Vision and innovation

Machine vision and innovation go hand in glove. In this issue of Vision in Action we take a look at ways in which vision can be at the forefront of innovation. The Innovate UK scheme, part of UK Research and Innovation (UKRI) funded by the UK government, works with UK business and academia to support innovation through match-funded grants and loans. In our special centre page spread, we'll explain more about the scheme, giving special mention to some projects that have involved UKIVA members. We'll also look at some of the latest technology and its importance in different market sectors.

Innovation and the UKIVA

Technological developments fuel the continuing rapid evolution of machine vision performance and capabilities, which in turn open up new possibilities in a host of applications and market sectors. UKIVA members bring innovative machine vision products to market and provide the skills to create innovative solutions to real world problems. Our Technology Presentation Hub initiative, which goes live on May 14, 2020 provides access to a rich program of on-line presentations that cover the latest industry trends, innovations and insights. Register for the Hub at: http://bit.ly/MVCHub

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OCCUPANT 1   OCCUPANT 2
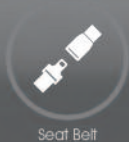
Seat Belt   Speeding   Car Sharing   Mobile Phone Usage   Red Light Jumping

Intelligent Transportation Systems from Sony Image Sensing Solutions

FOREWORD by Allan Anderson

The coronavirus 2 (COVID-19) pandemic has led to the cancellation of several Vision events globally, including our own Machine Vision Conference and Exhibition. However while we wait for the next MVC in Spring 2021, a FREE-to-access Technology Presentation Hub will go live at www.machinevisionconference.co.uk from May 14, 2020 to showcase content that would have been presented at the original event. More details are available on Page 5.

However, business must continue, especially now that the UK has left the EU. Some early indicators could be very positive for the UK vision industry. For example, the government is encouraging employers to develop automation technology and invest in retaining staff as a consequence of its proposed new immigration policy. By restricting the issue of visas to low-skilled workers, less low cost labour will be available. Machine vision can make a massive contribution to the automation of many industrial processes, although the UK's current track record on automation is not good.

In 2018, the UK was ranked 22nd in the world for the number of industrial robots installed per 10,000 employees in manufacturing industry. A 2019 report from the House of Commons Business, Energy and Industrial Strategy Select Committee, observed: "The UK's low automation adoption is part of our lagging productivity, especially for SMEs, which is preventing a much-needed rise in economic growth, wages and living standards." It goes on to say: "Where we have a new chance to lead and succeed is with service robotics and in AI, but only if we are supporting British businesses and researchers to innovate."

We take a good look at innovation in vision in this issue of Vision in Action. While the vast range of proven machine vision technology available could help with automation across numerous industrial sectors, innovation is key for further increases in productivity.

Allan Anderson, UKIVA Chairman

CONTENTS

ASSOCIATION NEWS

SCORPION VISION WINS 2019 PPMA VISION AWARD

Scorpion Vision won the 2019 PPMA 'Innovative Machine Vision Project' award for the development of a 3D robotic solution for the application of labels to wedges of Blue Stilton cheese at the Long Clawson Dairy in Melton Mowbray. This was to overcome haphazard labelling by the existing

z3D Cheese wedge inspection
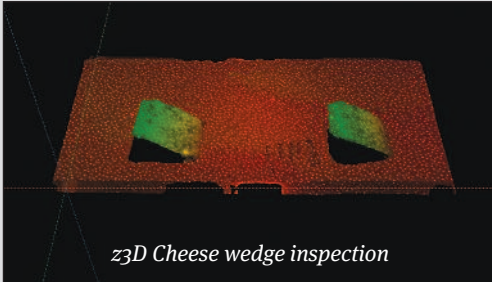
mechanical labelling system caused by variations in the size, shape and wedge angle of each wedge of cheese. Scorpion Vision worked with robot integrator, Stelram Engineering, to install two end of line robotic labelling systems that use 3D vision to create a 3D model of each cheese. This is then used to define the wedge height, angle and direction and the label placement coordinates are then sent to the robot. The label is applied with +/- 2mm accuracy in the X/Y location in the centre of the wedge and is also applied straight. This solution has increased throughput by 100% for each line.

UKIVA MEMBERSHIP CONTINUES TO GROW

The UKIVA membership has grown once more as we welcome Beckhoff Automation Ltd, Edmund Optics Ltd, OEM Automatic Ltd, Spookfish Innovations Ltd and Tendring Pacific Ltd. Beckhoff Automation is a world leader in PC-based control systems, incorporating vision into many applications. Edmund Optics is a premier provider

of optical and imaging components for machine vision applications. OEM Automatic's machine vision and identification business area focuses on offering the full solution from lens to final result. Spookfish Innovations build intelligent, high-speed quality inspection solutions for the manufacturing sector using the latest vision and machine learning techniques. Tendring Pacific's product line for the packaging industry includes end of line visual inspection and seal integrity systems.

APPLICATION ARTICLES

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

## ALLIED VISION   www.alliedvision.com

Visual inspection on hard disk drive cases

As hard disk drive (HDD) manufacturers continue to increase production to meet the ever-increasing demand for digital storage, quality control has become even more vital. It is crucial for a HDD to be perfectly fitted and sealed in its case for efficient mechanical operation and protection from external environmental effects.

Manufacturers of HDD cases have to make sure that there are no defects or incomplete machining on HDD cases' thread holes. Flexon Technology, a system integrator located in Thailand, has developed Visual Machine Inspection (VMI) for the production line, to increase the productivity and accuracy of HDD case quality control inspection. The inspection is performed on the top, side and back of the case using Allied Vision's Mako G-125B PoE and Manta G-505 PoE GigE machine vision cameras, featuring Sony CCD sensors.

There are 2 vision stations in each VMI machine. The HDD cases are loaded onto the conveyor. Vision station 1 is fitted with 2 cameras. A Manta G-505B PoE camera is used to locate the position of the HDD case. A Mako G-125B PoE camera captures 14 shots within 4.2 seconds for defect inspection of the top part of the HDD case. The defects criteria include missing or incomplete thread, thread damage, missing machining surface and missing drill.

Once this inspection is completed, the HDD case proceeds to a flip station before it arrives at Vision 2 Station which contains 3 Mako G-125B PoE cameras and 1 Manta G-505B PoE camera. Two of the Mako cameras inspect the sides of the HDD case for missing or incomplete thread, while the third inspects the back part of the HDD case for missing or incomplete thread, missing riveting, missing drill, machining surface as well as part number reading. The Manta camera locates the position of the thread hole. The cycle time in this station is 4.8 seconds. After the inspection in Vision 2 station is completed, the HDD case will proceed to the load out conveyor if all the conditions are met. If the HDD case fails the inspection it will go to the rejected pile (NG stack).
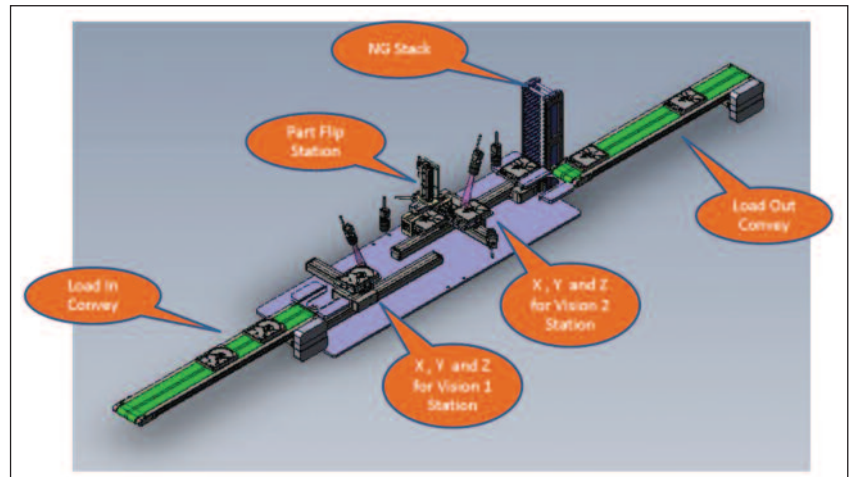

Flexon Visual Machine Inspection for HDD cases

ALRAD IMAGING   www.alrad.co.uk

Surface OCR for tyre inspection

Surface OCR technology from EVT is providing tyre manufacturers with the ability to read black print such as DOT codes on the black tyre wall background. The system uses EyeVision 3D Software and the EyeScan AT 3D sensor available from Alrad Instruments. With 100% quality inspection required for finished tyres, a special integrated surface OCR tool has been developed for use with both the standard EyeScan 3D sensor (up to 2 kHz) and the high-speed EyeScan 3D sensor (from 2 kHz up to 120 kHz). The tool recognises and extracts character strings from surfaces using either scan data from the 3D-height map for moulded markings or 2D intensity data for painted or lasered

APPLICATION ARTICLES
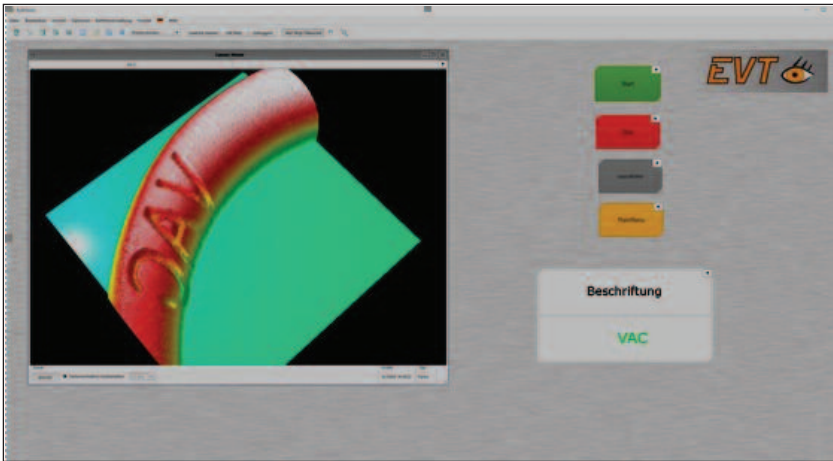
3D OCR

markings. The OCR command set offers powerful functions for the optical detection and inspection of characters. The module includes image pre-processing, segmenting, sorting and classifying of characters.

