NEWSLETTER OF THE UK INDUSTRIAL VISION ASSOCIATION

20 years of the UKIVA!

September 2012 sees the 20th anniversary of the formation of the UKIVA. The prime objective of the Association has always been the promotion of the use of vision in industry but it has broadened its remit over the years to embrace emerging technologies and new market developments.

Founding chairman, David Humphries, said: "It seemed essential to provide a forum to help educate potential users in the application of vision technology. The first 5 years provided the framework from which the Association has flourished." Graham Long (chairman 1999-2001) observed. "The UKIVA had to persuade clients that vision systems were now reliable, lived up to expectations, were cost effective and appropriate for the clients' industries." The UKIVA has sought to educate industry through informative seminars, newsletters, articles in the trade press, useful publications and a web site (www.ukiva.org) which naturally is the main source of information about members.
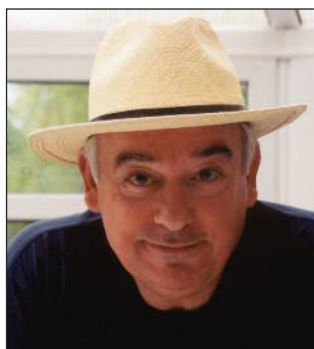
David Humphries the UKIVA's founding Chairman

Geoff Smith (chairman 1997-1999) comments on changes in vision technology: "When I took over, a move to better intelligent camera systems was being made which did not rely on external computers. Huge leaps were also made in software development as well as camera technology, as digital output was still in its earlier format of LVDS. CMOS sensors were being used for the first time in industrial applications." During Richard White's tenure as chairman (2001-2003), there was an emergence of IR, NIR and X-ray imaging in industrial applications.

More recent progress in vision technology is highlighted by current chairman, Mark Williamson: "Any modern smartphone would have more computing power than the bespoke computing systems needed for image processing applications back in the early 1990s! The vision industry has been transformed by improvements in cameras, optics, colour, 3D imaging, miniaturisation, software, data management and, of course, affordability."

Vision is now an enabling technology in many industries and in some ways has come full circle. In the early days, the vision industry 'borrowed' and adapted technology such as cameras from other industries and there were no industrial vision standards. However, CameraLink, GigE Vision and others have evolved specifically for industrial vision, yet GigE Vision utilises Ethernet technology, CoaXPress uses standard coaxial cable and the latest USB 3.0 cameras utilise a consumer vision interface.

"Vision technology now touches almost everyone's lives from smartphones to speed cameras and even computer games with the latest Kinect system for Xbox 360", concludes Mark Williamson. "Going forward it is likely that vision will be used even more in security, medicine, transport, automotive, energy, defence, sport and other areas of everyday life we haven't thought of yet!."

How machine vision has changed from the first machine vision system from Stemmer to miniature USB cameras available today

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FOREWORD by Mark Williamson

The latest issue of our new-look newsletter sees the UKIVA celebrating its 20th anniversary. 2012 also sees a number of other milestone anniversaries. The PPMA itself celebrates its 25th anniversary and we congratulate several of our members: Framos 30 years, MultiPix 15 years, Omron 20 years and STEMMER IMAGING 15 years in the UK, 25 years in Europe. As we move into our 21st year, we have reviewed our membership categories to reflect the changing face of the industrial vision industry in the UK and to help existing members, potential new members and vision customers alike.

In our last issue, we highlighted the use of vision in applications away from the traditional industrial environment, and this theme continues here with an interesting article from National Instruments where visitors to the Chelsea Flower Show were able to view plants as a bee would see them, while STEMMER IMAGING highlights the use of vision in sport with analysis of golf ball movement during putting.

For some of the more traditional applications the dairy industry has proved popular in this issue. Baumer describe a system to check the presence of straws on milk cartons, SICK UK have a system for inspecting plastic milk bottles and MultiPix Imaging report on the inspection of milk bottle caps! Getting closer to the dairy product itself, Cognex tell us about Datamatrix readers for caesin labels used on cheese products. Olmec-UK have designed a bister inspection system for use in an existing process line and Framos and are involved in a project to monitor material flow using cameras attached to fork lift trucks.

At the time of writing, the finalists for the UKIVA's first UK-based award have been revealed, and the announcement of the winner of 'Most Innovative Machine Vision Project' on September 27th is eagerly anticipated! The autumn period is a busy one for exhibitions, with the PPMA Show and Photonex in the UK and the Vision Show in Germany. Many of our members will be busy at one or more of these shows and they provide a great opportunity for face-to-face meetings.

