UKIVA celebrates 25 years with major new event!

2017 sees the 25th anniversary of the UKIVA and what a time it has been! Back in 1992 the use of machine vision was very much in its infancy and the Association set out to educate industry about the benefits vision could bring. Since then the vision industry has taken on a life of its own with a myriad of technological developments that have transformed the vision landscape.

To celebrate this, the UKIVA's first ever Machine Vision Conference and Exhibition, held at the Arena MK (Milton Keynes, UK) on April 27th 2017, combines 50 educational vision seminars, 2 keynote addresses and an exhibition featuring over 45 of the world's leading companies operating in the field of vision to illustrate the extraordinary relevance that vision technology has to everyday life.

UKIVA
machine vision
conference
& EXHIBITION
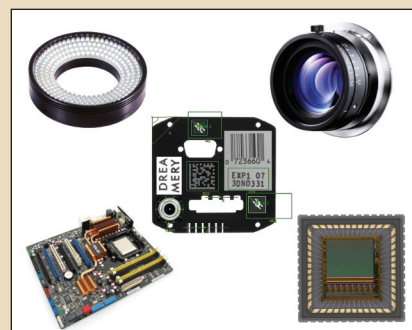
Vision makes a difference

Vision has been able to replace many traditional human inspection methods by making measurements faster and more reliable, while operating 24/7. It has expanded to encompass new applications, many of which did not exist in 1992. For example, household solar panels were not available, 2D Datamatrix codes were not in use and the use of traffic cameras was in its infancy.

Vision really has made a difference and we are going to examine this in more depth in a specially extended centre page feature. Meanwhile the Machine Vision Conference and Exhibition (www.machinevisionconference.co.uk) gives vision newcomers and experienced users alike an outstanding opportunity to explore the possibilities that vision offers.

Technology triumphs

There have been massive improvements in vision technology over the last 25 years. Major developments in **image sensors**, particularly in CMOS sensors, **processing power, image processing, LED illumination and control technology** and **optics** mean inspections can be carried out faster and at higher resolution. Just as important is the sheer range of applications that can be handled. **High resolution line scan** sensors have allowed high speed inspection of continuous materials such as textiles, paper etc.

Smart cameras and **embedded vision systems** have simplified single point inspections. The increase in processing power has also made **3D imaging** an affordable reality, with a choice of techniques including **3D smart systems**. In addition to this, the industry has developed a number of **machine vision data transmission standards** which allow cameras from any manufacturer using a particular standard to be interchangeable.

Advances in all areas of vision technology

FOREWORD by Paul Wilson

This is my first contribution to Vision in Action as Chairman of the UKIVA and it is a privilege to take over at the time of the Association's 25th anniversary. Many of our members have been involved in this industry through this entire period and I'd like to congratulate all those who have recently enjoyed or are about to celebrate milestones of their own.

These are particularly exciting times for the Association as our 25th anniversary coincides with our first Machine Vision Conference. This has been a major undertaking, since establishing an event such as this from scratch requires a concerted effort from many people. The Conference organising committee and the experienced team at the PPMA have worked very hard to make the event a reality.

I'd like to thank Ian Alderton, who has just stepped down as UKIVA Chairman after 2 years in the role. He has worked tirelessly during his tenure to help the Association move forward. I'd also like to congratulate Allan Anderson from Clearview Imaging who has taken over as Vice-Chairman for the next 2 years and welcome Alastair Slater from Allied Vision, Tim Irons from Dimaco and Chris Pitt from Stemmer Imaging who have joined the UKIVA committee. I'm sure that we will benefit from their insights and contributions.

While it is obviously too early to assess the full implications of Brexit for the UK vision market, it is certainly true that the weaker pound has led to price rises for many vision components. Nevertheless the VISION Show held in Stuttgart last November was bigger than ever with a strong attendance from the UK and we have been hugely encouraged by the response we have had by UKIVA members and non-members alike to participate in our Machine Vision Conference. Not only that but we have had to increase the space for the associated exhibition by 50% to accommodate the number of bookings we have received. There are plenty of indications that the vision market in the UK is still healthy and we enter the next 25 years for the UKIVA with a very positive outlook!

Paul Wilson, UKIVA Chairman

CONTENTS

www.ukiva.org

MEMBERS NEWS

UKIVA MACHINE VISION CONFERENCE EXCEEDS EXPECTATIONS

Many congratulations go to the team who has organised the UKIVA Machine Vision Conference and Exhibition at Arena MK on April 27th. The impressive conference programme (www.machinevisionconference.co.uk) begins with keynote addresses from Dr Mike Aldred from Dyson Ltd and Dr Graham Deacon from Ocado Technology. These illustrate how vision technology has relevance to everyday life such as household

UKIVA
machine vision conference
& EXHIBITION
27 April 2017
Arena MK, Milton Keynes, UK

cleaning and shopping. The main programme features 50 technical seminars across six individual presentation theatres covering a broad range of vision topics to provide plenty of interest to everyone. Machine vision basics through to the latest in vision technology, a plethora of imaging techniques and examples of the use of vision in industries ranging from agriculture to automotive add up to a programme to excite vision newcomers and experienced users alike. With the added bonus of over 45 of the industry's leading companies at the accompanying exhibition, the Conference is set to become a regular fixture in the vision calendar.

NEW UKIVA CHAIRMAN & VICE-CHAIRMAN

Paul Wilson, Managing Director of Scorpion Vision Ltd, has become the new Chairman of the UK Industrial Vision Association (UKIVA), taking over the reins from Ian Alderton. He had served 2 years as Vice-Chairman of the Association and will hold his new position for a further 2 years. Allan Anderson, Managing Director of Clearview Imaging, was elected as the new Vice-Chairman, again for a period of 2 years.

Paul has had a varied career in many areas of technology and IT which has taken him from providing flight technical support in the RAF through to machine vision. He established Scorpion Vision in 2006 and has grown it from a component sales business to a specialist machine vision integrator with a major interest in 3D imaging. Paul still finds time for the local community, having been involved with a local Sea Scout Group and in July this year is cycling from Basingstoke to Paris for charity!

UKIVA SEMINARS AT PHOTONEX

UKIVA will once again be offering a program of technical seminars at the Vision UK/Photonex exhibition. Photonex will take place on 11-12 October at the Ricoh Arena, Coventry.

www.ukiva.org

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

ACROVISION   www.acrovision.co.uk

The world's first multi smart camera vision system

The Cognex In-Sight VC200 from Acrovision is the only multi-camera system that gets faster as cameras are added since the processing power increases with each additional camera. For the first time, it is possible leverage the power of distributed vision processing with multiple smart cameras for high-performance applications. This improved performance helps keep pace with fast-moving production lines and provides flexibility.

The In-Sight VC200 multi smart camera vision system brings the proven reliability of standalone In-Sight vision systems to multi camera vision applications. Up to four In-Sight cameras can be easily attached to a controller for multi-view inspections in a manufacturing environment. Flexible multi smart camera triggering is possible. Data can be exchanged and results combined from multiple inspections. Modern, powerful, web-based human machine interfaces (HMIs) can be created for displaying images and results from all connected cameras with simultaneous, multi-user, platform-independent access to HMI.

Cognex In-Sight VC200

ALLIED VISION   www.alliedvision.com

Manta G-1236 with 12 Megapixel Sony CMOS sensor

Manta G-1236

The new high resolution Manta G-1236 camera is one of the first to feature the Sony IMX304 CMOS sensor with PregiusTM global shutter technology in a GigE Vision camera. With a resolution of 4112 x 3008 pixels, the sensor delivers unprecedented image quality with exceptional dynamic range, equalling or even outperforming comparable CCD sensors. The camera achieves up to 9.7 frames per second at full resolution. Higher frame rates are possible on smaller regions of interest.

The Manta G-1236 also benefits from the flexibility of the Manta platform. This includes a comprehensive feature set and a large variety of hardware options including Power over Ethernet, angled heads, optical filters, lens mounts, and a board-level variant for easy integration. In addition the camera is supported by all popular image-processing libraries.

ALRAD IMAGING   www.alrad.co.uk

EyeSens ColorInspect for precise colour inspection

The EVT EyeSens Color Inspect is a leading vision sensor for the inspection of colour-based quality characteristics. The integrated EyeVision software can verify coloured objects with high
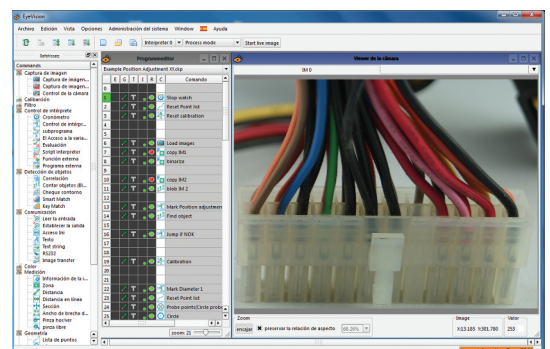
Inspection of multicore cables

accuracy at speeds up to 60 frames per second. The precise software can not only detect colour print errors, but also recognise missing components and assembly groups which do not match. Integrated LED illumination in the IP67-rated camera housing makes the camera suitable for harsh industrial environments.

Colour control is an important part of quality control processes in industries as varied as pharmaceutical, electronic, food and beverage, automotive, and print and paper. EyeVision software can detect small colour defects and also low contrast and contamination. Applications include checking lacquer in car body construction, checking the colour of metal parts in the automotive industry and checking the colour sequence and colour quality of multicore cables.

BAUMER   www.baumer.com

16 new VeriSens vision sensors increase productivity

VeriSens-500-700-800-models

The new VeriSens models 510, 700 and 800 of the XC, XF and ID series can double productivity in image-based quality inspection. Integrated Industrial Ethernet provides these vision sensors with the connectivity required by the Internet of Things.

