Stemmer Imaging for their contributions to these features.
We focus on what counts.
The right camera for your application.

With a deep understanding of customers’ needs, Allied Vision supplies individual camera solutions for every application including industrial inspection, science, medicine, and traffic monitoring.
The question uppermost in any UK business at the moment is ‘What effect will Brexit have’ and of course the vision industry is no different. However, the UKIVA is taking a positive step to further stimulate interest in the vision industry in the UK with the announcement that it will be holding its first ever UKIVA Machine Vision Conference & Exhibition (MVC) at ArenaMK in April 2017 – but more of that later.

After the turmoil of the changes in government personnel in the aftermath of the referendum result, things seem to be stabilising more in the country as a whole. One thing we do know for certain is that the value of the pound has dropped significantly against both the dollar and euro. This is detrimental for the UK vision market as there is only a very small manufacturing base and more than 90% of vision components are imported. However, around 70% of UK vision revenue comes from vision solutions and integration projects. In these cases, the vision components can be a comparatively small proportion of the total project cost and so any exchange-rate induced increases have relatively little impact on the overall cost. On the other hand, for the small UK vision manufacturing sector that generally relies heavily on export business, the falling pound has a positive effect.

Fortunately, there are a number of important exhibitions in the next few weeks which will provide a good indicator of the mood of the post referendum vision market. The UKIVA Machine Vision Conference & Exhibition (MVC) is an exciting new event with the emphasis on a rich program of educational vision seminars. You will find more details elsewhere in this issue of Vision in Action, but please make sure that you bookmark the date as it promises to be a major event in the UK dedicated to machine vision. Before that, however, we have the PPMA Total Show at the NEC 27 – 29 September, Photonex at the Ricoh Arena, Coventry 12 – 13 October and VISION Stuttgart, 8 - 10 November. We hope for a positive response from all of these events!

Ian Alderton, UKIVA Chairman
MEMBERS NEWS

NEW MACHINE VISION CONFERENCE AND EXHIBITION, 27 APRIL 2017

This brand new event will take place at ArenaMK on 27 April 2017 with the aim of promoting the latest developments and technologies within the Machine Vision and Imaging industry. Multiple informative presentations will be made by both UKIVA members and non-members across a variety of vision topics such as 3D vision, image sensors, software, embedded vision, camera interfaces, optics, illumination & lasers, systems & solutions for print, packaging, serialisation, track & trace and manufacturing. The conference will be accompanied by a small-scale exhibition. More details on the conference program and registration details can be found at www.ukiva.org/mvc.

UKIVA MEMBERS OUT IN FORCE AT THE PPMA TOTAL SHOW

Nearly twice as many UKIVA members are exhibiting at the PPMA Total Show at the NEC, 27 – 29 September, compared to the last Total Show held in 2013. This reflects the growing opportunities for industrial vision in the areas covered by the show including processing equipment, packaging machinery, materials, design & innovation and containers. UKIVA members exhibiting at the show will be concentrating on practical demonstrations of vision solutions across a broad range of industry-relevant applications.

2 KEYNOTE SPEAKERS FOR UKIVA SEMINARS AT PHOTONEX

We are delighted to announce we will have two keynote speakers for the UKIVA ‘Industrial Vision Works’ seminar program on each day of the Vision-UK/Photonex show (12 – 13 October, Ricoh Arena, Coventry). Jason Gow, Centre for Electronic Imaging, The Open University and Dr. Stuart Green, an amateur astronomer, will explore the functionality of imagers in space technology from different perspectives. Jason’s talk is entitled ‘The Challenges Associated with Imaging Technology in Space’, and Stuart’s presentation will cover ‘Machine Vision Cameras for Solar Imaging’. These will be supplemented on both days by a program of 6 further seminars which will cover a broad range of imaging technologies. More details can be found on the Photonex website (www.vision-uk.org/industrial-vision-works.html).

Editorial material in this section is provided by UKIVA Members. Content accuracy is the responsibility of individual UKIVA Members.

ALLIED VISION

User friendly SDK for beginners and experts

Allied Vision’s Vimba 2.0 is a completely new generation of its Software Development Kit with several new innovative features and user friendly widgets. The software combines the advantages of standardised GenICam features with an easy to use graphical user interface. The new software widgets ensure a quick start and access to the latest camera features. The simple graphical user interface makes it easy for beginners to adjust key settings such as exposure time, colour, region of interest and triggering.

First time users can intuitively configure the camera, save their settings and load them in their own application. At the same time, GenICam experienced users can still manage the feature settings by using the original GenICam feature list. For designers, systems integrators, and end users alike, programming and creating their systems with Vimba has become easier than ever. Vimba 2.0 is available free of charge as a download on Allied Vision’s website.

ALRAD IMAGING

BitBox for high density I/O applications

The BitBox from Bitflow has been designed to manage the high I/O requirements of many machine builders and provides an unprecedented 36 inputs and 36 outputs in a compact, DIN-rail mounted, compact form factor that supports TTL, LVDS, open collector, opto-isolated and 24V signaling. Instead of having another card occupying a PC slot, all the transmitters and receivers are located right in the BitBox, on the rail, close to the other equipment.

Control is facilitated by a small high speed cable which goes between the BitBox and the frame grabber. This cable can be up to 10 metres in length, providing maximum flexibility in positioning equipment inside the machine. It is controlled completely from the frame grabber, uses the same API, driver and manuals as the frame grabber. This saves time, money, space, and reduces the learning curve.

BAUMER

Baumer GAPI SDK for ARM® processors for embedded vision applications

The newest SDK version of the Baumer GAPI for Linux® ARM® processors supports optimally harmonised software integration of Baumer GigE cameras in embedded vision applications. Accessing cost and energy efficient ARM® based hardware platforms will reduce system cost. Existing applications can be easily ported to ARM® based platforms to benefit from reduced development time and cost without requiring new developments.

www.ukiva.org
Baumer GAPI supports camera application relevant hardware platforms of several manufacturers via two installation packages: standard and basic. The standard packages allow for the use of manufacturer specific evaluation kits (presently NVIDIA® Jetson, Raspberry Pi®, CompuLab and ODROID) to quickly analyse the capabilities for embedding in the image processing solution. Basic packages enable user specific developments aided by the hard and softfloat processors of the ARM® ARM7™ family for optimal application architecture in terms of performance, design and cost.

Byronic partner with FLIR for thermal imaging applications

Byronic Automation has become the first, and currently the only, officially recognised system integrator for FLIR thermal imaging cameras, and will sell the full range of FLIR automation cameras. These include the FLIR A65 / A35 / A15 and A5 compact, low-cost infra-red cameras and the FLIR Ax8 combined thermal and visual camera.