Mark Williamson, UKIVA Chairman

MEMBERS NEWS

ALRAD IMAGING   www.alrad.co.uk

mvBlueLYNX-X intelligent cameras

The mvBlueLYNX-X is the next generation of the successful MATRIX VISION intelligent camera product line. The CPU core is based on the state-of-the-art ARM technology with up to 1 GHz target clock and image processing acceleration by a DSP coprocessor for parallel handling of multiple pixels.

The system is ideally suited for the classical areas of machine vision. The large processing power and high-end display and graphics capability make it perfect for many other application areas. The camera is modest in power consumption (<5W), carries out tasks remotely and has low cost of ownership.

MXG board level cameras

Illumination for industrial applications
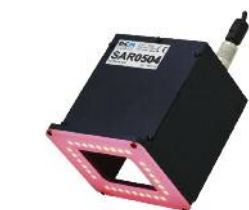
ALRAD IMAGING is pleased to offer the latest lighting products from DCM Sistemes, a company dedicated to the design, development and manufacture of LED lighting for industrial applications. Recently featured products include: PRL Compact Linear Projectors; High intensity LED projectors (which produce an intense narrow line of light, specially designed for use with linear cameras) and BKC Cylindrical Backlights.

DCM_SAR

Cylindrical backlights emit homogeneous diffuse lighting over 360º of their circular surface. This allows complete backlight inspection of hollow objects such as pipes, deposits and boxes or inspection from different angles in carousels or turntables. The new products from DCM Sistemes complement the High Power LED lighting systems available from TPL Vision LED lighting allowing Alrad to advise on the most effective solution for the customer application.

BAUMER   www.baumer.com

MXG board level cameras

In many applications progress is measured by advancing miniaturization, so every cubic millimetre of installation space counts. The new MXG board level camera series from Baumer is the solution for applications that demand this high level of flexibility. The separate sensor board measures only 28.5 x 28.5 mm, hardly larger than a 2-Euro coin.

It is connected to the system circuit board via flexprint. This allows the cameras to be individually integrated even into small installation spaces in almost any mechanical design. Storable user sets simplify camera integration, and the GigE standard interface with Power over Ethernet can be used to reduce integration and maintenance costs.
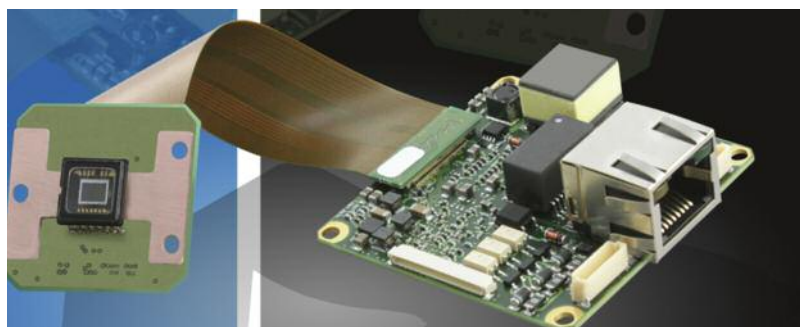
MXG board level cameras

New Categories For UKIVA Members

Our Members' Directory in this newsletter has been reorganised in line with our three new member categories: 'Vision Technology Providers', 'Vision Systems Integrators & Consultants' and 'Providers of Solutions that utilise Vision Technology'.

These new categories better reflect the state of industrial vision in the UK and are designed to help existing members, potential new members and vision customers alike. 'Vision Technology Providers'' can supply end-user and OEM customers with anything from individual components such as cameras or light sources to complete vision systems. The new 'Vision System Integrator & Consultants' category will make it easier for customers to find companies who specialise in working with manufacturers to integrate vision into a new or existing production line The new 'Providers of Solutions that utilise Vision Technology' category provides another way for PPMA members that build machines with integrated vision technology to showcase their vision-enabled products.

New additions to UKIVA membership

Astech Projects Ltd has joined the UKIVA as a Vision Systems Integrator. Astech Projects is a leading automation solutions provider, offering a complete design and build service within the machine vision and automated inspection fields. Astech's machine vision solutions are therefore ideal for customers with challenges including assembly verification, seal integrity, final product quality, and primary/secondary packaging inspection

Optimal Industrial Automation Ltd now ffeatures as a 'Provider of Solutions that utilise Vision Technology'. Optimal is an automation company specialising in high speed and high performance Part Handling & Vision Inspection systems for use in regulated and quality critical industries, such as medical devices and pharmaceuticals.