The new models provide enhanced processing performance, cutting image processing time in half in many applications. This allows throughput to be doubled or twice as many feature checks in the same time, enhancing inspection scope. The new configurable VeriSens MultiViewer web interface allows viewing of up to 16 vision sensors simultaneously on one browser screen.

VeriSens vision sensors can perform up to 32 feature checks simultaneously including: presence and completeness checks, inspecting object positions, reading and evaluating imprints as plain text (OCR/OCV) and matrix and bar codes including GS1 codes. Sophisticated code reading algorithms improve reading reliability under industrial conditions.

FRAMOS   www.framos.co.uk

Small, versatile, power-saving Python 480 sensor from ON Semiconductor

ON Semiconductors' new small, power-effective Python 480 sensor is available from Framos. The new sensor offers outstanding benefits for use in industrial automation systems, robot vision, barcode scanner applications, and in the collision avoidance control of drones. Industry and product experts at Framos are available to support customers in integrating these new sensors in their applications and projects.
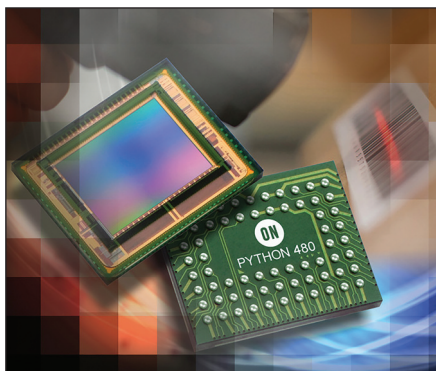
Python 480 sensor

The 1/3.6 inch SVGA CMOS image sensor with its large, highly-sensitive 4.8µm pixels, enables the capture of moving objects without any artefacts with single digit noise performance. It provides a high SVGA frame rate of 120fps with a compact CSP package and a small footprint. This allows a very small camera design and significant power saving, as well as battery-powered mobile operation. Up to four regions of interest can be programmed, enabling higher frame rates in these areas. A separate synchronisation channel containing payload information is provided to facilitate image reconstruction at the receiving end. The device provides High Speed Serial or Parallel CMOS Output.

PPMA SHOW

The PPMA Show will be taking place at the NEC on 26 -28 September 2017. With over 17% of visitors to the last PPMA show show having registered vision as being at least one of their interests, it comes as no surprise that many UKIVA members will be exhibiting again this year

NEW MEMBERS

UKIVA is delighted to welcome wenglor sensoric GmbH and FT System as new members.

Wenglor sensoric GmbH develops intelligent sensor technologies as well as safety and image processing systems with state-of-the-art communication standards for a variety of industries around the world. The product range includes vision sensors, OCR readers, smart cameras, image processing, illumination technology, 2D/3D sensors, and 1D/2D and barcode readers.

FT System works with its customers in the food & beverage, pharmaceutical, healthcare and industrial chemicals sectors to ensure the total quality of their products. Applications include shape, inspection of empty cans and bottles, cap quality, fill level control, cap closure inspection and code and label inspection.

UKIVA MEMBERS SHINE AT AWARDS

Two UKIVA members were in the spotlight at the PPMA Group Awards ceremony. Stemmer Imaging won the award for the 'Most Innovative Vision Project' for the supply and integration of 25 cameras on the Bloodhound Supersonic Car. Bloodhound SSC is a jet and rocket powered vehicle designed to reach 1000 mph for a new world land speed record attempt. Twenty five cameras are located at strategic points on the car. Forward facing cameras deliver live streamed video for broadcast purposes, while rear-facing cameras look at the output from the rocket and jet engine exhausts. Other cameras monitor critical engineering parameters such as the wheel-ground interface. In-cockpit cameras monitor controls and driver actions. One of the major challenges in the vision project is to achieve reliable live video transmission at speeds up to Bloodhound's target of 1000 mph.

In addition, Olmec-UK joined the team from Domino Printing Sciences on stage. A turnkey validated vision system from Olmec-UK is a core component of Domino's 'SerialTrac' serialisation solution which won the award for the 'Most Innovative Processing or Packaging Machine'.

www.ukiva.org

IDS IMAGING DEVELOPMENT SYSTEMS   www.ids-imaging.com

GigE Vision interface support added to IDS industrial camera range

The industry-standard GigE Vision interface is now available for the IDS second-generation GigE uEye CP and GigE uEye FA series of industrial cameras. IDS is the only camera manufacturer to offer users the choice between the GigE Vision global interface standard and the proprietary IDS Software Suite depending on the camera functionality most important to them.

IDS GigE Vision cameras are compatible with all machine vision software, and are ready for use immediately without software development kits or special drivers. Alternatively, the IDS Software Suite for Windows, Linux and Linux Embedded allows users to fully exploit many of the useful additional functions and features provided by the latest generation of image sensors such as long exposure, multi integration mode, line mode, higher pixel rate and many more.

GigE Vision uEye FA Industrial Cameras

INDUSTRIAL VISION SYSTEMS   www.industrialvision.co.uk

Industrial Vision Systems relocates to fulfill ambitious expansion plans

Industrial Vision Systems (IVS) has relocated into a new custom designed facility at the Harwell Science and Innovation Campus in Oxfordshire. This heralds a new phase of business with the company expecting double digit growth year on year over the next decade in machine vision and robotics on the manufacturing floor. Industry 4.0, flexible manufacturing and replacing unskilled labour have been identified as key drivers in this expanding industrial sector.

The new facility features state of the art engineering offices, research and development areas, dedicated sales office and training rooms in addition to the production floor, breakout areas and administration yet has room for further expansion. IVS has also invested in new demonstration equipment for the new demonstration facility including collaborative robots, automated inspection test rigs and vision inspection machinery demonstrations.

New Premises

LEUZE ELECTRONIC   www.leuze.co.uk

Looking around the corner

With the new industrial LCAM 408i IP camera from Leuze electronic, it is possible to see into areas which are not accessible by plant operators. Possible collisions are therefore avoided and troubleshooting simplified in case of failure.

The robust LCAM 408i IP camera with an IP65/67 metal housing and easy to clean glass pane is suitable for use in industrial environments. The 5 megapixel colour camera delivers live streams at high image quality via a Gigabit Ethernet interface. It is easily integrated into a machine or system control via M12 connections and 24V voltage supply. Diverse mounting options include using dovetail, threaded holes and an extensive range of mounting accessories. Configuration is carried out using a standard browser with images displayed via standard streaming tools. Additional software is not required.

LCAM 408i IP Camera

MATROX IMAGING   www.matrox.com

Matrox Design Assistant 5 simplifies use and adds a unique OCR tool

Matrox Design Assistant 5 software, the latest release of the flowchart-based integrated development environment will enable system integrators and machine builders to set up vision systems with less effort and greater confidence. It features a more image-centric approach to project configuration. Measurements are set up directly on the image itself, rather than through configuration panes. The update further streamlines flowchart creation by allowing the logic for specific events and actions to be placed in separate sub-flowcharts. A new, ready-to-go communication structure simplifies the interface between the vision system and a programmable logic/automation controller.
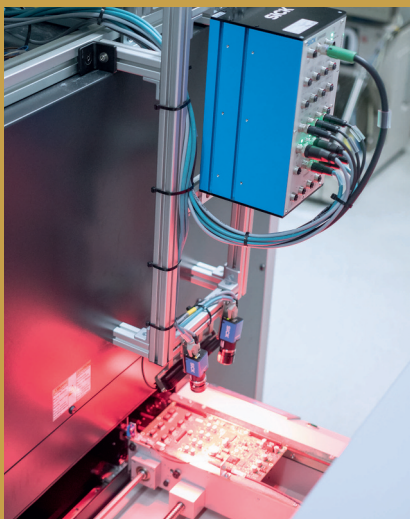

Design Assistant 5

www.ukiva.org

MEMBERS NEWS

Matrox Design Assistant 5 also integrates Matrox's SureDotOCR™ technology for reading challenging dot-matrix text as produced by industrial inkjet printers. This new flowchart step handles distorted and rotated text, on uneven backgrounds and under non-uniform illumination. The software is also available bundled with specific SKUs of the Matrox Iris GTR smart camera.

Multipix Celebrates 20th Anniversary

MULTIPIX   www.multipix.com

Multipix Imaging celebrate 20 years

2017 sees Multipix Imaging celebrate 20 years in business, successfully distributing Machine Vision components to the UK and Ireland. Multipix was formed in 1997 with the desire to promote machine vision to a wider audience and do whatever possible to influence the efficiency and competitiveness of manufacturing for UK companies. Twenty years on, machine vision has become widely accepted, not only in traditional production environments, but in many everyday aspects of life from travel, logistics, health and entertainment.

Today, Multipix Imaging continues to offer world-leading products, support and knowledge to an ever-increasing range of customers and applications. The company looks forward to an exciting future, as new technology continues to expand the horizon for vision solutions, while Multipix Imaging retains the original commitment to educate and support. The company is grateful to all suppliers and customers that have been an integral part of its success.

M12 lenses

SCORPION VISION   www.scorpionvision.co.uk

New M12 lens and lighting ranges available via Scorpion Vision's eCommerce platform

The high quality miniature macro to zoom S-Mount M12 lenses feature an M12x0.5mm thread. Compact and lightweight, the lenses are ideal for numerous applications across CCTV and sports action. M12 lenses are also being increasingly used for airborne drone activities such as wildlife filming and agricultural surveys as well as the hobby market. Additionally, cameras equipped with M12 lenses are becoming practical solutions for quality control, optical sorting, measurement and robot vision within the industrial automation sector.

