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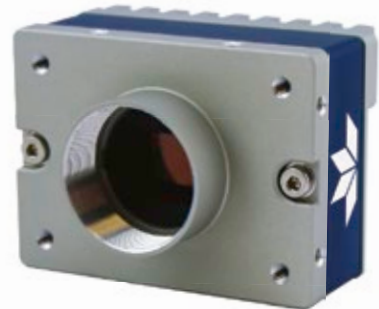
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Good Prospects



The yearend is virtually predestined for a review and, at the same time, a look to the future. Which were the topics the vision industry dealt with the most in 2018? Which developments are emerging, and what can we prepare for?

The industrial vision industry has gone through a great growth phase during the past years. According to the VDMA's Machine Vision division, the German vision industry's turnovers have doubled in the last 10 years. Between 2013 and 2017, the industry is said to have grown by 13 percent on average, in 2017 alone by almost 18 percent. Even if the quantitative values cannot be transferred 1:1 to the entire industry as VDMA does not cover

100 percent of it, the qualitative development remains extraordinarily positive. While these are the facts for the German market, they apply to the international vision industry, too.

Moreover, this positive impression is not really mitigated by the zero growth rate forecasted by VDMA for 2018. The fact remains: The machine vision industry was, is, and will remain a growth industry. This development is further fueled by the trend topics hyperspectral imaging, embedded vision, and deep learning. They do not only offer increased efficiency, but also new fields of application. From a technological point of view, industrial vision will become even more exciting and will offer new market potential for all stakeholders.

It is interesting to observe how markets and companies are developing. As in many other technology industries, the vision market has a series of highly attractive startup companies, both German and international. That Chinese companies have also discovered vision as a field of interest is no wonder and has become imminent over the past years – a development that will surely accelerate.

The same applies to an increasing market concentration. The vision industry is especially dominated by many small to medium-sized – often family-owned – companies, not only in Germany.

The market is therefore undergoing a shift that we as inspect will monitor for you with interest.

The key to a sustainably successful development, for manufacturers and users, will be steady innovation and customer-centric corporate action. With our Buyers Guide 2019 we are providing you, our valued reader, with a comprehensive information medium. You will find exciting market reports, many interesting suppliers and a comprehensive overview of products and services in this issue.

We are looking forward to continue informing you about the world of industrial vision and optical metrology in 2019 and sincerely wish you lots of success for 2019 and beyond.

Warm regards,

Martin Buchwitz and the entire inspect team



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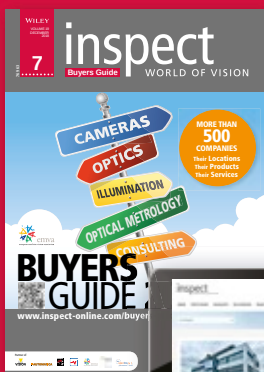
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Schäfter+Kirchhoff develop and manufacture laser sources, line scan camera systems and fiber optic products for worldwide distribution and use.

Machine Vision and Optical Metrology in Europe

The inspect Buyers Guide 2019



Throughout the year, we aim to provide you with information about new developments, technological trends, groundbreaking applications, new products and leading companies. Throughout the year, we are faced with the recurring challenge: What to select, what to highlight, what to point out. There is never enough room to cover it all. So once a year we seize the opportunity to present to you a comprehensive overview of the machine vision and optical metrology industries.



The Online Buyers Guide provides sophisticated search functions for all listed companies.



Companies providing a full-fledged company profile will be additionally found in multiple categories with the keyword search.



The full text search for "CMOS" yields 40 results: every company that used the word "CMOS" in their description is listed.

The inspect Buyers Guide is published in its 10th year now, for the 11th time it also serves as the official Buyers Guide of the EMVA, the European Machine Vision Association. The guide contains information about more than 500 companies from over 30 countries. The inspect Buyers Guide has a clear focus on companies doing business in Europe or exporting their goods to Europe. Naturally, this comprises companies and organizations from all over the world.

Online ...

The inspect Buyers Guide is a true cross-media product. At www.inspect-online.com/buyers-guide the online database provides sophisticated search functions for all listed companies. Every entry can be searched for with full-text search, and every listed company will be found here based on the individual company description. Additionally, every listed company will be found by name, company category (e.g. producer, integrator, research facility, association, etc.) and country of headquarters.

Companies wanting to provide more information and aiming at even better search results are listed with a company profile, including detailed company data and a listing of products offered, industries served and applications catered to. These, and only these, companies will be found in the respective search categories.

The online Buyers Guide is open for companies within the scope of the inspect all year round. In this way it is always up-to-date.

... and Print

The availability of data online is a clear benefit when presented with clever search functions. However, sometimes you do not want to bother going online, or you don't want to search specifically but rather obtain a quick overview. In these instances a printed version has its unchallenged advantages.

Not to mention the ease-of-use when taking notes right next to the provided data. Thus, once a year the the printed edition of the inspect Buyers Guide is provided to you. With this guide we aim to give you a full overview that is still easy to use, a complete set of information that is still not too subdivided into too many categories.

The inspect Buyers Guide 2019 is divided into three main chapters: Topics, company profiles for the main global regions, and company listings for the main product categories. In an

industry as innovative and dynamic as ours it will most likely never be possible to provide an overview that is final and complete, but we do our best to come as close as possible.

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And the inspect award goes to...

Presentation of the inspect award 2019 at Vision

The companies had to wait a long time until the inspect award 2019 was announced: And the winner is... The award was preceded by a submission and selection process and, of course, the readers' choice procedure. After all, it is the inspect readers who decide which products should receive an award. This year's inspect award, which has now been announced for the third time, again attracted numerous entries, ten of which were among the nominees. Both products from the Vision and Automation+Control categories received awards.

inspect
award 2020

Submit your entry now for 2020!

We would also like to cordially invite you to submit your vision, automation and control products for the inspect award 2020. The deadline for the Call for Papers is 30 April 2019, so don't wait any longer and present your innovation at www.inspect-award.de (German) and inspect-award.com (English).

Category Vision

1st place Baumer Group with their product: CX Series Cameras



Nicole Marofsky and Torsten Wehner from Baumer, Anke Grytzka-Weinhold (Product Manager, Wiley) and Heiko Baumgartner (Publishing Director, Wiley)

The Baumer CX.I cameras of the CX series offer the pulse of performance. Due to an extended operating temperature range from -40 to 70 °C, additional cooling or heating measures can be dispensed with in order to achieve fast and cost-effective system integration. 4 power outputs with pulse width modulation and an output power of up to 120 W for direct lighting control save additional components. The camera features exposure times of 1 µs and frame rates of up to 1,000 fps. Due

to the modular tube system, cameras and lenses of different lengths can be reliably protected against dust and dirt quickly and flexibly with a variable number of extension rings.

→ Baumer Group – www.baumer.com



2nd place Edmund Optics with their product: Liquid Lens M12 Imaging Lenses

EO's liquid lens M12 lens series utilizes the Varioptic liquid lens to enable the user to quickly focus anywhere between the minimum working distance and infinity. With the optical design being optimized to account for

the liquid lens, this lens series offers high image quality on large sensor formats of 1/2" or even 1/1.8", depending on focal length. With the liquid lens being positioned at the aperture stop, all lenses operate at a very fast F/2.4. The intelligent opto-mechanical design supports the ease of use: Simply fully thread in the lens to the camera and use the liquid lens to focus from there.

→ Edmund Optics – www.edmundoptics.de



Boris Lange and Nicholas Sischka from Edmund Optics, Anke Grytzka-Weinhold (Product Manager, Wiley) and Heiko Baumgartner (Publishing Director, Wiley)

3rd place Hikvision with their product: VPU Platform Smart Camera



Kane Luo and Tina Wu from Hikvision, Anke Grytzka-Weinhold (Product Manager, Wiley) and Heiko Baumgartner (Publishing Director, Wiley)

Based on Hikvision's extensive background and technology advantage in audio and video, imaging acquisition, core algorithms and other areas, Hikvision has researched and developed the VPU Platform Smart Camera. The camera is embedded with the Intel-based artificial intelligence platform-Movidius VPU chip that can be widely applied in 3C manufacturing, auto parts and electronic semiconductors. The chip is equipped with a 12-core processor and two 32-bit RISC,

providing superior algorithm performance and flexibility. In addition, the acceleration of the hardware system is optimized for visual processing.

→ Hikvision – www.hikvision.com



Category Automation + Control

1st place VisiConsult with their product: XRH RobotStar



Hajo Schulenburg from VisiConsult, Martin Buchwitz (Deputy Editor-in-Chief, Wiley) and Katja Habermüller (Corporate Sales Director, Wiley)

The XRH RobotStar is a digital X-ray robot-system that allows an ultra-fast in-line inspection. The throughput can be increased by using a cluster of several systems and an innovative Automated Defect Recognition (ADR). The underlying principle is that a loading robot on the outside handles the incoming parts and distributes the inspected parts while the robot on the inside has a C-Arm with mounted X-ray components. The acquired images are automat-

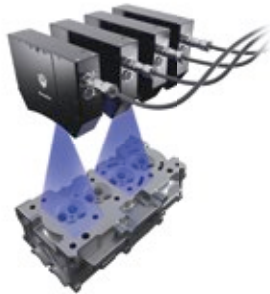
ically processed and checked for critical defects or other user-defined criteria. The patented system is ready for Industry 4.0.

→ **Visiconsult** – www.visiconsult.de



2nd place LMI Technologies with their product: Gocator Volume Checker

Tactile CMMs can accomplish volume gauging with a high degree of accuracy. However, this method can take more than two minutes per chamber, and all chambers need to be measured.



For automotive component suppliers who need to verify high tolerances on medium-sized internal combustion engines, LMI has designed a 3D non-contact inspection method: The Gocator Volume Checker leverages several technologies (Gocator 3210 3D smart snapshot sensor, Gocator Development Kit and Accelerator, and a Master networking hub) to achieve high-speed, accurate volume measurement of cylinder heads and piston bowls.

→ **LMI Technologies** – www.lmi3d.com



Vanessa Germann and Christian Benderoth from LMI, Martin Buchwitz (Deputy Editor-in-Chief, Wiley) and Katja Habermüller (Corporate Sales Director, Wiley)

3rd place Ametek, Creaform Division with their product: Cube-R



Annick Giesen and Harald Ferge from Ametek/Creaform, Martin Buchwitz (Deputy Editor-in-Chief, Wiley) and Katja Habermüller (Corporate Sales Director, Wiley)

Cube-R is a fast, reliable, and efficient complete turnkey solution for automated quality control applications. It is the perfect alternative to solve any productivity issues caused by bottlenecks at the traditional CMM. Unlike existing solutions, this scanning machine enables manufacturing companies to harness the power of optical 3D measurement and industrial automation. It maximizes the production cycle and throughput resulting in better product quality. It is ideal for

the dimensional measurement of parts ranging from 1 to 3 m with a volumetric accuracy of up to 78 microns.

→ **Ametek, Division Creaform** – www.creaform3d.com





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Industrial Camera Trends and the Market

Machine Vision Meets Innovative Embedded Vision

In cooperation with the industry magazines inspect and Vision Systems Design, imaging specialist Framos conducts an annual survey among users and manufacturers, asking them about trends in the vision sector and additional technical and business developments. The current market study comprises the insights into the imaging market of 61 manufacturers and users from 22 countries.

Traditional machine vision and modular embedded vision are aligned to become the cornerstones of the vision industry as it continues to grow. Users and manufacturers are relying on outstanding sensor performance, simple connectivity and integration, and mass-market-ready technologies like 3D, polarization, and artificial intelligence. Where possible, these technologies can be mounted on sensor board modules to allow smart devices, machines in the industrial and the consumer market to be visual. Automation can allow for 100 % control, while embedded imaging technology in everyday devices can improve quality of life.

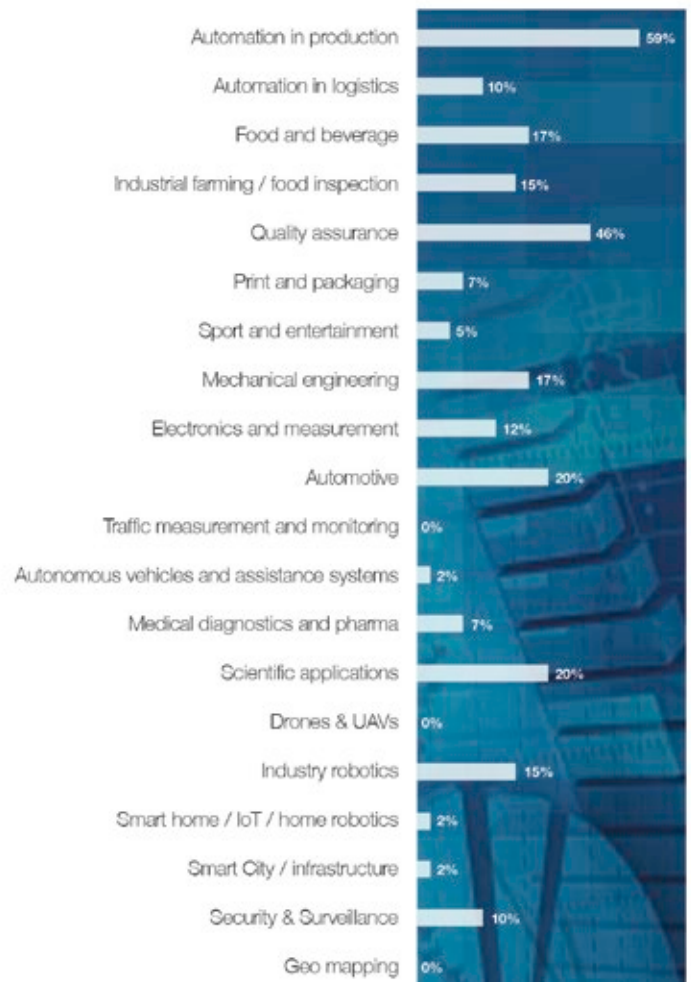
The 2018 study is based on statements from 41 users and 20 manufacturers who answered questions on the following subjects: application and integration, cameras, sensors, sensor modules, and market development. The relevance of the answers was weighted by the indicated purchasing and production volume. Two thirds (66 %) of the participants were from Europe; 21 % were from America; and, 14 % from Asia. This sampling of data is roughly equivalent to the participant sampling of the previous year.

Despite the uneven distribution across continents, 94 % of the users purchased equipment for the European market in 2018. The most important markets for manufacturers are Europe with 50 % of all cameras sold, Asia with 32 %, and America with 18 %. Compared with the previous year, seven percentage points went from North America's demand to Asia. This difference represents the increasing importance of Asian demand for industrial cameras. Most likely, this demand is a result of their continuing investment in automation and robotics.

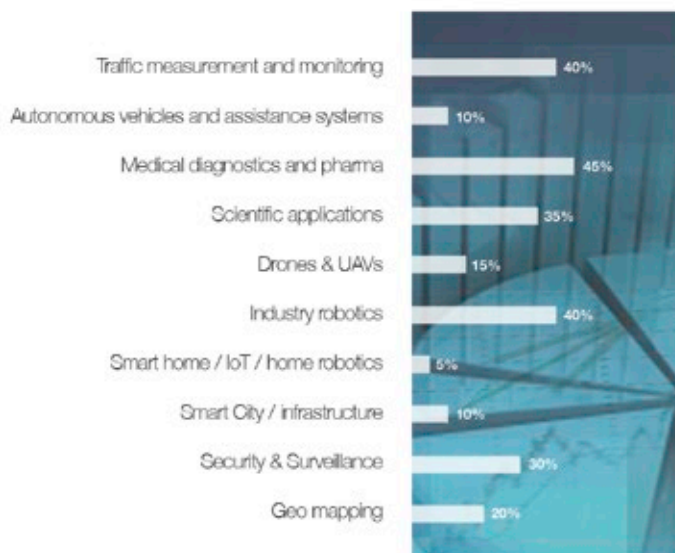
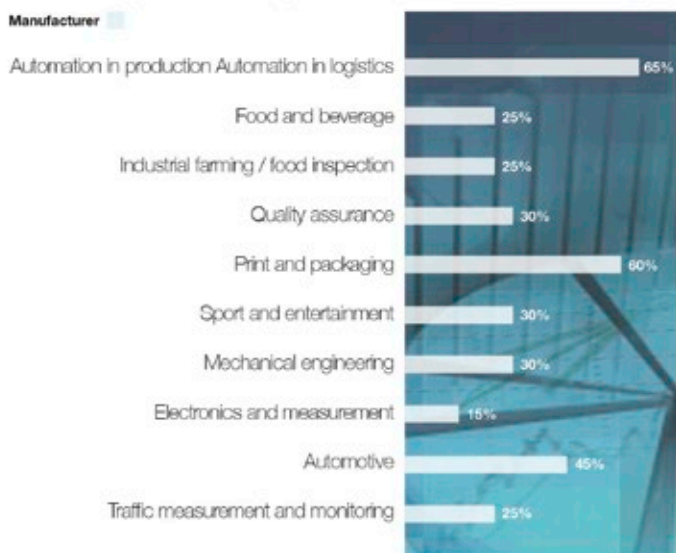
Traditional Imaging and Industrial Robots

Imaging technology is mainly concentrated in production automation and quality assurance. This fact has not changed during the last ten years, neither among manufacturers, nor users. Users focus on the traditionally strong automotive industry as the main market for machine vision and automation; in addition to scientific applications, food and beverage production, mechanical engineering, and robot-

For which applications are your industrial cameras used mainly?



For which applications are your industrial cameras used mainly?



ics. Traditionally, manufacturers concentrate on a wider range of sectors including the electronics industry and metrology, medicine, industrial robotics, and transport. The new areas like autonomous cars, drones, smart home applications and the smart city achieved implementation rates between 5 % and 15 %. The highest growth rate was recorded in the robotics sector.

The Market Is Growing and Pairing Embedded Vision with Intelligence

Manufacturers are selling their cameras in mostly equal proportions to end users (28 %), system integrators (31 %), and OEMs (30 %). The amount sold to end users has almost doubled compared to 2017 with plus 15 percentage points. The reasons for this increase can be found in technological advances. The well-equipped cameras and modules, sometimes intelligent, can be integrated easily and intuitively. This result is reflected in the user’s responses. 58 % of users indicate that they assemble and implement their vision systems themselves while another 23 use ready-made systems from manufacturers. Only 18 % of the users employ system integrators.