New division for Alrad

ALRAD has launched new trading division, ALRAD PHOTONICS to give a greater focus to its photonics products.

MEMBERS NEWS

HALCON 11 image processing software available from MultiPix

HALCON 11 image processing software available from MultiPix

MVTec's latest image processing software, HALCON 11, not only has many new and enhanced features, but will now also run on the Mac OS X operating system. Sample-based object identification is possible using characteristic features like colour or texture only, even for warped objects or varying perspective views of the object. A new 3D surface comparison tool identifies an expected and measured shape of a 3D object surface, a unique technology of HALCON 11. The surface can be reconstructed by any 3D technology available in HALCON such as multi-view stereo, sheet of light, or by ready-to-run 3D hardware scanners.

Comprehensive 3D vision features are enhanced and improved by registration and triangulation of point clouds, shape and volume calculation, segmentation of point clouds by cutting planes and many more to detect and process 3D objects.

Photometric stereo is improved for special use in surface inspection. Conventional surface inspection will now perform 3D surface inspection so scratches, cracks or dents in surfaces are quickly and easily found by taking shadows into consideration. A new automatic feature selection facility allows a bundle of features to be optimised quickly to create a powerful solution.

MultiPix offers first 3-Year warranty for industrial cameras

The industry's first 3-year warranty for industrial and network cameras is now provided with every Basler camera purchased. Basler is the first industrial camera manufacturer to offer such a long warranty period on all cameras and MultiPix is the sole distributor of Basler cameras in the UK. Headquartered in Ahrensburg, Germany, Basler has seen its production numbers increase threefold since 2009 and this has been accompanied by a massive expansion in manufacturing capacity, test equipment, and know-how.

Every Basler camera is subjected to very specific optical and mechanical tests before leaving the factory. This ensures that, regardless of when they come off the production line, Basler cameras always meet the same quality standards.

New Modular Vision User Interface For Non-Vision Engineers

Olmec-UK, has developed a new, modular easy-to-use user interface that allows engineers to easily make adjustments to any Olmec production-line vision system without needing to be vision experts. Configured to run in the Windows® 7 environment using a large touchscreen, the new VP3 user interface is a flexible platform that features modules for 1D and 2D code reading, human readable codes, defect inspection, blister pack inspection, part presence, colour verification and high accuracy gauging and measurement.

The VP3 interface features large, simple to use buttons for set-up, system configuration and statistics with a clear 'pass/fail' result indicator. It provides multi-level security to help support compliance with industry standards such as CFR21 Pt II requirements for the medical and pharmaceutical industries. Images of both good and failed product can be stored, and images from failed components can easily be reviewed while measurement continues in the background. The system can also be set up for remote diagnostics, if required.

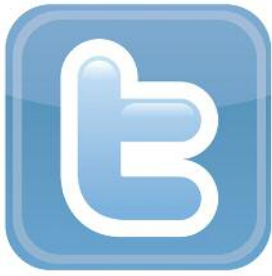*New Modular Vision User Interface For Non-Vision Engineers*

CORE TECHNOLOGY
FOR VISION DEVELOPERS.

Explore state of the art vision technology from Europe's largest provider.
Discover how we combine leading products with outstanding competence
and service to make you stronger!

MEMBERS NEWS

High performance vision especially developed for pick and place applications

Omron has introduced a new vision sensor developed specifically to meet the needs of pick and place applications. Measuring just 110x75x50mm, and with a processing speed of 5000 pieces per minute even with full 360 degree rotation, the new FQ-M vision sensor comes with Ethernet and EtherCAT embedded for ease of integration into any environment, and includes an incremental encoder for easy tracking and calibration.

Providing smart camera guidance for dynamic pick-and-place robots, the FQ-M is easily configured using Omron's Sysmac Studio software, and is complemented by the palm-sized TouchFinder console for local monitoring and access to functions and settings. The vision sensor ensures stable and robust shape-based detection even under changeable environmental conditions. The FQ-M vision sensor is the latest addition to Omron's Sysmac automation platform, which tightly integrates core automation components with a common network and a single programming and configuration interface.

Intelligent dice playing robot

RNA and Kawasaki Robotics UK combined forces and shared a booth at this year's MACH show, collaborating to develop a live exhibit – an intelligent dice playing robotic system.