To meet the need for reliable and constant lighting for machine vision tasks, Scorpion Vision now offers a complete range of entry level and more complex LED lighting accessories such as back lights, ring lights and lighting controllers. These affordable, high quality products are suited to a wide range of machine vision tasks such as image acquisition and evaluation of coloured pictures.

SIM4000 in action

SICK (UK) LTD   www.sick.co.uk

SIM4000 sensor integration machine for more than just vision applications

The SIM4000 sensor integration machine from SICK is a one-box, high-performance multi-technology sensor processor for cameras and other sensors. Part of the SICK AppSpace eco-system, it not only opens new doors for customised application solutions, but also enables advanced object transformation for quality control, process analysis, and predictive maintenance for vertical integration in Industry 4.0.

The programmable SIM4000 offers system integrators and OEMs the opportunity to develop applications to fit the customer's specific requirements. Alongside conventional, relevant image processing tasks, data from SICK sensors and cameras can be merged into a point cloud, evaluated, archived, and transmitted. 8-gigabit Ethernet interfaces are available for 2D or 3D cameras, and in some cases feature a voltage supply over Ethernet (PoE). Additional SICK sensors can be integrated via IO-Link to include distance and height measurement, for example.

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 you current inspection or sorting systems.

The wide choice of UNiiQA+ cameras offer a 'one-stop-shop' solution at multiple price points in order to accommodate any performance requirement and budget.

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

Having more than 10 years experience on this sector and international presence, they are experts in offering optimal solutions for many industrial vision applications.

Industrial image processing needs to be faster and productive. **MATRIX VISION** enables users and system integrators to implement very efficient solutions by means of a stand-alone smart mvBlueGEMINI system.

It combines highly intuitive software and modern hardware technology in an unprecedented manner.

NIT WiDy SWIR cameras incorporate ultra wide dynamic range InGaAs sensors which provide a high QE signal response in the 900nm to 1700nm SWIR range.

The cameras deliver > 140 dB dynamic range in a single image without any external control. QVGA and VGA models with USB2 or analog interface can be synchronised externally at up to 150fps. All cameras come with custom software.

ALRAD
IMAGING

T: 01635 30345   E: imaging@alrad.co.uk   W: www.alrad.co.uk   M: www.alrad.mobi

weCat3D Sensors   Dominance in 70 models

weCat3D highlights at a glance:

- For 2D and 3D object measurement
- Visual field width from 30 to 1300 mm in the X direction
- 3.6 to 12 million measuring points per second
- Minimum resolution: 2.0 μm in the Z direction
- 4 selectable laser classes (1, 2M, 3R, 3B)
- 2 selectable types of light (red, blue)
- Integrated CPU without additional controller
- GigE Vision standard, e.g. for incorporating Halcon or LabVIEW

- Open interfaces with DLL for customer software in C++, C# or Visual Basic
- Future-proof thanks to RS-422 TTL encoder and standard HTL encoder
- Ethernet TCP/IP as of 100 Mbit/s up to 1 GBit/s
- Intuitive OLED display and integrated, multilingual web server
- uniVision: configurable standard software

STEMMER IMAGING   www.stemmer-imaging.co.uk
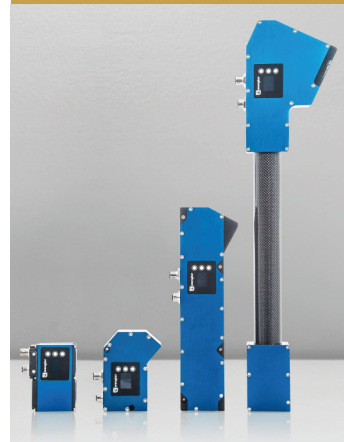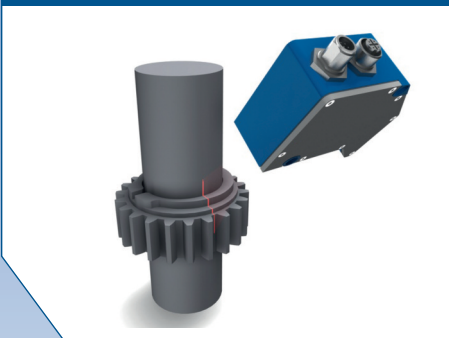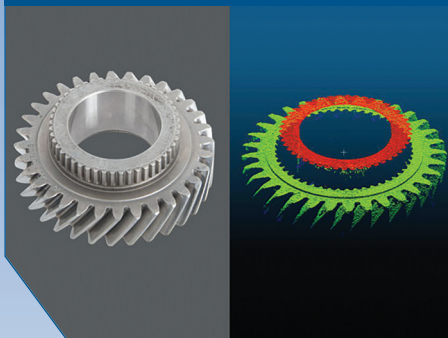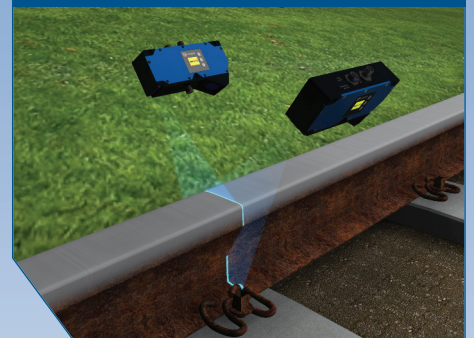
Opportunities to shine in the UK vision market

With the Stemmer Imaging Group enjoying an increase in turnover of nearly 10% in its last financial year, expansion in the UK continues to gather pace. In 2016 a dedicated UK Customer Centre was opened at the Tongham offices. This completely refurbished 2-storey building is the third to be acquired on the Tongham site.

Accompanying this has been the creation of 3 new positions in the UK sales force, including two Business Development Managers - one for End User Solutions and another for OEM Solutions. These would suit candidates with machine vision experience and a proven track record of supplying solutions to end users in factory automation and other similar markets, or winning OEM designs respectively. An additional Graduate Sales Engineer position provides a great opportunity to grow into a machine vision sales role, with time divided equally between learning about the technology, responding to incoming sales enquiries and driving new leads and opportunities into the business. A full list of vacancies can be found at: www.stemmer-imaging.co.uk/en/careers/.

UK Customer Centre

WENGLOR   www.wenglor.com

New weCat3D profile sensors

The new range of weCat3D Profile Sensors features more than 70 models. These offer a visual field width range of 30 to 1300mm in the horizontal X-axis and are available with laser classes (1, 2M, 3R, 3B) and a choice of red or blue light. The profile data collected can either be read out directly as measured values or used for rapid further processing of the point cloud.

The weCat3D MLWL scans up to 12 million measuring points per second, has an output rate of up to 6000 Hz, visual field widths from 30 to 1300mm and high resolution (down to 17 µm in X and 2.0 µm in Z). This extremely high resolution allows the detection of components in the micron range. Special algorithms ensure high quality measurements even on glossy, reflective surfaces such as metals. An extremely high dynamic range allows objects to be precisely measured almost independently of colour and brightness.

weCat3D range

MEMBERS DIRECTORY

VISION TECHNOLOGY PROVIDERS

ALLIED VISION
www.alliedvision.com T 0207 1934408
Allied Vision supplies camera technology and image capture solutions for industrial inspection, science, medicine, traffic monitoring and many more application areas in digital imaging.

ALRAD IMAGING
www.alrad.co.uk T 01635 30345
Alrad 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 LTD
www.baumer.com T 01793 783839
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 LTD
www.clearviewimaging.co.uk T 01844 217270
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 UK LTD
www.cognex.com T 0121 296 5163
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.

CREST SOLUTIONS
www.crestsolutions.ie T +353 (0) 21 452 47 67
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 ELECTRONICS LTD
www.framos.co.uk T 01276 404 140
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
www.ids-imaging.com T 011897 01704
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 LTD
www.ifm.com/uk T 020 8213 0000
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.

IMPERX INCORPORATED
www.imperx.com T +1 561 989 0006
Imperx, Inc. designs and manufactures high performance cameras, frame grabbers and industrial imaging systems for a variety of markets. Our multi-service brand is recognised for superior performance, reliability, and cutting-edge design.

LAMBDA PHOTOMETRICS LTD
www.lambdaphoto.co.uk T 01582 764334
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 GMBH
www.laetus.com T +49 6257 5009-0
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 LTD
www.leuze.co.uk T 01480 408500
Leuze electronic 'the sensor people' are the experts for sensors. They also specialise in smart cameras and identification products.

MATROX IMAGING
www.matrox.com/imaging T +1 514 822 6020
Matrox Imaging is a leading developer of hardware & software for machine vision and imaging technology.

MULTIPIX IMAGING
www.multipix.com T 01730 233332
The wide range of products offered includes frame grabbers, cameras, lenses and imaging software together with a highly experienced support service.

OMRON ELECTRONICS (UK) LTD
www.industrial.omron.co.uk/vision T 01908 258 258
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.

PYGSA SISTEMAS Y APLICACIONES S.L.
www.pygsa.es T +34 961 85 6867
Pygsa 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.

SCORPION VISION LTD
www.scorpionvision.co.uk T 01590 679 333
We sell and support Scorpion Vision 2D and 3D Compact Vision Systems for integrators and machine builders. We sell a range of imaging components thorough our webstore, many products in stock and available next day.

SICK (UK) LTD
www.sick.co.uk T 01727 831121
SICK manufacture and supply a complete range of Vision Systems & Solutions, including vision sensors, smart cameras, full 3D and colour multi-scanning systems. Just part of the SICK automation portfolio.

STEMMER IMAGING
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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.

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Innovative products for contactless recognition. Products: Photoelectric Sensors, Ultrasonic Sensors, Fluid Sensors, Inductive Proximity Switches, Vision Systems & Sensors, Laser Scanning and Safety Technology.