One factor that has remained unchanged for years is the expectation of continued growth in the imaging market among all manufacturers, and virtually all users. 75 % of the manufacturers expect significant growth in the number of first-time users. This figure amounted to just 38 % in 2017. The increase comes from the new applications for vision technology in the industrial and consumer sectors. 70 % of the customers want to augment their existing systems with vision technology. 93 % of the users are planning to introduce new systems, while 56 % want to modernize existing ones. All customers rely on standard components for new and modernized systems. 46 % choose embedded vision systems, a slight increase over the previous year. 68 % want to use off-the-shelf components. Technological development and modular design entail that users who want to build their own systems no longer have to develop their own components. The proportion of in-house components is 10 percentage points lower than in 2017. Why build something when

it is already available for purchase? Despite this decrease, 29 % still develop their own individual components. Therefore, only 15 % of camera manufacturers consider customers who develop their own cameras a threat to their business; a decrease of six percentage points compared to the previous year:

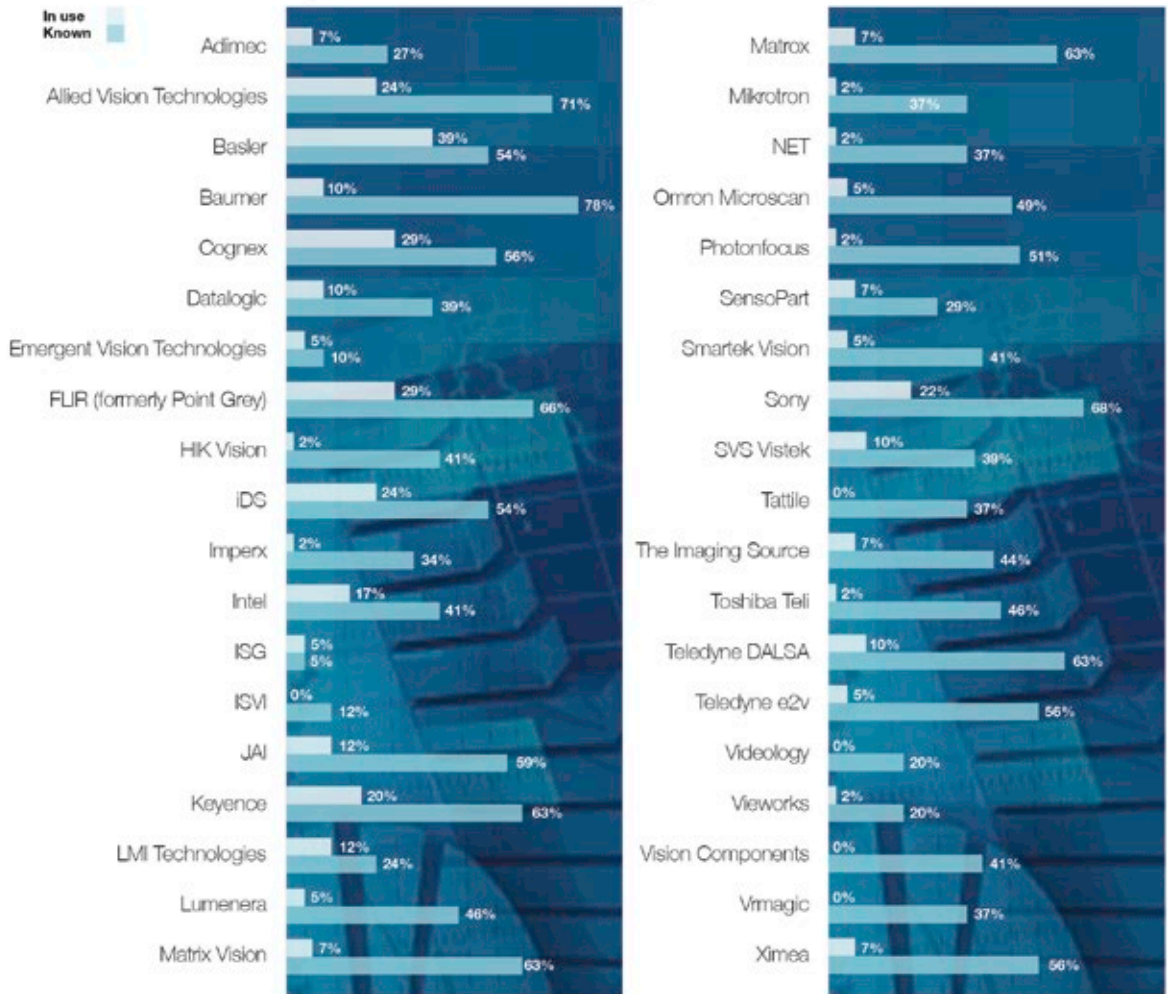
Claudia Unterhuber, Head of Product Marketing, Framos: Just like in the previous year, the challenges for the vision industry are clear: greater competition from Asia and the trend towards embedded vision. Therefore, there is risk that traditional camera solutions will become obsolete. In addition, manufacturers are taking a critical view at imaging that allows machines and devices “to see” in almost all industry sectors and the consumer market. 25 % of the manufacturers view the resulting market fragmentation as a risk.

In contrast, 65 % of the manufacturers see embedded vision as one of the greatest opportunities to integrate image processing into all areas of life and work. 3D imaging and enabling vision devices with artificial intelligence are factors that could change both users by 75 %, and manufacturers by 70 %.

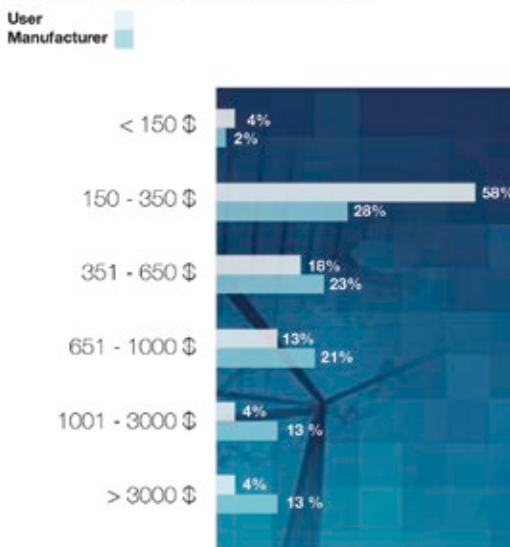
Price Drop, Matrix Cameras, and Strong Brands

The price levels for cameras is a good indicator for future demand. Responses from manufacturers and users suggest that prices are falling again, after having stabilized throughout the past two years. 62 % of the users state they would be prepared to spend \$350 or less on a camera (See Chart 2), compared to 19 % in the previous year. 31 % would be prepared to pay between \$350 and \$1,000; seven percentage points less than in 2017. 8 % of the users indicate that they would invest more than \$1,000 into their camera; a drop of 34 percentage points. The clear increases of the previous year could not be observed for 2018. Among manufacturers, the shift is less dramatic (see chart 4). The price segment below \$150 increased by just three percentage points, while the losses in the over-\$1,000 segment are largely due to the benefit of the mid-price segment which increased from 33 % to 44 %. This significant shift can likely be explained by a combination of the altered participant sampling

Which camera brands do you know and which brands do you use?



To which pricing sector can your industrial cameras be allocated?



and the increased competition from Asian manufacturers. In addition, the continued technical development that allowed greater performance for lower cost and modularization through embedded vision are further factors to consider.

86% of all users use matrix cameras in their applications compared to 60% in the previous year. Camera modules and smart cameras are the only other relevant technologies, each amounting to 5%. Preferences among manufacturers are more varied now. Matrix cameras are heading the list with 64%, followed by camera modules with 14%, 3D cameras with 12%; and smart cameras with 9%. The strongest growth is predicted for OEM camera modules and 3D cameras. Their proportion of growth is due to increase over the next two years to 23% and 18%, respectively. This growth will continue to drive embedded vision and ensure a greater accuracy of the predictions based on 3D data. The increase in embedded vision will benefit autonomous devices like robots in the industry, in logistics and households along with drones, AR/VR/MR, autonomous cars and other intelligent machines in all areas of life.

The five most well-known camera brands are: Baumer with a supported brand awareness of 78%; Allied Vision with 71%; Sony with 68%; and, Flir with 66%. The fifth place is shared by Matrix Vision, Teledyne Dalsa, and Keyence, with 63% each. Basler, in terms of use, remains at the top with 39%; followed by Cognex and Flir with 29% each and Allied Vision and iDS with 24% each.

Zeiss is the best-known optics brand with a supported brand recognition of 66%, followed by Edmund Optics with 61%, and Schneider-Kreuznach with 51%. Tamron and Edmund Optics share the first place concerning lenses used with 39%, Computar and Fujinon follow with 37% and 34% (see Chart 6). When it comes to mounts, the C-Mount is the standard for both users and manufacturers, with 92% and 62%, respectively. In addition, manufacturers are

increasingly offering CS mounts and mini-lens mounts like M8 and M12 for embedded vision.

The Sensor Market Remains Clear and Stable

The sensor market is clear and remains stable. Among the surveyed users, Sony remains the clear market leader with 48% (see chart 6). ON Semiconductor follows with a market share of 22%. With a share of 19%, CMOSIS will play a significant role in the clearly divided sensor market in the medium term. The picture is similarly evident among manufacturers. After a few challenging years for Sony, the Japanese giant has secured market leadership with a share of 62%, a doubling of the previous year's market share. ON Semiconductor has a market share of 22% which corresponds to a fall of three percentage points (see chart 6). Teledyne e2V achieves 7% while CMOSIS remains at 3% as in 2017.

Different Sensors for Machine Vision and Embedded Vision

The sensor is the heart of every camera or embedded vision module. Therefore, it must meet certain criteria for every application. 80% of all deployed sensors are CMOS sensors. These sensors offer high quality and ever-improving performance for demanding vision applications. However, there is a clear difference between traditional machine vision and advanced embedded vision in the industrial and consumer sectors. Applications like VR/AR/MR, autonomous cars, drones, and intelligent robot systems require high resolution, sensitivity and analysis quality to achieve the greatest possible level of reliability and accuracy. This level of reliability and accuracy is ideally true in 3D for precise processing and control in real time. In contrast, measurement and testing tasks can be performed at lower resolutions and speeds.

Sensor resolution has successfully made the jump to the next-highest class, but not in the

expected way. This year, 68% of all users indicated that they use sensors with resolutions from 1 to 3 megapixels. This number is highly indicative of the entire segment below one megapixel moving upward, with only 4% still using the lowest resolution. However, the increase

further upward has been much more modest. Forecasts for sensors between three and five megapixels showed that 24% of users favor these models – a rise of six percentage points. Manufacturers are taking a longer-term view, although the discrepancy is becoming clearer.

16% still use VGA resolutions, with 62% of all sensors fitted having between one and five megapixels. In contrast, already 21% of sensors boast resolutions of between five and twenty megapixels. This statistic is consistent with last year's forecasts. Respondents predict

New 3-CMOS industrial prism area scan cameras from JAI

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In nature, no one handles color better than the chameleon. And for color vision systems, no industrial cameras handle color better than the Apex Series. With their new 3-CMOS, prism-based technology, these Apex cameras provide significantly higher color accuracy and spatial precision than typical Bayer-filter cameras, and offer more than 3 times the throughput of previous 3-CCD models – up to 3.2 megapixels at 55 fps. Add to that advanced features like edge enhancement, color enhancement, and built-in color space conversions for a price that's well-below previous prism cameras, and it's easy to see why system designers are choosing Apex Series cameras for their color-critical applications in life sciences, print inspection, paint matching, darkfield color wafer inspection, and much more. If color is critical to your vision system, don't settle for less than the best. To learn more, visit www.jai.com/apex

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The new Apex cameras

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- ✓ Exceptionally accurate color image capture
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AP-3200T

- ✓ 3 x 3.2 megapixels
- ✓ Sony Pregius™ IMX265
- ✓ 55.6 fps (PMCL)
- ✓ USB3, GigE, PMCL



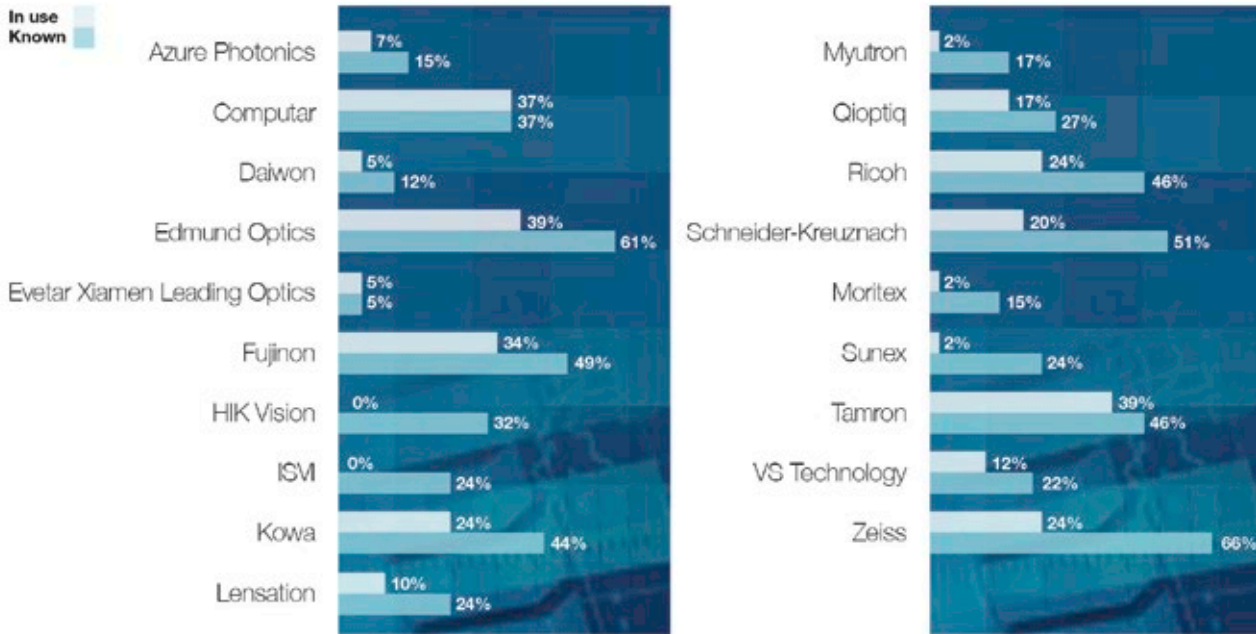
AP-1600T

- ✓ 3 x 1.6 megapixels
- ✓ Sony Pregius™ IMX273
- ✓ 126 fps (PMCL)
- ✓ USB3, GigE, PMCL



See the possibilities

Which lens brands do you know and which brands do you use?



that the next two years will only be seeing a slight rise in resolution. Despite this prediction, resolutions starting from five megapixels will continue to be used for almost a third of all applications.

75 % of all users are using sensor formats between 1/3 and 2/3 of an inch, same as last year. Manufacturers are showing stability and a trend towards miniaturization. Depending on the application area, they generally choose either very large sensors measuring more than one inch that achieve a share of 33 % , or small sensors measuring up to 1/2 inch whose percentage has risen to 41 % as a result of embedded vision. Both users and manufacturers are using global shutter scanning sensors.

Dr. Miriam Rudel, Data Analyst, Framos: "Polarization provides highly precise recognition. When asked for the first time, 53 % of users and 60 % of manufacturers considered sensors with on-chip polarizers important for their applications. Both groups are seeing great potential for polarization technology in precise surface inspection, 3D measurements, cross-sector spectroscopy, and applications in medicine and transport."

Image Rates, Speed and Interfaces

Image rates, as with resolutions, have reached the next-highest group of speeds, although the expected massive increases towards mega-speeds have failed to materialize. The smallest class up to 25 fps suffered from losses among both users and manufacturers of eight and seven percentage points, respectively. The segment from 25 fps to 100 fps has grown by 10 percentage points among users, and 20 percentage points among manufacturers. The classes over 100 fps are forecasted to grow throughout the next two years among both users and manufacturers.

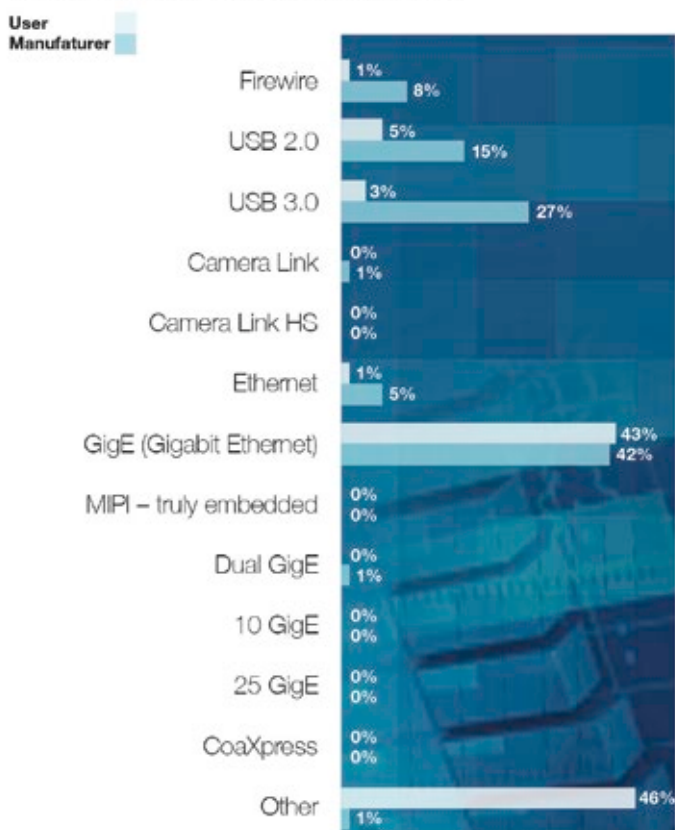
GigE Vision is by far the leading transmission standard among both manufacturers and users (42 % and 43 % , respectively); in addition, consider that USB solutions are offered by 42 % of manufacturers. Was genau soll gesagt werden? Analog connections are still used by some users. LVDS and HDMI are additionally used transmission standards, while the use of USB is still evident with a rate of 8 % . Both users and manufacturers mainly select the 10GigE and USB 3.1 standards for bandwidths above 5 Gb/s. Furthermore, manufacturers are including CoaxPress in their portfolios. In this regard, the importance of frame grabbers to precisely synchronize and transmit high bandwidths of video data will increase.