The live demonstration system comprised of an automated system based upon a Kawasaki 6-axis robot, vision inspection system and bowl feeding system. The robot rolls the dice, a vision system identifies the number on the dice upper face and pick position. The robot then accurately picks and places the dice into a numbered nest that corresponds with the upper face number. The robot then indexes to the bowl feeder and picks the exact number of parts corresponding to the dice face and nest number from the location nest. The cycle then repeats.

This fun concept showcased the many benefits of three pieces of differing technology combined in a compact footprint The combination of bowl feeding, robotic and vision technology when integrated by experts can provide a reliable and flexible system to a wide range of applications.

Intelligent dice playing robot

Scorpion Vision Ltd wins major 3D Machine Vision Tender

The Manufacturing Technology Centre (MTC) in Coventry has acquired a number of Scorpion 3D Stinger development systems manufactured by Tordivel AS. Scorpion Vision Ltd was invited to bid for the tender by Scorpion 3D Stinger integrator, John Larsson of Oxford based Scandinavian Machine Vision Ltd - a company that specialises in high end machine vision based on the Scorpion 3D Stinger technology.

Scorpion 3D Stinger offers the ability to create 3D data from 2D images, using a variety of image acquisition techniques and the additional Python scripting capabilities - including seamless integration of Intel's OpenCV machine vision library.

MTC provides a high quality environment for the development and demonstration of new technologies on an industrial scale, providing a unique opportunity for manufacturers to develop new and innovative processes and technologies in a low risk environment. MTC plans to develop ground breaking, comples 3D robot guidance using Scorpion Vision Software.

Scorpion Vision Ltd wins major 3D Machine Vision Tender

Enhanced functionality for Gocator 3D smart cameras

The LMI Gocator family of 3D smart cameras has been upgraded with new capabilities. Existing Gocator users can upgrade through a free firmware download (V3.3). A mega pixel resolution version is also available.

A new Gap and Flush measurement tool allows precise inline non-contact gap and flush inspection by measuring the distance between two sharp or curved edged panels, as well as how flush two surfaces are relative to each other.
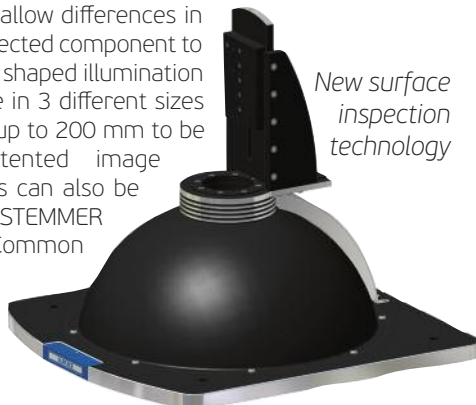
The new Groove Measurement tool measures the width and bottom of V and U shape grooves in applications wherever grooves are essential to a product's performance such as tyres, plastic container lids, or tongue and groove materials. Gocator's 'whole part' measurement capability now features a Rotated Box measurement tool for accurate measurement of an object in whole part mode even if it is not perpendicular to the laser line during scanning.

Enhanced functionality for Gocator 3D smart cameras

Gocators are now also certified to communicate with a wide range of PLCs, including Allan-Bradley and Omron, via the industry standard EtherNet/IP protocol.

New surface inspection technology

STEMMER IMAGING can now offer a new automatic surface inspection system, based on the Trevista image processing system from OBE GmbH & Co. Structured diffuse illumination is combined with specialised calculation algorithms within the popular Sherlock machine vision platform from Teledyne DALSA to create a fast automated total inspection solution capable of identifying defects in a range of surfaces from shiny components to diffusely scattering surfaces.

The Trevista process combines the speed of 2D image processing with the precision of 3D recognition to allow a 100% coverage of components. The process filters image information to separate topography and texture into different images. Topographic images allow defects down to a depth of just a few micrometres to be located and classified, while texture images allow differences in brightness on the inspected component to be determined. Dome shaped illumination housings are available in 3 different sizes to allow components up to 200 mm to be measured. The patented image processing algorithms can also be implemented through STEMMER IMAGING's own Common Vision Blox imaging toolkit.

New surface inspection technology

MEMBERS DIRECTORY

VISION TECHNOLOGY PROVIDERS

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 0845 606 0457

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.co.uk T 01908 206000

Cognex is the world's leading vision company, with over 150,000 systems delivered. We offer a complete range of vision solutions, from smart cameras to powerful framegrabbers.

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.