VISION SYSTEM INTEGRATORS & CONSULTANTS

ACROVISION LTD
www.acrovision.co.uk T 0845 337 0250
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.

BYTRONIC AUTOMATION LTD
www.bytronic.com T 01564 793174
Bytronic is the only Cognex Platinum Partner System Integrator in the UK. Bytronic are experts in machine vision, packaging verification, factory automation, MES solutions, manufacturing data management and more.

FISHER SMITH LLP
www.fishersmith.co.uk T 01933 625162
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.

INDUSTRIAL VISION SYSTEMS LTD
www.industrialvision.co.uk T 01865 823322
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 LTD
www.looptechnology.com T 01305 257108
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.

OLMEC-UK LTD
www.olmec-uk.com T 01652 631960
Specialists in product handling, controls automation and validation; Olmec deliver complete inline and stand-alone vision inspection into existing, new and OEM machinery processes.

PANTHER VISION LTD
www.panther-vision.co.uk T 01252 713285
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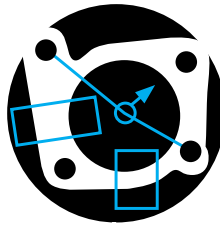100% inspection guaranteed

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VISION
IN ACTION

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Spring 2017 — Newsletter of the UK Industrial Vision Association

25 Years of Vision

In this special four-page feature, we take a look at how vision has become an essential enabling technology in a wide range of different markets over the past 25 years. Some of these are traditional markets and some are comparatively new, and there are many more that we don't have space to cover. Nevertheless, these show how vision touches almost everyone either through day-to-day activities or products we purchase. We are indebted to Allied Vision, Clearview Imaging, Dimaco, IDS Imaging Development Systems GmbH, Multipix Imaging, Olmec-UK, Omron, Scorpion Vision, Sick-UK and Stemmer Imaging for their extensive contributions to this special feature.

MEDICAL DIAGNOSTICS

Cameras are used in many areas in the medical diagnostics field, for example on optical microscopes used in diagnostic laboratories, blood analysers, endoscopes used for internal examinations and general imaging in the operating theatre. 3D imaging is used in many orthopaedic investigations. In recent years, the development of small, high resolution cameras including board level cameras using low cost consumer interfaces has helped medical OEMs create even higher-performance medical imaging systems.

Away from the medical centre

These compact cameras offer excellent performance with lower noise and high resolution. Connection to analysis processors is often through consumer interfaces such as USB2 and USB3. This has also allowed the development of equipment that is portable and affordable enough to be used away from a hospital or medical centre. This includes equipment for dermatology or diagnostic and cosmetic skin analysis, live blood analysis and ophthalmology. In addition, there has also been a move towards the use of embedded systems which makes the equipment even lower cost and more portable. In the developing world, for example, people are now able to have examinations, screening, diagnosis (and even treatment) in the field where none were possible before. In fact the equipment can be used in any remote area where it was too difficult or expensive for the patient to get to the hospital.

On the high street

There are also many examples of these types of camera being used in routine healthcare environments that might be found on any high street, such as the dentist or optician. Cameras on flexible probes allow dentists to keep records of patients' teeth over time to see if any changes have taken place between appointments. For spectacle wearers, routine eye inspections utilise these type of cameras. In addition they are used to in table-top systems to measure the position of an individual's eyes in a new spectacle frame for accurate positioning of the lens – especially important for varifocal lenses.
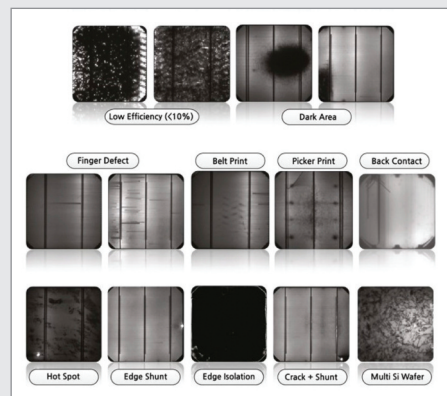

*Eye inspection -
Courtesy IDS*

SOLAR ENERGY

The solar energy market is one of the newest markets to benefit from vision. Solar power is a clean and attractive alternative source of electricity, so there has been an increasing demand for photovoltaic modules to be cheaper and become more efficient at solar energy conversion.

Solar cells are crystalline silicon devices and a variety of imaging techniques can be used during manufacture. Cell breakages resulting from micro-cracks, degradation and shunted areas on cells are proven to cause major problems and affect module performance. Many such defects can-

*Solar cell micro cracks and defects -
Courtesy Allied Vision*

not be observed with conventional imaging systems. However a measurement method known as the Electroluminescence (EL) imaging is providing a solution.

Electroluminescence imaging

EL imaging consists of applying a direct current to the solar module and measuring the photoemission using an NIR camera. The system is able to accurately detect numerous failures and ageing effects in very short times. Based on the severity of the defects, the cell will either be accepted or rejected. In addition, the amount of light a cell generates for a given applied current can also serve as a measure of the solar cell's conversion efficiency.

Edge isolation

Edge isolation is used to provide electrical separation between the active front side of a solar cell and the rear side. In the edge isolation process, a laser cuts a small groove along the cell edges, the depth of the groove depending on the cell doping. The groove needs to be positioned as close as possible to the outer contour of the cell in order to maximise the active surface and thus the efficiency. By using a line scan camera and customised LED illumination to measure the outer contours of the cell and feed them back to the control system of the laser, the edge cutting can be carried out automatically to within preset tolerances.

AUTOMOTIVE

Vision drives quality

Vision can benefit the entire automotive supply chain from parts and components, including major subsystems, to automotive manufacture itself. This sector is one of the most demanding in terms of product quality and aversion to component failures. The ability of vision to both measure and classify helps the modern quality inspection approach of differentiating between critical and non-critical defects – those that affect the functionality of the object and those that do not. Although the integration of vision technology into complex 24/7 manufacturing processes can pose many practical challenges, the return on investment timescales for industrial vision systems are very short, especially when the costs associated with product recalls is taken into consideration.

Components and assemblies

Inspection continues to be one of the most importance uses of vision in this industry, ensuring the quality of components ranging from engines, drives, and chassis components to safety-relevant parts such as brakes, steering, airbags and seat belts. 3D imaging has many applications such as measuring flush and gap alignment when vehicle doors are fitted. A multitude of electronic components including cable tracks, switches and displays can be inspected with machine vision during production. Elsewhere in the assembly process, machine vision can be used for robot guidance to position and bond windscreens or other guidance tasks such as fitting of doors.
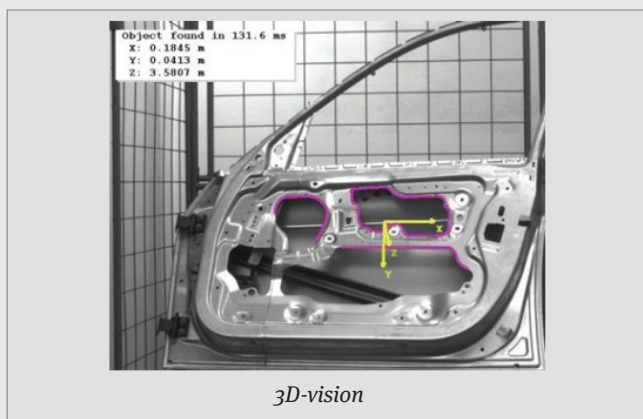
3D-vision

Raw materials

Vision is also used in the inspection, classification and selection of raw materials. Specific lighting techniques or structured lighting can be used to help expose any typical defects to ensure that defect-free raw metal sheets are used for visible parts of the bodywork. Metal that has been classified as structurally sound but contains blemishes, can be used on non-visible parts of the vehicle.

Other applications

Beyond the manufacturing phase, code readers can track vehicle shipments and optical character recognition systems can read the VIN (vehicle identification numbers) and number plates. High-speed vision systems enable accurate analysis of vehicle behaviour in crash tests to help reduce the impact on passengers in accidents. In car use of vision technology can include parking aids and collision avoidance systems. Perhaps one of the most interesting new applications of vision is its use in autonomous vehicles. And finally, when vehicles reach their end of life and need to be recycled, vision technology is responsible for reliably identifying and separating materials and routing them to the appropriate recycling stations.
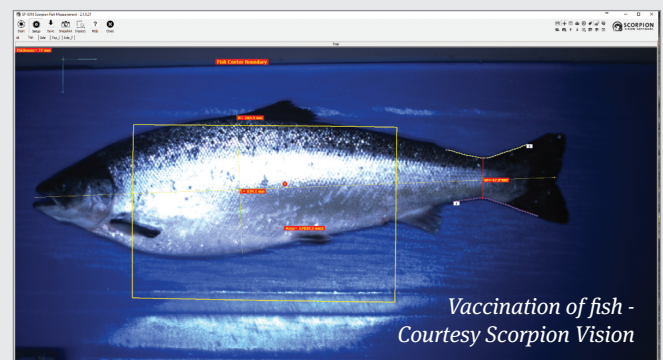
FOOD

Getting things right

Vision technology can offer food manufacturers a competitive advantage. It opens up possibilities in quality assurance that were previously impossible to implement, including inspection of the food product itself, inspection of food packaging integrity to avoid premature spoilage and inspecting food labelling for accuracy. Newer technologies such as hyperspectral imaging are likely to have a big impact in the future.

Controlling the product

Vision can be used in the processing of virtually any food, living, grown or manufactured. In almost every case it is carrying out previously labour-intensive tasks as diverse as the vaccination of live fish to the checking of pizza for shape, size, edge defects, holes, and the presence and distribution of the correct toppings, using both 2D and 3D imaging. Vision can also be integrated into slicing equipment for portion control for products such as bacon, cheese and ham in order to maximise the on-weight percentages and minimise giveaway.