3D inspection can be used throughout the tyre manufacturing process, including rubber extrusion profiling, strip guidance, layer control and radial and layer runout. On completed tyres, 3D inspection applications include checking for surface defects or flaws in the tyre tread and sidewall such as bulges and dents.

In addition to the surface OCR tool, a surface bar code tool has also been developed. This allows 1D and 2D bar codes to be read from the surface data (2D intensity or 3D height map), without using an additional 2D camera or special bar code reader.

GENESI LUX   www.genesi-elettronica.it

Innovative lighting helps fresh fruit and seed sorting

With greater and greater demands being placed on the industrial vision systems used by manufacturers of optical sorting machines, a new high power linear light has been developed to meet these needs. This is currently being used on sorting machines for fresh fruit and seeds. Larger machinery dimensions, faster throughput of the product to be selected and new product types to be selected (aggregates, waste, plastics, organic materials etc) have all posed great challenges for the sorting machine manufacturers. They need to equip their products with more efficient and reliable industrial vision technology in order to keep up with the competition This has led to the use of vision
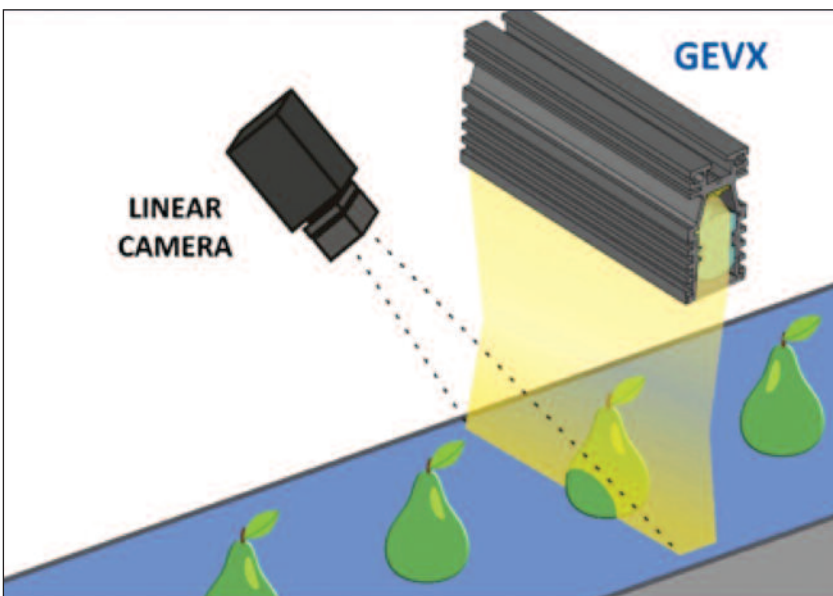
High intensity incident lighting for fruit inspection

ASSOCIATION NEWS

MVC RESCHEDULED TO 2021

As a consequence of the coronavirus 2 (COVID-19) pandemic, the 2020 Machine Vision Conference & Exhibition (MVC), has been rescheduled to Spring 2021, with the exact date to be confirmed. Although the event was on course to be the largest in MVC's 4-year history, the well-being of UKIVA and event staff, exhibitors and visitors alike was of paramount importance. However, as one of the great attractions of MVC is the Conference itself, we are delighted to announce that from 14 May, 2020, a Technology Presentation Hub will be free to access at the event website, www.machinevisionconference.co.uk

MVC TECHNOLOGY PRESENTATION HUB

The conference has always been designed to be educational and to appeal to visitors new to machine vision as well as machine vision experts and everybody in between. The Technology

Presentation Hub initiative will provide registrants with access to many of the presentations that they would have seen on the day had the event gone ahead. Anyone who had pre-registered for the original event will be able to access the hub, and visitor registration will continue to remain open (http://bit.ly/MVCHub) to enable even more people to sign-up so that they do not miss out on the Conference technical content.

KEYNOTE PRESENTATIONS ON THE HUB

In addition to a general speaker program, the Hub will also host the two Keynote presentations that had been planned for the original event. Richard Love, EMEA Marketing Manager for the NVIDIA's Jetson™ Embedded Processor Family, discusses 'Applying AI at the Edge - a Vision of the Future'. This explores how NVIDIA's Jetson Platform, CUDA and parallel GPU acceleration can meet these ever-increasing demands of 21st-century machine vision. In addition, Kieran Edge, Technical Lead for Machine Vision at the Advanced Manufacturing Research Centre at the University of Sheffield, considers advances in polarisation imaging and AI in inspection. This presentation covers how these techniques can be employed and the low cost approaches which can be used to tackle demanding applications for high-value manufacturing industry.

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systems with increasingly higher speed and higher resolution line scan and area scan cameras. Different illumination wavelengths, including RGB, NIR and SWIR are required depending on the sorting criteria to be used, such as colour, ripeness degree and humidity level, which has in turn led to the need for new, high power, multi wavelength light sources.

The GEVX ultra power linear light is a new generation light source with a wide spectrum focusing lens. The light operates from 350 to 1600 nm and can deliver up to 3.5 million lux thanks to the 5° convergent lens. Combined emissions of white/IR or RGB can be managed on a single light. It is available in lengths from 4 to more than 300 cm with a self-supporting structure and can deliver high light power without needing additional heat dissipation. The light is available in a number of versions. The normal linear version is used for sorting applications on a continuous conveyor such as for fruit. There is also a back light version which gives a uniform line of 20 mm. This is ideal for applications where the items to be sorted are small and light such as seeds. These are usually viewed in silhouette by illuminating them from the back through a gap in the conveyor belt.

IDS IMAGING DEVELOPMENT SYSTEMS GMBH

www.ids-imaging.com

Avoiding product mix-ups in the pharmaceutical industry

Good Automated Manufacturing Practice (GAMP) is intended to ensure the quality of the production of pharmaceuticals, active ingredients and cosmetics. In addition, quality demands are placed on processing, packaging and storage and the printing and marking of products and packaging must be reliably recorded and tested. This helps to prevent product mix-ups due to incorrect labelling and to ensure traceability of ingredients and end products as well as protect against counterfeiting. The German company i-mation GmbH has developed GampBOX, a plug & play image processing system featuring up to four robust GigE uEye FA industrial cameras from IDS in combination with HALCON image processing software. GampBOX facilitates process optimization for pharmaceutical manufacturers as well as for suppliers (for packaging materials, equipment) to meet the legal requirements of Directive 2011/62/EU regarding the protection against counterfeiting of prescription-only drugs.

The one-time allocation of a serial number in connection with individual production data (e.g. product identification GTIN, expiry date and batch number) is key to complete traceability through the entire logistics chain from production to distribution and wholesale to the customer. The GampBOX series is divided into three stages: the first integrates smart cameras into a single batch production. The second integrates smart cameras into a serialised production, for example to verify a serial number in connection with individual production data. The third stage integrates up to four classic industrial cameras, such as the IDS GigE uEye FA camera, into a PC-supported system with database synchronisation (for GS1 and ePedigree) in a serialised production. The GampBOX takes full control of the cameras and provides an OPC UA interface for the higher-level control or the host computer to the outside. The HALCON image processing software is responsible for implementing the inspection task.

GampBOX offers complete traceability of operating actions (by users with a time stamp), the creation of audit trails (for monitoring and recording process changes) and the safeguarding of important process steps with electronic signatures or electronic approvals. In addition, recipe management and versioning, archiving of user actions subject to verification of a serial number in connection with individual production data are possible.

i-mation GampBOX

APPLICATION ARTICLES

CV-X2

Vision inspection for organic biscuit quality control

Nutrition & Santé is Europe's leading maker of organic and health foods. Biscuits roll off its production lines in stacks of 4 or 5 units that are then wrapped in packs and inserted in their cardboard packaging at high speed. It is essential to avoid broken biscuits in a stack since they not only have an adverse effect on customers' perception of the quality of the products, there is also a risk of packs being incorrectly sealed due to bits of biscuit getting in the way. Biscuit inspection is challenging due to the high speeds required and the variety of biscuit sizes and shapes conveyed on each line at Nutrition & Santé's production site in Annonay, France. The huge quantities of biscuits that are processed each minute mean that there is a window of just 150 ms for inspecting each stack. The Keyence CV-X400 vision series was able to deliver the detection speed required for this demanding application. The system checks for broken biscuits using edge detection on images from two cameras placed around 20 centimetres above the biscuits on each line. A different program is set for each of the thirty plus variants of biscuit shape and size that need to be inspected on each line.