Imperx Incorporated
www.imperx.com T +1 561 989 0006

Imperx, Inc. was founded in 2001 by a seasoned team of senior executives with a proven track record in developing advanced digital imaging products. Imperx designs, develops and manufactures state-of-the-art imaging products for a variety of markets.

Lambda Photometrics Ltd.
www.lambdaphoto.co.uk T 01582 764334

Lambda Photometrics distributes a broad range of machine vision products. These include fibre & LED lighting, lens systems, cameras (CCD, linescan, smart CMOS), framegrabbers & software.

Leuze electronic Ltd
www.leuze.co.uk T 01480 408508

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 01895 827280

Matrox Imaging is a leading designer & manufacturer of PC-based hardware & software for machine vision, image analysis & medical imaging drawing on an unparalleled 25 years of industry experience.

Multipix Imaging Ltd.
www.multipix.com T 01730 233332

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

National Instruments UK Ltd.
www.ni.com/uk T 01635 523545

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

Omron Electronics (UK) Ltd
www.omron.co.uk 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.

Scorpion Vision Ltd
www.scorpionvision.co.uk T 01590 679 333

Scorpion Vision Ltd is the UK representative of Tordivel AS of Norway. Founded in January 2006, the company has the remit to promote, advise and manage sales and support of Scorpion Vision Software.

SICK IVP AB
www.sick.co.uk | www.sickivp.com
T +46 13 36 21 00 | 01727 831121

IVP offers cameras for high-speed 3D machine vision for OEMs and vision integrators. IVP's 3D technology can replace or complement traditional 2D inspection. The outstanding performance is a result of a proprietary CMOS sensor technology.

Stemmer Imaging
www.stemmer-imaging.co.uk T 01252 780000

The premier UK machine vision components distributor providing leading vision technology, advice and development services to OEMs, integrators and corporate customers.

Vision & Control GmbH
www.vision-control.com T +49 3681 7974 - 0

Vision Control produces a comprehensive system of precise components suitable for industrial machine vision. This includes our PICTOR smart cameras, VICOTAR range of lenses and VICOLUX range of illuminations.

VISION SYSTEM INTEGRATORS & CONSULTANTS

Astech Projects Limited
www.astechprojects.com T 01928 571797

Astech Projects are Vision System Integrators that specialise in the custom design, build & systems integration of advanced robotics and automation applications

Creative Automation Solutions
www.creativeautomation.co.uk T 07812 766639

CAS Ltd provides a full range of services to support both suppliers and users of automation.

FS Systems LLP
www.fssystems.co.uk T 01933 625162

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

Loop Technology Ltd
www.looptechnology.com T 01305 257108

Loop Technology Ltd provides development and integration services for automated processes involving machine vision systems and/or motion control systems. They produce automation systems for the electronics, automotive, printing and packaging industries.

OLMEC UK Ltd
www.olmec-uk.com T 01652 631960

Olmec supply, install and integrate vision systems into existing, new and OEM machinery processes.

Panther Vision Ltd
www.panther-vision.co.uk T 01252 713285

Panther Vision provides independent consultancy and bespoke product development and is interested in joint development opportunities.

RNA Automation Ltd
www.rnaautomation.com T 0121 749 2566

RNA are specialists in the supply of parts handling and orientation equipment, including vision systems and pick and place handling units.

PROVIDERS OF SOLUTIONS THAT UTILISE MACHINE VISION

Optimal Industrial Automation Ltd
www.optimal-ltd.co.uk T 01454 333222

Optimal is an automation company specialising in high speed and high performance Part Handling & Vision Inspection systems for use in regulated and quality critical industries, such as medical devices and pharmaceuticals.

Multivac UK
www.multivac.co.uk T 01793 42580

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

Stein Solutions Ltd
T 07787 568307

Stein Solutions provide inspection and optical sorters.

UPM Conveyors
www.upmconveyors.co.uk T 01753 548801

UPM Conveyors provide complete automated conveyor & vision systems

APPLICATION ARTICLES

BAUMER   **www.baumer.com**

Monitoring drinking straws regardless of package design

Milch-Union Hocheifel eG (MUH) is a classic dairy cooperative processing approximately 3.5 million litres of milk every day at its site in Germany. About 1.3 billion packages of refined milk leave the dairy annually. Detecting the exact position of drinking straws sealed in transparent foil, against various multicolored background designs of the packages poses a significant challenge. Drinking straws protruding sideways from the packaging inevitably cause cartoners to malfunction. An existing high-end camera-based solution to check the

Milk carton with drinking straw

position of drinking straws led to additional operating costs because the system had to be readjusted for every new package design. Since the half-litre packages with drinking straws have more than 30 different designs, the resulting time and cost expenditures were considerable.