The practical applications of thermal cameras and Bytronic’s bespoke system integration software are wide and varied, with the potential to be used in areas where traditional cameras have been unable to solve certain problems. Recent applications have included checking the correct application of hotmelt glue to packaging and in fire prevention applications for waste sites, where the cameras are used to monitor regions with elevated temperatures and then to automatically activate water cannons.

New Smartek Vision “twentynine” family of GigE and USB3 vision cameras

The new “twentynine” family of CMOS GigE Vision and USB3 Vision cameras from Smartek Vision features a new high speed sensor front end in a miniature housing, and offers standardised connectivity, enhanced processing capabilities and a flexible customisation concept. These new cameras feature the latest Sony Pregius and ON Semiconductor Python image sensors with up to 18 megapixel resolution to maximise both camera interface options. With pixel sizes from 5.86µm and 3.45µm down to 1.25µm and sensor formats from 1/2.8” to 1/3”, as well as high frame rates, there is the right camera-sensor combination for nearly every industry need.

The new camera series provides doubled FPGA capabilities that allow application specific implementations and an enhanced feature set with auto exposure, multiple areas of interest, gamma, LUT and chunk data control. For applications with special demands in sensor functionality, feature set and mechanical dimensions, the Smartek Vision “twentynine” series can be adapted to almost any requirement quickly and efficiently.

GAPI SDK for ARM-based systems

FLIR A5 camera

DOUGLAS ALDERTON
1934 – 2016

We are sad to note the sudden passing of Douglas Alan Alderton on 20th May. Douglas was the founder of UKIVA member Alrad Imaging, and father of current UKIVA Chairman, Ian Alderton.

In 1976 Douglas completed a management buy-out from Wenzel Elektronik UK Ltd to form Alrad Instruments Ltd, with his wife, Doreen as Financial Director. Amongst the early products sold were camera tubes from Mullard, which eventually allowed the company to diversify into scientific imaging and then into industrial vision as that industry grew during the 1980s.

The Alrad Imaging name was adopted in the early 1990s and the company has been an active member of the UKIVA since then. Douglas and Doreen retired from Alrad in 1995 with sons Ian and Graham taking over running the business.

UKIVA AT VISION, STUTTGART

VISION 2016 (8 – 10 November, Messe Stuttgart, Germany) attracts many visitors from the UK. UKIVA will have its own stand at the show. If you would like to meet up with any of the many UKIVA members who attend the show but are not exhibiting, call by the UKIVA stand and we can set up a meeting for you!
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USB 3.0 industrial cameras with Sony IMX250 and IMX264 CMOS sensors

USB 3.0 uEye CP cameras from IDS are now available with second generation Sony Pregius CMOS sensors. The 2/3” IMX250 and IMX264 sensors provide a resolution of 5 megapixels (2456 x 2054 pixels) and deliver excellent image quality and extremely low noise images even under low light conditions. In combination with the IDS Software Suite, some interesting features are available including triggered line scan mode, multi AOI, and long exposure up to 30 seconds.

These new USB 3 industrial cameras are suitable for classical machine vision applications as well as for inspection tasks on fast moving objects, for applications in microscopy, or in the ITS market. The Sony UI-3080CP camera (IMX250 CMOS sensor) achieves a frame rate of 77 fps while UI-3280CP (IMX264 sensor) reaches 36 frames per second. The latter camera will be especially interesting for users who prefer a more cost effective option and have no need for high frame rates.

LEUZE ELECTRONIC

The new DCR200i offers quick and easy code reading

The new camera based DCR 200i code reader for the fast decoding of 1D, stacked and 2D codes has been developed for equipment used in packaging systems, automation, robotics and production. It is characterised by an extremely high reading performance with speeds of up to 6 m/s as well as by simple commissioning, operation and maintenance for system manufacturers and end customers.

The code reader ensures reliable and complete traceability of foodstuffs, beverages, pharmaceutical and cosmetic products as well as all types of non-food items. The DCR200i can be put into operation in just three minutes using the configuration wizard. In addition, a teach function using the two buttons on the control panel of the DCR 200i in combination with a smartphone app developed by Leuze Electronic is provided for configuration. Selectable optics variants High Density (N optics), Medium Density (M optics) and Low Density (F optics) cover reading distances of approx. 40 to 360 millimetres.
**New Iris GTR smart camera**

The new Iris GTR smart camera is smaller, faster and more cost-effective than its predecessor. Designed for systems integrators, machine builders and OEMs of factory automation solutions, it offers a choice of monochrome and colour On Semiconductor® PYTHON CMOS image sensors with resolutions from VGA to 5 Megapixels and high readout rates. An Intel® Celeron® dual-core embedded processor allows it to inspect on faster moving lines or perform more inspections in an allotted time. It comes pre-installed with Microsoft Windows Embedded Standard 7 or Linux, giving developers the choice for running their vision application software.

A dedicated LED intensity control interface simplifies setup and use of the overall machine vision system by enabling integrating illumination regulation via an application’s user interface. In addition, a Gigabit Ethernet interface allows the smart camera to efficiently output data including images over factory networks.

**Ensuring the safety and integrity of tall, rigid containers**

Food manufacturers are increasingly integrating x-ray inspection systems into their production lines to minimise the risk of product recalls, protect brand integrity and ensure consumer safety. Mettler Toledo’s latest white paper ‘Ensuring the safety and integrity of tall, rigid containers’ outlines how x-ray technology can enhance food safety, quality control and operational efficiency.

Specifically designed to inspect a range of tall, rigid containers, advances in x-ray technology mean multi-beam systems can effectively inspect a full range of quality parameters. This includes both low and high density packaging types such as metal cans, doypacks, cartons, and plastic and glass containers. By utilising the latest x-ray technology, manufacturers can learn more about selecting the right systems to suit their application needs, whilst maximising throughput without compromising detection sensitivity.

**Merlic – a new generation of vision software**

Multipix launch Merlic, an all in one software product for quickly developing machine vision applications without the need for software programming. It is based on MVTec’s extensive machine vision expertise and combines reliable, fast performance with ease-of-use. Merlic allows users to develop and deploy a complete machine vision application including graphical user interface, integrated plc communication and image acquisition based on industry standards. An explanatory video at multipix.com/introduction-to-merlic gives more detail.