Edge detection is just one of the 28 core inspection tools available with CV-X400 vision series. Each tool makes it possible to set up a detection application both simply and quickly, even for the engineers at Nutrition & Santé who did not have any previous experience in vision inspection. The CV-X400 Series features 7 core processors supplemented by 7 core DSPs, designed specifically for image processing. These fourteen processors are used to achieve parallel processing and attain the fastest processing speed possible. The ability of the system to process 2 million pixels in 11.7 ms means that the vision system works faster than the production lines, thus providing headroom for future developments. The processing power also makes it possible to perform multiple inspections and further enhance the reliability of in-process inspections thanks to its excellent repeatability and many image-processing tasks that optimise inspection accuracy. The system runs seven days a week and provides the detection reliability and stability needed by the customer.
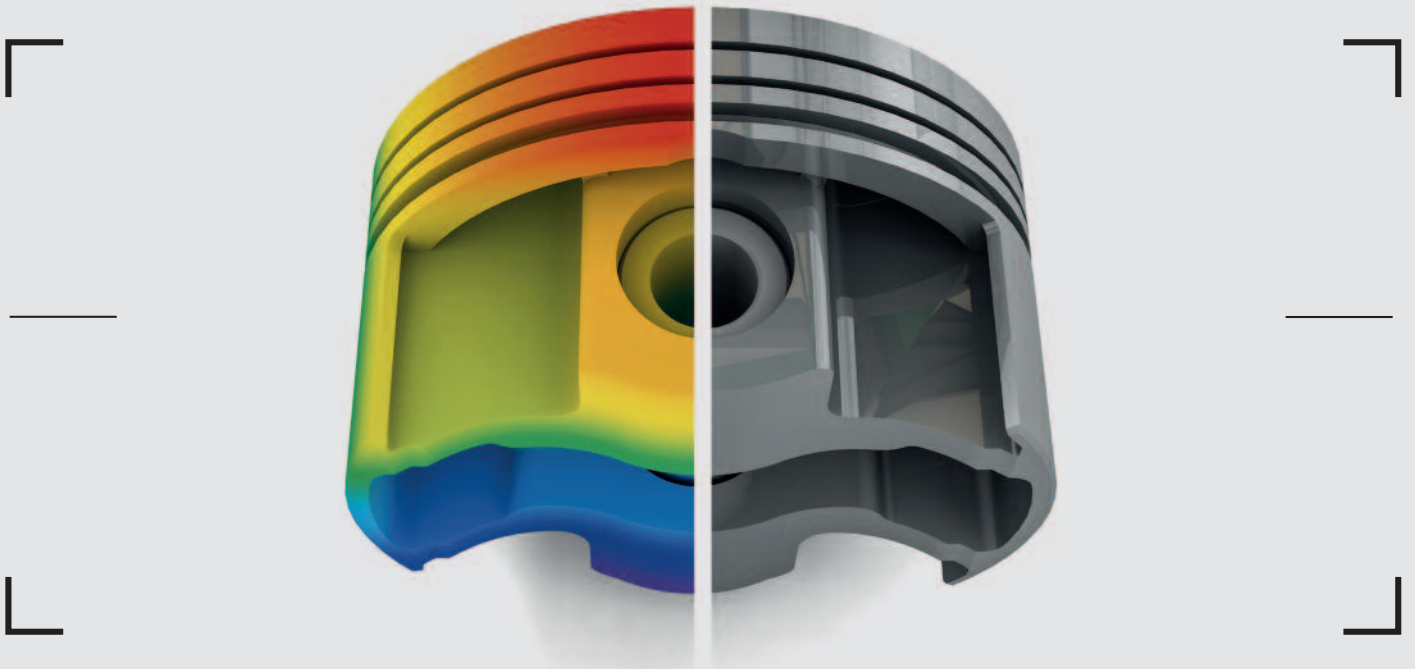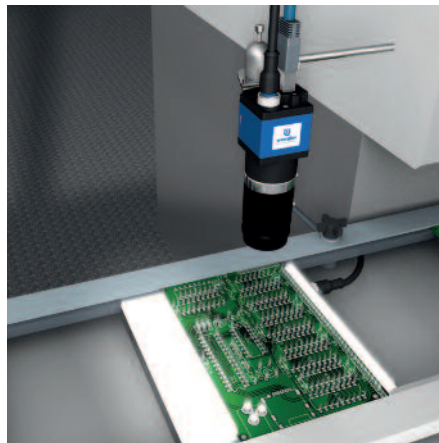
Top Performance in 1D, 2D and 3D

Bin Picking

Large bins such as Euro pallets are recorded along with their content as a 3D point cloud. Even extremely small objects in large containers can be reliably detected in this way.
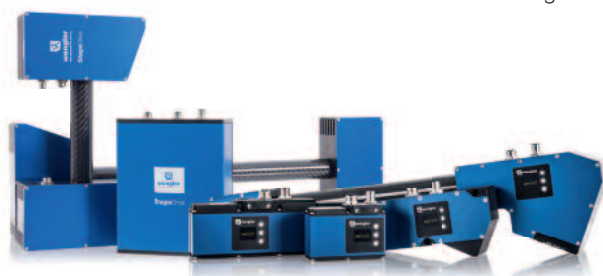
Quality Assurance for PCBs

wenglor's VisionSystem2D is an image processing system which has been developed for simple as well as complex vision applications. It consists of up to 16 digital cameras for image recording, interchangeable lenses with various focal distances, external illumination components for ideal lighting and a control unit (IPC) for image evaluation.

Gap and Flushness Measurement of Transparent Objects

Gap and flushness accuracy for auto body parts such as doors, tailgates and headlights is an important quality criterion in the automotive industry. Thanks to the weCat3D model variant with UV light, gap dimensions can be reliably detected for matte and glossy, as well as transparent materials such as metal, glass and plastic.

wenglor sensoric ltd.
Unit 2, Beechwood | Cherry Hall Road, Kettering Business Park
Kettering, Northants NN14 1UE | Tel. +44 (0)1536 313580
info.uk@wenglor.com | www.wenglor.com/visionworld

APPLICATION ARTICLES

Vision system aids food product traceability and label verification

Crofter's Foods is a leader in the organic and all natural food industries, providing fruit spreads, conserves, jellies and jams made from natural ingredients. In addition to manufacturing its own brand product lines it has a number of private-label customers. Crofter's uses a Mettler Toledo CI-Vision inspection system at its manufacturing plant in Seguin, Ontario, Canada, for advanced label verification. This ensures every product package meets their specifications and offers their customers advanced tracking information.

The facility can package up to 150,000 jars of product per shift. Unique product and lot information is encoded in a QR code that is printed on every label to meet the very strict requirements for food safety and traceability required by many retailers throughout North America. This code can be scanned using a smartphone to direct users to Crofter's web page to check out batch and useful product information for that jar. The CI-Vision system verifies the readability of the QR codes, and inspects every label applied to ensure it matches the requirements for that product. Installed on the plant's rotary 16-station inline labeler, the vision inspection system uses three cameras to execute various quality control checks on all labels after the QR code has been laser printed. It can detect missing, twisted and damaged labels, verify the UPC code, identify the shape of the jar, confirm the colour of the product and check that the cap code has been properly applied in full. It can also be programmed for any new label designs or for other inspections as required.

The system differentiates between the similar looking Bilingual Canadian product labels and U.S. bound English-only labels to ensure that these are not mixed up to avoid a costly product recall. It can be 'future proofed' by adding up to 3 more cameras to add critical control points upstream and/or downstream on the line as requirements evolve. These are all managed from a single HMI (human-machine interface) terminal. The vision system can be integrated with Mettler Toledo's own ProdX data collection system, so that the plant management can have real-time access to what is happening on the line. Mettler Toledo has also installed a checkweigher and Safeline metal detection system at the plant. *(Original article published in Canadian Packaging).*

*CI-Vision inspection system at Crofter's Foods (courtesy Canadian Packaging)*

Icing gingerbread biscuits

The Scorpion Vision 3D icing robot system enables a robot with a biscuit icing depositor to accurately apply icing to a tray of handmade biscuits, thanks to very localised 3D profiling of each biscuit. The distance between the depositor and the surface of the biscuit is maintained to sub millimetre accuracy. The system uses a Scorpion 3D Stinger with 2 x 2.3 Mpixel cameras, integrated illumination and a random pattern projector. A 12 mm IR lens is used and software runs on an embedded industrial PC.

Up to 32 biscuits are placed on a tray for icing by the robot. The tray is moved to the inspection area by a conveyor and clamped in place under the 3D camera. An image is captured in 200 ms, blending laser and LED illumination. The 2 cameras inside Scorpion 3D Stinger create a baseline of 200 mm offering a good disparity for the working area. The robot has a nominal drawing model in its memory for each biscuit that defines the path pattern of the icing. There are 12 pre-trained models and new ones can be trained. The robot receives measurements from the vision system, scaling its predefined model up or down and starting icing from the reference point.

The cameras were calibrated at the conveyor belt on a flat surface, but the trays used are not flat. Even when clamped at their four corners, the surface on which the biscuits lay is still bowed, so the portion of the tray around each biscuit is found and the plane used to extract a heightmap for each biscuit. The images created in this way have the correct dimensions regardless of whether the tray is bowed. The vision system can then measure the biscuit height, width and length and send it to the robot.