A new drinking-straw monitor was developed by Baumer, featuring a VeriSens® vision sensor and a specially arrayed lighting system which indirectly illuminates only the drinking straw itself and completely screens out the background, making it independent of the package design. The compact vision sensor has a resolution of 752 x 480 pixels. It can perform 100 inspections per second in high-speed mode and up to 50 per second in high-resolution mode. The sensor can store up to 255 programs, each with 32 product features.

The intervals between packages on the conveyer belt are adjusted before they pass the new drinking-straw monitoring area. A sensor triggers the image acquisition of the individual packages as they pass by. The system recognizes in less than 30 milliseconds whether or not a drinking straw is attached and correctly positioned. Packages with wrongly positioned drinking straws are ejected immediately after monitoring. The new system has provided trouble-free, reliable monitoring of over three million packages in the first three months since its installation.

Cognex Code Readers Ensure Cheese Production Traceability

LABELYS, based in eastern France, specializes in producing labels made of casein (a milk protein biocompatible with cheese). This marking method is natural and indelible. It cannot be removed nor falsified. It becomes the cheese's "passport", providing reliable identification that allows producers to protect their wares and their brand, defend against imitations and guarantee flawless traceability. As well as production data such as traceability and food safety codes, labels may include the name of an Appellation of Origin Control, a trustworthy guarantee of authenticity. Data Matrix codes have higher data capacity and density, but as cheese "evolves" as it matures, reading the label can become a challenging task.

LABELSYS chose Cognex DataMan® readers as they provide uniform results despite variations in label quality. Their powerful algorithms can reconstruct even the most degraded codes to ensure 100% reliable identification. The reader must also overcome problems such as dimensional degradation and incorrectly positioned labels.

LABELYS, together with a partner, has developed a comprehensive traceability solution to not only read labels and verify their information content, but also store them in a centralized database, interfaced to the dairy's production management system. This solution provides real time production control, determines stock status by taking inventory snapshots, "geolocates" each cheese stored in the ageing cellars, monitors the operations of brushing and turning over the wheels of cheese, records events and manages the production tools.

Capturing data from a caesin 2D Datamatrix code on cheese

APPLICATION ARTICLES

Forklift eye

The 'Forklift Eye' – optimising transport processes

Researchers at the Institute of Materials Handling, Material Flow, Logistics (fml) at the Faculty of Mechanical Engineering at the Munich University of Technology have formed an industrial consortium to work on the technical development of material flow systems and their control. FRAMOS supports the "The Forklift Eye" project and the associated research activities by participating in the Project Committee. There is a demand for transport devices such as forklift trucks to gather information about the transport process using suitable sensor equipment. The use of a Smartek GigE Vision® camera (5 megapixels at 15 fps) on the forklift truck combines a great many sensor functions in a single sensor technology.

The system needs to address issues related to whether the fork is loaded or not; the lifting height; the position of the forklift in the room and the identification of the load using 1D and 2D codes for automatic tracking of the material flow. The camera must be able to record the codes in sufficient resolution and contrast over a very wide viewing angle. Since forklift trucks may be used both out of doors and in dark warehouses. LEDs operated by a lighting control system from Smartek are being used to provide a high degree of insensitivity to ambient light. To keep the number of cameras required to a minimum, the lens used must be able to image objects of vastly different sizes and distances from the camera's installation location.

The camera's SDK has been used to link established image processing libraries and special recognition algorithms. Ethernet-compatible technology allows additional sensor functions to be incorporated with little expense. On completion of the research project, the software framework will be published as an open source solution, offering system integrators working on material handling devices a solution with minimal hardware integration, which could be used in other logistical material flow systems.

Milk bottle cap inspection – defect analysis

Milk bottle cap - foil inspection

## Cap inspection system for milk bottle manufacturer

MultiPix and vision systems integrator, Engage Technology, have worked closely with factory automation systems specialist, ALS Controls, to create a bespoke vision inspection system which checks bottle caps for a large milk bottle manufacturer. The production line runs 24/7 manufacturing plastic milk bottles and injection moulded bottle caps. The 40mm diameter moulded caps are produced in three different colours to signify different milk types and must be produced to the correct dimension and shape. Inserted into each cap is a round foil seal complete with pull tab to ensure that the product stays fresh and airtight. The quality of cap production and the inner foil seal are key to producing a product that will not leak, will keep the milk fresh and prevent hefty supermarket fines.