Sensor Modules as the New Market Segment for Embedded Vision

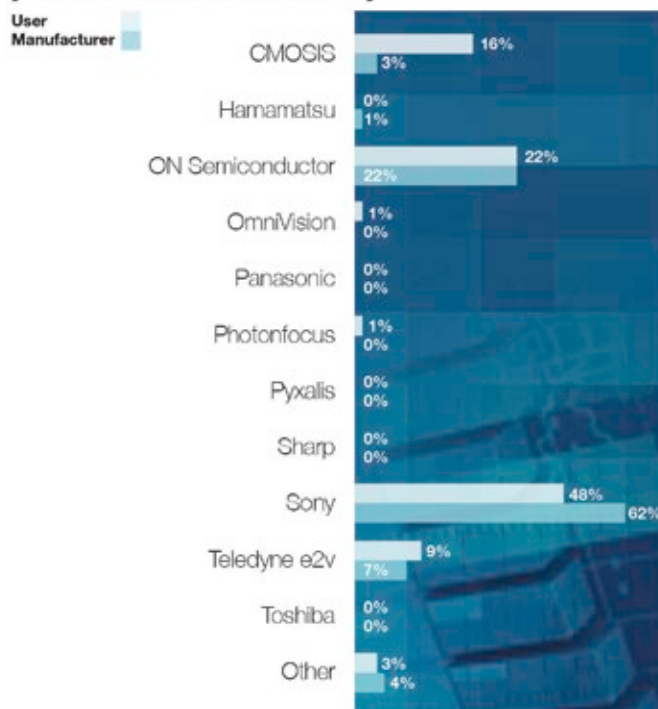
Embedded vision requires high-performance sensor modules. For the first time, the 2018 survey asked users and manufacturers about their plans and criteria. The good news is that 46 % of the users and 40 % of the manufacturers have already experimented with sensor modules or were already using them at the time of the survey. 42 % of the manufacturers and 10 % of the users are planning additional use cases for embedded vision projects with

20 years inspect Curious? The anniversary issue of inspect will be published on 16 September 2019. WILEY

Which interfaces do you use today?



Which sensor brands are presumably used in your cameras in the next two years?



modules in the next two years. About half of the respondents in both groups expected costs of between \$100 and \$200 per module. The preferred interfaces for sensor modules are USB, LVDS, and MIPI. In addition, both users and manufacturers share preferences when it comes to platforms. NVIDIA Tegra comes in at first place, followed by Intel's Movidius and Qualcomm Snapdragon. Two thirds (66 %) of the manufacturers are planning to develop their own drivers, while 70 % of users prefer to use available solutions. The advantages on both sides are clear. Manufacturers value the uniqueness and differentiation of their own solutions, while users look to invest as little as possible to allow them to concentrate on their core activities. Users and manufacturers prefer various versions of Sony CMOS sensors for the modules. A controllable lens and image stabilization for moving applications are further important criteria on both sides, with support for IPS and GPS also playing a role. Users focus on production automation, logistics and quality assurance, while manufacturers clearly see automotive, autonomous vehicles, drones, robotics, and smart applications as important markets.

Traditional Machine Vision versus Embedded Innovation

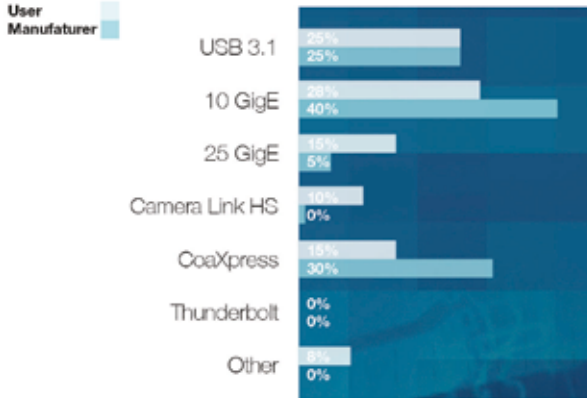
The aforementioned factors for the continued positive development in the vision industry imply two central requirements for the future. On the one hand, users are demanding the greater development of machine vision. Faster image sensors with higher performance in all attributes, standard interfaces, simple integration, falling prices and high on-board processor power are set to drive and perfect industrial automation. Here, the focus is on integration and systems for the smart factory, IoT connectivity, and smart production in general. Subsequently, other specific criteria like 3D

and polarization sensors for increased precision along with deep learning algorithms and artificial intelligence are factors that make previously hidden details and correlations visible. One participant summed it up: "We have to check everything. Zero-error production demands 100 % monitoring." In general, the shift towards extreme performance and unusual applications is progressing much more slowly than expected one or two years ago.

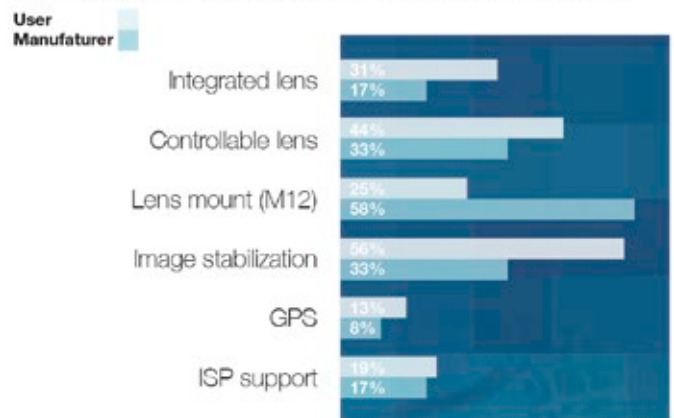
The second major requirement is the trend towards embedded vision and modularity. This trend leads to the same criteria for performance, availability, and connectivity. Manufacturers are seeing great potential in embedded solutions for automotive and infrastructure applications. They place much greater focus on technologies like 3D, smart sensors, artificial intelligence, and modular design. This focus allows them to create systems that are both standardized and customized to meet specific needs, and to differentiate themselves from the competition. Manufacturers see themselves faced with a change that they must confront together with their customers, both in terms of machine vision and innovative embedded applications in the industrial and consumer sectors. One manufacturer summed up the mood and opportunities for further development in the vision industry:



Which interface will be most likely prevailing for bandwidth > 5 GB/s ?



What features are important for sensor modules?



“Higher quality and, at the same time, cheaper CMOS sensors with high-speed interfaces will help to overcome the cost/performance bump that many customers will otherwise have a hard time to overcome. Machine builders are under extreme pressure to reduce the overall cost of their machines to remain competitive in the global market. A reduction in the overall cost of a complete imaging system helps them to achieve this goal. However, a shift in mentality is needed - away from purchase price to a focus on return on investment (ROI). Successful companies have already made this shift but the majority of OEMs, especially in the Asian markets, still have not grasped this concept. They focus on quarterly profits, which puts pressure on imaging component suppliers to reduce pricing. This business practice leads to unhealthy margins that strangle long-term investments in new technology. As more

and more companies are realizing that spending a little more gets them better imaging results and consequently gives them a competitive advantage we will be seeing a resurgence of quality growth in our industry.”

The results of this year’s Market Study by Framos mirror the industry’s change towards embedded vision for machines and devices that “can see.” As vision technology enters the industrial and consumer mass-markets, vision systems which can be easily developed are requested by developers and engineers - preferably on a modular approach, both powerful and highly standardized, and of course scalable. Technological progress and miniaturization have given a decisive boost to the progressive modularization of embedded vision and its further growth.

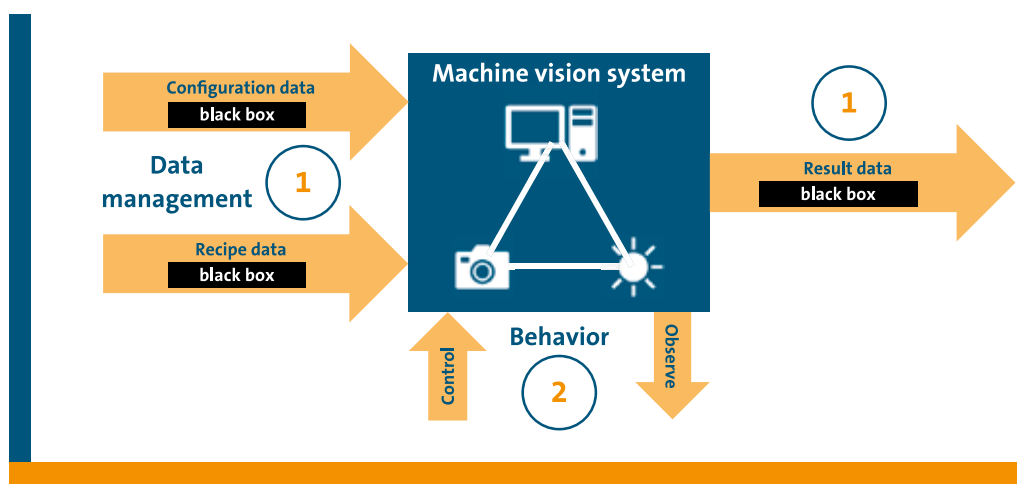
Framos presented the main results of their Market Study 2018 at the Vision Show in Stuttgart in November on the Industrial Vision Day’s stage.

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Contact
Framos GmbH, Taufkirchen, Germany
Tel.: +49 89 710 667 10
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Main scopes of OPC UA Vision, part 1

OPC Vision

Industry 4.0 Becomes Reality

At Automatica 2018, VDMA Machine Vision published the Release Candidate of the OPC Vision part 1 – an impressive 146-page document.

The document was jointly developed – in only two years – by over 20 key players from the European machine vision industry, backed up by the international community through G3. Connected to the publication of the OPC UA Companion Specification at automatica was an OPC UA Demonstrator that was developed by the VDMA Robotics + Automation association together with 26 partners from the European automation community. It demonstrated the potential of this new communication approach in a concrete and understandable way: Interoperable, vendor-independent and skill-based.

A Generic Model

The OPC UA Companion Specification Vision (in short OPC Vision) provides a generic information model for all vision systems – from simple vision sensors to complex inspection systems. Put simply, it defines the essence of any vision system that does not necessarily have to be a “machine” vision system. OPC Vision is the accepted and officially supported OPC UA Companion Specification for vision systems by the OPC Foundation. The scope is not only to complement or substitute existing interfaces between a vision system and its process environment by using OPC UA, but rather to create non-existing horizontal and vertical integration abilities to communicate relevant data to

other authorized process participants, e.g. right up to the IT enterprise level. It is possible to have a gradual phase-in of OPC Vision with coexisting other interfaces. The benefits are a shorter time to market by a simplified integration, a generic applicability and scalability and an improved customer perception due to defined and consistent semantics. Specific example: OPC Vision enables Machine Vision to speak to the whole factory and beyond.

Fundamentals

A vision system is any system that has the capability to record and process digital images or video streams, typically with the aim of extracting information from this data. The output of a vision system can be any image-based information like measurements, inspection results, process control data, robot guidance data, etc.

The basic concept of OPC Vision is a subdivision into several parts. Part 1 includes the basis specification and describes an infrastructure layer which provides basic services in a generic way. From part 2, a vision skill layer is addressed which provides more specific vision services.

OPC Vision, Part 1

Part 1 published as release candidate in June 2018 describes an abstraction of the generic vision system, i.e. the representation of

the so called “digital twin” of the system. It handles the management of recipes, configurations and results in a standardized way, whereas the contents stay vendor-specific and are treated as black boxes (1). It allows the control of a vision system in a generalized way, abstracting the necessary behavior via a state machine concept (2).

Future Parts

In future parts, the generic basic information model will shift to a more specific “skill-based” information model. Vision skills could include presence detection, completeness inspection, pose detection, etc. For this purpose, the proprietary input and output data black boxes will be broken down and substituted with standardized information structures and semantics.

Author

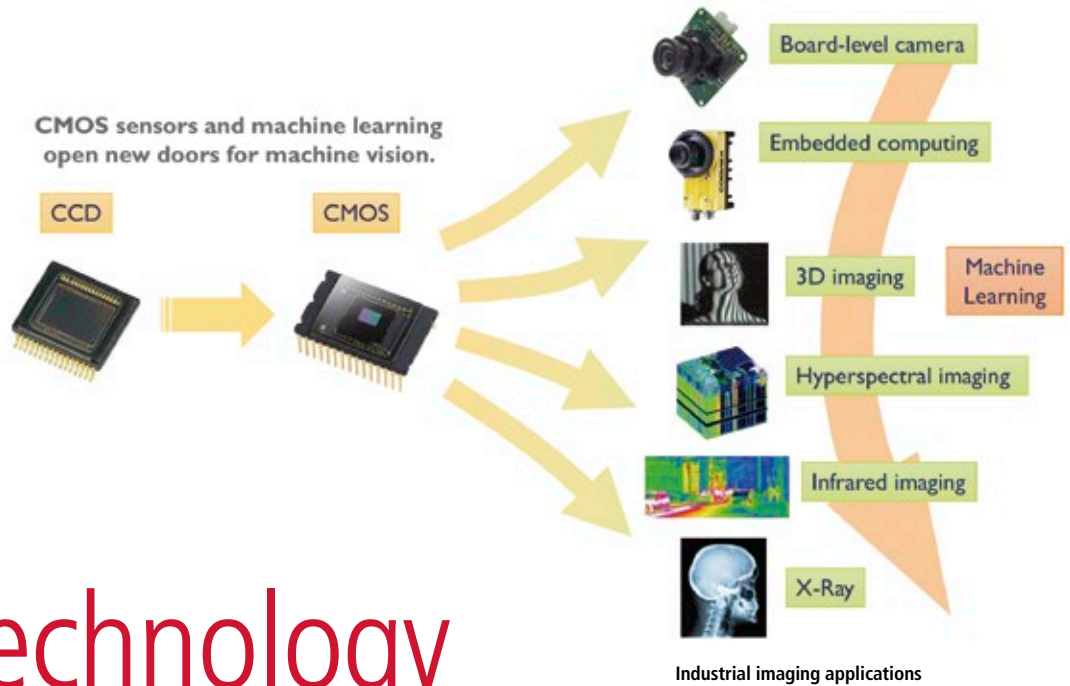
Dr. Reinhard Heister, VDMA Robotics + Automation

Contact

VDMA Robotik + Automation – Industrielle Bildverarbeitung, Frankfurt/Main, Germany
Tel.: +49 69 660 30
www.vdma.org/vision

A crossroad for industrial imaging

(Source: Machine Vision for Industry and Automation report, Yole Développement, 2018)



From Technology to Applications: The Revolution of Machine Vision

How the Technological Development in Machine Vision Is Driving the Industry's Transformation

Machine Vision for industry and automation is experiencing a significant transformation which is driven by two forces. Several key technological advances are expanding the capabilities of industrial cameras, while simplifying their manufacture and use. Meanwhile, on the application side, there is a steady interest in increasing quality control in the manufacturing segment, but there are also new applications, sometimes unexpected, which have evolved considerably from initial ideas when these technologies originated. These two forces, technological push and market pull, are leading to a repositioning of several players, emergence of new ones, and could lead to even more transformation in the industry in the near future.

The Transition from CCD to CMOS Technology

The transition from CCD (Charge-Coupled Device) to CMOS (Complementary Metal Oxide Semiconductor) has had a major impact on the machine vision industry. One impact has been on the image sensor makers themselves. In the last five years, from 2012 to 2017, several major Mergers & Acquisitions have redefined the image sensor landscape for machine vision. Although Sony was clearly dominant in 2012 with a 44% market share, it is now on a par with On Semiconductor, each having 33%

of the market after the acquisition by ON Semiconductor of Aptina for \$400 million and Truesense for \$90 million in 2014. The third largest player for image sensors for Machine Vision is now AMS with 16% of the market, although it was non-existent five years ago. This is as a result of the acquisition of CMOSIS by AMS in 2016 for \$235 million.

Although the image sensor market for Machine Vision is modest compared to other segments, these acquisitions show that major image sensor players are seeing an opportunity not only in CMOS technology,

but also in Machine Vision itself. In 2017, the total CMOS image sensor market was valued at \$13.9 billion, while that of image sensors for Machine Vision was valued at \$323 million. By comparison, the market for CMOS image sensors for mobile phones was valued at \$9.4 billion, for security at \$786 million, and for automotive at \$734 million according to the 2018 Machine Vision for Industry and Automation report by Yole Développement.

However, the shift from CCD to CMOS technology is not only about business opportunities and landscape, but is also about

“The transition from CCD to CMOS has had a major impact on the machine vision industry, one impact has been on the image sensor manufacturers themselves.”

technology, and what can or can't be done. CMOS technology for image sensors uses the same fabrication process as traditional logic, memories, and analog devices, and can, therefore, now integrate more functions which used to be on separate semiconductor components: clock, power supplies, analog processing, analog to digital conversion, and image processing. The result is cameras which contain far fewer components and are therefore easier to produce.

In 2017, the penetration of CMOS technology in the Machine Vision segment was estimated to be more than 60%. However, with the announcement by Sony that it will be stopping the production of CCD image sensors by March 2020, it is expected that the penetration of CCD image sensors will shrink to about 10% in 2023 and be limited to very specific scientific or medical areas.

Other Technological Drivers for Machine Vision

Although CMOS image sensors were initially limited to rolling shutter, global shutter is now widely available for Machine Vision. In rolling shutter lines are read-out sequentially, so scenes in motion, which typically happen in factories, are deformed. By integrating memory into each pixel, using transistors and capacitors, all the pixels can be read-out simultaneously, giving a non-deformed image even for a moving scene.

Interfaces are crucial aspects of cameras, defining what data can be transmitted. Coming from the consumer market, the interface defined by the MIPI (Mobile Industry Processor Interface) alliance greatly simplifies the connection between the CMOS image sensor and the other components of the camera. There are currently numerous interfaces for cameras: IEEE 1394, Camera Link, GigE Vision, and USB3 Vision. Although GigE Vision represented 58% of the market in 2017, USB 3Vision, with only 11% market share, has many advantages such as a higher bandwidth (350 MB/s against 100MB/s) and the possibility of real-time transmission. The next challenge is expected to be wireless data transmission.

Status of the Machine Vision Market

The machine vision market in 2017 at the camera level was valued at \$2.2 billion. It is expected to reach \$3.3 billion in 2023, with a CAGR of 7.5%. This market is divided into several applications for which the size and growth are quite different, the 2018 Machine Vision for Industry and Automation report by Yole Développement shows.