The result is massive cost savings and increased throughput for the bakery, as the production can be dramatically increased without adding more labour costs. The Scorpion Vision 3D icing robot system can be used for any bakery product, including birthday cakes where the top of the cake is a dome shape.
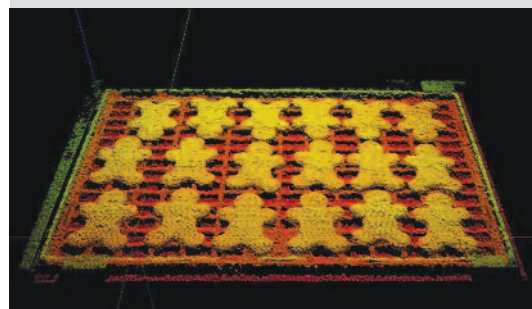
3D image of gingerbread biscuits

APPLICATION ARTICLES

IMS Messesysteme X-3Dvision system

Ranger3 Rises to A Steely Challenge

Sick Ranger3's ability to capture dimensions, contours and surface defects make it ideal for dimensioning and inspection tasks in metal production processes. High repeatability must be assured regardless of the colour, contrast or brightness of profiles, slabs and pipes, even as they flicker with heat, and despite harsh environments contaminated with tinder, dirt or moisture.

IMS Messesysteme GmbH, who offer a range of measurement technologies for steel and non-ferrous metal production, has integrated the Ranger3 camera into its optical X-3Dvision measurement system This is used for 3D inspection in thermal production processes in continuous casting plants, hot rolling mills and tube rolling mills. IMS's X-3Dvision measurement system is used for 360° inspection of profiles such as H beams, C profiles, CZ profiles, sheet piling and tubes. To capture the entire surface seamlessly, multiple Ranger3 cameras and lasers are configured into a single, circular measurement setup. While systems usually feature between three and eight cameras, the latest plant contains 22 Ranger3 cameras with eight lasers in one system.

Using the highly light-sensitive M30 CMOS sensor and ROCC (Rapid On-Chip Calculation), the Ranger 3 converts the laser line contour of the profile into precise, ready-to-use 3D coordinates. There is no need for complex post-processing and the images are output at 4 gigabits per second via Gigabit Ethernet interface. The camera configuration can create up to 24,000 profiles per second.

Long goods or pipes are passed through the system to measure dimensions, contours and linearity, as well the smallest of surface defects such as cracks, deposits, inclusions, or indentations. Very small details, typically 0.3mm in the width, 0.3mm in the depth and 1mm in the length can be detected at full production speeds. Using Ranger3 in its X-3Dvision system, has improved dimension and contour measurement up to ± 0.1mm accuracy.

ISW Smart Manual Aggregation Table

Manual packaging and aggregation in the pharmaceutical industry

Pharmaceutical companies achieve significant cost savings by using traceability and aggregation solutions as well as complying with regulations for proof of origin and traceability of prescription drugs. The Smart Manual Aggregation Table (SMAT) system from ISW, Industrielle Sensorsysteme Wichmann GmbH, uses machine vision from Stemmer Imaging to provide a flexible and cost-efficient solution for manual packaging and aggregation from the folding box to the pallet It guides the operator through the whole process to ensure that no goods are lost during the packing process and that the specified packing information is strictly observed.

Stemmer Imaging worked closely with ISW, providing expert advice on choosing the most suitable cameras, bar lights, lenses, scanners and ID readers as well as other accessories and filter components for the vision system. They also provided in-depth support on technical issues.

The stand-alone system is positioned where the delivered products require packaging. After initiating the order, the operator scans the delivered bundles of single-unit packages using a camera mounted under a glass cover. Individual package data, such as serial numbers and other identification parameters, are bundled in the database. If the recording is correct, a label with the corresponding serial number for the bundle is printed and checked by a scanner for print quality. The SMAT displays the appropriate packing diagram and the scanned and labelled bundles are packed into shipping boxes. After filling up one layer of the shipping box, a camera mounted above captures the codes of the packed bundles. Once the whole box is filled according to the packing diagram, the system prints out a label with a single code including the entire box content, linking the data of each package to its box. This label is then attached to the shipping box and another scanner checks the validity of the code.

The next stage is stacking the completed and labelled shipping boxes on a pallet with SMAT providing similar guidance to the employee. After the pallet is loaded in this way, the labels of all cartons are recorded using a hand-held scanner. A third printer creates another label for the entire pallet, which the employee attaches to the pallet before re-reading it with the hand-held scanner to complete the aggregation.
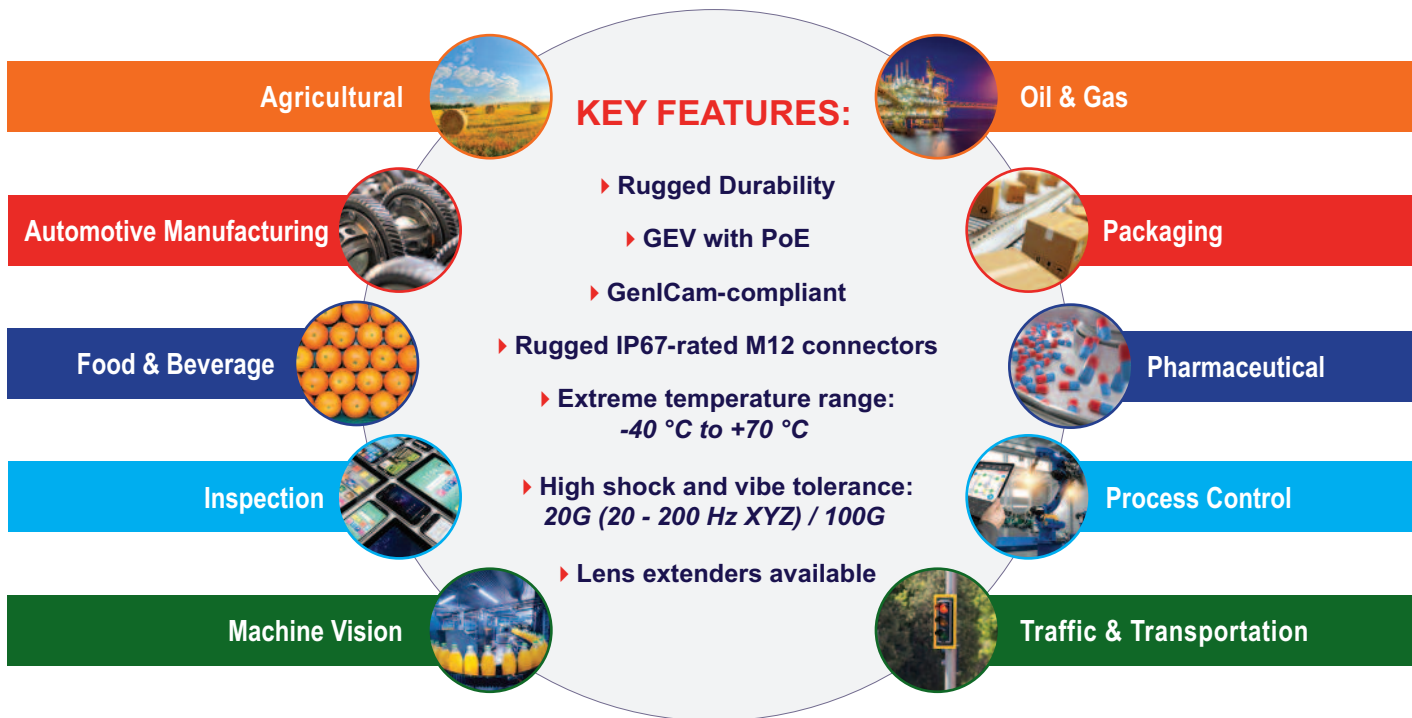
IMPERX

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FOR INDUSTRIAL APPLICATIONS

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Applications (left)	KEY FEATURES:	Applications (right)
Agricultural	▸ Rugged Durability	Oil & Gas
Automotive Manufacturing	▸ GEV with PoE	Packaging
Food & Beverage	▸ GenICam-compliant	Pharmaceutical
Inspection	▸ Rugged IP67-rated M12 connectors	Process Control
Machine Vision	▸ Extreme temperature range: -40 °C to +70 °C	Traffic & Transportation
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Embracing innovation

The UK Government has put research and innovation at the heart of its Industrial Strategy, with the aim of making the UK the most innovative country in the world and increasing its total R&D expenditure from 1.7% of GDP in 2016 to 2.4% by 2027. Machine vision is a fast moving innovative technology, where game changing advances are regularly brought to market. As a well-established enabling technology with applications across so many industries, it has already contributed to many current and completed projects and will undoubtedly have significant involvement in some of the future innovations. UK Research and Innovation (UKRI) will help the Government towards achieving its objectives by working in partnership with universities, research organisations, businesses, charities, and government to create the best possible environment for research and innovation to flourish. With a combined budget of more than £7 billion, it brings together the seven Research Councils (AHRC, BBSRC, EPSRC, ESRC, MRC, NERC and STFC), Innovate UK and Research England to be involved in projects throughout the UK. Non EU members can also participate in Horizon 2020, the largest ever European funding programme for research and innovation.

Funding and finding vision projects

Innovate UK (www.gov.uk/government/organisations/innovate-uk) funds business and research collaborations to accelerate innovation and drive business investment into research and development in a variety of ways. Through the Knowledge Transfer Partnership (KTP) scheme it links businesses with an academic or research organisation and a graduate. It also funds a network of technology and innovation centres known as Catapults which connect businesses with the UK's research and academic communities.