**Olmec vision system powers serialisation compliance solution**

A turnkey validated 3 camera vision system from Olmec-UK is a core component of the ‘SerialTrac’ serialisation solution developed by Domino UK Ltd. SerialTrac helps provide the item level serialisation capability needed in the pharmaceutical industry to meet the EU Falsified Medicines Directive (FMD) and others. SerialTrac is an out of the box solution that follows the systematic aggregation (carton to bundle, bundle to case, case to pallet) approach used on primary packaging lines by many smaller to medium sized manufacturers.

The vision system handles the complex data generation and management needed to link production management databases, set up the inspection process, create codes and inspect them. It handles aggregation requirements and returns data to the factory level data repository, all in real time. It reads and verifies the 2D and human readable codes, checks the authenticity of the serialisation code and that it is not duplicated with any previously generated code and grades the 2D code.
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Matrox SureDotOCR is specifically designed to address the challenges with reading dot-matrix text produced in practice by industrial inkjet printers and dot peen markers at manufacturing line rates. It eliminates the need for case-specific image pre-processing, is straightforward to use and reliably reads information despite text distortion and orientation as well as uneven backgrounds and illumination.

Learn more about SureDotOCR
www.matrox.com/suredotocr/ukiva
The Sick Inspector P Series

Sick’s new Inspector P Series of high resolution programmable 2D vision cameras supports a comprehensive list of application options from high speed pick and place and part presence to quality control, all in a single device. The extensive image processing, powered by the Inspector’s powerful and extensive on board vision library, facilitates real time standalone operation without requiring communication via central PC control.

The flexible optical design enables analysis of small features at high speeds in each segment of the range, with the Inspector P63x, 64x and 65x model series offering resolutions from 1.9 to 4 Megapixels. As well as the embedded image processing and comparison, the vision units are easy to programme to match exact customer needs through Sick AppSpace, a software platform to create complete application software for programmable products. Within AppSpace is a Software Development Kit, AppStudio, for use by integrators and developers with skills in automation, programming and image incorporation.

Stemmer Imaging announces new partnership for hyperspectral imaging

Hyperspectral imaging opens up innovative new inspection possibilities for machine vision users. The near infrared absorption behaviour of organic objects can provide information on their chemical composition. Stemmer Imaging has signed a distribution agreement with Graz-based Perception Park to utilise the company’s intuitive, configurable data processing software platform which makes the scientific methods of hyperspectral analysis readily accessible to everyone.

Stemmer Imaging’s hyperspectral systems utilise this software platform to allow the identification and separation of ingredients and substances based on chemical information, which is not possible using conventional colour or monochrome imaging. It has applications in industries as diverse as pharmaceutical, medical, food processing, recycling, mining and wood processing as well as for document inspection.
Norpix Streampix 7

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EVENTS

The PPMA Total Show
27 - 29 September, NEC, Birmingham
Many UKIVA members will be exhibiting at this extended event. www.ppmaotalshow.co.uk

Photonex,
12 - 13 October, Ricoh Arena, Coventry
UKIVA will present a program of free seminars: ‘Industrial Vision Works! - techniques, and applying imaging technologies’ featuring 2 keynote speakers. www.photonex.org

VISION
8 – 10 November, Messe Stuttgart, Germany
UKIVA will have a stand at this show and several UKIVA members will be exhibiting. www.messe-stuttgart.de/en/77ision/

UKIVA Machine Vision Conference & Exhibition (MVC)
27 April 2017, ArenaMK, Milton Keynes
UKIVA’s first conference promoting the latest developments and technologies within the Machine Vision and Imaging industry. www.ukiva.org/mvc

TRAINING

Training courses offered by UKIVA members:

Multipix Imaging
‘MERLIC imaging software in action’, Hampshire, UK, December 1, 2016
http://multipix.com/events/merlic-in-action

Stemmer Imaging
(in association with the European Imaging Academy)
‘Programming with Common Vision Blox’ October 5, 2016
‘3D Imaging using the LMI Gocator’, November 16, 2016
All courses at Tongham, UK
www.stemmer-imaging.co.uk/en/events/training-events

TECHNICAL TIPS

Some useful technical tips from UKIVA members

The basics of Short-Wave Infrared (SWIR) technology
(Allied Vision)
www.youtube.com/watch?v=dRxorx8h0cU&feature=youtu.be

The key to contrast and detail - Adjusting the black level
(IDS Imaging Development Systems)

3D Imaging for Industry: Different 3D Imaging types and when to use them
(Multipix Imaging)
multipix.com/3d-imaging-for-industry/

Chemical Colour Imaging: the evolution of machine vision
(Stemmer Imaging)
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Allied Vision supplies camera technology and image capture solutions for industrial inspection, science, medicine, traffic monitoring and many more application areas in digital imaging.

Aldraf Imaging is a prime UK distributor of vision products. Products include cameras and sensors, frame grabbers, illumination, imaging software and sub system solutions for OEMs and system integrators.

Baumer is one of the leading global manufacturers of innovative image processing components and offers an extensive product range of high quality industrial cameras and vision sensors.

ClearView Imaging is a supplier of vision components, including a wide range of cameras, frame grabbers, software, embedded systems, smart cameras, Vision processors, lighting and optics.

Cognex is the world’s leading vision company, with over 1 Mio, systems delivered. We offer a complete range of vision-based solutions, including vision sensors, 2D and 3D vision systems as well as barcode readers.

Combining proven technology and expert local support, we provide UK pharmaceutical sites with turnkey machine vision inspection and Track & Trace solutions, supporting compliance with regulations.

Framos is a specialist distributor of digital and electronic imaging devices and complete cameras. Both area and linear CCD and CMOS devices are offered with full technical support for design and integration.

IDS Imaging Development Systems is a global leader in medical vision and machine vision technology, offering industrial cameras with USB 2.0, 3.0 and GIGE Interface and OEM plus customised solutions.

Ifm electronic develops, produces and sells sensors, controllers and systems for industrial automation worldwide and is a leading supplier of vision systems including 2D and 3D sensors and cameras.

Impex, Inc. designs and manufactures high performance cameras, frame grabbers and industrial imaging systems for a variety of markets. Our multi-service brand is recognized for superior performance, reliability, and cutting-edge design.

Lambda distributes a broad range of MV products for industrial, research and logistic applications. Providing digital cameras, frame grabbers, software, lenses and lighting teamed together a wealth of technical experience.

Laetus is world leading supplier of complete Track & Trace solutions and innovative and value-adding quality and security inspection systems for the Pharmaceutical, Medical, Cosmetics and FMCG industries.

Leuze electronic ‘the sensor people’ are the experts for sensors. They also specialise in smart cameras and identification of products.

Matrox Imaging is a leading developer of hardware & software for machine vision and imaging technology.