Vaccination of fish - Courtesy Scorpion Vision

Sustainability

Sustainability is a critical aspect concerning food producers in the UK today. A report by WRAP (Waste and Resources Action Programme) has estimated that up to 480,000 tonnes of food is wasted in the UK each year because of poor seals in packaging. Up to 24% of all packs are "at risk of failure" yet only 1% were detected in the factory using conventional means. Not only is this food wasted, but its carbon footprint is made worse by having to be then transported for disposal. Vision can be combined with existing methods to radically improve the detection of poor seals. For example, thermoformed and top sealed trays can be pressure-tested for integrity. However if food has become trapped in the seal itself, the pack may pass that test but leak later as the trapped food dries and shrinks. Vision systems can be used to identify packs with food trapped in the seals.

Food labelling

The correct labelling is vitally important for the consumer with regards to allergen information, 'use-by' dates and other data such as price, weight, country of origin etc. With the costly penalties imposed by supermarkets for incorrectly labelled and presented products, there are signs that the food industry will follow the pharmaceutical industry in terms of traceability. Here, however, the entire label needs to be verified. This includes the artwork, any promotional 'flashes' as well as 1D/2D barcode verification, overprinted coding, date and time verification and printed text verification. The need for 100% inspection makes vision essential essential and a vision system can yield a very quick return on investment.

PACKAGING

Safety first

The importance of label inspection and code reading have been covered in the 'Food' and 'Pharmaceutical' sections. Other packaging applications can range from checking the packaging materials and the packaging themselves for defects to checking fill levels and the integrity of the final packaging for product purity and shelf-life considerations. Examples include the orientation of bottle lids, the integrity of seams in cans and the presence of foil seals in container lids which will ultimately be heat sealed onto the neck of the container.

Developing techniques

Many emerging techniques have facilitated packaging inspection. Smart cameras can be programmed for individual inspections and decision-making anywhere on the packaging line. Thermal imaging cameras can be used to check the correct application of hot-melt glue for cardboard carton assembly. NIR imaging makes it possible to image the contents through some packaging materials at the same time as inspecting the print on the packaging itself. Hyperspectral imaging is a new technique that can inspect the contents of packaging.

The impact of 3D imaging

From its early beginnings, 3D vision required specialist programming expertise to take the raw data output and configure it for different factory control networks. Huge amounts of expensive processing power and bulky equipment were needed. Now, with advances in embedded, smart technologies, 3D is affordable and accessible to many without specialist skills. Instead of a camera or lasers that need complex configuration with a separate PC, new 'intelligent' sensors offer all-in-one vision solutions. However, that does not mean that we have arrived at "one size fits all" in 3D vision. Instead, from high-performance cameras, advanced colour, 3D measurement and multi-scanning technology through to stand-alone programmable sensors, we have reached a continuum of choice. With a solution for every application, the challenge now is to match the best technology to the process.
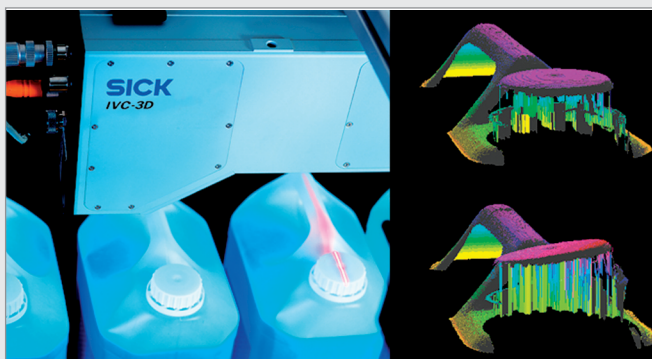
3-D container lid inspection - Courtesy Sick UK

Applications include checking the contents, content, number and fill of a container. This is useful for products such as chocolates or biscuits in compartmented containers. Not only is the absence of an item noted, the insertion of a damaged or wrong item can also be flagged up. Overfill levels can be a problem, for example where totes, bags and tubs which must meet a safe carrying weight limit or allow safe stacking, or food products such as meat are over-height and filling would interfere with sealing the plastic film cover correctly. Checking the orientation of products like shampoo bottles prior to shrink wrapping can avoid awkward shaped packing that does not fit into outer cartons, resulting in waste and downtime.

PHARMACEUTICAL

The packaging revolution

Whilst there are many applications for vision in the pharmaceutical industry throughout the manufacturing process, more recently there has been a lot of developments with regard to packaging inspection. Packs are no longer merely transport or storage boxes. They are dispensers, information sources, functional extensions of the product and even lifestyle accessories. For optical inspection systems, the resulting requirements are for more pack-specific data and a growing need for high-density code verification and image-based quality inspection on high-speed lines.

The packaging challenge

Mis-labelled products not only present a tangible threat to public safety but have major implications with respect to damage to the pharmaceutical company's brand and reputation. Since considerable costs can be associated with recall notification, product retrieval and liability, the overall effect on the finances and credibility of a business during and post recall can be significant. For example, cartons inadvertently packed with the incorrect patient information leaflet can result in a product recall. Integrating a vision system into a packaging line goes a long way to eliminating such errors. There are also many logistics and quality control strategies, such as the EU's Falsified Medicines Directive – the FMD (2011/62/EU) – or the Good Manufacturing Practice (GMP) Annex 1-121. GMP Annex 1-121 requires a check on the plug position on vials. Pharmaceuticals manufacturers have only until this year to comply with the FMD by printing serialised 2D codes on each pack.

Serialisation

These serialised 2D codes will provide traceability from the point of sale back to manufacture. This will allow product authenticity to be checked at any point in the supply chain to reduce counterfeiting of pharmaceutical products. Serialisation requires that the packs are labelled, the labels verified by machine vision and all data passed upstream to the appropriate place, and all at production line speeds. A number of companies have implemented solutions for the inspection of serialised codes. In the past, inline inspection was a compromise between speed, precision, functionality, ease-of-use and cost. That is changing. New, fast pattern-matching capabilities mean image processing speeds are increased and errors reduced. New algorithms address the effects of machine vibration and changing light conditions. They allow fast processing of multi-camera and high-resolution inspections and simplify finding optimal image processing parameters.

Interestingly, the tobacco industry has also begun to introduce serialised 2D verification for its so-called 'dot codes'. Although the verification of alphanumeric codes – such as date and lot codes – remains standard, many printed promotions have started to use 2D codes.

The 2d DataMatrix forms a part of serialisation - Courtesy Omron

SPORT

## Vision now integral to professional sport

Any follower of sport on TV would at the very least expect 'slow motion replay' and multiple angle view analysis of key action sequences. However, vision technology is now used extensively by sports officials, coaches, developers and amateur performers alike. Applications fall into 3 main categories: tracking the trajectories of moving items, such as balls and people, high-speed imaging to allow frame by frame motion analysis and the use of infra-red imaging to reveal information that could not be obtained from conventional cameras.

Geometrical systems

Ball tracking systems such as 'Hawk-Eye' (part of Sony) are used extensively in many sports including international tennis, cricket and football, to help the officials verify borderline decisions. The system uses a number of cameras at key locations around the particular arena to track the movement of the ball and a sophisticated image processing system calculates the trajectory of the ball relative to the particular playing area. Other examples include the tracking of a player's movement during football matches for analysis. The systems monitor the position coordinates for every player, the ball and the referee at all times during the game to allow calculation of players' total running performance including average and maximum speeds, number and intensity of sprints and the distance covered, allowing the production of so-called 'heat maps'. A very recent application is a vision based scoring system in a social darts environment using multiple cameras and 3D fitting algorithms to measure the precise position and score of the dart in the board.

High Speed Analysis

High frame rate and high resolution imaging allow complex movements to be filmed and slowed down for analysis. Applications include analysis of racehorses in motion, the analysis of athletes' techniques for sports science and the analysis of golf swings both for professionals and amateurs.
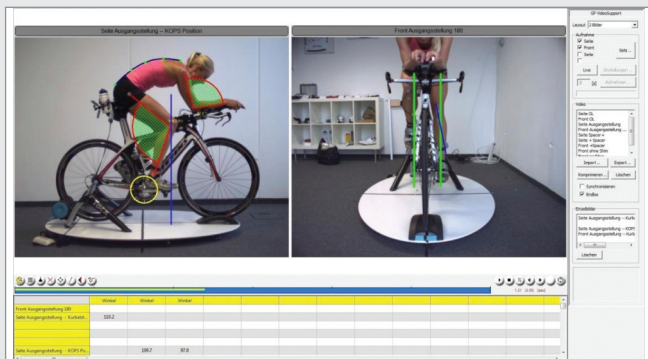
Cycling posture analysis - Courtesy IDS

Infrared imaging

In cricket, a system called 'Hot Spot' uses infrared cameras to help adjudicate disputed catches since the impact of the ball against bat results in a localised heat spot, which appears bright on the IR image. Infrared cameras have been used in the development of ventilation and cooling systems in athletics footwear. Infrared technology can reveal the thermal performance of Formula 1 tyres under race conditions and in different weathers. It can also be used to provide a detailed understanding of how the complex materials used in disc brakes react under load and how heat is dissipated in exhaust systems.

TRAFFIC & TRANSPORT

Keeping us moving

An area that now benefits from vision, that affects us all, is transportation and traffic. Monitoring of traffic and in particular Automatic Number Plate Recognition (ANPR), has changed the face of our roads, but there has also been considerable use in railway applications.