Major investment

Since 2007, Innovate UK has invested £2.5bn, matched by £1.8bn funding from industry, across 11,000 projects. A number of these have included elements of machine vision. At the time of writing, Innovate UK funding is available for many projects where vision could potentially play a role. These include:

- Innovation in UK civil aerospace.
- Enhancement of productivity and sustainability of crop, livestock and aquaculture systems (UK-Canada).
- Rail sustainability, customer experience, operations or maintenance.
- Smart and sustainable plastic packaging
- Low carbon propulsion capability in the automotive sector

Machine vision projects

Although none of the projects above specify the use of machine vision, we'll take a look in the centre pages at the influence of machine vision in some of these sectors, including where some UKIVA members have contributed to previous projects. Of course sometimes there are some dedicated machine vision projects. One example of this was the recent Innovate UK GrassVision study project in which a low-cost machine vision system and novel spray apparatus were developed for the precision application of herbicides to broad-leaf weeds in grass crops.

Finding the projects

The Gateway to Research website (http://gtr.ukri.org/), provides details on projects being funded by the Research Councils and Innovate. Another online tool, konfer (www.ukri.org/innovation/working-with-business/konfer/), created by the National Centre for Universities and Business in partnership with UKRI, can help businesses connect with universities with opportunities for collaboration.

The UK government is also encouraging UK organisations to continue to bid into calls for Horizon 2020 funding. With a budget of 79 billion euros, Horizon 2020 is the largest ever European funding programme for research and innovation. More information on the different types of Horizon 2020 funding schemes can be found at European Commission Participant Portal (https://ec.europa.eu/info/funding-tenders/ opportunities/portal/screen/home).

Key vision technologies

While any vision technology could be used in an innovative project, there are a few that seem to be featuring quite frequently.

3D imaging

3D imaging is finding a lot of use in a wide variety of projects. For example in agriculture it may be necessary to distinguish crop types from surrounding material, or identify when crops are ripe and ready for picking. In addition to providing size and shape data, the 3D system can be used to guide a robot arm for picking, or other actions such as selective pesticide spraying or trimming.

Deep learning

Machine learning and deep learning methods in machine vision can be used in projects where there are complex classification challenges. This is particularly important for applications involving organic items such as fruit and vegetables, but could readily be deployed in almost any industry including automotive, aerospace, agriculture, food production, logistics, pharmaceuticals, semiconductor, traffic, etc.

Apple sorting using deep learning (Courtesy ClearView Imaging)

Non-visible wavelengths

Imaging using wavelengths outside the visible range can reveal 'hidden' information. For example, the strong IR absorption by water in SWIR imaging opens up applications such as identifying water distribution in plants in order to improve crop yields. Hyperspectral imaging is another technique that offers enormous potential. By combining infrared spectroscopy with machine vision information can be obtained about the chemical composition of the objects being imaged.

Agri-food industry

The growing importance of the agri-food industry is reflected in the £90 million of new funding for innovation that is available in a programme led by Innovate UK and BBSRC (Biotechnology and Biological Sciences Research Council). UKIVA members Multipix Imaging, Scorpion Vision and Stemmer Imaging have all been involved in agri-food projects.

Tail biting in pigs

Tail biting in pigs can have a significant financial impact on the pig industry resulting from losses due to reduced weight gain and the need for more veterinary treatment, as well as culling and carcass condemnation. Innovent Technology and the Agricultural Engineering Precision Innovation Centre (Agri-EPI Centre) have been working on a project funded by Innovate UK on an early warning system for tail biting in pigs based on 3D camera technology. Multipix Imaging has supplied the latest time-of-flight 3D vision cameras for use on this project which has already led to a successful commercial pilot. .

Automated harvesting

The automated harvesting of fruit and vegetables is an important topic for the agri-food industry. Fruit and vegetable picking and post harvest

Robot picking

processing is labour-intensive yet there is a diminishing workforce availability. Innovate UK has funded a number of projects to address this, ranging from automated harvesting of crops such as cucumbers to the differentiation between weeds and crops for the selective application of fertiliser and weed killer. Stemmer Imaging was involved in supplying cameras for an early Innovate UK-funded project to acquire information on apples growing on apple walls which could be used for robot harvesting purposes and data that could contribute to the breeding of new apple cultivars. The USB colour cameras supplied were mounted on quad bikes, to produce stereo 3D images for subsequent processing. 3D imaging is a key technology in harvesting applications. Stemmer Imaging has also supplied 3D imaging systems used in combination with their machine learning classification tool for accurate broccoli identification and classification on the fly for robot harvesting. Scorpion Vision has developed 3D systems for post harvest trimming of vegetables such as swedes, leeks and sprouts.
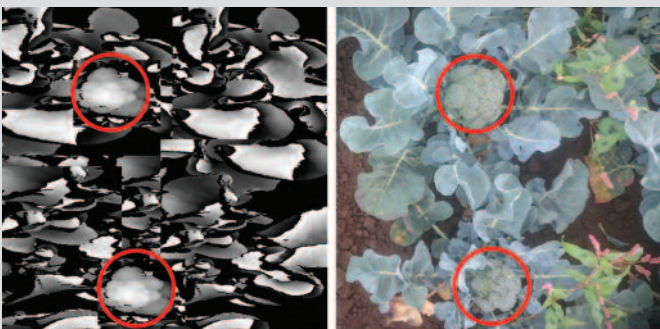

Classification of broccoli heads using machine learning and 3D vision (Courtesy Stemmer Imaging & Capture Automation)

Food production

Improving safety, productivity and quality, while reducing waste is a challenge for food producers around the world. Increased automation using vision-guided robots and more effective identification of defects in a part-processed or final product can significantly contribute towards this. Machine vision is already used to check parameters such as shape, size, position, edge defects and holes in food products, but the latest vision technologies open up additional possibilities.

Using robots

The use of 3D vision-guided robots is already being adopted in many industries, especially for pick and place applications. In the food industry, application range from food preparation such as automated peeling of brussels to secondary packaging of food products. An innovation grant funded example comes from Scorpion Vision who supplied a 3D camera for a cake decoration project. Here, the machine builder is using robots to apply buttercream icing to the outside of the cake. To enable an even and tidy application, the cake is first scanned in 3D so that an accurate representation of the cake can be measured to generate the coordinates across the surface of the cake with sub-millimetre accuracy.
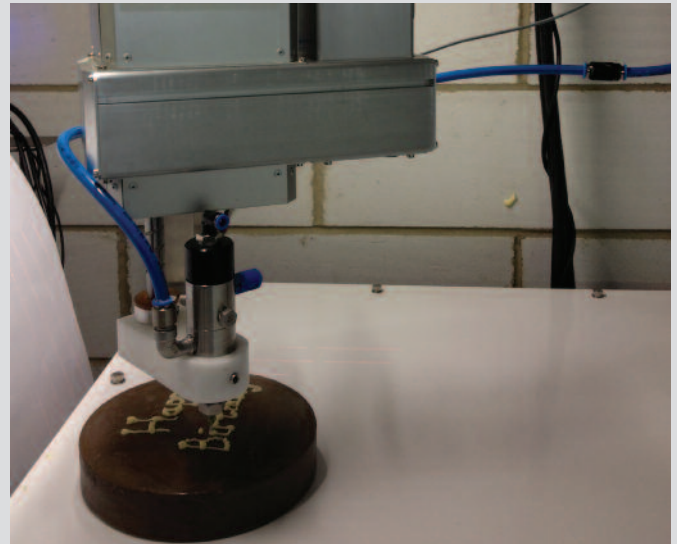
Robot cake icing (Courtesy Scorpion Vision)

Deep learning

Deep learning utilises artificial neural networks to imitate the way the human brain works for recognition and decision making. Deep learning is good at recognising or identifying objects or features for the classification of different product types. By supplying a neural network with a set of training images, the system can learn the classification required and then apply this in real time in a production environment. Deep learning is particularly good for organic materials such as food products where there are lots of natural variations. Applications include detection of incomplete biscuits; sorting different biscuit types; checking whether the coating on nuts is complete; counting and identifying different types of chicken portions; inspecting the meat in seafood products after the shell is removed for any remaining fragments prior to packaging and identifying defects in fruit.

Hyperspectral imaging

By combining near infrared spectroscopy with machine vision, hyperspectral imaging opens up major new possibilities for detecting impurities in food products based on their chemical composition. Examples include the identification of problems such as sugar end defects in potatoes, the assessment of the ripeness of food that doesn't change colour when it ripens, such as the avocado, and the detection of non-metallic foreign bodies in confectionery.

Sustainable packaging

Around 80 million tonnes of plastic packaging is produced annually and this is expected to triple by 2050. After a short first-use cycle, 95% of plastic packaging is not only lost to the economy but much of it becomes a significant environmental pollutant. As part of the Smart Sustainable Plastic Packaging programme, Innovate UK is providing up to £1 million for early-stage projects in smart and sustainable plastic packaging. One of the objectives is to improve on current state-of-the-art plastic packaging, while still demonstrating practical and close-to-market solutions. Machine vision already plays an important role in the plastics packaging industry and will continue to do so for the newer emerging materials.