The wide range of products offered includes frame grabbers, cameras, lenses and imaging software together with a highly experienced support service.

National Instruments manufactures hundreds of integrated software and hardware products, which are used to replace and/or communicate with traditional instrumentation.

Omron Electronics manufactures a wide range of vision-based industrial solutions, ranging from cost effective vision sensor products to high-end vision controller and camera products.

Optivision is a leading provider of inspection and serialisation systems for the global pharmaceutical industry, equipping thousands of lines with cutting-edge, turnkey solutions.

Pyga are specialists in Machine Vision for the food and beverage industry. With years of experience and customer satisfaction, our machines are installed into the most important companies in these sectors.

We sell and support Scorpion Vision 2D and 3D Compact Vision Systems for integrators and machine builders. We take care of the customers throughout our website, many products in stock and available next day.

Sick manufacture and supply a complete range of Vision Systems & Solutions, including vision sensors, smart cameras, 3D and colour multi-scanning systems, just part of the Sick automation portfolio.

Europe’s premier Machine Vision technology provider. Offering the widest range of 2D and 3D vision systems and components along with independent technology training and extended technical services delivered with passion.

Acrovision is a leading systems integrator of vision inspection and barcode reading systems. Our Validator series has been designed to carry out any required End of Line Packaging validation and inspection.

Bynnorphic is the UK's leading Cognex Platinum Partner System Integrator in the UK. Bynnorphic are experts in machine vision, packaging verification, factory automation, MES solutions, manufacturing data management and more.

Fisher Smith LLP is a UK specialist in machine vision. Our product range covers Vision and Control machine vision components, and GenVis and RoboVis PC-based vision systems and vision training.

Easy to use vision systems, special purpose vision machines & smart cameras. Improve yield and remove defects with our automated quality control machine vision solutions. Practical and simple to maintain.

Loop Technology specialises in 2D/3D vision solutions for manufacturing applications: aerospace, automotive and composites industries, robot guidance, composite handling, surface profiling and inspection systems.

Specialists in product handling, controls automation and validation; Olmcse deliver complete inline and stand-alone vision inspection into existing, new and OEM machinery processes.

Piavt Imaging provides independent consultancy and bespoke product development and is interested in joint development opportunities.

RNA are specialists in the supply of special purpose machinery including automated vision inspection systems and pick & place handling units.

Scandinavian Machine Vision Ltd is an independent machine vision integrator providing complete solutions and tailored services for a wide range of manufacturing and process industries.

Specialist SAP consultancy and producer of CodingControl™, a SAP Certified software platform that connects vision systems, coders and labellers to your SAP ERP system to eliminate coding errors.

Alltec designs and builds special purpose equipment for a variety of applications. Machine vision is used for tasks such as data capture, inspection, verification and robot guidance.

Dimaco is the UK’s leading provider of vision inspection systems in the food industry. Our VeriPack series is widely used to meet the packaging validation requirements of the major supermarkets.

Metal Toledo Ltd is one of the world’s leading suppliers of industrial weighing and inspection solutions, including checkweighing, metal detection, x-ray and vision inspection systems.

Multivac UK is a wholly-owned subsidiary of Multivac Sepp Haggenmüller GmbH & Co, the world’s leading supplier of packaging machines.

Stein Solutions provide inspection and optical sorters.

UPM Conveyors provide complete automated conveyor and vision systems.
Multipix Imaging empowers its customers to create outstanding inspection solutions, ranging from high speed barcode reading to 3D object analysis.

Not all systems are created equal – take your vision to greater heights!

Your machine vision specialists since 1997. Many years of experience, commitment to excellence and superior customer support ensures our customers maintain their competitive advantage.

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Board level vision systems

The availability of small, embedded processing boards based on either ARM or x86 instruction set architecture offers great potential for the development of embedded vision systems for industrial applications. Many of the leading image processing libraries and toolkits can now be ported to these platforms meaning that the tools are available to produce a wider range of vision solutions in this format.

Developing Applications for embedded systems (Courtesy Multipix Imaging).

Combining these processing capabilities with low cost cameras, including board level cameras, means that vision systems could be incorporated into a wide variety of products and processes with comparatively small cost overheads.

The board level challenge

While embedded vision has been applied to transport, logistics and other non-industrial machine vision applications, their use in industrial applications is still at a comparatively early stage. Systems are not readily available ‘off the shelf’ in the same way as smart cameras or multi-point vision systems.

To date, embedded vision systems tend to have been designed by vision and integration specialists for a specific OEM application, often in the field of medical devices, industrial automation or remote monitoring. Thus, at present their specialist development costs will offset the inherently low component costs. Although the boards offer very powerful processing capabilities, data transfer bandwidth is limited even with direct connection to the board.

This means that the boards need to be used to perform selected processing tasks that minimize data transfer. In addition, although image processing libraries are available for use on the embedded processors the exact performance of an algorithm can vary depending on the particular processor used.

Moving forward

In the same way that other variants of visions systems have matured in recent years, there is little doubt that there will be significant developments in board level systems allowing the real cost benefits to be realised. It is also likely that there will be an increasing use of SoC (system on chip) processors such as the Xilinx Zynq series.

Smart cameras and vision sensors

Smart cameras

With their on-board image capture and processing capabilities, smart cameras avoid the need to transmit large quantities of image data back to a remote PC for processing and analysis. The results of the inspection are made on board and sent to a PLC over industry standard connections such as Ethernet. The ability to pack more speed and processing power into smaller chip sizes has enabled more intelligence to be embedded into the smart cameras. Not only that, but use is also being made of multiple processing technologies such as DSP, CPU and FPGA for algorithm, communication and control optimisation. Smart cameras have benefited from the recent developments in CMOS sensor technology with the result that there is an enormous choice on the market with an impressive range of resolutions, size and weight. Smart cameras are available with different levels of embedded software ranging from simple code reading to the most sophisticated imaging toolkits. Camera configuration is carried out via a simple user interface – often a web browser or a user development interface. Smart cameras offer a comprehensive range of capabilities including:

- Positioning – guide robot handlers or adjust vision tools for part measurement
- Identification – for verification or traceability
- Verification – verifying parts for correctness assembly or packaging
- Measurements – for dimensional accuracy
- Flaw detection checking surfaces for defects

Smart cameras are single point inspection systems so where there are multiple inspection points in a process, it may be more cost-effective to consider using a compact vision system.