The largest application for machine vision cameras is factory automation, with a \$1.1 billion market in 2017, rising to \$1.2 billion in 2023 with a 1% CAGR. This modest CAGR is explained by price erosion although the market volume has steady growth due to a growth in manufacturing and automa-



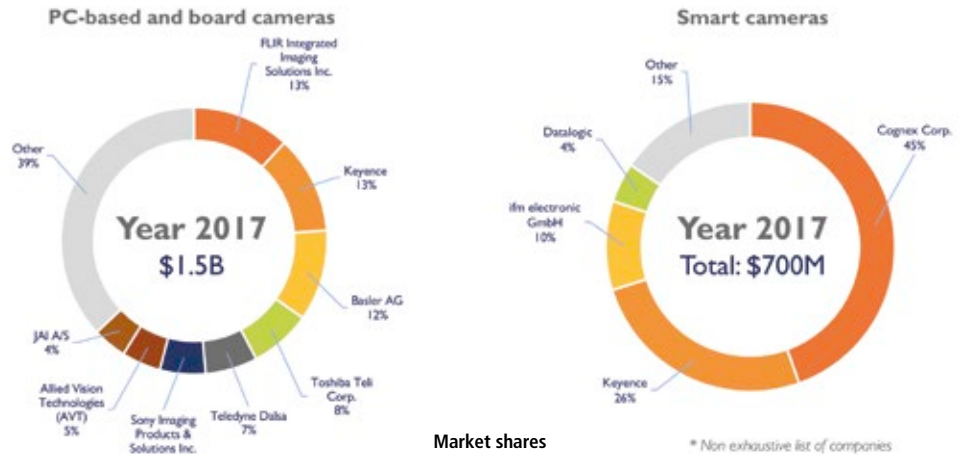
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Machine vision camera market shares*

(Source: Machine Vision for Industry and Automation report, Yole Développement, 2018)



tion. Indeed, the added value of manufacturing increased 3.7% between 2008 and 2013 despite the sub-prime crisis. On the other hand, the industrial robot supply is expected to grow more than 10% each year, leading to a five-fold increase in the 2010-2020 decade.

In 2017, the second largest application for machine vision cameras was traffic monitoring, with a market of \$333 million. This market is expected to grow to \$410 million in 2023 with a CAGR of 3.5%. This market is dominated by automatic number-plate recognition. The core users are still public agencies which require heavy-duty equipment. However, new applications are expanding to car management in car parks (public and private) and private security for shops and even houses. For these purposes, Chinese players such as Hikvision are offering products below \$100.

Agriculture is another interesting application which uses industrial cameras mainly for food sorting. The market in 2017 was worth \$89 million, expected to rise to \$213 million in 2023 with a 16% CAGR. This industry is clearly divided into two groups.

Chinese companies, such as Meyer, Taihe and Angelon, essentially use color sorting which accounts for half of the units produced and has seen significant growth in the past few years. Other companies are using more sophisticated techniques, including array detectors, near infrared, hyperspectral imaging, and lane sorting in which each fruit is manipulated individually.

Still small at \$9 million in 2017, robotic vehicles need to improve image quality and robustness of Machine Vision cameras to operate. This application is expected to surge to \$689 million in 2023 with a 104% CAGR, becoming the second largest application. However, such a huge market pull will probably result in a modification of the industrial landscape.

Technologies and Industrial Landscape

The machine vision camera landscape is mainly divided into two groups: PC-based cameras and smart cameras. PC-based cameras need to be connected to a computer for images to be analyzed while smart cameras do image analysis in the camera itself. In

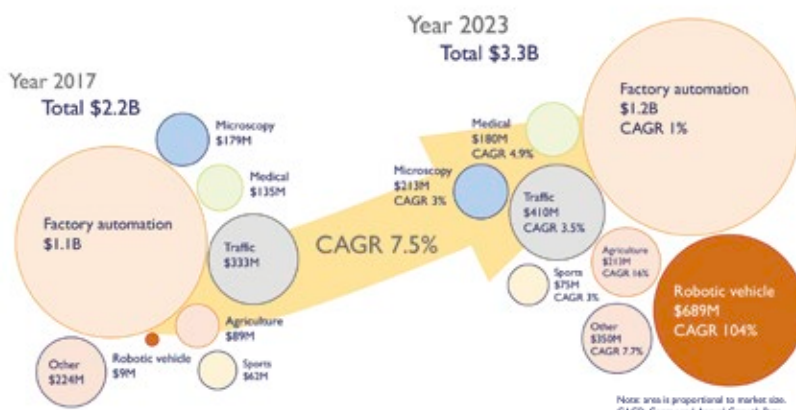
2017, the smart camera market was valued at \$700 million, and was dominated by a few players: Cognex, Keyence, and Ifm electronic. They are characterized by their easy to use packages and close relationship with the final users. On the other hand, there are many more PC-based camera players, the largest being FLIR, Toshiba Teli, Teledyne Dalsa, Sony, Basler and Allied Vision.

Smart camera players have been boosted by the evolution of SoC (System on Chip) and MIPI which have been heavily driven by the mobile phone market and are now finding new developments in artificial intelligence: in April 2017, for example, Cognex acquired Vidi Systems, a deep learning software company. PC-based camera players, however, have seen their added-value diminish with the advent of CMOS image sensors replacing CCD image sensors.

Capitalizing on the integration of functions in CMOS image sensors, several PC-based camera players have recently started to offer industrial cameras which are reduced to a single board. At the same time, they are offering computing tools to develop Machine Vision functions for their cameras. As a result, they are proposing all that is needed to actually build an industrial camera system, or a smart camera, doing a kind of step backward in the supply chain. This new offering could lead to the emergence of new players using these single board cameras and tools to address new applications, where robotic, or industrial, or robust, or machine vision is needed, expanding even more the realm of Machine Vision outside of factories.

Forecast for machine vision cameras market in its main applications

(Source: Machine Vision for Industry and Automation report, Yole Développement, 2018)



Camera market by application

Author

Dr. Alexix Debray, Technology & Market Analyst, Optoelectronics

Contact

Yolé Développement, Lyon, France
Tel.: +33 4 72 83 01 80
www.yole.fr

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QUALITY



About Allied Vision

For more than 25 years, Allied Vision has been supplying camera technology and image capture solutions for applications as diverse as industrial inspection, scientific, medical, or outdoor imaging. By focusing on what counts for each customer, Allied Vision finds solutions for every application, a practice which has made Allied Vision one of the leading camera manufacturers in the machine vision market.

Camera Solutions for Individual Requirements

Founded in 1989, Allied Vision supplies camera technology and image capture solutions for embedded systems as well as for industrial inspection, science, medicine, traffic monitoring and many more application areas in digital imaging. Our engineers design a wide range of digital cameras with a large scope of resolutions, frame rates, spectral sensitivities and sensor technologies. We have created modular platforms to ensure that your camera adapts to your requirements and not the other way around. Our job is to reliably deliver the image you need, when you need it and how you need it.

Modular Platforms

Acknowledging the special requirements of embedded vision systems as an alternative for PC-based machine vision, Allied Vision's engineers have completely reinvented camera architecture to create a new



camera platform for embedded vision. The new Alvium Camera Series is a full range of digital cameras designed for embedded vision applications but fulfilling the high standards of industrial and scientific image processing also referred to as "machine vision". It combines the performance of a machine vision camera and the size, power consumption and price of an embedded camera.

High Quality

We manufacture our products according to the highest quality standards in state-of-the-art clean room facilities to deliver the precision and reliability our customers need. All our manufacturing sites are ISO 9001 certified and comply with the ISO 13485 quality standard for medical devices.

With eight locations in Germany, Canada, the United States, Singapore and China as well as a network of sales partners in over 30 countries Allied Vision offers an excellent worldwide service and support. Allied Vision is part of the TKH Group.

Office(s)

Allied Vision Technologies GmbH
Germany
Tel.: +49 36428 677 230
Fax: +49 36428 677 28

Allied Vision Technologies Canada Inc.
Canada
Tel.: +1 604 875 88 55
Fax: +1 604 875 88 56

Allied Vision Technologies Inc.
United States of America
Tel.: +1 877 USA 13 94
Fax: +1 978 225 20 29

Allied Vision Technologies Asia Pte. Ltd.
Singapore
Tel.: +65 6634 9027
Fax: +65 6634 9029

Allied Vision Technologies (Shanghai) Co. Ltd.
China
Tel.: +86 21 648 611 33
Fax: +86 21 542 336 70

Management

Andreas Gerk, CEO a.i.

Foundation

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Staff

350

Products

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Associations

AIA, Embedded Vision Alliance, EMVA, JIA, UKIVA, VDMA

Regions served

Asia, China, EMEA, Japan, Latin America, North America



Allied Vision Technologies GmbH

Taschenweg 2a
07646 Stadtroda
Germany
Tel.: +49 36428 677 230
Fax: +49 36428 677 28
info@alliedvision.com
www.alliedvision.com

About Basler

Basler is an innovative, value-oriented family business that was founded by Norbert Basler in 1988. The key strength and passion of Basler AG is giving industrial machines and systems the power of sight. With its head office in Ahrensburg and branches in the United States, Singapore, China, Taiwan, Japan and Korea, the company has 30 years of experience in industrial image processing.

Today, Basler is the world's largest manufacturer of industrial cameras and camera components, with solutions for factory automation, robotics, medicine, lab automation and biotechnology, retail, traffic and many other applications. We offer a broad range of image-capturing components for our customers' vision systems. As a reliable partner, we develop and produce our products with great foresight for customer value and a high degree of efficiency so that we can offer the best cost-performance ratio. As a result, Basler is the camera brand most trusted by professional customers around the world.

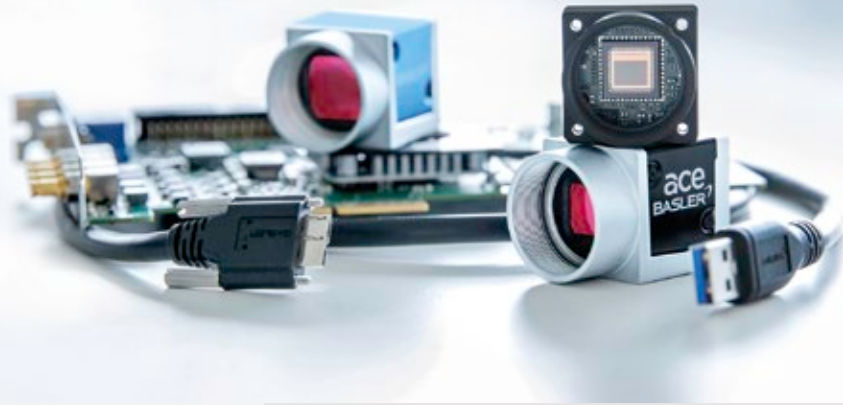
Ready for the Future with Experience and Innovative Drive

For three decades, we have been working to make image processing available for cost-sensitive markets and applications inside and outside factory automation. The technologies may be complex, but the goal is simple: we help our customers lower costs by eliminating waste at every stage of the value-creation process. Thanks to its ability to quickly recognise trends and implement them, the company has grown steadily in recent years.

Embedded Vision Trend

Embedded vision will replace many PC-based image processing applications, while enabling numerous new applications which prioritise a small design, low power consumption

and low costs. Using embedded vision still comes with a high integration cost, and Basler's goal is to reduce this significantly for its customers. As a former solutions provider, Basler is utilising its experience and expanding its range of offers with standardized interfaces and drivers, its cooperation with reputable manufacturers of processors (SoC, SoM) as well as building sales channels so that embedded vision can be available for a broad spectrum of users. Its competence profile is rounded off with the technological expertise of Mycable GmbH, a company acquired in 2017 and a leading provider in the field of consulting and development of embedded computing architectures.



Office(s)

Basler, Inc
United States of America
Tel.: +1 610 280 0171
sales.usa@baslerweb.com

Basler Asia Pte Ltd.
Singapore
Tel.: +65 6367 1355
sales.asia@baslerweb.com

Management

Dr. Dietmar Ley, CEO
Lutz Grübel, Director of Sales
Lars Hansen, Head of European Sales
Alexander Temme, General Manager Embedded Business

Foundation

1988

Staff

> 600

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Associations

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Basler AG

An der Strusbek 60-62
22926 Ahrensburg
Germany
Tel.: +49 4102 463 0
Fax: +49 4102 463 599
sales.europe@baslerweb.com
www.baslerweb.com

About Baumer

The Baumer Group is one of the worldwide leading manufacturers of sensors, encoders, measuring instruments and components for automated image-processing. With around 2,700 employees and 38 subsidiaries in 19 countries, the family-owned group of companies is always close to the customer.

Capture the Essential: Industrial Cameras and Vision Sensors

Merging cutting-edge technologies and customer-focused consultancy has made us one of the leading manufacturers for image processing components. We offer a unique range of products, from industrial cameras and vision sensors to image processing components, for many different applications across varied industries. The location in Germany accommodates R&D and production under one roof which ensures our high product quality standards. Prior to delivery, every component undergoes rigid electrical and optical testing and inspection.

High-performance Industrial Cameras

High frame rates, exceptional image quality and ease of integration – that's what our industrial cameras stand for. Their robust, industrial design is the basis for long-term stability and precise image analysis. The portfolio includes CCD- and CMOS-based matrix cameras, standard-compliant with GigE Vision, Camera Link

and USB3 Vision. Our many years of expertise make us understand your requirements to provide the optimum product for your application. Where standard products are too limited, we work together with you to develop customized components that fit perfectly to your application.

Easy and Intuitive Vision Sensors

Intuitive operation, fast and easy integration and configuration within minutes: These attributes characterize the Baumer VeriSens vision sensors. They can perform up to 22 different feature checks on object position and location, presence and completeness, reading and verifying human-readable imprints (OCR/OCV) or bar and matrix codes including GS1 codes. High process reliability is achieved with our patented FEX image processor. Models for color identification and inspection, with C-Mount design and integrated flash controller are also available as well as models with integrated white and infrared illumination.



Office(s)

Baumer Electric AG
Switzerland
Tel.: +41 52 728 1122
sales.ch@baumer.com

Baumer Italia S.r.l.
Italy
Tel.: +39 02 4570 6065
sales.it@baumer.com

Baumer Ltd.
USA
Tel.: +1 860 621 2121
sales.us@baumer.com

Baumer (China) Co., Ltd.
China
Tel.: +86 21 6768 7095
sales.cn@baumer.com

Baumer SAS
France
Tel.: +33 450 3924 66
sales.fr@baumer.com

Baumer (Singapore) Pte. Ltd.
Singapore
Tel.: +65 6396 4131
sales.sg@baumer.com

Management
Dr. Oliver Vietze,
CEO and Chairman

Foundation
1952

Staff
> 2,000

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Accessories, Cameras, Network Components, Software, Vision Sensors

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Associations

AIA, CMVU, EMVA, UKIVA, VDMA

Regions served

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 **Baumer**
Passion for Sensors

Baumer GmbH
Pfungstweide 28
61169 Friedberg
Germany
Tel.: +49 6031 60 07 0
Fax: +49 6031 60 07 70
sales.de@baumer.com
www.baumer.com

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About Hikvision

Hangzhou Hikrobot Technology Co., Ltd. (Hikrobot) originated from the Machine Vision business unit of Hikvision, Hikrobot has become a global developer and supplier of mobile robot, machine vision products and algorithm platforms. It is committed to continuous intelligence of robots and leadership in smart manufacturing.

Hikrobot has nearly 1,000 employees across the world (by May 2018), of which about 800 are research staff. Meanwhile, it also shares technology with more than 10 thousand research fellows of Hikvision and Hikvision Research Institute. Supported by Hikvision's accumulated technology in image sensing, AI, and big data analysis, Hikrobot develops business areas including Mobile Robot, Machine Vision, and Industrial Unmanned Aerial Vehicle (UAV).

Machine Vision

With effort in industrial vision sensing application and underlying algorithm software and hardware technology, the company provides customers with leading machine vision products and algorithm platforms. The products cover industrial cameras, lenses, visual software platforms, vision boxes, and industrial smart cameras. All products are tested by the EMVA1288 standard and verifi-

cation to ensure that the highest quality images, and through rigorous EMC testing, safety testing and environmental reliability testing. Relying on mature DFMEA technology, Hikrobot ensure that the use of each product with high precision, high efficiency and high environmental performance. The machine vision products are widely used in manufacturing, electronic semiconductors, logistics, and other industrial automation sectors, to realize positioning guidance, measurement, defect detection, code reading, and OCR. Offering stable, reliable operation and the potential for customization, they help users to significantly improve productivity and accuracy.



Office(s)

Hikvision Europe B.V.
Dirk Storklaan 3, 2132 PX
Hoofddorp, The Netherlands
Tel.: +31 23 554 27 70
sales.eu@hikvision.com
www.hikvision.com/europe

Management

Shawn Huo,
Overseas General Manager

Foundation

Hikrobot originated from Hikvision Machine Vision Department, which is established in 2014.

Staff

>1,000

Products

Cameras, Interfaces/Cables/
Peripherals, Lighting Equipment,
Optics, Smart Cameras/Embed-
ded Systems, Vision Sensors

Applications

Character Recognition, In-
spection Piece Parts, Inspec-
tion Webbed Material, Mate-
rial Testing, Metrology 2D, Me-
trology 3D, Part Identification,
Robot Vision 2D, Robot Vision
3D, Symbol Recognition

Industries served

Automotive and Suppliers,
Precision Engineering/Optics/
Machine Vision, Traffic/Logistics

Associations

AIA, EMVA, UKIVA

Platforms supported

Windows, Linux

Regions served

Africa, Asia, Australia, China,
EMEA, Europe, Japan, Latin
America, North America,
national

HIKVISION

Hangzhou Hikrobot Technology Co., Ltd.

No.700 Dongliu Road, Binjiang District
Hangzhou 310052, China
Tel.: + 86 400 800 59 98
hikrobotics@hikvision.com
www.hikrobotics.com

See our ad on **Outside Back Cover**

About AutoVimation

AutoVimation produces protective camera enclosures and a wide range of accessories that allow to use machine vision systems in almost any environment. Thanks to the patented camera mount the enclosure works like a heat-sink and can so be used in higher ambient temperatures. Water or Peltier cooling systems are available in order to extend the temperature range further. The „Machine-Vision Construction Kit“ makes it easy to integrate cameras, lights and other components into a machine – using pre-fabricated parts, avoiding design time and allowing simpler



adjustment to the application. New is the IP69k Dolphin range of stainless steel enclosures in hygienic design and the compact Meganova LED ring light with on-board strobe controller that mounts right behind the 3” front window.