Controlling traffic

Traffic applications are many and varied and can include ANPR, toll booth control, multi-lane monitoring, automatic toll licence validation, red light violation, traffic enforcement systems, vehicle recognition and identification, vehicle occupancy and speed monitoring. Although many will comment on speed detection, ANPR is actually greatly increasing the effectiveness of our homeland security with image data, networked throughout the UK, to detect or find vehicles of interest. This wide range of applications have been made possible by developments in lighting and lighting control technology, the versatility in functionality and triggering offered by modern image sensors and sophisticated software. In particular, high dynamic range cameras are available which can provide more than 1000x the dynamic range of conventional sensors. These cameras can produce high quality images of moving objects in widely varying lighting conditions, for example in the open air where the sun may come in and out at random times, underground car parks, tunnels or traffic monitoring at night (for example checking registration number plates without interference from the vehicle headlights). Cameras can accept trigger signals from motion detectors, barriers being raised, pressure sensors etc. A wide choice of image sensors allow the most suitable resolution to be chosen for the application. For example, resolution choice could be influenced by the field of view necessary, such as the number of traffic lanes to be covered, different sizes of number plates etc. Line scan technology is also used in vehicle inspection applications such as high integrity under vehicle surveillance. This can be used at airports, prisons, border control, and other high security facilities to detect foreign objects such as explosives hidden under vehicles.

Keeping on track

There are many examples of the use of vision technology on the railways both trackside and mounted on the trains themselves, even though the operational conditions are demanding. Cameras and imaging systems can be exposed to extremes of weather, vibration and physical wear. Line scan technology is being used to inspect the rails, sleepers and ballast for early detection of failure at speeds over 100 MPH, to a resolution of 0.8mm. Used in conjunction with cutting-edge pattern recognition software, this can automate the detection of track defects to help increase the safety of the railway network in a way that was previously impossible.

104 industrial camera assemblies on London Underground passenger trains check the condition of the wheel/rail interface and the track - Courtesy Stemmer Imaging

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Reading etched identifiers on automotive exhausts

Tenneco are global leaders in developing clean air and ride performance solutions to the global automotive industry. They supply car exhausts to customers, with each part containing a DAM (Reference) and Model number marked with an "Impact marker". These two identifiers are used to fulfil the requirements of the Critical Character Identification (CCID) initiative, implemented globally by the automotive industry, which provides traceability for all these components from "the cradle to the grave". A vision system was required to check the required information on all the parts and help enhance readability and accuracy. Two different components on the exhaust were marked. One part was flat and the other was cylindrical. In addition, the exhaust is manufactured from reflective material which presents significant challenges with regards to getting the correct illumination needed to obtain consistent images.

After comprehensive discussions with Tenneco and a full evaluation, Acrovision used a combination of Cognex camera models and specified the relevant lighting techniques to check that all components on exhausts were marked correctly. The camera system communicates with the machine's PLC to pass or fail parts, with live images of the camera inspections being displayed on a Cognex Vision View 900 HMI. Working with Tenneco and their machine builders, the system was integrated successfully into the work stations using modular lighting for the resonator which was changeable with a part tool change. The solution was designed to ensure the time to change jobs for new part variations was kept to a minimum. Polarised filters were also used to take away the shiny glare from the images, which would normally make the task of reading the codes more difficult.

The implementation of the Cognex Vision View 900 resulted in a successful, robust solution with extremely high first-read-rate success. This has led to over 20 vision systems being installed over the two Tenneco sites in South Wales.
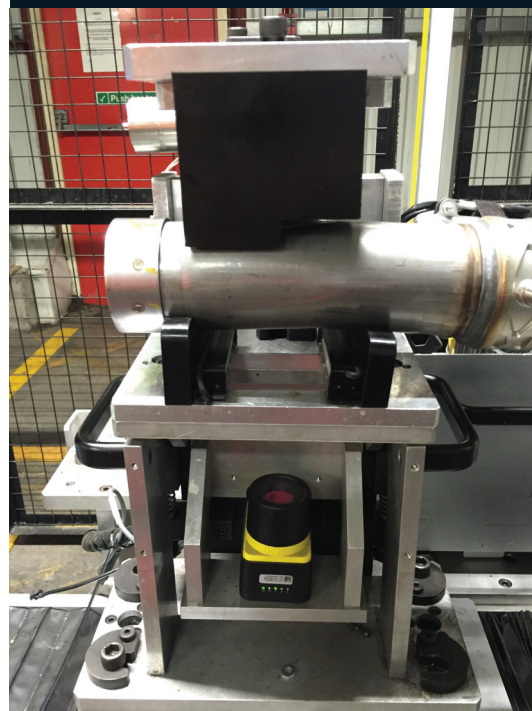
Reading etched codes on automobile exhausts

Photovoltaic Module In-Line Inspection
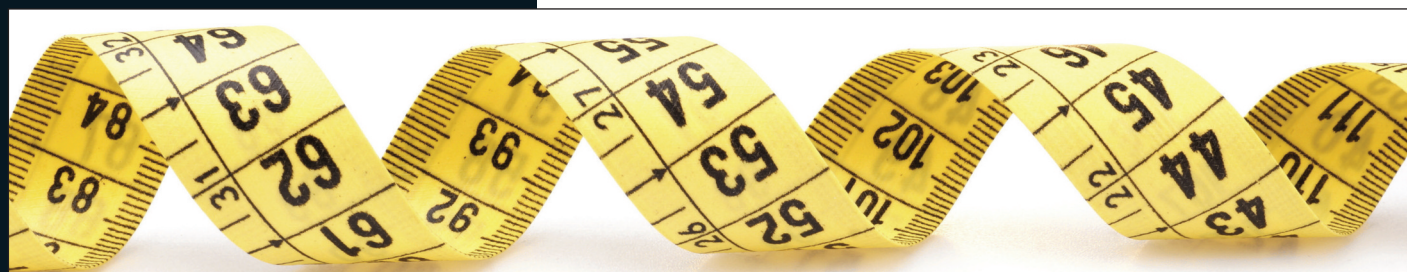
Photovoltaic module inspection systems

Structural defects in solar cells such as micro-cracks, degradation and shunted areas may stem from challenges in silicon processing, the quality of crystalline lattices or other external influences. DISSEM, Allied Vision's partner in Korea, helped leading providers of solar cell inspection systems develop a cost-efficient imaging solution based on electroluminescence in the near-infrared spectrum. Many defects cannot be visually observed with conventional imaging systems. However, Electroluminescence (EL) Imaging can accurately detect numerous failures and ageing effects in both crystalline and thin film solar modules. EL imaging consists of applying a direct current to the solar module and measuring the photoemission by means of an infrared-sensitive camera. Since these emissions are very weak, extremely sensitive cameras are required. Good software is also required to study the image for dark defects, uniformity and overall efficiency of the cell. Based on the severity of the defects, the cell will either be accepted or rejected. Multiple cameras are utilised in an enclosure free from ambient light.

Photovoltaic module inspection is carried out in a specific wavelength range of 950-1250nm. The camera must have the ability to precisely render the whole panel in a single exposure with the required resolution for easy detection of broken contacts, and the sensitivity needed to detect varying but weak emissions. The Manta G-145B Near-Infrared (NIR) is equipped with a CCD image sensor with good responsivity in the NIR region, delivering 20~30% QE at 900nm, low read noise and down to sub-second frame read out. It is capable of detecting shunts, crystalline defects and broken finger electrodes both before and after the lamination process. The favourable and affordable price of the Manta camera was a key factor in the customer choosing this camera for their PV Module Inspection System. In addition, Allied Vision's VIMBA Software Development Kit is intuitive and simple to use, making it efficient and convenient during the whole set-up.

For particularly demanding photovoltaic inspection applications, Allied Vision's Goldeye camera series offer a more advanced solution. Goldeye is a short-wave infrared camera with a maximal sensitivity between 900 and 1,700 nm, which makes it an ideal solution to detect weaker electroluminescent emissions at higher wavelengths.

Food producer satisfies the latest industry requirements for proof of origin

Barcode readers are increasingly being used in the food industry for the automated identification, tracking and tracing of products for clear proof of origin. Until recently, consumers were often left in the dark as to the precise origin of food such as fruit and vegetables. Surveys show, however, that over 60 percent of customers would like to buy food from their own region. Cognex has helped food producer, Hengstenberg, implement an efficient track and trace solution at its Bad Friedrichshall site using the DataMan 302 barcode reader. This allows pickled gherkins bearing the mark of quality "Produced in Germany" to be traced all the way back to the respective grower. Hengstenberg sees the automation of its processes as a means of efficiently meeting the ever stricter requirements of its customers with regard to transparency and proof of origin.

At the beginning of the production chain, the DataMan 302 is used to detect and read the labels found on the containers containing the classified batches of gherkins. As soon as the manufacturer and product data read has been verified successfully, the gherkins enter downstream production. Long-term storage of the data enables Hengstenberg to trace back the batches even after a period of years to the respective field and grower.

The fixed-mount DataMan 302 barcode readers feature integrated and controllable lighting as well as a liquid lens with adjustable focus to enable the optimum setting of working distance, depth of field and field of view in order to achieve the best-possible read rates. An intelligent auto-tuning function automatically selects the optimum settings for the integrated lighting, autofocus and imager. The patented Cognex Hotbars image analysis technology allows reliable reading of damaged, distorted, blurred and low-contrast codes and information to be transferred to the controller.


Tracking gherkins at Hengstenberg

Vision inspection checks the presence of bottle and leaflet in Pharma cartons

Crest Solutions has installed a vision system on a fully automated bottle packaging line for a major global pharmaceutical company. This system is designed to check the completeness of a pack, which in this case consists of a carton containing a bottle and a leaflet. The client already had a sensor in place to ensure that packs were complete when they reached the end of the packaging line. However following a number of false passes using this method, it became clear that a more thorough system was required in order to safeguard against the risk of incomplete packs entering the marketplace. Although the option of a check weighing system was considered, a vision system was selected as the most cost-effective and efficient solution.