3D Smart cameras

Perhaps the most striking evidence of development in smart camera technology has been the emergence of 3D smart cameras. Up until comparatively recently, the computationally intensive requirements of 3D measurements to acquire images, create 3D point clouds and make measurements was only possible using a PC. However, the developments in processor technology means that this is also now possible using processors housed in the camera itself, and these 3D smart cameras can be used to make the appropriate measurements in production line environments in the same way as 2D smart cameras.

Smart vision sensors

Smart vision sensors are low cost imagers, often with integrated light sources, which can perform simple tasks such as identifying the orientation, shape and position of objects and features. They can also inspect for assembly errors, defects, damaged parts and missing features. Embedded vision tools can provide part locating, feature finding, counting and measuring capabilities. The built-in intelligence can allow these tools to be combined and used numerous times to solve simple or complex inspection tasks.
Choosing an embedded vision solution

Determining what type of embedded vision system is right for a given application depends on the application itself. What needs to be accomplished and how will the resultant data be used? Other factors include the number of sensors needed, the operating environment including the amount of space available, the level of support available and, of course the cost. One of the most important considerations is software. The capabilities of the software must match the application, programming and runtime needs.

Board level applications

Board level embedded vision systems deployed to date have generally been developed by vision specialists. Once this initial development has been completed, the economies of scale offered by the low cost components can be realised. There is much potential for board level systems, ranging from use in hand-held devices to being an integral part of the smart factory approach. It will be interesting to see whether system development will remain in the domain of the specialist or whether more easily set-up systems (as with smart cameras) will become common-place.

Smart cameras and vision sensors

Smart cameras can be used in all of the traditional industrial vision applications such as high volume component inspection, robot guidance, 1D and 2D (DataMatrix) code reading and verification, optical character recognition etc. Small form factors and high-end embedded software offer great flexibility to the machine builder or systems integrator who want to use vision as an integral part of a process or machine. Smart cameras are single point inspection systems and are the ideal choice where multiple independent points of inspection are needed. Each one can be set up independently to perform a specific task and modified if needed without affecting the other inspections. For less demanding single point inspections, the low cost of ownership of smart vision sensors allows them to be used at more points of inspection. This gives better failure analysis data and allows corrective action to be taken more quickly and easily. 3D smart cameras provide the ability to process whole parts, making factory automation easier and less expensive by eliminating the multiple components and software engineering required for automated part scanning and detection. With discrete parts segmented into 3D cloud datasets, it is possible to perform volumetric measurements such as volume, centroid, orientation, etc. to provide information on dimensions, location, and orientation.

Multi-point vision systems

Multi-point inspection systems are best suited to applications where multiple cameras are required to carry out the same inspection. Comprehensive embedded software provides processing and measurement capabilities equivalent to smart camera systems. In addition, cameras with different sensor sizes and resolutions can be mixed and matched according to the particular inspection point.
Ensuring correct “Best Before End” information on outer cartons of coffee capsules

A world leading nutrition, health and wellness manufacturer prints Best Before End (BBE) dates as well as other information onto the outer cartons of coffee capsules. This information is printed with inkjet printers and, as they need continuous maintenance, it is possible that the text can become unreadable. Since it is important that this text is accurate and legible for both consumer safety and customer satisfaction, the client looked for a vision system that performs Optical Character Verification (OCV) on every box to check and guarantee that the correct information is printed every time. Acrovision recommended the use of a Validator 200 system, part of its suite of End of Line Inspection solutions designed to meet the needs of food and drink producers wanting to check the accuracy and quality of their labels and packaging.

The Validator 200 system consists of a smart camera with relevant lighting and a VisionView panel, used to see the images on line, show real-time statistics and to select the relevant product for a new batch-run. The camera uses an OCV tool to validate each product and provide an output to a reject mechanism if any codes are incorrect or illegible. The system has evolved to allow operators to edit system parameters, and add new variants without taking the vision system offline.

The implementation of the Validator 200 system resulted in the reduction of false rejects to near zero. The improved print monitoring allowed for better print setup and the trial systems reported print failures of less than 1%. The vision systems can communicate with the machine PLC and factory control systems to allow automatic variant selection providing zero downtime and 24/7 monitoring. The intention is that the customer will roll-out Acrovision Validator systems on all remaining lines.

Hail damage – high resolution cameras detect every dent

Following hailstorms, many vehicles must be inspected for hail damage in the shortest possible time. With the aid of 17 high-resolution Manta cameras from Allied Vision, Germany’s adomea (advanced optical measurement and automation) GmbH mobile hail scanner MIKo quickly and thoroughly detects even the smallest dents, accelerating the claim process for insurers and vehicle owners alike, making complete documentation of damage possible for the first time.

MIKo’s aluminium frame construction, with a footprint of approximately 50 m² (538 ft²), provides sufficient space to check the entire surface of any current vehicle model. The walls surrounding the vehicle are illuminated by projectors. A total of seventeen cameras are mounted in different positions to capture the entire exterior of the vehicle. In order to register the smallest irregularities and distortions within the surface, two high resolution Allied Vision GigE Vision camera models are used: the 6-megapixel Manta G-609 camera and the 9-megapixel Manta G-917 camera.

All seventeen cameras are synchronously controlled using PTP (Precision Time Protocol). Together, they generate a complete image of the examined vehicle. Using Allied Vision’s Vimba Software Development Kit, the images are integrated into damage analysis software, developed by adomea, where 3D renderings for nearly 90% of the highest sold auto models over the last ten years are stored. The results, specifically the individual dents, can be subdivided not only according to shape and depth, but also can be designated according to the corresponding section of the chassis. A visual representation of the damage is included in a damage report that is generated automatically. Common damage calculation software can be connected. The damage assessment takes two to three minutes and in another two and a half minutes, the results are logged and available. Currently, five mobile MIKos are ready for use across Germany and adomea works closely with different insurance companies as a cooperative partner. MIKo is also in use in the USA as well, but the aluminium frame construction has been replaced by a large truck that can be set up and parked conveniently in a shopping centre or supermarket parking lot. The measurement chamber’s area has been adapted and increased in size to accommodate American pickup trucks.
**ALRAD IMAGING**

**3D inspection of beer bottle crown caps**

The inspection of bottle cap alignment and integrity is a key quality control requirement in bottling plants. 3D inspection to check that metal caps are tightly sealed on beer bottles packed in crates has been carried out on a 3D imaging system using EyeVision image processing software from Eye Vision Technology GmbH (EVT). The EyeVision software supports various 3D sensors such as the EyeScan AT 3D and contains tools for evaluating point clouds and grayscale images. The EyeScan AT 3D has a profile resolution of up to 4096 points/profiles (4k Ultra-HD) and integrated 3D evaluation algorithms contained in a robust, IP67-rated enclosure.