Plastic film inspection

Line scan imaging is used in continuous, 100% web inspection for plastic films used in food packaging to detect defects such as dirt, debris, pinholes tears etc. and similar testing will be required for any new, sustainable materials. Special systems have been developed for inspecting holes down to 30 μm diameter at high speed in laser micro-perforated plastic films used in modified atmosphere packaging using multiple cameras. This has been further extended to use in microwaveable packaging to check that the laser holes forming part of a self-venting 'steam valve' are present and complete.
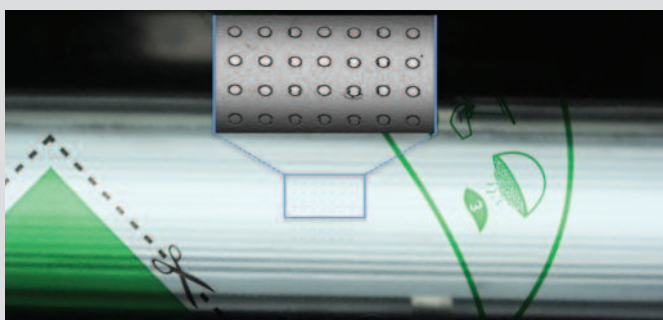
*Perforated Microwave Packaging Inspection
(Courtesy Olmec UK)*

NIR imaging

NIR imaging is a useful technique since some dyes and inks are transparent to NIR illumination. This means that it can be used to inspect product that is already sealed in with overprinted plastic film. By applying hyperspectral imaging, organic contaminants in the seals of heat sealed packages can also be detected.

Plastic bottle and preform inspection

New sustainable plastic materials will also be used to manufacture bottles and are likely to use current manufacturing processes. Machine vision can be used in metrology systems to inspect plastic bottle preforms and the final, blown bottles. The measurement of plastic preforms is important to prevent defective product being sent for blowing since these will result in defective bottles. Parameters such as preform thread, inner diameter, height and outer diameter can be checked. Preform bodies can be inspected for scratches, bubbles, contamination and other imperfections. Imaging preforms using polarised light can reveal internal stress and strain patterns and new polarizing cameras have recently come to market. that are not detectable using conventional imaging. Final, blown bottles can be inspected for parameters such as neck finish, body dimensions and perpendicularity.

Rail infrastructure

With further investment in high-speed rail technology, vision systems can play a vital role even though the operational conditions are demanding. High speed imaging is often required under challenging environmental conditions, with cameras exposed to extremes of weather, vibration and physical wear. UKIVA members have been involved with a number of applications of vision technology either mounted on the trains or positioned trackside.

Track integrity and wheel-rail interfacing

Line scan technology can be used to inspect the rails, sleepers and ballast for early detection of defects and failure at high speed and high resolution. Used in conjunction with pattern recognition software, this can automate the detection of track defects to help increase the safety of the railway network. Cameras mounted on the bottom of the train can also provide information on wheel-rail interfacing, contact point friction and the dynamics of conductor shoe movement on conductor rails. Cameras mounted in troughs on the track can be used to evaluate brake shoe wear or to examine the wheel profile for damage and wear for predictive maintenance. Roof-mounted cameras provide information on pantograph and catenary interactions, especially with regard to wear and contribute towards design improvements and preventative maintenance.

Track flaw detection trolley

Inspection of trains and trackside assets

Other cameras mounted on the train can be used to evaluate railway assets such as trackside cabinets and huts. These can be imaged and mapped with accuracy to within a couple of metres. Thermal cameras can be used to check that heaters are working in trackside cabinets (which can be important for operation of the signals); that points heaters are working or to locate hotspots generated by the breakdown of insulators on the third rail. Automated gauging of bridges, tunnels or overhanging trees can be carried out to identify any potential hazard during routine surveying. Cameras mounted on trackside posts can be used for vehicle identification and to inspect passing trains for graffiti.
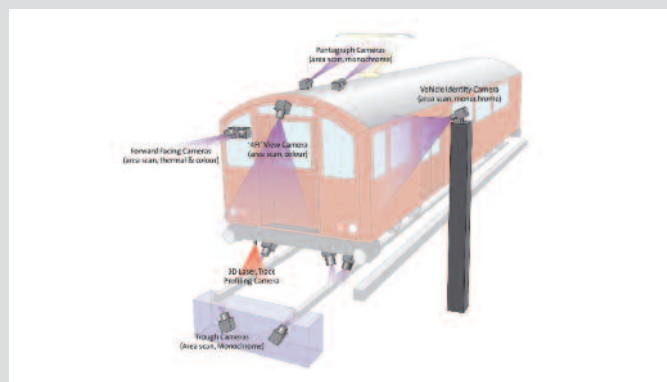
Possible camera locations (Courtesy Stemmer Imaging)

Rewarding vision innovation

The application of machine vision technology in innovation projects is largely made possible by innovations in the industry itself. One way that these technological developments are recognised is through industry-recognised award schemes. Here we look at some of the awards available.

VISION award

Probably the most coveted award in the industry is the VISION award, a now biennial prize for outstanding innovations in machine vision, which is sponsored by Imaging and Machine Vision Europe. The 24th winner will be announced at VISION 2020, which will be take place on 10 – 12 November 2020 in Stuttgart, Germany.

The prize was first awarded in 1996, when VISION was an annual event. It is judged by a panel of industry experts and is a gauge of technological developments and trends in the vision industry. It is open to all, including institutes and younger companies in the market.

Recent winners

Four of last five award winners have introduced new 3D imaging capabilities, while the other won for a new lighting technique that is particularly useful for machine reading of 3D features on shiny surfaces. These successes highlight the fast moving developments an 3D technology. The winners are:

- 2018: Photoneo for MotionCam-3D, which uses parallel structured light technology to enable the capture of high resolution images of moving objects at a speed up to 40 m/second.
- 2016: Machine Vision Lighting Inc for its variable irradiation solid angle (VISA) illumination technique which creates identical irradiation on an object's surface at every single point, no matter its distance from the light source.
- 2014: Odos Imaging for its high-resolution vision systems based on a pulsed 3D time-of-flight imaging process, suitable for direct integration into industrial solutions using a standard interface.
- 2012: New Imaging Technologies for Magic 3D, a new wide dynamic range 3D stereoscopic vision system.
- 2011 AIT Austrian Institute of Technology GmbH (Safety & Security Department) for real-time stereo vision technology for an intraoral 3D scanner

The short list for the 24th award will be announced in September 2020.

PPMA Group Award for 'Most Innovate Vision Project'

The 'Most innovative vision solution' award is part of the annual PPMA Group Awards Scheme, with the winner announced at the annual PPMA Show. Judged by an independent panel, the award is open to any vision equipment supplier, vision system integrator or end user who has recently manufactured, designed or installed an innovative vision solution that has led to a significant improvement in process, safety, quality, efficiency or cost saving. Entry is not limited to UKIVA or PPMA members. For this award, the emphasis is on innovative uses of vision technology to solve real world problems rather than innovative developments in vision technology itself. The judges look for a clever and creative approach to the problem and the best productivity outcome. 3D imaging and the use of AI have featured strongly by the most recent winners. The last 3 recipients have been:

- 2019: Scorpion Vision and Stelram Engineering for the development of a 3D robotic solution for the application of labels to wedges of Blue Stilton cheese (more details on Page 4)
- 2018: OAL, with a date code reading and verification system. They used a combination of machine learning and artificial intelligence in a vision system that could deal with variations such as lighting, positioning, print quality and placement inherent in a food or beverage plant.
- 2017: Industrial Vision Systems Ltd for a flexible automated vision inspection cell featuring a camera head mounted on a six-axis collaborative robot. The vision solution utilised artificial intelligence machine vision algorithms to allow the robot vision to learn the difference between good and bad parts.

A record number of entries were received for this award in 2019, reflecting its growing importance in the industry.

PPMA Group Award

Other awards

There are a number of other award schemes that companies within the vision industry can enter. These include the Vision Systems Design Innovators Awards, the 'inspect' vision award organised by John Wiley & Sons, Inc, the publishers of 'inspect' magazine, and the Prism awards which have a vision technology category and these are organised by Laurin Publications.

PRODUCT UPDATES

Fast, accurate dimensioning technology

Acrovision can supply the Cognex 3D-A1000 dimensioning system. This compact industrial 3D + 2D motion capable smart camera is used for dimensioning both regular and irregularly shaped items. Patented 3D technology combined with 2D inspection capabilities delivers precision at high speed. The 3D-A1000 provides reliable and effective results without any complicated setup or maintenance and can be installed by anyone in under 15 minutes.

The system eliminates manual dimensioning, allowing tracking of registered goods and efficient product sorting. Shipping costs can be estimated, storage density optimised and lost revenue recovered. The 3D-A1000 uses patented 3D symbolic light technology to freeze motion with a single image. This generates more accurate 3D point cloud data, eliminating the need for complex calibration and encoder integration. Embedded processing enables use of powerful Cognex vision tools to run additional 3D + 2D inspections. There is no need for calibration as it is out of the box factory ready for easy integration.

Cognex 3D-A1000

Alvium 1800 U-501 NIR cameras offer superior near-infrared imaging

The new Alvium 1800 U-501 NIR 5.1 megapixel USB3 Vision camera is equipped with ON Semi's AR0522 NIR enhanced sensor, which is designed for both low light and high dynamic range performance. It offers a frame rate of 67 frames per second at full resolution. The combination of small size, light weight, low power consumption, and NIR sensitivity makes it the perfect choice for surveillance and security applications, especially in low light conditions.

The camera's NIR sensitivity makes it ideal for applications where visible light could blind people or interfere with the purpose of the application (e.g. traffic monitoring and eye tracking). NIR cameras can reduce costs and simplify system design as the illumination of the scene would cause additional costs and complexity. The camera will be available in closed, open and bare board housing variants as well as different lens mount options (S-Mount, CS-Mount, and C-Mount). The USB interface can be located either on the back or left side of the camera (as seen from the sensor).