Management

Peter Neuhaus, CEO
Andreas Beetz, Sales Manager
sales@autovimation.com

Foundation

2008

Staff

5

Products

Lighting Equipment, R&D, other

Applications

Character Recognition, Digitalization, High Speed Analysis, Inspection Piece Parts, Inspection Webbed Material, Material Testing, Metrology 2D/3D, Robot Vision 2D/3D, Particle Analysis. Part Identification, Symbol Recognition, Thermography

Industries served

Automotive and Suppliers, Electronics/Semiconductors, Energy/Water/Solar Technology, Foodstuffs/Beverages, Glass/Ceramics, Mechanical Engineering/Line Building, Medical Technology, Metal, Packaging, Paper/Wood, Pharmaceuticals/Cosmetics/Chemicals, Plastics, Precision Engineering/Optics/ Machine Vision, Traffic/Logistics

Companies represented

Swivellink

Regions served

Asia, Australia, Central Europe, Europe, Latin America, North America, national



AutoVimation GmbH

Römerweg 1
76287 Rheinstetten
Germany
Tel.: +49 721 627 67 56
Fax: +49 721 627 67 59
sales@autovimation.com
www.autovimation.com

See our ad on page **17**

About Edmund Optics

Edmund Optics, leading supplier of optics, imaging, and photonics technology with manufacturing sites in the US, Asia and Europe as well as global sales offices, holds



with a portfolio of more than 30.000 products the world's largest inventory of optical components for immediate delivery. Building up great competency in imaging and imaging components, EO provides complete imaging solutions with a large product line, technical expertise, manufacturing

capabilities, extensive technical support, and assists customers in every way possible to maximize the performance of their imaging system. From stock items in the catalog to custom imaging lenses, from prototype to high volume: “EO – Your Imaging Solutions Provider.”

Office(s)

Edmund Optics Inc.,
Headquarters
101 E. Gloucester Pike
Barrington, NJ 08007, USA
Tel.: +1 856 5736 250
Fax: +1 856 5736 295

EO Europe has locations in Finland, France, Germany, and the UK and cooperates with various representatives throughout the continent. Request our free catalogue for optical components, imaging products and laser optics.

Phone & Email:

Germany: +49 61315700 0
France: +33 820 207 555
UK: +44 1904 788600
Italy: +39 800 875 211
Spain: +34 914 197 354
Russia: +7 499 350 3901
Europe: +44 1904 788600

If you are in one of this countries, please call the respective number. After regular business hours, English only.

Email: sales@edmundoptics.eu
Sign up for our newsletter:
www.edmundoptics.eu/
newsletter

Applications Support:

Techsup@edmundoptics.de

Online Chat:

Monday - Friday, 2:00 - 24:00 CET
www.edmundoptics.eu/contact

Management

Samuel Sadoulet, President & Marketing, MD EO Germany

Marisa Edmund, EVP Global Sales & Marketing, MD EO Germany

Helge Vogt, Director Sales Europe

Dr. Boris Lange, Manager Imaging Europe

Foundation

1942 in USA, 2000 in Germany

Staff

appr. 1,000

Products

Cameras, Imaging Lenses, Lighting Equipment, Microscopes, Optics, Optical Components, etc.

Industries served

Electronics/Semiconductors, Medical Technology, Mechanical Engineering, Line Building, Pharmaceutical, Cosmetics, Chemical, Precision Engineering, Optics, Machine Vision, Traffic, Logistics, etc.

Associations

AIA, EMVA, JIIA

Regions served

Worldwide



Edmund Optics

Isaac-Fulda-Allee 5
55124 Mainz
Germany
Tel.: +49 6131 570 00
Fax: +49 6131 217 23 06
sales@edmundoptics.de
www.edmundoptics.de

About Fujifilm Optical Devices

Fujinon Lenses from Fujifilm

Tapping into optical technologies and precision processing and assembling technologies nurtured over many years, Fujifilm offers a wide variety of Fujinon lenses. The Fujinon brand is world-renowned for its innovative and reliable products in the field of broadcast & cine lenses, binoculars, CCTV lenses, machine vision applications as well as for special custom made optical products, for example those used in digital projectors, automobiles and in many other applications.

CCTV and Machine Vision lenses: The extensive product range of Fujinon CCTV and

Machine Vision lenses features the appropriate solution for almost every application. The Japanese manufacturer offers a continuously growing product range of high resolution megapixel Zoom and Varifocal lenses for security applications in HD quality. Lenses for Machine Vision are precise optics with minimized distortion for optimal image quality – even in harsh environments. Special lenses round off the wide product range, like infrared-coated lenses for Day&Night, lenses for 3CCD cameras or high resolution 185° Fish Eye lenses. You no longer miss anything with Fujinon lenses.



Management

Christopher Brawley,
Toshihisa Iida,
Koichi Tamai
Masato Yamamoto,
(Managing Directors)

Foundation

1934

Staff

500

Products

Optics

Applications

Character Recognition,
Digitalization, High Speed
Analysis, Inspection Piece Parts,
Metrology 2D, Metrology 3D,
Part Identification, Robot
Vision 2D, Robot Vision 3D,
Symbol Recognition

Industries served

Precision Engineering/Optics/
Machine Vision

Regions served

Central Europe, EMEA, Europe,
national

FUJIFILM

See our ad on page **31**

Fujifilm Optical Devices Europe

GmbH

Fujistraße 1
47533 Kleve
Germany
Tel.: +49 2821 7115 400
cctv_eu@fujifilm.com
www.fujifilm.eu/fujinon

About Hamamatsu

Hamamatsu Photonics is a worldwide leading manufacturer of opto-electronic components and systems. Among others we offer sensors and systems for spectroscopy (including ultra fast), scientific-grade + + e cameras, beam monitoring solutions, photon counting detectors and systems, photomultipliers, photodiodes, IR detectors.



Office(s)

Danish Office
Lautruphøj 1-3
2750 Ballerup, Denmark
Tel.: +45 70 209 369
Fax: +45 44 209 910
info@hamamatsu.dk

Netherlands Office
Transistorstraat 7
1322 CJ Almere
The Netherlands
Tel.: +31 36 540 53 84
Fax: +31 36 524 49 48
info@hamamatsu.nl

Poland Office
8 St. A. Boboli Str.
02-525 Warsaw, Poland
Tel.: +48 22 646 00 16
Fax: +48 22 646 00 18
poland@hamamatsu.de

Management

Dr. Reinhold Guth,
Managing Director
rguth@hamamatsu.de
Tel.: +49 8152 375 121

Foundation

1973

Products

Cameras, Lighting Equipment,
Software, Vision Sensors, X-ray
Equipment, and other optoelec-
tronic components and systems.

Industries served

Automotive and Suppliers,
Electronics/Semiconductors,
Energy/Water/Solar Technology,
Foodstuffs/Beverages,
Mechanical Engineering/
Line Building, Medical
Technology, Packaging,
Precision Engineering/Optics/
Machine Vision, Traffic/
Logistics

Regions served

national

HAMAMATSU
PHOTON IS OUR BUSINESS

Hamamatsu Photonics Deutschland

GmbH

Arzbergerstr. 10
82211 Herrsching
Germany
Tel.: +49 8152 37 50
Fax: +49 8152 26 58
info@hamamatsu.de
www.hamamatsu.de

See our ad on page **11**

About the JAI Group

JAI is a global manufacturer of digital cameras for machine vision, traffic imaging, surveillance, life science and scientific research.

Besides a broad range of leading-edge 1-CCD and 1-CMOS progressive area scan and line scan cameras, JAI is a leading provider of multi-imager cameras incorporating advanced prism-block technology, including 3-CCD/3-CMOS RGB area scan cameras, 2-CCD multi-spectral/HDR cameras plus a complete family of 3-CMOS/4-CMOS line scan cameras. JAI's product program includes cameras for visible, UV, NIR, polarized and SWIR imag-



ing with GigE Vision, Camera Link, USB 3.0 Vision and CoaX-Press interfaces.



Office(s)

JAI Germany
Tel.: +49 6022 26 1500
camerasales.emea@jai.com

JAI Inc. USA
Tel.: +1 408 383 0300
camerasales.americas@jai.com

JAI Ltd. Japan
Tel.: +81 45 440 0154
camerasales.apac@jai.com

JAI Ltd. China
Tel.: +86 21 61800533 053
camerasales.apac@jai.com

Management

Jørgen Andersen, CEO
Masao Watabe,
President of JAI Ltd. Japan
Flemming W. Maunsbach,
Group VP of Finance
Shuichi Suibui, Global
Marketing and Product Manager

Foundation

1963

Staff 101–250

Products

Cameras, Interfaces/Cables/
Peripherals, Software, Other

Applications

Character Recognition, High
Speed Analysis, Inspection
Piece Parts, Inspection Webbed
Material, Metrology 2D, Part
Identification, Robot Vision 2D,
Symbol Recognition

Industries served

Automotive and Suppliers,
Electronics/Semiconductors,
Energy/Water/Solar Technology,
Foodstuffs/Beverages, Glass/
Ceramics, Mechanical Engi-
neering/Line Building, Medical
Technology, Metal, Packaging,
Paper/Wood, Pharmaceuticals/
Cosmetics/Chemicals, Precision
Engineering/Optics/Machine
Vision, Traffic/Logistics, Other

Associations AIA, EMVA, JIIA

Regions served

APAC, EMEA, The Americas



See the possibilities

See our ad on page **15**

JAI Group A/S

Valby Torvegade 17, 1st floor
2500 Valby
Denmark
Tel.: +45 4457 8888
Fax: +45 4491 3252
camerasales.emea@jai.com
www.jai.com

About Lumenera Corporation

Lumenera Corporation, headquartered in Ottawa, Canada, is a leading developer and manufacturer of high performance digital cameras and custom/OEM solutions. Lumenera's solutions provide unique combinations of speed, resolution and sensitivity to satisfy the most demanding digital imaging requirements. The company's core competencies include digital bus technologies such as USB 3.0, USB 2.0, HDMI, Ethernet and GigE as well as the integration of CMOS and CCD sensors. Lumenera leverages its leading edge technology to provide customized design ser-



vices, continuous innovation and licensing options to OEM partners. Lumenera customers achieve the benefit of superior price-to-performance ratios and faster time to market with the company's commitment to high quality, cost effective product solutions.

Office(s)

Lumenera Corporation
7 Capella Court
Tel.: +1 613 736 4077
info@lumenera.com
www.lumenera.com

Management

Huw Leahy, President
Stephan Shaw, Vice President
Finance
Dany Longval, Vice President
Worldwide Sales
Brooks Riendeau, Vice President
Marketing
Doug Sanderson, Vice President
Engineering
Rob Sample, Vice President
Manufacturing
Nick Bultka, Chief Technology
Officer

Foundation

2002

Staff

60

Products

Cameras, Software, Interfaces/Ca-
bles/Peripherals, Consulting, R&D

Applications

Inspection Piece Parts, Inspection
webbed Material, Robot Vision

2D, Robot Vision 3D, Character
Recognition, Symbol Recognition,
Part Identification, Metrology 2D,
Metrology 3D, High Speed Anal-
ysis, Particle Analysis, Material
Testing, Digitalization

Industries served

Mechanical Engineering/Line
Building, Automotive and
Suppliers, Electronics/Semi-
conductors, Packing, Precision
Engineering/Optics/Machine
Vision, Plastics, Pharmaceuticals/
Cosmetics/Chemicals, Foodstuffs/
Beverages, Medical Technology,
Metal, Glass/Ceramics, Traffic/
Logistics, Paper/Wood, Energy/
Water/Solar Technology

Platforms supported

Windows XP, Vista, Win 7,
Win 8, Win 10, Linux OS – both
32 and 64 versions; Most X86
and some ARM solutions

Associations

EMVA, AIA

Regions served

Africa, Asia, Australia, China,
Central Europe, Europe, EMEA,
Japan, Latin America, North
America, ROW, national



See our ad on page **35**

Lumenera Corporation

7 Capella Court
Ottawa, Ontario K2E 8A7
Canada
Tel.: +1 613 736 4077
info@lumenera.com
www.lumenera.com

About Matrix Vision

Matrix Vision is a leading manufacturer and offers a large spectrum of digital cameras – from USB, GigE with Power over Ethernet to smart cameras with integrated easy configurable machine vision software. A wide range of USB 3.0 cameras with CMOS sensors up to 31 megapixels are provided with the USB3 Vision Standard. Matrix Vision introduced a new, revolutionary 6D perception camera. It detects objects in space by means of motion, depth information and experience. The perception camera is ideal for palletizing, de-palletizing and pick & place applications in logistic, packaging and



automotive sectors. Besides an extensive range of standard products we offer custom solutions, which provide maximum utility for users as a result of continuous development. Join our vision world and benefit from cutting-edge technologies and extensive services.

Office(s)

Worldwide distribution by Balluff subsidiaries

Management

Uwe Furtner, CEO
Ralf Grasmann, VP Sales & Marketing
Dirk Muschert, Sales Director D-A-CH
Marcus Bleise, International Sales Director

Foundation

1986

Staff

51-100

Products

3D Cameras, Digital Cameras, Frame Grabber, Smart Cameras, USB 3.0 and GigE Cameras, Software

Applications

Digitalization, High Speed Analysis, Inspection Piece Parts, Inspection Webbed Material, Material Testing, Metrology 2D, Metrology 3D, Part Identification, Particle Analysis, Robot Vision 2D, Robot Vision 3D, Symbol Recognition, Others

Industries served

Automotive and Suppliers, Electronics/Semiconductors, Energy/Water/Solar Technology, Foodstuffs/Beverages, Glass/Ceramics, Mechanical Engineering/Line Building, Medical Technology, Metal, Packaging, Paper/Wood, Pharmaceuticals/Cosmetics/Chemicals, Plastics, Precision Engineering/Optics/Machine Vision, Traffic/Logistics, Other

Associations

AIA, DNHK, VDMA, PPMa

Regions served

Africa, Asia, Australia, Central Europe, China, EMEA, Europe, Japan, Latin America, North America



Matrix Vision GmbH

Talstr. 16
71570 Oppenweiler
Germany
Tel.: +49 7191 9432 0
Fax: +49 7191 9432 288
info@matrix-vision.de
www.matrix-vision.com

FUJIFILM
Value from Innovation

Always in focus
Despite vibration



Anti Shock & Vibration

The unique Fujinon lens design for stable image quality

Fujinon's Anti Shock & Vibration Technology compensates for shocks and vibrations that often occur in industrial imaging systems. The lenses keep their high resolution and minimize the shift of the optical axis. Fujinon HF-12M series and HF6XA & HF50XA already incorporate the new technology. More on www.fujifilm.eu/fujinon Fujinon. To see more is to know more.

FUJINON

About Micro-Epsilon

Micro-Epsilon is a medium-sized family-run company which plays a leading role in measurement technology. For more than 50 years we have continuously offered reliable, high performance, unique solutions particularly when high precision measurement or inspection is required. Our product range covers sensors for the measurement of distance and displacement, sensors for IR temperature measurement and color detection, as well as systems for dimensional measurement and defect detection.



Innovative products that provide the highest level of precision are created through intensive research and development processes, unique know-how and a broad network of collaborative operations.



Micro-Epsilon Messtechnik GmbH & Co.KG
 Königbacher Str. 15
 94496 Ortenburg
 Germany
 Tel.: +49 8542 168 0
 Fax: +49 8542 168-90
 info@micro-epsilon.com
 www.micro-epsilon.com

See our ad on page **3**

Office(s)

Micro-Epsilon UK Ltd
 United Kingdom
 Tel.: +44 151 3556070
 info@micro-epsilon.co.uk

USA Headquarters
 Tel.: +1 919 7879707
 me-usa@micro-epsilon.com

China
 Tel.: +86 10 64398934
 info@micro-epsilon.com.cn

Czech Republic
 Tel.: +420 38 1213011
 info@micro-epsilon.cz

France
 Tel.: +33 1 39102100
 france@micro-epsilon.com

Switzerland
 Tel.: +41 71 2500838
 info@micro-epsilon.ch

Foundation
 1968

Staff
 1,000

Products

Vision Sensors/Smart Cameras, Optical Instruments, Turn-Key Systems, Other

Applications

Inspection Piece Parts, Metrology 2D, Metrology 3D, Robot Vision 2D, Robot Vision 3D, Part Identification, High Speed Analysis, Thermography

Industries served

Automotive and Suppliers, Electronics/Semiconductors, Foodstuffs/Beverages, Glass/Ceramics, Mechanical Engineering/Line Building, Medical Technology, Metal, Paper/Wood, Pharmaceuticals/Cosmetics/Chemicals, Plastics, Precision Engineering/Optics/Machine Vision, Traffic/Logistics

Associations

AMA

Regions served

Asia, China, Europe, North America, South/Central America, national

About Optics Balzers

Optics Balzers is the innovative and independent industry partner for the development and production of coated optical components and subassemblies. The company possesses a broad and in-depth know-how in optical thin-film coating processes, complemented by sophisticated patterning, glass bonding and sealing, and further processing capabilities necessary for producing optical thin-film coated components up to optical subassemblies.

Highly experienced and skilled development and engineering teams closely collaborate with customers to develop innovative solutions meeting their requirements and design robust processes to manufacture the customer specific components. The combination of these capabilities and skills places Optics Balzers at the forefront of markets in the photonics industry such as Automotive, Biophotonics, Laser, Space & Defence, Lighting & Projection, Sensors & Imaging, and Industrial Applications.

neering teams closely collaborate with customers to develop innovative solutions meeting their requirements and design robust processes to manufacture the customer specific components. The combination of these capabilities and skills places Optics Balzers at the forefront of markets in the photonics industry such as Automotive, Biophotonics, Laser, Space & Defence, Lighting & Projection, Sensors & Imaging, and Industrial Applications.



Offices

Optics Balzers Jena GmbH
 Otto-Eppenstein-Straße 2
 07745 Jena, Germany

Germany
 Tel.: +49 6196 999 4144

France
 Tel.: +33 699 5562 83

Switzerland, Austria
 Tel.: +423 388 9216

USA
 Tel.: +1 720 974 5927

Singapore
 Tel.: +65 6809 5243

Foundation
 2009 / 1946

Staff

251-500

Products

Optics, Optical Coatings, Optical Components

Industries served

Automotive, Medical Technology, Packaging, Precision Engineering/Optics/Machine Vision, Others

Applications

Others

Regions served

Asia, EMEA, Europe, North America



Optics Balzers AG
 Neugrüt 35
 9496 Balzers
 Liechtenstein
 Tel.: +423 388 9200
 Fax: +423 388 9390
 info@opticsbalzers.com
 www.opticsbalzers.com

See our ad on page **49**

About Opto

Opto delivers integrated Imaging Modules consist of Optic, Light, Camera and Intelligence for Integrators, Product Manufacturers and Machine builder in the domains of Medtech and Industry. Opto is a globally recognised solution provider, able to support customers from around the globe.