The system uses the laser triangulation principle to check the presence and alignment of each cap since the crown caps on these bottles do not have a measurable cap curve. If a cap is askew or missing, the whole crate is rejected and the defective bottle exchanged for a new one. The sensor is aligned vertically over the crate. At defined positions in the camera image the distance of the crown cap to the sensor is measured and evaluated.

In addition to the cap inspection, the sensor detects whether entire bottles are missing. Other errors on the crate can also be detected, such as bottles jutting out of the crate compared to the other bottles, due to, for example, broken glass under the bottle. Other bottling applications for EyeVision software include inspection of the fill level, and checking the correct position of the label. EyeVision features a wide array of measurement tools, including pattern matching, code reading, object counting and error detection such as scratches, holes, cracks, contamination and printing or colour errors.

**ALTEC ENGINEERING**

**Machine vision ensures quality in grommet sealant system**

Integrated machine vision is used to perform inspection and validation checks prior to and following the application of sealant to rubber grommets. Two vision systems are integrated within a sophisticated and high-speed machine, operating at 600 parts per minute, which manufactures components used in hearing aids. The machine feeds and sorts rubber grommets, before presenting them for sealant application. Grommets are fed from a vibratory bowl feeder into a track containing 10 separate rows. The grommets then move down the tracks to an escapement where they are released and fed into trays. Each tray contains multiple pockets which should contain a single grommet. The trays then travel to the first vision inspection station which is used to check that the grommets are in place within the tray and also in the correct orientation, with a slot at the top. This information is stored and subsequently used to control the sealant application.

The sealant application station comprises of a total of 10 dispensing heads, 5 on each side of the station. Once the tray containing the grommets has been presented to the sealant applicators, individual applicators only advance to apply sealant if the grommet in that position has passed the first vision inspection. A pre-determined quantity of sealant is then applied to each grommet and when this operation is complete the trays continue through the machine to the second vision inspection station.

This inspection area uses UV light to make a dye within the sealant fluoresce allowing the camera in this station to verify that the sealant has been applied correctly to each grommet. The trays containing the processed grommets then pass through a heater system before reaching a double venturi system. Here all good parts are removed by one half of the system and any parts identified as reject are removed by the other.

**BAUMER**

**Reliable text and code reading in the FMCG sector with a vision sensor**

The “best-before date” printed on packaging is an essential requirement in the modern supply chains within the FMCG industry, particularly for perishable goods. The print must be of the highest quality and the information must be correct. A single error can cause an entire batch to be returned not only the attendant cost implications of wasted goods, but also the potentially damaged reputation of the supplier in this highly competitive market.

continued on page 21
**Machine Vision Components**

**e2v’s** new UNiiQA+ family of line scan cameras have been specifically designed to bring affordable, flexible and simple high speed solutions to your current inspection or sorting systems.

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**DCM Sistemes** is a high technology company designing and manufacturing LED lighting systems for machine vision.

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**ALRAD IMAGING**

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The Baumer VeriSens® ID 110 vision sensor was chosen for this application, where it was positioned directly after the printing process in order to detect and flag up any faulty printing. The vision sensor offers all the capabilities needed at a lower cost that a conventional system as it is supplied complete with built in illumination. This all-in-one compact design, together with a rugged, IP67-rated metal housing as well as ethernet connectivity and digital I/Os allowed easy integration into the existing line.

The system provides robust optical character recognition (OCR) of text and numbers even from dot matrix printers without the need of complex programming. The system was also able to compare the required and actual states of statically or dynamically predefined contents as well as evaluating the print quality (OCV). The system was able to easily and interactively learn letters, numbers and special characters for this purpose.

Set up was quick and easy using the proven VeriSens® user interface allowing the user to save valuable practice time and achieve success in only a few minutes. In addition, the user level password protection ensured secure operation. A further VeriSens® ID 110 with an IP69K-rated housing was added later in a ‘wet’ Food & Beverage area.

BYTRONIC AUTOMATION www.bytronic.com

Checking bottled beer cartons using LWIR imaging

Bytronic Automation has recently undertaken a turnkey vision system on behalf of a household name beer brand for the inspection of the integrity of boxes used to package the beer bottles. The project involves the use of LWIR imaging and traditional monochrome imaging and is fully integrated into the system as the boxes emerge from the cartoning machine.

The boxes are formed in the cartoning machines and hot melt glue is applied to the flaps of the boxes. These are then folded to stick to the sides of the box to complete the

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assembly. By ensuring that the glue is the right temperature, and has been applied to the correct areas in the desired quantity; the manufacturer can be certain that the boxes are stuck together thoroughly, and are safe to be moved ready for transport. If the flaps are not properly stuck, then the boxes can collapse on the pallets causing breakages. A secondary problem is that sometimes the glue is applied in the right place, but the flaps are not formed or folded properly resulting in an irregularly shaped box.

The vision system consists of a monochrome camera and Flir LWIR camera, looking at the edges of the box where the flaps fold over. The Flir thermal imaging camera provided a focused readout of the temperature of the glue and that it is in the right place, imaging through the cardboard material of the box. The monochrome camera checks that the flaps have been properly formed and that the box is the correct shape. The vision application software for this project was developed using Vision Pro software from Cognex. In the event of a failure, the line is automatically stopped and additional glue can be applied manually.

**ID and vision solutions for contact lens packaging**

NKL Contactlenzen, a manufacturer of hard and soft contact lenses, has installed a compact packaging machine with high quality and hygiene requirements in which customer-specific lenses are packaged efficiently and very carefully. The turnkey solution was developed and installed by Stevens Engineering and has been successfully used within a “clean room” production environment for 6 months. Challenging vision and ID requirements to identify a delicate, see-through product in a clear liquid whilst reading a translucent code were fulfilled by Cognex.

After a final manual lens inspection, the operator places the lens in the lens holder and places this in a newly developed product carrier. The machine adds a special preservation liquid to the product carrier, seals it with aluminium foil and closes the lens holder’s cover – ready for shipping. The cycle time is currently only 10 seconds and each product and lens holder can be tracked at all times both during and after packaging through an SQL database.

The first requirement is to scan the 1-D barcode label on the product carrier using a Cognex DataMan 200 barcode reader. Based on this identification, the lens holder is then accurately filled with one of two available liquids for preservation. A Cognex In-Sight 7050 smart camera is now used to detect the lens even though the lens is transparent, has different colours and is covered in liquid. The smart camera also checks if the lens is covered by enough fluid and whether there is any spoilage, e.g. drops outside the lens storage section.