Alvium 1800 U Series

New MIPI® CSI-2 / FPD-Link® III camera modules

Alrad can now offer MIPI® CSI-2 camera modules from The Imaging Source for industrial embedded-imaging solutions. The new product line-up features a variety of compact industrial sensor modules and supported platforms. The embedded target platform's ISP allows for the direct execution of post-processing tasks such as demosaicing, and colour correction.

The FPD-Link® III bridge is used for applications where longer cable lengths are required such as Advanced Driver Assistance Systems and allows for cable lengths up to 15 m and simultaneous data transmission, control channels and power over a single compact coaxial cable. The Imaging Source provides embedded system solutions based on the powerful embedded platform NVIDIA Jetson TX2. In addition to its powerful GPU, it offers a dedicated ISP which completes post-processing tasks and processes 12 CSI-2 camera lanes with up to 1.5 Gb/s per lane and up to six simultaneous camera streams. Embedded applications can be developed using prebuilt OpenEmbedded images and layers for The Imaging Source's supported platforms or user-generated images for sensor configuration.
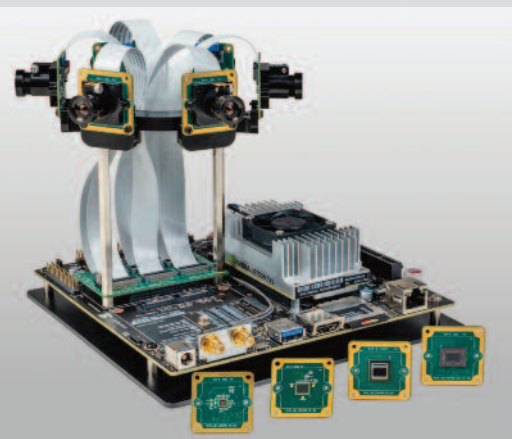
The Imaging Source MIPI CSI-2 Camera Modules

PRODUCT UPDATES

Fast, Flexible, Simple Control

FLIR Firefly Deep Learning camera

Genesi and Alrad to work together

BAUMER   www.baumer.com

Fast, flexible, simple control of cobots with new vision sensors

Baumer's new 'smart' XF900 and XC900 VERISENS vision sensors have been designed for controlling collaborating robots (cobots). They can be mounted directly on the cobot or above it. Using the 'SmartGrid' feature (patent pending) they can be quickly and easily calibrated to control image distortion, converted to the required coordinates and aligned between the vision sensor and the robot. This ensures improved precision and eliminates the need for any elaborate and conventional 'hand-eye' calibration of the robot and vision sensor.

Installation and calibration is simplified via the VeriSens URCap interface specifically developed to optimise robot control. For the programming of the robot, only two additional commands (nodes) are necessary to realise the benefits and advantages of vision guided robotics across a wide range of control applications. Set-up and calibration is also simplified because free positions are used on which objects are then visually recognised while the already established functions are able to check for object overlaps and gripper clearances.

CLEARVIEW IMAGING   www.clearviewimaging.co.uk

Firefly deep learning camera

At the heart of FLIR's Firefly Deep Learning camera is the low-power, high-performing Intel Movidius Myriad 2 Vision Processing Unit (VPU). Users can load their Convolutional Neural Network onto the camera then start capturing images and make logical inferences – all without the need of additional processing on the PC. With its low energy consumption, small size, and user-friendly design, this camera will appeal to OEMs and system integrators.

Users can now deploy any Myriad 2-compatible neural network to the camera to utilise the deep learning framework and optimisation toolchain of their choice. Employing classification and object detection in tandem with localisation techniques opens up endless possibilities. The technology even has the capacity to excel at subjective questions where the answers may depend on the complex interactions of multiple criteria. A new tool is provided to help users swiftly transfer their trained neural networks to the camera allowing OEMs and System Integrators to validate their prototypes rapidly. This means more workflow and less time-to-market.

GENESI LUX   www.genesi-elettronica.it

Genesi Lux appoints Alrad as UK distributor

Having established a wide customer portfolio in Italy, Genesi is spreading its sales network out to foreign markets, particularly in Europe. The company is pleased to announce that after attending international trade fairs, several commercial agreements have been concluded with specialised resellers in UK and Germany to offer our custom lighting solutions. The first of these is Alrad Instruments Ltd in the UK, who will be able to meet every customer need thanks to their proven experience in the imaging and machine vision component areas.

Genesi Elettronica has been designing and manufacturing custom electronic boards and lighting for machineries and camera vision systems for 30 years. In the current fields of industrial automation and quality control, it is essential to have suitable illumination that meets the needs of more and more advanced technologies.

IDS IMAGING DEVELOPMENT SYSTEMS GMBH
www.ids-imaging.com

Training neural networks to create individual inference cameras

IDS NXT ocean is an easy to use all-in-one solution for AI-based image processing. From cameras including a hardware-accelerated AI core to intuitive training software for creating individual artificial neural networks and support, everything comes from a single source. Users only need their application expertise and sample images to create a neural network.

The IDS NXT lighthouse cloud software allows even non-experts without prior knowledge of artificial intelligence or camera programming to train an AI classifier with their own image data. All functions and the necessary infrastructure for creating a neural network are provided as a web application without the need to to set an individual development environment. Sample images are uploaded, labelled then the fully automatic training is started. The resulting network can then be executed directly on IDS NXT industrial cameras, with inference times of just a few milliseconds. IDS also offers an IDS NXT ocean design-in kit which is particularly useful for anyone who wants to test the potential of AI for individual vision tasks.

NXT ocean design-in-kit

INDUSTRIAL VISION SYSTEMS
www.industrialvision.co.uk

Industrial Vision Systems enters 20th year in business

Founded in 2000, Industrial Vision Systems (IVS) has grown to meet the rise of machine vision and automation within production processes and has supplied thousands of vision systems to customers around the world. With proficiency in machine vision, robotics and industrial automation, IVS has developed a comprehensive suite of standard vision inspection machines, combined with hundreds of unique solutions to service major industries such as medical device, pharma, automotive, electronics and packaging.

The IVS engineering team has addressed some of the most demanding and complex machine vision applications, resulting in vision systems used all over the world in automated production processes for inspection, guidance, identification, measurement, tracking and counting. Through standalone projects and complete automation lines, the company provides excellent support to customers at every step of the project process. With the continuing growth of machine vision, and the advent of deep learning and artificial intelligence in vision system deployment, the company is well positioned to meet any challenge over the next twenty years.

Celebrating 20 years

MATROX IMAGING
www.matrox.com

Matrox Imaging releases expandable vision controller

Matrox 4Sight XV6 is an expandable vision controller, powered by an eighth-generation Intel® Core™ processor, and designed specifically to handle intensive vision applications on the factory floor, including warehouses, plants, and manufacturing or fabrication facilities. It provides a reliable platform with significant expansion capabilities for video acquisition.

Matrox 4Sight XV6 offers powerful desktop-level processing performance, with support for up to three displays, whether VGA, DVI-D, HDMI, and/or DisplayPort. Made to address the multitude of camera interface standards, Matrox 4Sight XV6 features four full-height, half-length expansion slots for accepting frame grabber PCIe® cards operating at full performance. It pairs readily with Matrox Imaging frame grabbers to deliver customised video capture solutions for Camera Link®, CoaXPress®, GigE Vision® with Power-over-Ethernet (PoE) support, DisplayPort, HDMI, and SDI interfaces.

Matrox 4Sight XV6 comes pre-installed with Microsoft® Windows® 10 IoT Enterprise 2019 (64-bit), giving the familiarity, performance, and reliability of Windows 10. Matrox Imaging Library (MIL) software, which provides a comprehensive range of vision development tools, is available separately to expedite application development.

4Sight XV6

PRODUCT UPDATES

Pekat Vision Software

3D Stinger food safe scanner images

Visionary T Units

Pekat Vision software for industrial visual inspection

Multipix are pleased to announce a new partnership with Pekat Vision, to assist OEM's and vision solution providers in finding the right software solution for their machine vision application. Pekat are developing software specifically to tackle the imperfections of physical objects with high-end AI. Pekat Vision is a comprehensive set of tools that can tackle practically any vision task in manufacturing, with an easy-to-use GUI for any industrial visual inspection based application.

Pekat Vision uses its own proprietary focused-learning algorithm which goes beyond deep-learning. Focused-learning works like a human eye, by focusing on detail and only needing a few images to learn and understand the task. From those few images it can find anomalies, detect and classify defects and check surfaces on materials and objects where current vision systems fail. The software makes it possible to extend product inspection, automate quality assurance, reduce personnel costs and accelerate process cycles.

Scorpion 3D Stinger food safe colour scanner

The Scorpion 3D Scanner is an industrial camera designed for the most advanced food quality inspection and for robot vision on a running conveyor. The system is a 3D colour scanner featuring fully integrated light sources, cameras and I/O in an industrial IP-67 rated and food safe housing. It provides a cost effective way to provide 3D and 2D images from a running conveyor. The scanner is tightly integrated with Scorpion Vision Software with regards to image capture and synchronisation. Scorpion has complete support for 3D Image processing from filtering, measurement and detecting surface defects.

The Scorpion 3D Stinger colour scanner is mounted over the conveyor and the 3D and 2D scanners are synchronised with the encoder signal from the conveyor. The scanner requires two cable connections, an integrated power and trigger signal cable and an ethernet cable for data output and camera setup.