Over half a million caps requiring 100% quality inspection are produced each day at a rate of 20/second with conveyor speeds reaching 50 metres per minute. The main quality inspection checks are for 'short shot', when not enough plastic is injected into the mould, 'flashing' when too much plastic is injected, and the foil insert being present within the cap and placed correctly with no folds, creases or damage. Finally, the colour of bottle cap also needs to be verified.

The turn-key inspection system utilises the Basler ace GigE Vision camera, Microscan DOAL lighting and a telecentric c-mount lens together with MVTec's HALCON image processing software. To cope with the speed, a separate colour sensor is integrated to verify the colour of the cap to ensure no cross-over has occurred and that the dye in the plastic has not washed out. The vision system has reduced total defects to less than 2%, which represents a vast improvement in the manufacturing process.
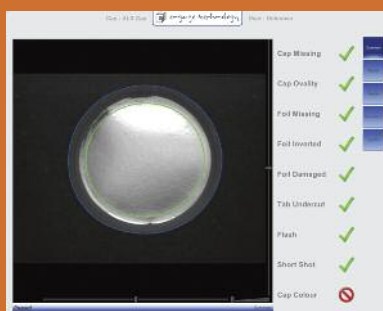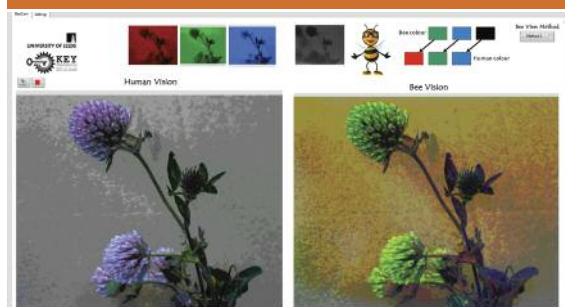
Seeing a garden through a pollinator's eyes – the 'BeeCam'

A group from the University of Leeds' Schools of Geography and Biology, working in collaboration with Key Engineering Solutions Ltd, produced an interactive exhibit for the RHS Chelsea Flower Show that would enable members of the public to simultaneously view plants as both a human and a bee would see them, highlighting the role that gardens play in ecosystem services such as pollination distribution.

RGB and monochrome cameras sensitive to ultraviolet light (UV) and National Instruments LabVIEW, were used to mimic how a pollinator sees flowers and compare that to how humans see them, since bees can see UV light but have a poor response to red light. The image processing functions available in the software enabled spectral components of the two images to be split, filtered and combined to produce "Bee-Vision". The cameras were placed on a motorised pan and tilt mount controlled by a separate touch screen control. The system uses two USB cameras from IDS GmbH; a standard colour (RGB) digital camera and a monochrome digital camera combined with a high-pass filter to allow through only the UV components (ca 350-400 nm).

A custom camera settings user interface was created to provide users with on-site fine tuning due to variations in the lighting conditions. The final solution features a LabVIEW Front Panel containing four small images displaying the Red, Green, Blue and UV images separately; beneath them are two big images side by side: a "Human-Vision" (R, G, B) image and a "Bee-Vision" (combining G, B & UV streams) image.

Human vision – bee vision comparison

APPLICATION ARTICLES

OLMEC-UK   www.olmec-uk.com

Blister Pack inspection

Olmec-UK has designed and installed a blister pack inspection system for a leading UK healthcare product manufacturer. This was integrated into the existing manufacturing process without the need to reconfigure the line, by mounting the lighting and camera system in a purpose-built housing that could glide out of the working area, giving the operators good access for threading up and other tasks.

The system can inspect a variety of different product layouts and contents before foil sealing, varying from pressed tablets to gelatin-type capsules. Typical inspections include colour checks of products and product types to ensure that there are no rogue products. Additional checks ensure that there are no cracks, there is no product missing and there is no additional product. The system can check 540 blisters/min on the process. 2MPixel colour cameras are used to ensure high quality imaging even in the presence of reflections from the packaging.

Back lighting was used in addition to top lighting. This enabled detailed imaging of the product shape, and contour characteristics to identify cracks and chips and was essential for products that were impossible to distinguish from the background using top lighting. Splice sensors from the machine and a product-tracking module were integrated in to the system to provide a single control system for splice and product related defects.