After that, the lens holder is sealed with aluminium foil and its plastic lid is closed and printed with a UV ink 2-D matrix code to clearly identify the lens. The 1-D barcode on the product carrier and the 2-D matrix code on the lens cover outside are now read by another DataMan 200. Special UV lighting is then used in order to detect the UV ink printed code. The product and packaging data acquired helps to verify the completion of the process in the SQL database and NKL’s management information system.

**More sustainability due to vision-based recycling**

Refind Technologies provides systems for grading and sorting of many types of used products. The systems feature sophisticated image processing with access to millions of reference images for object recognition. This enables producers, retailers and recyclers to get as much value as possible from used and returned electronics, batteries, lamps and other complex products that otherwise would have been dumped or treated inefficiently.

Refind’s optical battery sorter has been redesigned to incorporate the two channel IPSC2 LED Strobe Controller from SMARTEK Vision with project support from Framos. The newly developed OBS 600 is the world’s only automatic sorter for waste portable batteries. The system is a complete identification and sorting system for all cylindrical and 9V batteries. At the heart of the system is a sophisticated image recognition and processing system which uses artificial intelligence and includes a database of over two million images covering around 2,500 types of battery. High speed strobed LED illumination is used to allow the acquisition of good quality images at high battery throughput rates. The IPSC2 LED Strobe Controller allows the light to be strobed with four times the intensity possible with earlier systems and, at 20 batteries per second,
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the OBS600 can now sort twice as many batteries as the earlier model. The new machines can sort half a million batteries per day, equating to a minimum of 600kg per hour. The strobe controller provides the capacity for a greater throughput, but this is reserved to offer the ability to re-image problematic batteries if necessary.

The IPSC2 LED Strobe Controller also provides the flexibility to vary the pulsing rate and intensity of light according to the imaging conditions required. For example, applications involving sorting larger electronic devices such as tablets and phones, require a different lighting intensity to the smaller ones. Different sorting applications can require different illumination sources and the IPSC2 can accommodate visible LEDs, UV illumination or laser line sources, for example, with equal ease.

**IDS IMAGING DEVELOPMENT SYSTEMS GMBH**

**www.ids-imaging.com**

**Mission to Mars**

Scientists at the German Aerospace Centre (DLR)’s Institute of Planetary Research are using a USB 2 uEye XS camera from IDS to help investigate whether organisms such as polar and alpine lichens and cyanobacteria organisms might be able to survive in the harsh environment of Mars. A climate chamber at DLR’s Mars Simulation Laboratory has been configured to replicate the Martian atmosphere with around 96% CO₂ at about 8 millibar atmospheric pressure and a relative humidity of up to 100%. The surface features mineral constituents (based on information obtained by the Opportunity and Spirit Mars rovers) and temperatures between -75°C through +20°C can be accommodated. Special radiation sources from ultraviolet through infrared replicate the solar surface radiation.

The various microorganisms undergo trials in the climate chamber for 30 days or more, with the camera used to observe how the samples and surface material develop and whether photosynthesis or metabolic processes occur. The USB 2 uEye XS 5-megapixel autofocus colour camera captures images at regular intervals. In order to save space, no protective housing is used. The camera is simply screwed onto a copper block to dissipate the heat. With its magnesium housing, the camera is designed for use in harsh conditions and has been able to cope with this extreme environment with the autofocus working perfectly even at -50°C.

Thanks to the camera’s wide range of automatic functions, hardly any settings need to be adjusted in most situations. The IDS software development kit supplied with the camera includes a range of useful tools for capturing and viewing images that is more than sufficient for the DLR scientists.

Results to date show that lichens and bacteria demonstrated measurable activity and carried out photosynthesis in Martian conditions, even in trials lasting more than 30 days. The lichens have proved to be real survivors, especially under conditions such as those found in niches in the ground or in small cracks and fissures in rocks. During the period of the trial, they demonstrated the same activity that they would in their natural habitat, such as the Antarctic.

**MULTIPIX IMAGING**

**www.multipix.com**

**Top athletes benefit from swimming pool vision**

In 2015, the University of Bath completed a refurbishment of the 50m swimming pool used to train top athletes. Part of the re-fit included an imaging system commissioned by British Swimming and UK Sport for the purpose of advanced training, which is used to improve swimming techniques, including those competing at the Rio 2016 Olympics. The vision hardware was supplied by Multipix Imaging whilst the bespoke software was written by Dr Simon Goodwill, a research engineer in Sports Engineering at Sheffield Hallam University. He has developed a range of customised software applications which link data acquisition hardware with camera systems which are being used to help improve an athlete’s performance.

The vision hardware is mainly based on Basler acA2000-50gc, running 2048 x 1000 pixels @ 50fps. There are 12 cameras along the length of the lane and one camera each end of the lane where the swimmer enters the water. In addition, there are three cameras placed high above the pool for an overhead view of the lane. Each camera is using a Kowa LM5JCM, 5mm megapixel lens, as it was important to achieve the widest field-of-view possible due to the change in refraction index from air to water. Each camera is protected by an AutoVimation ORCA IP67 enclosure.
All cameras must be synchronised which, until very recently, would have required additional trigger cabling to run to each camera (along the 50 m length of the pool) and a common trigger source. This was simplified greatly, however, with the use of Basler GigeVision cameras supporting PTP and PoE. The extremely neat solution means only the CAT6e cable is required to run from each camera back to a NETGEAR switch which is connected to the 19” rack PC for image capture, analysis and replay. PTP (Precision Timing Protocol) is a way to synchronise cameras using the GigE cable interface and eliminates the need for traditional triggering via a dedicated hardware port on the camera.

Inspection system is the ‘cream of the crop’

A leading manufacturer of emollient cream has commissioned a vision system from Olmec-UK to inspect the labels applied to the front and back of the tubs of cream. The vision system offers high read rates, low waste and ease of use, with very little user adjustment necessary. A customised user interface was provided to match the other vision systems developed by Olmec for the same customer.

Printed labels are applied to tubs in a rotary labeller. The vision system checks that the correct labels have been applied to the product and that the labels on the front and the back are consistent with each other. The system features a 5 MPixel JAI GO area scan camera to read the label on the front and a 2D datamatrix code reader for the label on the rear. Code reading and measurement is carried out using software developed using the Sherlock machine vision development environment. Once the codes have been read, a pass/fail decision is made and accept/reject signals are sent to the parent machine.