Sick foresees many apps in one basket

As its AppSpace software 'ecosystem' reaches maturity, Sick has rolled out more stand-alone 2D and 3D vision solutions ready for use in common applications. Users can download Apps as ready-made independent software products from Sick, while developers can create and adapt custom apps for their own needs through the AppSpace software environment.

Recent additions include Sick's Presence Inspection 1.0, its first easy-set-up SensorApp to be included as standard on Sick's Inspector P programmable 2D vision cameras for pass/fail inspection tasks. Meanwhile, Sick's 'off-the-shelf' Labelchecker inspection solution, also based on the Inspector P, is already widely used in label inspection and identification in automotive assembly and end-of-line packaging applications.

The release of Sick's Visionary T-AP 3D snapshot camera accompanied a number of ready-to-use SensorApps available for use in 3D guidance and localisation e.g. for AGVs and service robots. Among the first is a solution for guiding forklifts smoothly into pallet pockets without the risk of collision or damage.

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PRODUCT UPDATES

SONY IMAGE SENSING SOLUTIONS
www.image-sensing-solutions.eu

Sony launches new camera remote SDK

Sony's new camera software development kit (Camera Remote SDK) offers opportunities for developers and integrators to access Sony's cameras and image data captured with them. The support for developers and integrators has been highly reinforced to allow them to design bespoke applications to remotely control Sony cameras for tailored usage requirements. The applications provide remote control functions from a host PC and facilitate transmission of the image data back from the Sony cameras.

In addition, the Camera Remote SDK allows developers and integrators to remotely access other functions such as changing the camera settings, shutter release and live view monitoring in their software applications. The Camera Remote SDK initially supports Alpha 7R IV and Alpha 9 II and the line-up of supported Cameras will be gradually expanded in the future.

Alpha 7R mk4

STEMMER IMAGING
www.stemmer-imaging.co.uk

New shape from shading design simplifies integration

With a flat illumination system and integrated light controller for automated generation of lighting patterns, the new SAC trevista® FLAT is the latest addition to the trevista family of shape from shading inspection systems. The flat, compact format allows easier access to 'shape from shading' inspection methods for machine builders and integrators and the integrated controller makes it ideally suited even for price-sensitive applications.

Multiple illumination patterns can be generated electronically, allowing the system to be used with diffusely scattering surfaces, glossy surfaces and reflective surfaces. The shape from shading technology used in trevista FLAT allows topographic surface defect information down to the micron level to be obtained. The unique illumination possibilities enable the detection of material defects even on cylindrical surfaces despite gloss and dirt. The compact design and long working distance can accommodate stationary or moving parts providing the flexibility to handle diverse samples including glass rotary plates and both cylindrical andsheet materials.

trevista® FLAT

WENGLOR SENSORIC
www.wenglor.com

VisionSystem2D: The image processing solution

VisionSystem2D is a modular image processing system for all vision applications. It consists of up to 16 digital cameras, lenses with various fixed focal lengths, external illumination components and a control unit (IPC) with all common standard interfaces, as well as software for image evaluation. These components can be individually combined according to the particular application. The uniVision software is used to configure parameters for image recording, and for subsequent image analysis.

The cameras feature integrated image chips from Sony's Pregius series to deliver high-resolution images with 1.6 or 5 MP in colour or monochrome. Ring lights, spotlights and backlights are available in different sizes and colours. Red and infrared light in flash or continuous mode are offered in addition to white light. Whether digital IOs, Gigabit Ethernet over TCP/IP and UDP or the LIMA protocol based on XML is required, communication can be implemented with the most up-to-date technologies. The uniVision all-in-one software is also compatible with Wenglor's weQube smart camera and weCat3D 2D/3D profile sensors.

Vision System 2D

UKIVA DIRECTORY

VISION TECHNOLOGY PROVIDERS

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SCORPION VISION T: 01590 679 333	www.scorpionvision.co.uk
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STEIN SOLUTIONS T: 07787 568307	www.stein-solutions.co.uk
TENDRING PACIFIC LTD T: 01223 492080	www.tenderingpacific.com

EVENTS

**UKIVA Machine Vision Technology Presentation Hub
Live from 14 May, 2020**
www.machinevisionconference.co.uk

Keynotes presentations from:

Richard Love
EMEA Marketing Manager
NVIDIA's Jetson™ Embedded Processor Family -
'Applying AI at the Edge – a Vision of the Future'

Kieran Edge,
Technical Lead for Machine Vision
Advanced Manufacturing Research Centre (AMRC)
'Advances in polarisation imaging and AI in inspection'

Register for the Technology Presentation Hub,
http://bit.ly/MVCHub

**PPMA Show
29 September – 1 October, 2020,
NEC, Birmingham, UK**
www.ppmashow.co.uk

**VISION
10 - 12 November, 2020,
Messe Stuttgart, Germany**
www.messe-stuttgart.de/vision/en

TECHNICAL TIPS

Some useful technical tips from UKIVA members

**Artificial Intelligence - AI for all
(IDS Imaging Development Systems)**
https://en.ids-imaging.com/technical-article/en_ids-nxt-ai-for-all.html

**What is Short Wave Infrared (SWIR) - and when to use it.
(Multipix Imaging)**
https://multipix.com/what-is-short-wave-infrared-swir/

**A deep dive into polarisation
(Stemmer Imaging)**
www.stemmer-imaging.com/en-gb/knowledge-base/polarisation-and-polarisation-cameras/

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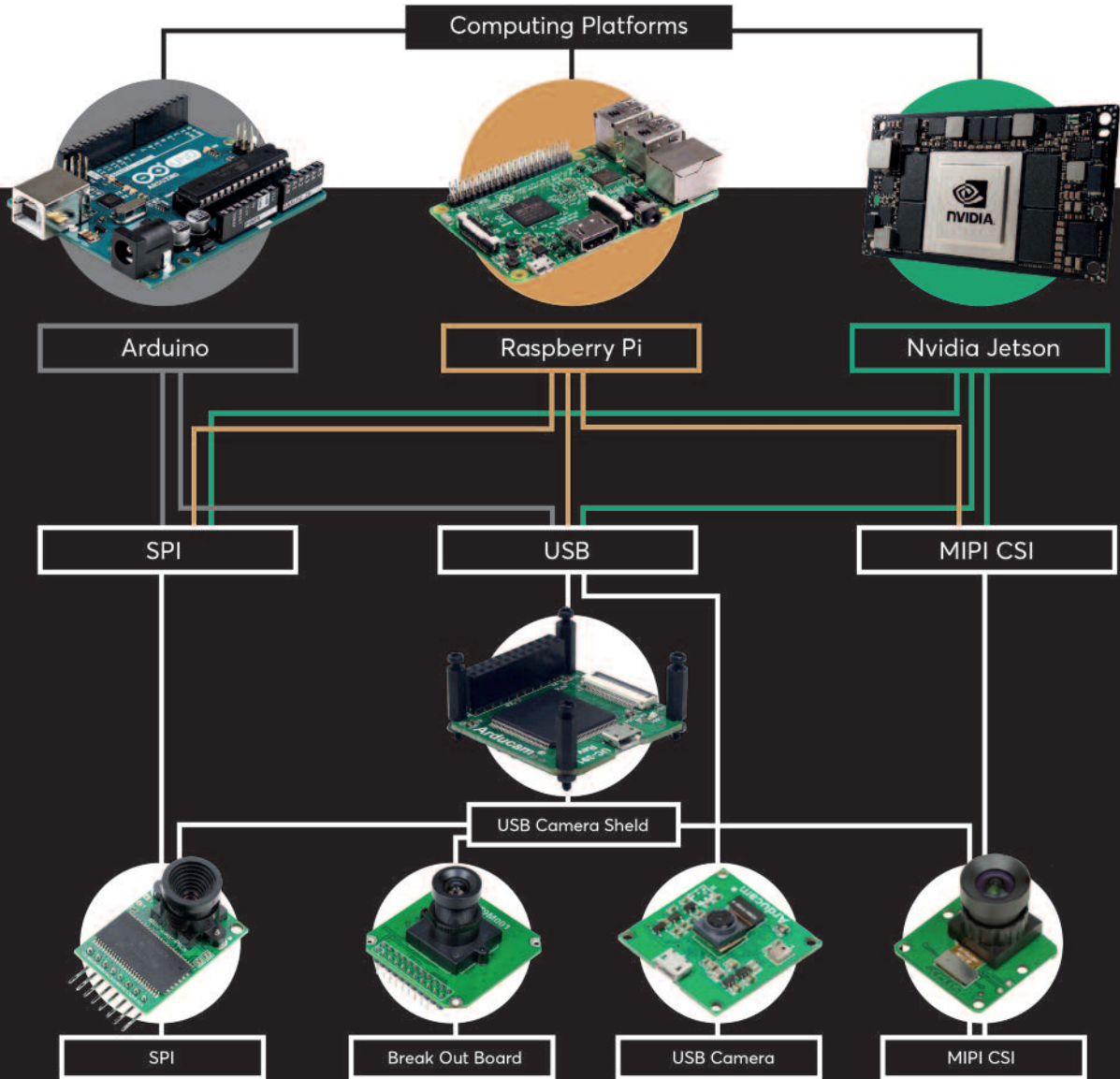
Overwhelmed with the various options and need help selecting the right camera module?

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