Together with Opto France we extend our Optics Know-How with Imaging and Automation skills on a solution level for high precision demands in Photonics and Machine Vision



applications. Through its deep application knowledge, Opto provides its clients with special optomechanical solutions that are reduced to the essentials of the application and perfectly cost optimised.

Office(s)

Opto France S.A.S.
Tel.: +33 475 53 1400
info@opto-france.com

Opto UK Ltd.
Tel.: +44 1925 606 595
info@opto-uk.com

Opto Asia Ltd.
Tel.: +65 9756 5833
info@opto.de

Management

Markus Riedi, CEO
Klaus Flügel, CTO
Martin Price, CMO
Roman Hartwich, COO

Foundation

1980

Staff

11-50

Products

Imaging Modules, Optical Instruments, Optics, Custom OEM Modules, Machine Vision Objectives, R&D, Vision Sensors

Applications

Cell Analysis, Inspection, Material Testing, Metrology 2D/3D

Industries served

Automotive and Suppliers, Electronics/Semiconductors, Energy/Water/Solar Technology, Glass/Ceramics, Mechanical Engineering/Line Building, Medical Technology, Metal, Packaging, Paper/Wood, Precision Engineering/Optics/ Machine Vision, Biotechnology, Security, Aerospace

Associations

AIA, EMVA, VDMA, Bayern Photonics

Regions served

Asia, Australia, China, EMEA, Europe, Japan, Latin America, North America



Opto GmbH

Lochhamer Schlag 14
82166 Gräfelfing
Germany
Tel.: +49 89 898 055 0
Fax: +49 89 898 055 18
info@opto.de
www.opto.de

See our ad on page **51**

About Ricoh International

On 1st April 2017, Ricoh (formerly Pentax) moved from Ricoh Imaging Europe S.A.S in Hamburg to Ricoh International B.V. - German Branch in Düsseldorf.

Ricoh International has 60 years of experience in the manufacture of CCTV lenses (including machine vision). Ricoh's goal is to always offer their ma-

chine vision customers the best lens with which to meet the technical constraints of an application. The focus during the development of our lenses is on quality, performance, durability and longevity. Therefore, since 1st November 2017 all Ricoh lenses come with a three year warranty.



Management (EMEA)

David Mills, Managing Director
Hisashi Arai, Division Manager

Foundation

1987

Staff

53

Products

Optics, Other

Applications

Character Recognition, High Speed Analysis, Inspection Piece Parts, Inspection webbed Material, Part Identification, Robot Vision 2D/3D, Symbol Recognition

Industries served

Precision Engineering/Optics/ Machine Vision

Regions served

EMEA



Ricoh International B.V. - German Branch

Oberrather Str. 6
40472 Düsseldorf, Germany
Tel.: +49 211 654 645 00
Fax: +49 211 654 645 01
iosd@ricoh-europe.com
www.ricoh-iosd.eu

About Stemmer Imaging



Stemmer Imaging is one of Europe's leading machine vision technology providers for science and industry. With a perfect combination of innovative products, expert advice and comprehensive service,

Stemmer Imaging helps clients solve their machine vision tasks securely with speed and ease. Experienced specialists can be contacted easily and are available to provide advice locally in 19 European countries.



Stemmer Imaging AG
Gutenbergstr. 9-13
82178 Puchheim
Germany
Tel.: +49 89 809 02 0
Fax: +49 89 809 02 116
info@stemmer-imaging.de
www.stemmer-imaging.com

Office(s)

Austria
Belgium
Denmark
Finland
France
Germany
Ireland
Netherlands
Poland
Sweden
Switzerland
United Kingdom

Additional served countries:

Estonia, Iceland,
Latvia, Liechtenstein, Lithuania,
Luxembourg, Norway

Foundation

1987

Staff

> 300

Products

Acquisition, Cabling, Cameras,
Consulting, Illumination, Optics,
Software, Vision Computers,
Vision Systems

Applications

Character Recognition,
Digitalization, High Speed
Analysis, Inspection Piece Parts,
Inspection Webbed Material,
Material Testing, Metrology
2D, Metrology 3D, Part
Identification, Particle Analysis,
Robot Vision 2D, Robot Vision
3D, Symbol Recognition,
Thermography, Others

Industries served

Automotive and Suppliers,
Electronics/Semiconductors,
Energy/Water/Solar Technology,
Foodstuffs/Beverages, Glass/
Ceramics, Mechanical
Engineering/Line Building,
Medical Technology, Metal,
Packaging, Paper/Wood,
Pharmaceuticals/Cosmetics/
Chemicals, Plastics, Precision
Engineering/Optics/Machine
Vision, Traffic/Logistics, Other

Associations

AIA, EMVA, UKIVA, VDMA

Regions served

Asia, Europe

About SVS-Vistek

As a producer of cameras for industrial machine vision, SVS-Vistek GmbH has been synonymous with innovation and precision for over 30 years. The SVCam-series cameras are used wherever a precise view is required for materials handling or assembly technology, logistics, traffic monitoring or quality assurance.



Known all over the world for its industrial cameras, the mid-size company develops and produces exclusively in Seefeld near Munich, Germany.

It provides specially customized solutions for system integrators and OEM customers.

With the broad expertise of its own specialists and the experience which it has gained as a pioneer of numerous technical developments, SVS-Vistek advises customers on the selection and combination of the appropriate elements, additionally offering custom-made cameras and machine vision components.



SVS-Vistek GmbH
Mühlbachstr. 20
82229 Seefeld
Germany
Tel.: +49 8152 99 85 0
info@svs-vistek.com
www.svs-vistek.com

Management

Walter Denk, CEO
Andreas Schaarschmidt, CMO

Foundation

1987

Staff

60-100

Products

Cameras, Consulting, Frame
Grabber, Integration Services,
Interfaces/Cables/Peripherals,
Lighting Equipment, Optics,
Software, Vision Sensors

Applications

Character Recognition, High
Speed Analysis, Inspection Piece
Parts, Metrology, Part Identifi-
cation, Robot Vision, Symbol
Recognition, Others

Industries served

Automotive and Suppliers,
Electronics/Semiconductors,
Energy/Water/Solar Tech-
nology, Foodstuffs/Bever-
ages, FPD Quality Control,
Glass/Ceramics, Mechanical
Engineering/Line Building,

Metal, Packaging, Paper/Wood,
Pharmaceuticals/Cosmetics/
Chemicals, Plastics, Precision
Engineering/Optics/Machine
Vision, Traffic/Logistics

Companies represented

Euresys, Moritex, Myutron,
Kowa, Neosys

Associations

AIA, EMVA, VDMA, CMVU, JIIA

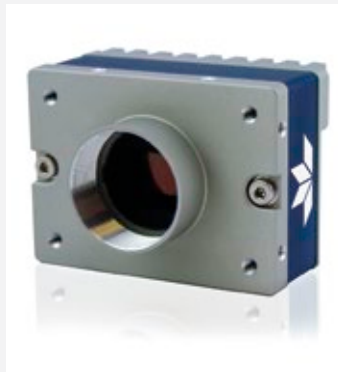
Regions served

Asia, Central Europe, China,
EMEA, Europe, Japan, Latin
America, North America



About Teledyne Dalsa

Teledyne Dalsa is part of the Teledyne Imaging group of leading-edge technology companies aligned under the Teledyne umbrella. With unrivalled expertise across the spectrum and decades of experience, the collective offers world-leading capabilities in sensing, signal generation and processing, enabling customers to succeed across a vast range of applications and industries.



Office(s)

Teledyne Dalsa
Lise-Meitner-Str. 7
82152 Krailling (Munich)
Germany
Tel: +49 89 895 457 30
Fax: +49 89 895 457 346
sales.europe@teledynedalsa.com

Management

Edwin Roks, Group President
Teledyne Dalsa, Inc. and
Teledyne e2v Digital Imaging
Corporate Vice President
Teledyne Technologies
Incorporated

Foundation

1980

Staff

1,000

Products

Cameras, Factory Floor
Automation Solutions, Frame
Grabber, Processors, Software,
Vision Sensors/Smart Cameras/
Embedded Systems, X-ray
Equipment

Applications

Character Recognition,
Digitalization, High Speed
Analysis, Inspection Piece Parts,
Web Inspection, Material
Testing, Metrology 2D, Part
Identification, Particle Analysis,
Robot Vision 2D, Symbol
Recognition, Thermography,
Others

Industries served

Automotive and Suppliers,
Electronics/Semiconductors,
Foodstuffs/Beverages, Glass/
Ceramics, Medical Technology,
Metal, Packaging, Paper/Wood,
Pharmaceuticals/Cosmetics/
Chemicals, Plastics, Precision
Engineering/Optics/Machine
Vision, Traffic (ITS)/Logistics

Platforms supported

Windows/Linux/DSP/ARM/FPGA/
x86/32 & 64 bit

Associations

AIA, EMVA, JIIA

Regions served

Asia, Australia, China, Europe,
Japan, North America, Latin
America



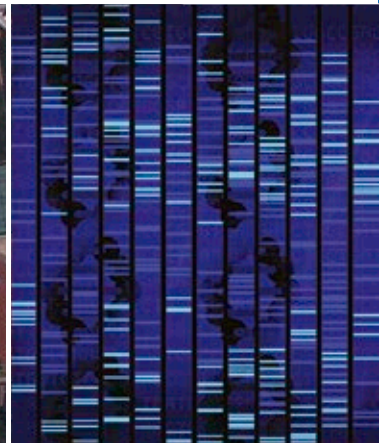
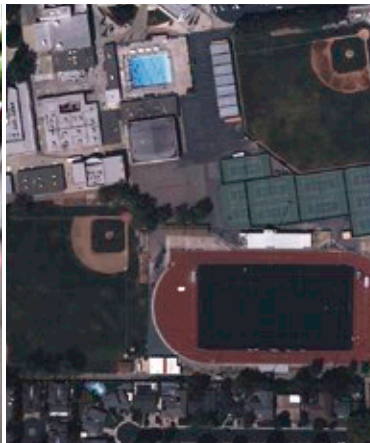
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About Vision Components

Vision Components GmbH is a leading supplier in the field of machine vision and develops and distributes intelligent, network-compatible real-time Smart Cameras which are able to operate without a PC. These embedded vision solutions can be easily integrated into almost any application. Customers can choose between models with ARM processors with freely programmable FPGA and VC Linux OS or DSP-based models with the proprietary VCRT OS. The prod-



uct portfolio includes Smart Cameras with/without protective housing, single board cameras, vision sensors. Providing custom-tailored OEM solutions for all kinds of applications are the core of the more than 20 years experience in machine vision and imaging.

Vision Components GmbH
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 info@vision-components.com
 www.vision-components.com



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Office(s)

Vision Components US Office
 Hudson, NH 03051, USA
 Tel.: +1 603 598 2588
 etoth@vision-components.com

Vision Components Asia Office
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 7-10 Hara Shinmachi, Ageo-shi,
 Japan
 minobe@vision-components.com

Foundation

1996

Staff

12

Products

Customized Camera Solutions,
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 Sensors, Software, other

Applications

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 tion, 3D Vision

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 cal Technology, Metal, Pack-
 aging, Paper/Wood, Pharma-
 ceuticals/Cosmetics/Chemicals,
 Plastics, Precision Engineer-
 ing/Optics/Machine Vision,
 Traffic/Logistics, Non-industrial
 Applications

Platforms supported

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 (Windows, Linux, RTOS)

Associations

AIA, Embedded Vision Alliance,
 EMVA, JIA, SPIE, VDMA

Regions served

Worldwide

About Vision Research

Vision Research designs and manufactures Phantom High-Speed cameras which can be found in a vast array of industries, such as entertainment, defense, and scientific research. The Phantom CXP6 Machine Vision cameras are specifically designed to bring Phantom high-quality images to the unique needs of machine vision high-speed applications. The CXP6 machine vision cameras utilize between 1 and 4 CXP chan-



nels to push the limits of speed and resolution imaging. They are GenICam compliant and stream directly into PCI Express frame grabbers or DVRs. The CXP6 will help to decrease bottlenecks and costs-per-unit while increasing production line speeds and volumes.

Office(s)

Vision Research
 United States of America
 Tel.: +1 973 692 45 00
 www.phantomhighspeed.com

Management

Jay Stepleton,
 Division Vice President

Deanna Carter,
 Vice President of Sales and
 Marketing

Kevin Gann,
 Director of Research and
 Development

Foundation

1950

Staff

100

Products

Cameras

Applications

High Speed Analysis, Material
 Testing, Particle Analysis,
 Other

Industries served

Automotive and Suppliers,
 Electronics/Semiconductors,
 Mechanical Engineering/Line
 Building, Medical Technology,
 Packaging, Other

Regions served

Africa, Asia, Australia,
 Central Europe, China,
 EMEA, Europe, Japan,
 Latin America, North America,
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Vision Research
 100 Dey Rd
 Wayne, NJ 07470
 United States of America
 Tel.: +1 973 692 45 00
 www.phantomhighspeed.com

About Ximea

For 25 years XIMEA has developed and manufactured leading-edge, high-performance custom and OEM cameras with the main features being of high speed, small size, low weight and efficient power consumption.

Our cameras flexible platform designs include an application programming interface (API) for many common Vision libraries and operating systems like Windows, macOS and Linux (ARM) as well as compliance with standards like USB3 Vision.

Drawing on decades of experience in the industry, XIMEA offers state-of-the art cameras with USB3, PCI Express, Thunderbolt and Fire-Wire interface

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To ensure the highest quality at the best price, XIMEA owns and operates its agile R&D and production facilities. This allows for the rapid design and production of your solution with the best components and shortest lead times. Customers can further leverage XIMEA's extensive engineering services for custom product development.



Office(s)

Ximea Corp.
United States of America
Tel.: +1 303 389 9838
Fax: +1 303 202 6350
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Ximea s.r.o.
Slovakia
Tel.: +421 2 205 104 26
Fax: +421 2 205 104 27

Management

Dr. Vasant Desai
Max Larin

Foundation

2010 / 1992

Staff

11-50

Products

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Applications

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Particle Analysis, Robot Vision 2D/3D, Symbol Recognition, Virtual Reality, Other

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Associations

AIA, EMVA, VDMA, Embedded Vision Alliance, Other

Regions served

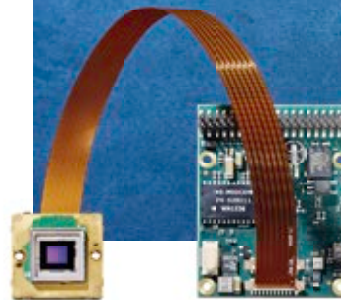
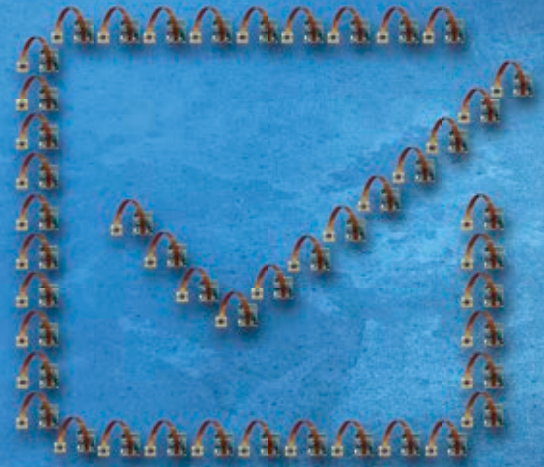
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Up to 20 Times Faster Image Processing with FPGA

Having built up extensive knowledge on FPGA programming, Vision Components has achieved up to 20 times faster performance in various projects. These results are enabled by the versatile system on chip (SoC) architecture in VC Z series embedded vision systems: the cameras feature a Xilinx Zynq SoC that comprises an 866 MHz dual-core ARM processor and an FPGA, which can carry out image processing tasks in parallel. Using Xilinx' Vivado HLS tool, Vision Components programs the integrated circuit in C and C++, and can furthermore draw on its own extensive software library. Software-based FPGA programming has huge advantages. Users can test all programmed functions in advance in a simulation environment and debug the script, if necessary. This greatly simplifies troubleshooting and significantly reduces development time. FPGA programming therefore promises to be-



come much more accessible to machine vision developers in future. Vision Components offers support and feasibility studies to explore the potential of FPGA programming.



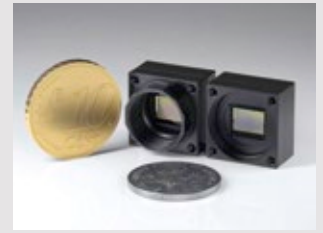
Vision Components GmbH
 Ottostr. 2
 76275 Ettlingen
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Adlink Technology provides a wide range of embedded computing products and services to the test & measurement, automation & process control, gaming, communications, medical, network security, and transportation industries. Adlink products include ETX and COM Express modules for industrial computing, AdvancedTCA, CompactPCI, PCI Express-based data acquisition and I/O and vision and motion control. Adlink provides customization and system integration services, and maintains low manufacturing costs.

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Producer

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For 25 years, Allied Vision Technologies has been helping people see the bigger picture. Allied Vision's camera portfolio is one of the largest in the market and offers a camera for nearly any application. If no standard product fits, the Allied Vision Modular Concept creates additional flexibility providing hardware option combinations that are almost endless. Allied Vision cameras are easy to integrate into any machine vision system thanks to our Software Development Kit (SDK) that is compatible with all common operating systems, camera interfaces and image-processing libraries.

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Producer

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Zeiss ZF lenses for industrial applications are key components in complex production processes as well as in measuring tasks, quality assurance and many other applications. The infrared lenses of the ZF series are suitable for the use with special cameras like IR cameras without an IR blocking filter. The transmission of ZF-IR lenses adds up to 70% at 1000 nm, while usual lenses exhibit only 20%. Zeiss Visionmes lenses are developed for crucial measuring tasks in industry and feature telecentric optics. For optical metrology at high precision telecentric optics are essential.

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HGV supplies scaleable turnkey machine vision solutions for all kinds of quality inspection: Flexible measurement systems (FMS) with robots, in-line-measurement, process control, robot guiding, assembly control, part handling (pick & place), surface inspection, sorting & identification.