The product is presented to camera and rotated by the labeller so that it is facing the camera for reading. The code reading is challenging because the label is attached to a curved surface on the pot, and the system needs to be able to accommodate different pot diameters. Area scan imaging of labels on a curved surface results in a polar distortion of...
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End of Line Packaging Validation Systems

Within the Food, Drink and Pharmaceutical industries, retailers are becoming more and more stringent about their suppliers meeting correct packaging specification criteria. The result of incorrect labelling can result in poor customer satisfaction at best – at worst, hefty fines or Emergency Product Withdrawals (EPW).

- **Validator 100**
  - In-line Barcode Validation System
  - Correct Barcode
  - Missing Barcode
  - 100% Inspection

- **Validator 200**
  - Correct Product / Label Inspection
  - Correct Barcode
  - Missing Barcode
  - Barcode Quality indication
  - 100% Inspection

- **Validator 300**
  - Full End of Line Packaging Inspection
  - Correct Barcode
  - Missing Barcode
  - Barcode Quality indication
  - Batch/Date Code Inspections
  - Label Positioning
  - Printer Control

- Check your Barcode
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- Check your Promotion Label
- Check your Label Position
- Save Reject Product Images

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- Easy to Operate

As well as monitoring and reporting the inspections of the labels / packaging we can also provide:
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- Stainless Steel Enclosures
- Audit and Performance Logs
- Simultaneous Control of Line Printers
- Visual and Audible Indicators
- Reject Mechanisms

Watch our 2 minute fun animation overview of Validator:
http://acrovision.co.uk/solutions/validator/

Or contact us for a demo or more information @ info@acrovision.co.uk
0845 337 0250
Dimaco supplies optical and image processing equipment within the packaging industry, in particular the food, beverage, cosmetics and pharmaceutical sectors. Our systems meet the label inspection requirements of the major UK supermarkets. Our mission is to provide our customers with state of the art quality control systems for their production lines at all times. We will achieve this by innovation, supply of leading edge technology products and associated after sales support as demanded by our customers. Our collective goal is that our customers are totally satisfied with the products and services we offer them. To this end we work with a quality assurance system of a very high standard so that progress towards our goal can be demonstrated at any time.

**SICK**

**www.sick.co.uk**

**Automatic stitching of woven carpet rolls**

The Sick Inspector PIM60 LUT smart camera has recently been used to solve a problem for a carpet manufacturer. The requirement was to accurately stitch together ‘raw’ rolls of woven carpet to form wider finished rolls as an automated part of the production process. Thread is used to mark the pile edge of a ‘raw’ roll, but its position is variable: · straight, zigzag or just inconsistent. Sensors were required to identify the thread at the pile edge of each of the raw rolls and guide the joiner machine so that it accurately sealed the two rolls together and cut away the thread and excess mesh backing.

The previously used sensors were unable to identify the marking thread consistently and guide the joiner to produce ‘seamless’ wide rolls of carpet. They were also not robust enough to withstand the vibration and dusty conditions. Sick suggested using the IP65-rated Inspector PIM60 LUT variant with integrated UV lighting in conjunction with fluorescing thread to mark the roll edges, to enable clean, invisible joining while cutting out the fluorescent thread.

The highly successful solution used the Sick SOPAS software to cover the Inspector’s whole field of view with digital output rather than just the single point provided by a sensor. As well as thread tracking, this enables it to oversee the roll edge position and inform the automated roll guidance when the edge is reaching acceptable limits for continued joining operations.

The Sick Inspector PIM Series of high-resolution programmable 2D vision cameras provide high speed positioning, inspection and measurement for real-time stand-alone operation without central PC control. Smart camera functionality combined with vision sensor ease-of-use is enhanced by optical design flexibility and integrated lighting making it suitable for a wide range of applications.

Dimaco supplies optical and image processing equipment within the packaging industry, in particular the food, beverage, cosmetics and pharmaceutical sectors. Our systems meet the label inspection requirements of the major UK supermarkets. Our mission is to provide our customers with state of the art quality control systems for their production lines at all times. We will achieve this by innovation, supply of leading edge technology products and associated after sales support as demanded by our customers. Our collective goal is that our customers are totally satisfied with the products and services we offer them. To this end we work with a quality assurance system of a very high standard so that progress towards our goal can be demonstrated at any time.

**Pack Label Verification**

Dimaco’s Smart-Check system helps with food safety as well as product traceability. It checks that the correct labels have been applied to the packs and all essential pre-printed and over-printed data such as barcodes, dates, price and weight are correct and legible.

A range of offline and on line applications are available, to suit your business requirements.

**Verifies:**
- Label presence
- Label identification
- Label placement
- Over printed data
- Over printed barcode
- Promotional labels

**The Benefits:**
- Avoids label mix ups
- Ensures the data is correct and legible
- Reduces risk of EPW/product recall
- Prevents poor quality barcodes reaching the checkout
- Electronically archives inspection results
Dutch company Niverplast is one of the world's largest manufacturers of film packaging equipment for bag and box packaging of bread, meat, fish, liquids and non-food products. Bread packaging lines from Niverplast are equipped with machine vision technology from long term partner, Stemmer Imaging, for quality checking and counting to ensure that customers receive the correct quantities of perfectly formed bread rolls.

Pre-baked bread (such as rolls or baguettes) is automatically or manually transferred from the freezer to the packaging machine conveyor and passes through a metal detector. The first vision inspection station features a combination of line scan cameras from JAI, line lights and optics allowing up to 1300 mm wide conveyor belts to be covered. Dimensions such as length and width are recorded and analysed which ensures that torn or broken pieces of bread can be identified and automatically diverted from the packaging line. The system also checks parameters such as the grooves in the top of the baguettes to ensure these are correct.

Niverplast developed their own inspection software making use of tools in Stemmer Imaging’s Common Vision Blox image processing library, to allow the differentiation of the natural variations of the bread from genuine defects such as unwanted cuts or indentations or the beginning of a break or tear. The software also allows setting of the various measurement parameters according to the particular bread products being inspected and provides the flexibility to inspect products of any size and shape. In addition to supplying the optical components, Stemmer Imaging also provided the PCs and various cables used in the system and took responsibility for integrating the image processing software into Niverplast’s own graphical user interface.

An optional second vision-based counting station can be used to ensure that the correct quantity of product goes into each box or bag for final packaging.
Award-winning 3D vision technology designed to solve complex robot vision applications:

- Ideal for random 3D box picking
- Locates moving objects in 3D real time
- Advanced integrated laser & LED control
- Suitable for conveyor, pallet and crate picking

We deliver fast, accurate product picking vision technology for any industry. Compatible with the latest 3D version of Scorpion Vision Software, the 3D Stinger™ captures images, identifies and locates the product, sending the id and 3D locations to a picking robot in real-time.

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