SICK (UK)   www.sickivp.com

Milk bottle inspection system

Worldwide plastics manufacturer Logoplaste has worked closely with Sick UK to reduce to nearly zero the number of defective blow-moulded 2-litre milk containers delivered to its customer – a major UK dairy products company. At Logoplaste's plant in Essex, two 500 metre lines produce 6,000 rigid plastic milk bottles an hour. The bottles are conveyed to the customers' plant as aseptic fully-enclosed containers.

The ring of material at the neck - known as the moil - is removed later in the customers' process prior to filling. During the moulding process, flashings occur at the moil and the handle. Automatic trimming removes these, but small pieces of flashing can be left attached to the moil or entire handle slugs left in place. These can cause a problem on the filling line, where the moil is removed prior to filling. If the moil is dented or deformed, it may not remove cleanly. If there are pieces of flashing on the moil or handle, they could possibly enter the bottle at this point. Holes, tears or weak points on faulty handles will cause the loss of sterility, or could leak after filling.

Two Sick Inspector I20 vision cameras are positioned on each line to inspect each moulded container at full line speed, replacing the human batch inspection rate of just 14 units per hour. One camera scans the container necks and one scans the section of the handle where untrimmed flashings remain. Set at 40mm from the target, the camera compares each scan against a pre-programmed image. If a fault is identified, an alarm is triggered and the faulty unit can be removed from the line before palletising.

Untrimmed flashings on milk bottle handle

Moil inspection

STEMMER IMAGING   www.stemmer-imaging.co.uk

Keeping an eye on the ball!

Quintic Consultancy specialises in premier sports biomechanics video analysis software, sports biomechanics consultancy, and human/equipment performance analysis. Quintic provides both the tools and consultancy expertise for performance analysis to aid coaching from grass roots through to elite level sport. They have developed software products that enable video capture at high frame rates from up to 4 cameras simultaneously. High speed USB 2.0 or Gig Ethernet cameras manufactured by IDS GmbH and supplied by STEMMER IMAGING are used in these applications. STEMMER has worked closely with Quintic to ensure successful integration of the cameras with the software.

Applications cover a multitude of sports, ranging from snooker, where the spins imparted on the cue ball can be analysed, to football, where high profile players such as Cristiano Ronaldo have been analysed with the software to show how different ball striking techniques affect subsequent spin and trajectory.

For putting in golf, imaging at 260 frames per second allows Quintic Ball Roll software to automatically track tiny markers on the ball for the first 30 cm of the putt, instantly producing fully digitised analysis of each putt before the ball has even reached the hole. This shows ball speed, sidespin (cut or hook), angular rotation (degrees & RPM), vertical bounce, launch angle and the point at which true roll occurs. The software then compares the results of different putts, for example, with different models of putter, and before or after changes in the golfer's putting technique.

Quintic ball roll system

VISION AWARD

Finalists for UK Vision Award announced

The judges for the UKIVA's 'Most Innovative Machine Vision Project' award have announced the 3 companies shortlisted for the award. They are: RNA Automation for a rotating disc vision inspection system for use with food/pharmaceutical products; Olmec-UK for their design of a vision system for the final inspection of ear drop dispensers prior to packaging and STEMMER IMAGING for their work in the development of the imaging system for the C-Cell bread & baked product quality assessment system. The winner of this award will be announced on the evening of Tuesday 25th September 2012 - the first night of the PPMA Show.

TECHNICAL TIPS

Some useful technical tips from UKIVA members:

The four step colour calibration guide (MultiPix Imaging)

This colour calibration guide is a well considered, standardised process consisting of four steps: white balancing, gamma correction, matrix correction and correction by the six-axis operator. Learn why it's important and how to put in place:

http://multipix.com/wp-content/uploads/2012/07/Color-Callibration.pdf

The test chart for machine vision (Stemmer Imaging)

A video tutorial which explains the elements and use of the test chart for machine vision which is printed on the back cover of STEMMER IMAGING's Imaging and Machine Vision Handbook 2010-11.

www.youtube.com/watch?v=E8GtScBzlxQ&

3D laser scanning – lasers and machine vision (Alrad Imaging)

This technical tip looks at the theory behind extracting information from the use of structured lasers. This helps with understanding the benefits, use and ultimate selection of these illumination sources. Particlular attention is taken to the core principle of triangulation.

www.alrad.co.uk/imaging/FAQ-Applications-Imaging.html