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Producer

Carl Zeiss Optotechnik GmbH · Georg-Wiesböck-Ring 12, 83115 Neuubeuern, Germany, Tel.: +49 8035 870 40, optotechnik.metrology.de@zeiss.com, https://optotechnik.zeiss.com

Distributor, Producer

CBC (Europe) GmbH · Hansaallee 191, 40549 Düsseldorf, Germany, Tel.: +49 211 530 670, info@cbc-europe.com, www.cbc-europe.com

Solution Provider

Ceres Vision GmbH · Kurt-Schumacher-Str. 1, 33615 Bielefeld, Germany, Tel.: +49 521 923 69 30, info@ceresvision.de, www.ceresvision.de

Machine Builder/OEM, Producer, Solution Provider

Chromasens develops and produces both standardized machine vision components – as color line scan cameras, spectral cameras, 3D stereo cameras and line scan lights – and custom-specific image processing solutions. Chromasens employees have comprehensive expertise in development, project management, application creation, system integration and professional services. The intensive cooperation with the customer in the form of comprehensive support throughout every project phase is a cornerstone of the company philosophy.

Chromasens GmbH · Max-Stromeyer-Str. 116, 78467 Konstanz, Germany, Tel.: +49 7531 876 0, info@chromasens.de, www.chromasens.com

Integrator

CLK · Mendelstr. 11, 48149 Münster, Germany, Tel.: +49 251 980 20 87, cruse@clkgmbh.de, www.clkgmbh.de

Producer

Cognex Corporation designs, develops, manufactures, and markets machine vision sensors and systems. Cognex vision sensors are used in factories around the world to automate the manufacture of a wide range of items and to assure their quality. Cognex is the world's leader in the machine vision industry, having shipped more than 450,000 machine vision systems, since the company's founding in 1981. In addition to its corporate headquarters in Natick, Massachusetts, Cognex also has regional offices and distributors located throughout North America, Japan, Europe, Asia, and Latin America.

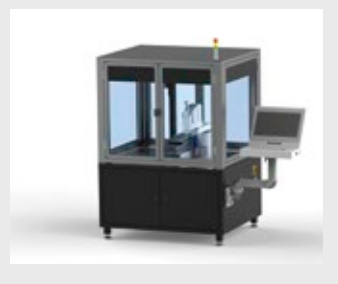
Cognex Germany, Inc. · Emmy-Noether-Str. 11, 76131 Karlsruhe, Germany, Tel.: +49 721 663 90, info@cognex.de, www.cognex.com

Producer

ColVisTec · Max-Planck-Str. 3, 12489 Berlin-Adlershof, Germany, Tel.: +49 306 392 78 16, info@colvistec.de, www.colvistec.de/

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Compar industrial machine vision systems are the solution wherever quality control is required, zero-defects strategies are applied, or value for money and high productivity are needed. The main functions are inspection, identification, and robot guidance. Customers in all industries – however, especially in the automotive, watch-making, packaging, printing, electronics, medical and pharmaceutical sector – appreciate our innovative package solutions based on a modular system. Aspiring to be your competent system provider for machine vision and robotics, we offer solutions that include smart cameras, computer-based vision systems, accurate robots, and even integrated test installations that allow for highly flexible handling.



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Credimex AG · Untere Gründlstr. 7, 6055 Alpnach, Switzerland, Tel.: +41 41 666 29 49, kilian.laebli@credimex.ch, www.credimex.ch

Producer

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Solution Provider

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www.dhsolution.com

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Diaspective Vision GmbH · Strandstr. 15, 18233 Am Salzhaff, Pepelow, Germany,
Tel.: +49 38294 166 760, office@diaspective-vision.com, www.diaspective-vision.com

Producer

Docter Optics GmbH · Mittelweg 29, 7806 Neustadt an der Orla, Germany,
Tel.: +49 36481 27 0, info@docteroptics.com, www.docteroptics.com

Machine Builder/OEM

Dr. Heinrich Schneider Messtechnik GmbH · Rothlay Mühle,
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Fraunhofer IMS · Finkenstr. 61, 47057 Duisburg, Germany, Tel.: +49 2033 783 0, info@ims.fraunhofer.de, www.ims.fraunhofer.de

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Tel.: +49 761 790 950, info@isys-vision.de, www.isys-vision.de

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Tel.: +49 8806 534 32 55, contact@mgopticalsolutions.com,
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Tel.: +49 8542 168 0, info@micro-epsilon.com, www.micro-epsilon.com

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Tel.: +49 89 726 342 00, info@mikrotron.de, www.mikrotron.de

Producer

Mitutoyo Messgeräte GmbH · Borsigstr. 8-10, 41469 Neuss, Germany,
Tel.: +49 2137 102 0, info@mitutoyo.de, www.mitutoyo.de

Producer

Moeller-Wedel Optical GmbH · Rosengarten 10, 22880 Wedel, Germany,
Tel.: +49 4103 937 76 10, info@moeller-wedel-optical.com,
www.moeller-wedel-optical.com

Consultant, Integrator, Machine Builder/OEM, Solution Provider

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Tel.: +49 5219 629 63 42, info@mt-vision.de, www.mt-vision.de

Producer

MVTec Software GmbH · Neherstr 1, 81675 München, Germany,
Tel.: +49 89 457 69 50, info@mvtec.com, www.mvtec.com

Integrator, Producer, Solution Provider

NanoFocus AG · Max-Planck-Ring 48, 46049 Oberhausen, Germany,
Tel.: +49 208 620 000, info@nanofocus.de, www.nanofocus.com

Producer

National Instruments Germany GmbH · Ganghoferstr. 70 b, 80339 München, Germany, Tel.: +49 89 741 31 30, info.germany@ni.com, www.ni.com/vision

Machine Builder/OEM, Solution Provider

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Tel.: +49 7821 580 80, dominik_uhl@nela.de, www.nela.de

Solution Provider

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Producer, Solution Provider

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Machine Builder/OEM

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h-kounev@nikka-research.com, www.nikka-research.com

Producer

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Tel.: +49 6023 917 330, sales_germany@nikonmetrology.com,
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Solution Provider

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Integrator

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info@octum.de, www.octum.de

Producer

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Tel.: +49 40 237 730, microscopy@olympus-europa.com, www.microscopy.olympus.eu

Integrator, Solution Provider

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Producer

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Polytec-Platz 1-7
76337 Waldbronn
Germany
Tel.: +49 7243 604 18 00
Fax: +49 7243 699 44
bv@polytec.de
www.polytec.com/bv

Producer

Präzisions Glas & Optik GmbH · Im Langen Busch 14, 58640 Iserlohn, Germany, Tel.: +49 2371 776 790, info@pgo-online.com, www.pgo-online.com

Producer

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Producer, Research Facility, Solution Provider

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Producer, Solution Provider

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sales@qioptiq.de
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Solution Provider

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Producer

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Producer

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www.schoenherr-elektronik.com

Producer, Solution Provider

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Producer

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Machine Builder/OEM, Solution Provider

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Tel.: +49 8677 409 95 81, info@senswork.com, www.senswork.com

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Solution Provider

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Tel.: +49 8171 968 34 00, info@smartray.de, www.smartray.de

Integrator, Solution Provider

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Integrator

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Tel.: +49 7822 895 203, info@stoehrmann.de, www.stoehrmann.de

Producer

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Consultant

Strategema | Frank Olschewski Consulting
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Producer

Streppel Glasfaser-Optik oHG · Döllersweg 3, 42929 Wermelskirchen, Germany,
Tel.: +49 2196 947 060, info@streppel.de, www.streppel.de

Producer

STZ Qualitätsicherung & Bildverarbeitung · Werner-von-Siemens-Str. 12,
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Producer

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Tel.: +49 89 895 457 30, sales.europe@teledynedalsa.com,
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Solution Provider

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Producer

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Tel.: +49 421 335 910, info@theimagingsource.com, www.theimagingsource.com

Producer, Solution Provider

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Tel.: +49 9131 691 400, info@thermosensorik.de, www.thermosensorik.de

Producer

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Tel.: +49 821 455 55 30, sales@tichawa.de, www.tichawa.de

Producer

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Tel.: +49 204 378 329 37, jochen.noell@tridicam.de, www.tridicam.de

Machine Builder/OEM

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Tel.: +49 4103 180 060, sales@trioptics.com, www.trioptics.com

Integrator

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Tel.: +49 951 700 85 80, info@ug-systems.com, www.ug-systems.com

Producer, Solution Provider

Unique Vision GmbH · Kleine Bahnstr. 8, 22525 Hamburg, Germany,
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Producer

VDS Vosskühler GmbH · Weiße Breite 7, 49084 Osnabrück, Germany,
Tel.: +49 541 800 840, vds@vdsvoessk.de, www.vdsvoessk.de

Producer

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Tel.: +49 371 334 24 70, info@vialux.de, www.vialux.de

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23617 Stockelsdorf, Germany, Tel.: +49 451 290 28 60, info@visiconsult.de,
www.visiconsult.de

Solution Provider

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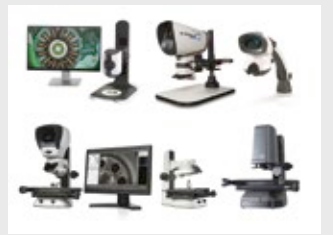
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Consultant

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Tel.: +49 89 215 536 65, contact@markets.vision, www.markets.vision

Solution Provider

Vision Tools Bildanalyse Systeme GmbH · Goethestr. 63-65, 68753 Waghäusel,
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Consultant

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Distributor

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Solution Provider

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Producer

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Solution Provider

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Producer

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Integrator, Solution Provider

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Solution Provider

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Muehlenstr. 34-36
09111 Chemnitz
Germany
Tel.: +49 371 404 606 0
Fax: +49 371 404 606 29
wir@wir-electronic.de
www.wir-electronic.de

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info@z-laser.de
www.z-laser.com

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Zertrox GmbH & Co. KG · Martin-Luther-Str. 3, 52062 Aachen, Germany, Tel.: +49 241 997 71 64, info@zertrox.de, www.zertrox.de

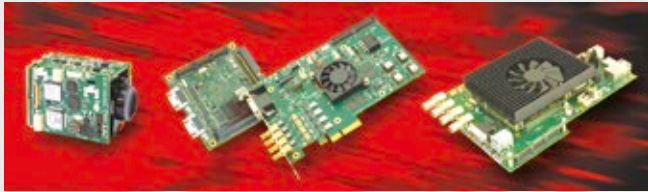
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Active Silicon Ltd.
Pinewood Mews, Bond Close
Iver SLO ONA
United Kingdom
Tel.: +44 1753 650 600
Fax: +44 1753 651 661
info@activesilicon.com
www.activesilicon.com

Producer

Adaptive Vision · ul. Bojkowska 37A, 44-100 Gliwice, Poland,
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Tel.: +31 40 235 39 00, www.adimec.com

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Alditech · Institutskaya, 142290 Pushchino, Russia,
Tel.: +7 4967 736 220, web@alditech.ru, www.alditech.ru

Solution Provider

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Tel.: +34 95 408 12 73, rafael.romay@anafocus.com, www.anafocus.com

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Tel.: +31 172 423 360
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Optics Balzers AG · Neugrüt 35, 9496 Balzers, Liechtenstein,
Tel.: +423 388 92 00, info@opticsbalzers.com, www.opticsbalzers.com

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Tel.: +39 0376 263 525, info@opto-engineering.com, www.opto-engineering.com

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Producer, Solution Provider

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Tel.: +1 520 721 05 00, jbreeding@breault.com, www.breault.com

Producer

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Integrator

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Tel.: +1 603 883 79 79, sales@cepoint.com, www.cepoint.com

Solution Provider

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Producer

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Research Facility, Solution Provider

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Solution Provider

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Machine Builder/OEM

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Solution Provider

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Producer

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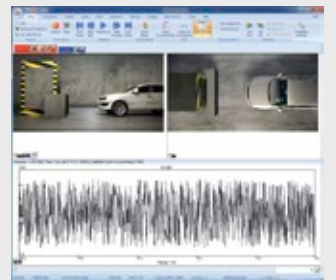
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Producer

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Producer

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Machine Builder/OEM

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Integrator

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North America

Producer

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Producer

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Consultant, Distributor, Integrator

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Songjiang District Shanghai PRC
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Tel.: +86 21 6768 7095
Fax: +86 21 6768 7098
sales.cn@baumer.com
www.baumer.com

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G4 Technology Co., Ltd. - 5F, No. 46, Sec. 3, Minquan E. Rd, Taipei 104-77, Taiwan, Tel.: +886 2 250 318 03, ken@g4.com.tw, www.g4.com.tw

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Association

Japan Industrial Imaging Association - 2-10-15, Nakameguro, Yamate Ave. K Bldg., 153-0061 Meguro, Tokyo, Japan, Tel.: +81 3 371 639 33, info@jiaa.org, www.jiaa.org

Producer

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Kaya Instruments - 20 HaMesila St., 3688520 Neshet, Israel, Tel.: +972 72 272 35 00, george@kayainstruments.com, www.kayainstruments.com

Machine Builder/OEM, Solution Provider

KOS Laboratory Homogenizer - A18 Second Floor, Building 1, Shunlian Machinery Plaza, ChenCun Town, 528313 Foshan, Guangdong, China, Tel.: +86 757 293 185 41, drbluejack@yahoo.com, www.emulsifyingmixer.com/homogenizer/lab-homogenizer.html

Distributor, Machine Builder/OEM, Producer, Solution Provider

Lanoptik Technologies Ltd. - R1002, No.140 Zhongshan Avenue, 510630 Guangzhou, China, Tel.: +86 20 389 860 17, info@lanoptik.com, www.lanoptik.com

Machine Builder/OEM

Leading-Tech Laser Co., Ltd. - 5th floor, building 52, No.5688, LongWu Road, 200241 Shanghai, China, Tel.: +86 21 335 881 22, sale@leading-techlaser.com, www.leading-techlaser.com

Producer

NED (Nippon Electro-Sensory Devices Ltd.) - Shinagawa-ku, Ohi 1-45-2 Gibraltar Ohi Bldg, 4f, 140-0014 Tokyo, Japan, Tel.: +81 3 571 831 81, info@ned-sensor.com, www.ned-sensor.co.jp/en

Integrator

Nexus Engiconsults - A 115 2nd floor Shakarpur, 110092 New Delhi, India, Tel.: +91 98 107 698 31, info@nexusengiconsults.com, www.nexusengiconsults.com

Producer

OPT Machine Vision Tech Co., LTD - NO8. Jinsheng Road, 523853 Jinxia Chang'an Dongguan, Guangdong, China, Tel.: +86 769 827 161 88, optmv1@optmv.com, www.optmv.net

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Machine Builder/OEM

RAA Vision Pvt Ltd. - Om vihar, 110058 New Delhi, Delhi, India,
Tel.: +91 99 116 902 40, amit@raavision.com, www.raavision.com

Producer

Shenzhen Kuangshi Communication Technology - 6/F, No.1 Building, Zhongyuntai Industry Park, Tangtuo Shiyuan, 51818 Shenzhen, China, Tel.: +86 755 297 818 35, ztzyhb@gmail.com, www.ksfiberoptic.com

Solution Provider

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Integrator

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Keyence	www.keyence.de
Klastech	www.klastech.com
Klughammer	http://kms-e.de
Kvant	www.kvant.sk
Lambda Photometrics	www.lambdaphoto.co.uk
Laser 2000	www.laser2000.de
Laser Components	www.lasercomponents.com
LAT elektronik	www.latab.se
LDD Trading Associates	www.lddlght.com
Leistungselektronik Jena	
Leitner Industrial Endoscopy	www.leitner-efer.de
Leutron Vision	www.leutron.com
LMI Technologies	www.lmi3d.com
LOT Quantum Design	http://lot-qd.de
Luster LightVision Tech	www.lusterinc.com
Matrix Vision	www.matrix-vision.de
MaxxVision	www.maxxvision.com
Menzel Vision and Robotics	www.menzelab.com
Metaphase Technologies	www.metaphase-tech.com
MG Optical Solutions	www.mgopticalsolutions.com
Microsystems	www.microsystems.it
Moritex	www.moritex.com
MsiVision	www.msivision.com
MTD	www.mtd-light.com
Myutron	www.myutron.com

NET	www.net-.com
NeuPro Solutions	www.neupro-solutions.com
Odem Technologies	www.odem.co.il
Olympus	www.olympus-europa.com
Omicron Laserage	www.omicron-laser.de
Omron Microscan Systems	www.microscan.com
Omron	www.industrial.omron.de
Opto	www.opto.de
Opto Engineering	www.opto-engineering.com
Opto Precision	www.optoprecision.de
Optometron	www.optometron.de
OptoPolymer	www.optopolymer.de
Orbis	www.orbis.eu
Parameter	www.parameter.se
PerkinElmer Optoelectronics	www.perkinelmer.com
Phaer	www.phaer.be
Phlox	www.phlox-gc.com
Phytec Messtechnik	www.phytec.de
Pi4_robotics	www.pi4.de
Planistar Lichttechnik	www.planistar.de
POG Präzisionsoptik Gera	www.pog.eu
Polytec	www.polytec.de/bv
Power Technology	www.powertechnology.com
Profactor	www.profactor.at
Qualimatest	www.qmt.ch
Quioptiq	www.quioptiq.de
Rauscher	www.rauscher.de
RH Engineering	www.rhengineering.de
Rheintacho Messtechnik	www.rheintacho.com
Schael-Optik	www.schael-optik.de
Schäfter + Kirchhoff	www.sukhamburg.de
Schmachtl	www.schmachtl.at
Schott Lighting and Imaging	www.schott.com
Second2None	www.visiondragon.com
Sedeco Vision Components	www.sedeco.nl
Seiwa Optical	www.seiwaopt.co.jp
Sharp Microelectronics	www.sharpsme.com
Sill Optics	www.silloptics.de
Smart Vision Lights	www.smartvisionlights.com
Smartek Vision	www.smartekvision.com