The vision system needed to accommodate a number of variable factors during the packaging process. For example, carton sizes, bottle sizes and leaflets on the line would be different from from batch to batch, and it is possible that batch changeover could take place on the line multiple times in a single day. In addition, the carton flaps were sometimes damaged or could be in a position where they could be falsely detected as a leaflet. The leaflet itself could be in a variety of locations within the carton, depending on where it is placed by the leaflet inserter.

An integrated vision system was designed utilising an external CSS bar light and a Cognex Insight 7000 camera. By inspecting for the carton flap in advance of inspecting for the bottle and leaflet, the system eliminates the possibility of the carton flap being falsely detected as a leaflet within the carton. A variety of inspection tools including blobs, patterns and edge tools are used in order to detect the bottle and leaflet. The result of the inspection is presented as a pass or fail. In the final testing phase, a run of 20,000 products through the system resulted in zero false passes. Following installation and validation of the system in accordance with 21 CFR Part 11 requirements, the system now detects closed or damaged carton flaps, leaflet presence, bottle presence and bottle skew, ensuring that the packs leaving the line are complete and ready for market.
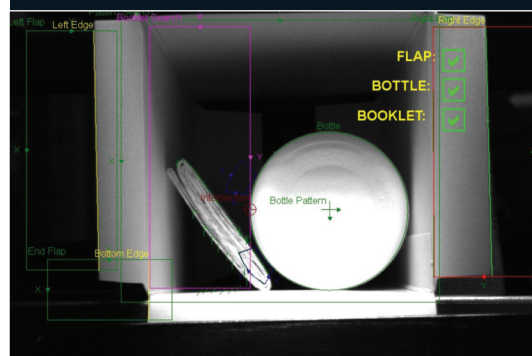
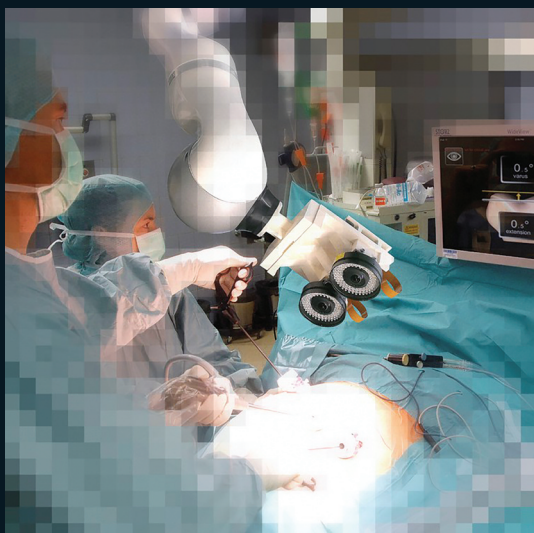*Checking pharmaceutical pack contents*

APPLICATION ARTICLES

Photo sensor technology

Photo sensor technology accelerates medical diagnostics

Many measurements in medicine are made using optical imaging so photo sensor technology is particularly important. The MT9V024 ON Semiconductor image sensor, available from Framos, satisfies medical engineering requirements both in terms of performance and availability since the manufacturer guarantees that the sensors will be available for ten years. Photo sensor technology can also be used to avoid errors when processing a medical sample. It can clearly identify samples marked with a QR code or a bar code, ensuring consistent and correct patient allocation.

Image sensors can even compensate for user errors. For example, they are used extensively in test strip analysers. If a test strip is not fully wetted with the liquid to be tested, this can be adjusted. If the wetted part is big enough, only information from the "acceptable" portion of the image is used. If the surface area is insufficient for a meaningful measurement, an error message is sent instead of an invalid result. Image recognition thus saves time and sample materials, which directly benefits both the patient and the doctor. It replaces manual optical reading, which in turn makes the measurement easier to use, more precise and more reliable because it can now be reproduced regardless of the user's disposition on the day or the light conditions at different times of the day.

The availability of such compact, high performance, low power consumption sensors makes them ideally suited for portable or mobile devices that could be used 'in the field', as well as at a doctor's surgery or in a hospital. This can allow a patient's key health data to be determined in a partially automated manner with great accuracy and reliability in a short space of time without the need for a laboratory test. Diagnosis be made quicker, and treatment can start sooner and has a greater chance of success. In addition, because every second counts when a diagnosis requires an immediate response, image sensors can even save lives. Due to the sensor's linearity all of the measured values recorded by identical devices can be compared with one another. The automation of measuring devices reduces the total cost of performing key medical readings, while the long availability guarantees that a defective device can be repaired or replaced as quickly as possible.

Norcott FAI system

Right first time for PCB assembly

Getting the correct components in the right place is crucial for SMT PCB assembly. Contract PCB assembler, Norcott Technologies, are using USB 3.0 camera technology in a new, custom-built First Article Inspection (FAI) system to help automate the PCB inspection process. FAI allows a final check that the correct component is in the correct position on the board before the board goes for soldering. It ensures that the expected output conforms to the customer's qualified process during normal production.

FAI is essentially a manual inspection process, but with boards containing hundreds of components, locating every component by eye and comparing it to the customer's Bill of Materials (BOM) is extremely time consuming, tedious and prone to error. Automating this process using vision technology allows the presence, positioning and identity of SMT components to be checked by directly referencing the BOM improving accuracy and saving time.. As the check is done before reflow, the inspection is non-destructive thereby increasing efficiency and 1st time pass rate.

The new FAI system uses a high resolution 5 Mpixel UI-3580CP USB 3.0 colour camera from IDS, equipped with high quality optics. This is mounted on a motorised XY platform to allow 1st off inspections to be performed under high magnification. The versatile camera links into Norcott's bespoke wpf.net application software using the uEye API, which is part of the IDS Software Development Kit supplied with all IDS cameras. PCBs for inspection are populated with the components held in the correct location on the board using solder paste.

As each component is called up on the BOM, the camera is automatically driven to the correct location for inspection. The camera system produces a 50mm square field of view at a resolution capable of imaging even 0201 components. A zoom function is provided if higher magnification is required. The bespoke software facilitates a myriad

of information to be displayed in real-time so each component can be checked visually for presence, positioning, orientation, part-marking, polarity and many other parameters. Boards that pass the inspection then progress for soldering. If there is any discrepancy between the board and the BOM, the software can save a high-resolution copy of the component image to a shared folder for Norcott's team of engineers to validate.

Carpet gap hider workstation

RNA AUTOMATION　　　　　　　　**www.rnaautomation.com**

Carpet gap hider 'Poka-Yoke' inspection station

RNA has designed and built a bespoke workstation, applying Poka-Yoke (also called mistake proofing) requirements to prevent the human errors that result in product defects. Poka-Yoke is a quality assurance technique intended to eliminate product defects by preventing, correcting or drawing attention to human errors as they occur. Its objective is to achieve zero defects. The workstation was designed to ensure the application of the correct label to the correct carpet gap hider product, since there are two types of product that are very similar to each other, both in size and in colour. Manual execution of the task required a high concentration from the worker, and was the cause of many errors,

The workstation frame features a Poka-Yoke clamp and a Poka-Yoke vision sensor, part presence sensing and a scanner and printer as well as an HMI and system control. The operator loads the LH or RH Carpet Gap Hider into the formed nest and activates the component locking clamps. At the start of each batch, the operator will scan the barcode that indicates the correct product colour for that particular batch (batch size can vary). The vision sensor checks the product and if it is correct, the machine will print off the correct label. The operator can then lower a mechanical guide onto the component to allow the operator to apply the label in the correct position on the component. The clamps will be released and the part can be removed from the fixture ready to load the next component. If the product does not match the build requirements the clamps will remain locked and the HMI will request a supervisor to attend. The Poka-Yoke designed workstation helps workers to be 'right first time', enhancing the quality and overall output of the process.

Hyperspectral imaging reveals blister pack contents
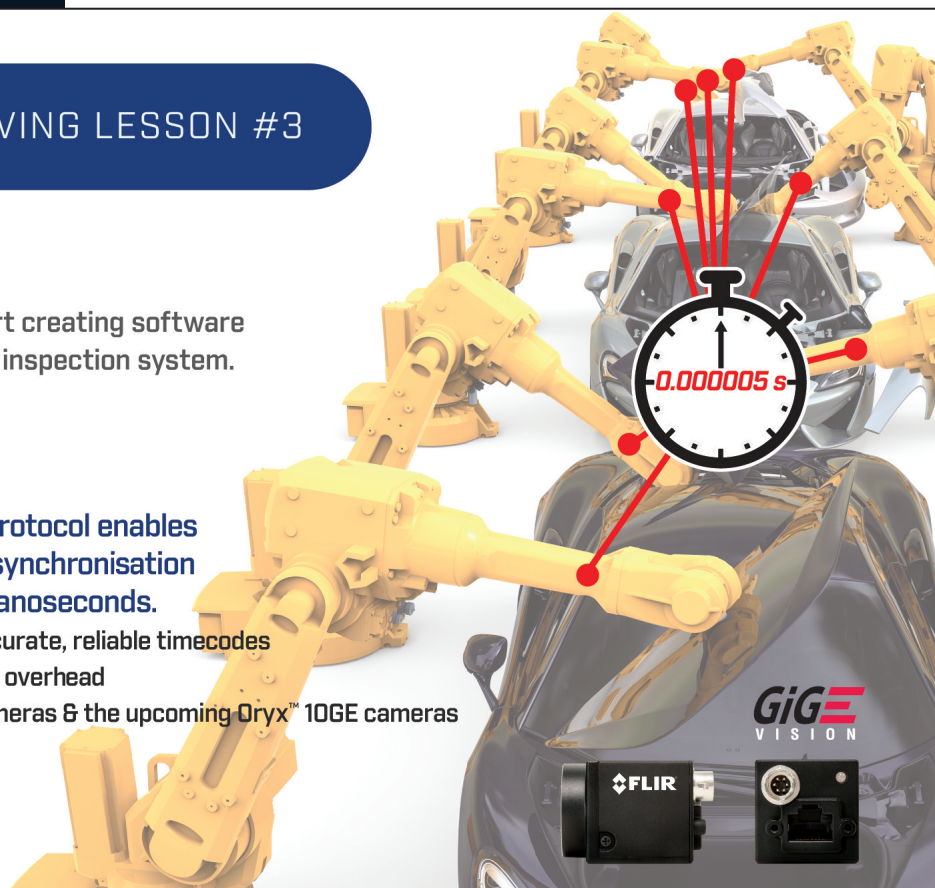
A hyperspectral imaging system from Stemmer Imaging has been used to inspect blister packs to ensure that they are fully populated with the correct tablets. This application makes use of the fact that a lot of packaging material is transparent to infrared light meaning that the technique can be used to examine product inside its packaging. Organic materials selectively absorb infrared light at different wavelengths depending on their composition. This gives distinctive 'fingerprints' which can be used to uniquely identify them. Hyperspectral imaging is a novel imaging approach that utilises spectral information to reveal things that traditional machine vision cannot show – namely the chemical composition of organic materials.
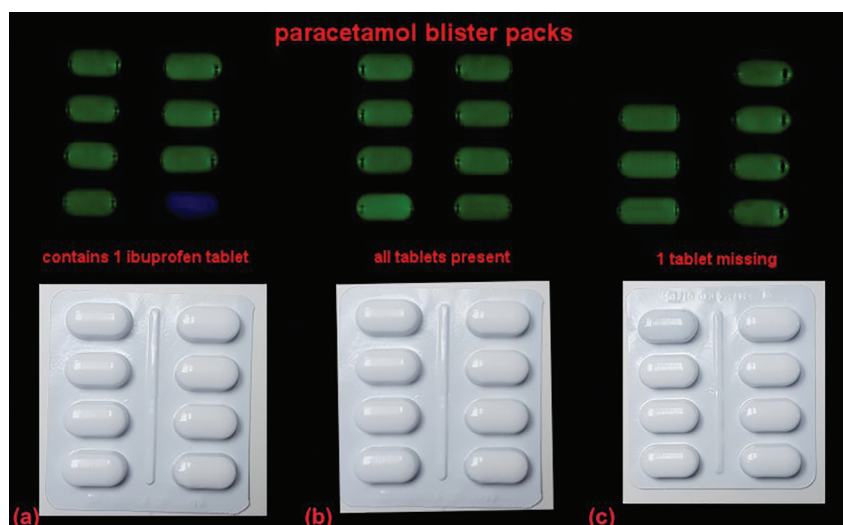
Hyperspectral imaging of paracetamol blister packs

The 'chemical colour imaging' approach used here produces an image where the contents are colour coded according to their chemical composition, making it possible to differentiate between different materials. Looking at the images of the blister packs shown here, paracetamol is colour-coded green, while ibroprufen is colour-coded blue. The images clearly show a pack fully populated with paracetamol tablets, one with a tablet missing, and, crucially, one containing a rogue ibuprofen tablet. Cross contamination in a pharmaceutical packing line could have potentially life-threatening consequences for the patient. The implications for the manufacturer could also be massive, both in terms of reputation and in terms of costly product recalls, and possible production line closure while the problem is investigated.

Stemmer Imaging has developed a complete, modular hyperspectral imaging system for traditional machine vision users, consisting of all the hardware and software needed and which was used in this application. A spectrograph allows the reflected light from the sample to be sorted into its constituent wavelengths and a series of images is built up by sequentially allowing these narrow wavelength bands of IR light from the sample through to an IR-sensitive camera. These images are combined to form a three-dimensional hyperspectral data cube. Flexible, high-speed data processing software extracts data from the complex data cube which is processed in real time to produce an image where the output of each pixel is colour coded according to the chemical composition of the material it is looking at. It is then possible to use standard machine vision colour sorting solutions, making chemical material properties accessible to the machine vision engineer.

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EVENTS

UKIVA Machine Vision Conference and Exhibition
27 April, ArenaMK, Milton Keynes, UK
2 Keynote addresses, 50 technical seminars and 45 exhibitors from the Machine Vision and Imaging industry
www.machinevisionconference.co.uk

Multipix WiseUp - Lensing & Lighting Techniques
15 June, Advanced Manufacturing Technology Centre, Coventry
http://multipix.com/events/lensing-lighting-techniques/

The PPMA Show
26 - 28 September, NEC, Birmingham
Many UKIVA members will be exhibiting at this extended event.
www.ppmatotalshow.co.uk

Photonex,
11 – 12 October, Ricoh Arena, Coventry
UKIVA will present a program of free seminars
www.photonex.org

TRAINING

Training courses offered by UKIVA members:

STEMMER IMAGING
(in association with the European Imaging Academy)
'Common Vision Blox' - April 20 & August 31
'Hyperspectral Imaging' - May 11
'Teledyne DALSA Sherlock' - May 25 & July 20
'LMI 3D Sensor' - June 15
'Line Scan Technologies' - July 6
'Machine Vision Solutions - September 14
All courses at Tongham, UK
www.stemmer-imaging.co.uk/en/events/training-events

Framos Imaging Experts Academy
'Deep Insights into CMOS Sensors' – April 19 – 20
'Computational Imaging' – June 27
'EMVA 1288 Course Standard 3.1' - June 28 – 29
All courses at Taufkirchen, Germany
www.framos.com/news-events/trainings/

TECHNICAL TIPS

Some useful technical tips from UKIVA members

Choosing a machine vision camera:
Spectral sensitivity (Allied Vision)
www.youtube.com/watch?v=c_b5jD1ATeU&feature=youtu.be

Stay connected with USB 3.1
(IDS Imaging Development Systems)
https://en.ids-imaging.com/tl_files/downloads/whitepaper/ids-usb31-stay-connected-whitepaper_EN.pdf

What is Embedded Vision?
(Multipix Imaging)
http://multipix.com/what-is-embedded-vision

Colour line scan technology
(Stemmer Imaging)
http://www.stemmer-imaging.co.uk/en/knowledge-base/cameras-colour-line-scan-cameras

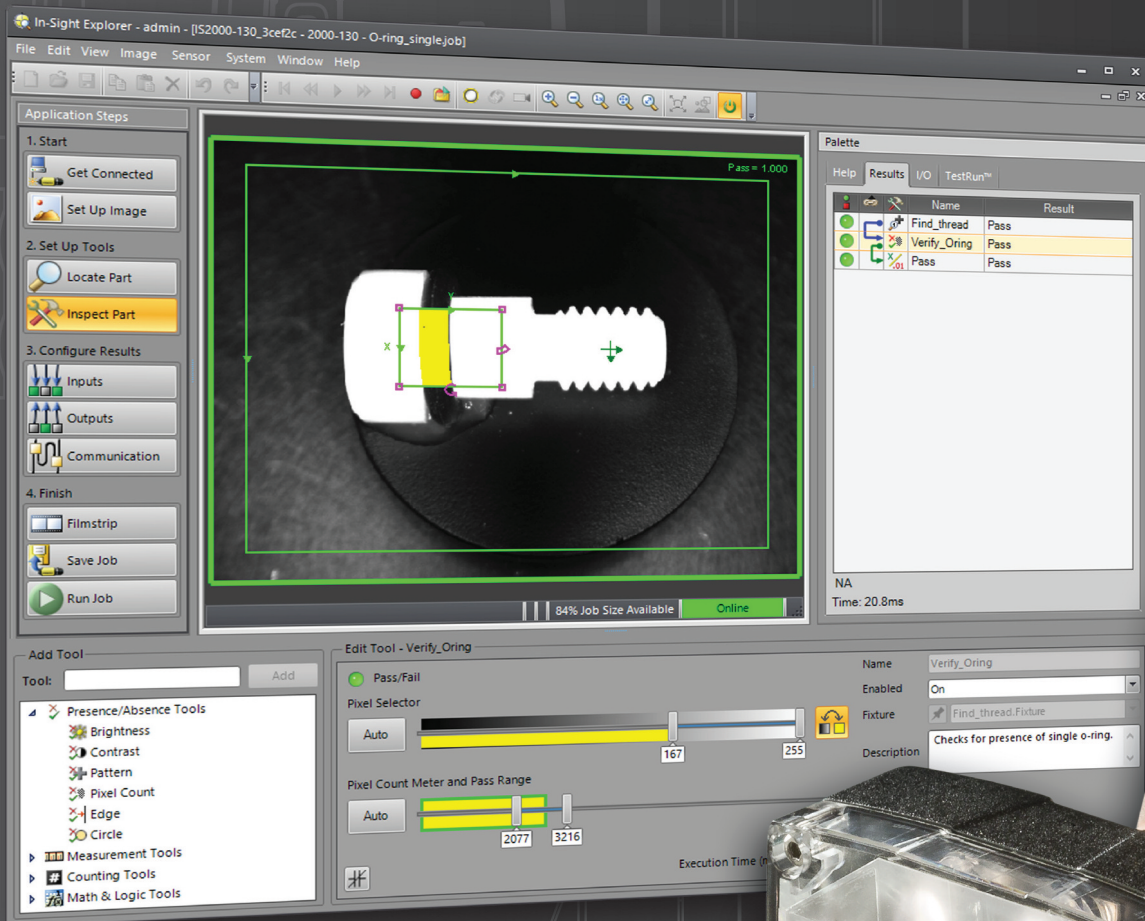# Scorpion 3D Stinger™ for Robot Vision

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