Soliton Technologies	www.solitontech.com
Special Application Products	www.sapltd.co.uk
Spectrum Illumination	www.spectrumillumination.com
Stemmer Imaging	www.stemmer-imaging.com
StockerYale	www.stockeryale.com
STZ Qualitätssicherung und Bildverarbeitung	www.stz-ilmenau.de
SVS Vistek	www.svs-vistek.com
Symco	www.symco.co.jp
Tecin	www.tecin.de
Tekno Optik	www.teknooptik.se
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Optris	www.optris.de	Tec5	www.tec5.com
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Parameter	www.parameter.se	Topometric	www.topometric.net
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Collischon Optik-Design	www.mikro-optik.de	Laser Components	www.lasercomponents.com
Cosyco	www.cosyco.de	Leading-Tech Laser	www.leading-techlaser.com
Deposition Sciences	www.depsci.com	Lensation	www.lensation.de
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Cognex	www.cognex.com
Collischon Optik-Design	www.mikro-optik.de
Creaform Deutschland	www.creaform3d.com
CSEM	www.csem.ch
CTR Carinthian Tech Research	www.ctr.at
Cypress Semiconductor	www.cypress.com
De Man Industrie-Automation	www.deman.de
Docter Optics	www.docteroptics.com
Eltec Elektronik	www.eltec.com
Entner Electronics	www.entner-electronics.com
Erhard + Leimer	www.erhardt-leimer.com
FiberVision	www.fibervision.de
Flir Advanced Thermal Solutions	www.flir.com
Fraunhofer Allianz Vision	www.vision.fraunhofer.de
Fraunhofer IFF	www.mpt.iff.fraunhofer.de
Fraunhofer IMS	www.ims.fraunhofer.de
FRT Fries Research & Technology	www.frt-gmbh.com
Gesellschaft für Bild- und Signalverarbeitung	www.gbs-ilmenau.de
Gevicam	www.gevicam.com
GFal	www.gfai.de
HaSoTec	www.hasotec.com
Helion	www.helionvision.com
IDS	www.ids-imaging.com
Imaging Lab	www.imaginglab.it
Impuls	www.impuls-imaging.com
IMS Chips	www.ims-chips.de
Infaimon	www.infaimon.com
Isomorph	www.isomorph.it
Joanneum Research	www.joanneum.at
Jos. Schneider Optische Werke	www.schneiderkreuznach.com
Kamera Werke Dresden	www.kwdo.de
Kappa opto-electronics	www.kappa.de

Lincoln Laser Company	www.lincolnlaser.com
LMI Technologies	www.lmi3d.com
Matrix Vision	www.matrix-vision.de
Mazet	www.mazet.de
Micro-Epsilon	www.eltrotec.com
Mikromak Service	www.mikromak.com
MsiVision	www.msivision.com
Norpix	www.norpix.com
Opto	www.opto.de
Panavision Imaging	www.panavisionimaging.com
PCO	www.pco.de
Photonfocus	www.photonfocus.com
Phytec Messtechnik	www.phytec.de
Pi4_robotics	www.pi4.de
Profactor	www.profactor.at
Schäfter + Kirchhoff	www.sukhamburg.de
Sensor to Image	www.sensor-to-image.de
Smartsurv	www.smartsurv.de
SPG Data 3D	www.spgdata3d.com
SPIE	www.spieeurope.org
Stemmer Imaging	www.stemmer-imaging.com
STZ Qualitätssicherung und Bildverarbeitung	www.stz-ilmenau.de
Tekno Optik	www.teknooptik.se
Tema	www.temavisio.com
Thermosensorik	www.thermosensorik.de
Tichawa Vision	www.tichawa.de
Tordivel	www.scorpionvision.com
Univision	www.univision.it
Vega Technology Group	www.vegatcgroup.com
Vision & Control	www.vision-control.com
Vision Machines	www.vision-machines.com
Vision Tools	www.vision-tools.com
V-Research	www.v-research.at
Zertrox	www.zertrox.de

Software

A&B Software	www.ab-soft.com
ABW	www.abw-3d.de
Adaptive Vision	www.adaptive-vision.com
Advantech Europe	www.advantech.eu
Alditech	www.alditech.ru
Alfvision	www.alfvision.de
Alicona Imaging	www.alicon.com
Alliance Vision	www.alliancevision.com
Alrad Imaging	www.alrad.co.uk
AMS Technologies	www.amstechnologies.com
Andor Technology	www.andor.com
AOS Technologies	www.aostechnologies.com
Applied Electro-Optics	www.aeousa.com
Artray	www.artray.co.jp
Asentics	www.asentics.de
Attentra	www.attentra.de
Baumer	www.baumer.com
Cimetrix	www.cimetrix.com
Cognex	www.cognex.com
Cosyco	www.cosyco.de
De Man Industrie-Automation	www.deman.de
Dhs Solutions	www.dhssolution.com
Digital Surf	www.digitalsurf.com
Duwe 3D	www.duwe-3d.de
Dynalog	www.dynalog-us.com
Ebs Automatisierte Thermographie und Systemtechnik	www.irpod.net
EHD Imaging	www.ehd.de
Eltec Elektronik	www.eltec.com
Energid	www.energid.com
Epix	www.epixinc.com
Erhard + Leimer	www.erhardt-leimer.com
Euresys	www.euresys.com
EVT Eye Vision Technology	www.evt-web.com
Fabrimex Systems	www.fabrimex-systems.ch
Fast	www.fast-corp.co.jp
FDS Research	www.fdsresearch.si
FiberVision	www.fibervision.de
Flir Advanced Thermal Solutions	www.flir.com

Framos	www.framos.eu
FSI Technologies	www.fsinet.com
G4 Technology	www.g4.com.tw
Gefasoft	www.gefasoft.com
Geomagic	www.geomagic.com
Gesellschaft für Bild- und Signalverarbeitung	www.gbs-ilmenau.de
Gevicam	www.gevicam.com
Goldlücke Ingenieurleistungen	www.giib.de
Hasotec	www.hasotec.com
Hexagon Manufacturing Intelligence	www.hexagonmi.com
IB/E Optics	www.ibe-optics.com
IDS	www.ids-imaging.com
iIM	www.iimag.de
Image House	www.imagehouse.dk
Image S	www.imagessrl.com
Imagic	www.imagic-imaging.com
Imaging Lab	www.imaginglab.it
Impuls	www.impuls-imaging.com
INB Vision	www.inb-vision.com
Industrial Vision Systems	www.industrialvision.co.uk
Infaimon	www.infaimon.com
Inray Solutions	www.inrays.com
In-situ	www.in-situ.de
Ircam	www.ircam.de
IS Imaging Solutions	www.imaging-solutions.de
Isomorph	www.isomorph.it
Isra Vision	www.isravis.com
IVS	www.industrialvision.co.uk
JAI	www.jai.com
Japan F.A. Systems	www.jfas.co.jp
Joanneum Research	www.joanneum.at
Kappa opto-electronics	www.kappa.de
Karlheinz Hinze Optoengineering	www.hinze-opto.de
Klughammer	www.klughammer.de
Kvant	www.kvant.sk
Lambda Photometrics	www.lambdaphoto.co.uk
Lambda Research	www.lambdares.com
Leica Microsystems	www.leica-microsystems.com

Leutron Vision	www.leutron.com
LMI Technologies	www.lmi3d.com
Luster Lightvision Tech	www.lusterinc.com
Math & Tech Engineering	www.mathtech.eu
Matrix Vision	www.matrix-vision.de
Matrox Imaging	www.matrox.com/imaging
MaxxVision	www.maxxvision.com
Menzel Vision and Robotics	www.menzelab.com
Micro Epsilon	www.micro-epsilon.com
Microsystems	www.microsystems.it
Mikromak Service	www.mikromak.com
Mitutoyo	www.mitutoyo.de
Msvision	www.msvision.com
MVTec Software	www.mvtec.com
National Instruments	www.ni.com
Neogramm	www.neogramm.de
NET New Electronic Technology	www.net-gmbh.com
Neurocheck	www.neurocheck.com
Norpix	www.norpix.com
Odem Technologies	www.odem.co.il
Olympus	www.olympus-europa.com
Omron Microscan Systems	www.microscan.com
Omron	www.industrial.omron.de
Optical Research Associates	www.opticalres.com
Optis	www.optis-world.com
Opto	www.opto.de
Optometron	www.optometron.de
Orbis	www.orbis.eu
Parameter	www.parameter.se
Photonfocus	www.photonfocus.com
Pi4_robotics	www.pi4.de
Pleora Technologies	www.pleora.com
Polytec	www.polytec.de/bv
Profactor	www.profactor.at
Qualimatest	www.qmt.ch
Rapidform	www.rapidform.com
Rauscher	www.rauscher.de
RH Engineering	www.rhengineering.de
Rubroeder	www.rubroeder.de
SAC	www.sac-vision.de
Schäfter+Kirchhoff	www.sukhamburg.de
Schmachtl	www.schmachtl.at

Second2None	www.visiondragon.com
Sedeco Vision Components	www.sedeco.nl
SensorDesk	www.sensordesk.com
Silicon Software	www.silicon-software.de
Simon IBV	www.simon-ibv.de
SmartSurv	www.smartsurv.de
SPG Data 3D	www.spgdata3d.com
Stemmer Imaging	www.stemmer-imaging.com
STZ Qualitätssicherung und Bildverarbeitung	www.stz-ilmenau.de
Supercomputing Systems	www.scs-vision.ch
SVS Vistek	www.svs-vistek.com
Symco	www.symco.co.jp
Systematic Vision	www.systematicvision.com
Tekno Optik	www.teknooptik.se
Teledyne Dalsa	www.teledynedalsa.com
Tema	www.temavisio.com
The Imaging Source	www.theimagingnsources.com
The Mathworks	www.mathworks.com
Thermosensorik	www.thermosensorik.de
Tordivel	www.scorpionvision.com
Trivision	www.trivision.dk
TYZX	www.tyzx.com
Unique Vision	www.unique-vision.net
Univision	www.univision.it
Van de Loosdrecht Machine Vision	www.vdlmv.nl
Vega Technology Group	www.vegatcgroup.com
Visicontrol	www.visicontrol.com
Visiolaser	www.vannier-photelec.fr/visiolaser
Vision & Control	www.vision-control.com
Vision Components	www.vision-components.com
Vision Machines	www.vision-machines.com
Vision Tools	www.vision-tools.com
Visionlink	www.visionlink.it
Vitronic	www.vitronic.com
Vizzion	www.vizzion.com
Weiss Imaging and Solutions	www.weiss-imaging.de
Wenzel	www.wenzel-group.com
X-Rite	www.xrite.com
Zertrox	www.zertrox.de

Vision Sensors, Smart Cameras & Embedded Systems

Acal BFi Germany	www.bfioptilas.com
Active Silicon	www.activesilicon.com
Adaptive Vision	www.adaptive-vision.com
Adlink	www.adlinktech.eu
Advantech Europe	www.advantech.eu
AIT Göhner	www.visionandid.com
Alfavision	www.alfavision.de
AMS Technologies	www.amstechnologies.com
Asentics	www.asentics.de
Banner Engineering	www.bannerengineering.com
Basler Vision Technologies	www.baslerweb.com
Baumer	www.baumer.com
Camsensor Technologies	www.camsensor.com
Cmos Vision	www.cmosvision.com
Cognex	www.cognex.com
Compar	www.compar.ch
Computer Dynamics	www.cdynamics.com
Cosyco	www.cosyco.de
Datalogic	www.datalogic.com
De Man Industrie-Automation	www.deman.de
Si-soric	www.di-soric.de
Eltec Elektronik	www.eltec.com
Erhard + Leimer	www.erhardt-leimer.com
EVT Eye Vision Technology	www.evt-web.com
Fabrimex Systems	www.fabrimex-systems.ch
Fastvision	www.fast-vision.com
Festo	www.festo.com
Fibervision	www.fibervision.de
Finger	www.finger-kg.de
Flir Advanced Thermal Solutions	www.flir.com
Framos	www.framos.com
FSI Technologies	www.fsinet.com
G4 Technology	www.g4.com.tw
Hans Turck	www.turck.com
Hema	www.hema.de
Hexagon Manufacturing Intelligence	www.hexagonmi.com
IBN	www.ibn-gmbh.de
IDS Imaging Development Systems	www.ids-imaging.com

Ifm Electronic	www.ifm.de
Image House	www.imagehouse.dk
Image S	www.imagesrl.com
Imaging Solutions Group	www.isgcameras.com
Imago Technologies	www.imago-technologies.com
Imagsa Technologies	www.imagsa.com
IMR Automatisierungstechnik	www.imr-le.de
Infaimon	www.infaimon.com
IOS	www.ios-web.de
IOSS	www.ioass.de
Ipf Electronic	www.ipf-electronic.de
IS Imaging Solutions	www.imaging-solutions.de
Isra Vision	www.isravision.com
ISW	www.isw-gmbh.biz
Japan F.A. Systems Corporation	www.jfas.co.jp
K + P Krempien + Petersen	www.kup-image.de
Keyence	www.keyence.de
Kontron	www.kontron.com
Lambda Photometrics	www.lambdaphoto.co.uk
Leutron Vision	www.leutron.com
Leuze Electronic	www.leuze.com
LMI Technologies	www.lmi3d.com
Lord Ingenierie	www.lord-ing.com
Luster LightVision Tech	www.lusterinc.com
Matrix Vision	www.matrix-vision.de
Matrox Imaging	www.matrox.com/imaging
MaxxVision	www.maxxvision.com
MaZet	www.mazet.de
Menzel Vision and Robotics	www.menzelab.com
Micro Epsilon	www.micro-epsilon.com
Microsystems	www.microsystems.it
Msvision	www.msvision.com
National Instruments	www.ni.com
NET New Electronic Technology	www.net-gmbh.com
Neupro Solutions	www.neupro-solutions.com
Neuricam	www.neuricam.com
Norpix	www.norpix.com
Odem Technologies	www.odem.co.il
Omron Microscan Systems	www.microscan.com
Omron	www.industrial.omron.de

Opto	www.opto.de
Optomotive	www.optomotive.si
Orbis	www.orbis.eu
Panasonic Electric Works	www.panasonic-electric-works.de
Parameter	www.parameter.se
Pepperl & Fuchs	www.pepperl-fuchs.com
Peter Scholz Software + Engineering	www.scholzue.de
Phytec Messtechnik	www.phytec.de
Pi4_robotics	www.pi4.de
PMDTec	www.pmdtec.com
Pollux	www.pollux.com.br
Polytec	www.polytec.de/bv
PPT Vision	www.pptvision.com
Profactor	www.profactor.at
Pulsotronic	www.bildverarbeitung.pulsotronic.de
Qualimatest	www.qmt.ch
Rauscher	www.rauscher.de
RSB Optotechnik	www.rsb-optotechnik.de
SAC	www.sac-vision.de
Schäfter+Kirchhoff	www.sukhamburg.de
Schmachtl	www.schmachtl.at
Schunk	www.schunk.com
Scintacor	www.scintacor.com
Second2none	www.visiondragon.com
Sedeco Vision Components	www.sedeco.nl
Sensopart Industriesensorik	www.sensopart.de
Sensor to Image	www.sensor-to-image.de
Shape Drive	www.shape-drive.com
Sharp Microelectronics	www.sharpsme.com
Sick	www.sick.com
Siemens	www.siemens.de/simatic-sensors/mv
SKS Vision Systems	www.visionsystems.fi
Smartek Vision	www.smartekvision.com
Smartray	www.smartray.de
Smartsurv	www.smartsurv.de
Soliton Technologies	www.solitontech.com

Sony	www.pro.sony.eu/vision
Stemmer Imaging	www.stemmer-imaging.com
Supercomputing Systems	www.scs-vision.ch
SVS Vistek	www.svs-vistek.com
Symco	www.symco.co.jp
Tattile	www.tattile.com
Tekno Optik	www.teknooptik.se
Teledyne Dalsa	www.teledynedalsa.com
Tichawa Vision	www.tichawa.de
Topsenso	www.topsenso.de
Tordivel	www.scorpionvision.com
Turck	www.turck.de
TYZX	www.tyzx.com
Vega Technology Group	www.vegatcgroup.com
Vialux	www.vialux.de
Videor Technical	www.videor.com
Visicontrol	www.visicontrol.com
Visiolaser	www.vannier-photelec.fr/visiolaser
Vision & Control	www.vision-control.com
Vision Components	www.vision-components.com
Vision Tools	www.vision-tools.com
Visionlink	www.visionlink.it
VRmagic	www.vrmagic.com
Webview	www.webspec.com
Wenglor Sensoric	www.wenglor.com
Werth Messtechnik	www.werthmesstechnik.de
Wintriss Engineering	www.weco.com
Ximea	www.ximea.com
Xiris Automation	www.xiris.com
Zertrox	www.zertrox.de

Vision Systems, Turnkey Solutions, Integration Services

3D Shape	www.3d-shape.com	Coherix	www.coherix.com
ABB	new.abb.com	Compar	www.compar.ch
Act Smartware	wp.act-smartware.de	Cosyco	www.cosyco.de
Adaptive Vision	www.adaptive-vision.com	Cosynth	www.cosynth.com
Adept Electronic Solutions	www.adept.net.au	Cyth Systems	www.cyth.com
Adept Technology	www.adept.de	Datalogic	www.datalogic.com
AGR International	www.agrintl.com	Datapixel	www.datapixel.com
AIT Göhner	www.ait.de	Degotec	www.degotec.com
AKU Vision Technologie	www.aku.eu	De Man Industrie-Automation	www.deman.de
Alfa Vision Systems	www.alfavisionsystems.com	DE Software & Control	www.de-gmbh.com
Alfavisision	www.alfavisision.de	Desconpro Engineering	www.desconpro.de
Alliance Vision	www.alliancevision.com	Digital West Imaging	www.highspeedvideos.com
Altair Industries	www.altairindustriesinc.com	Divisoft	www.divisoft.com
Applied Vision	www.appliedvision.com	DMC Vision & Motion	www.dmc-vision-motion.de
Asentics	www.asentics.de	Dr. Schenk Industriemesstechnik	www.drschenk.com
ATN Automatisierungstechnik	www.atn-gmbh.com	Dr. Schwab Inspection Technology	www.schwabinspection.com
Attentra	www.attentra.de	Dunkley International	www.dunkleymachinevision.com
Automation Technology	www.automationtechnology.de	Dutch Vision Systems	www.dvs-vision.de
Automation W+R	www.automationwr.de	E3tam	www.e3tam.com
Autoware	www.autoware.it	Eckelmann	www.eckelmann.de
AVT Advanced Vision Technology	www.avt-inc.com	Edixia	www.edixia.com
Balluf	www.balluf.com	EHR	www.ehr.de
Basler Vision Technologies	www.baslerweb.com	Eines	www.eines.es
Baumer	www.baumer.com	Electronic Systems	www.electronicssystem.it
Beratronic	www.beratronic.de	Ellips	www.ellips.nl
Bertram Elektrotechnik	www.bertram-bevern.de	Emhart Glass	www.emhartglass.com
Bi-Ber	www.bildererkennung.de	Epix	www.epixinc.com
Böwe Systec	www.boewe-systec.com	Epson Deutschland	www.epson.de/robots
Brainware Solutions	www.null-ppm.info	Erhard + Leimer	www.erhardt-leimer.com
BST eltomat International	www.bst-international.com	EVK DI Kerschagl	www.evk.biz
BST International	www.bst-international.com	EVT Eye Vision Technology	www.evt-web.com
Camsensor Technologies	www.camsensor.com	Eyec-UK	www.eyec-ukandireland.co.uk
Carl Zeiss Optotechnik	optotechnik.zeiss.com	Fast	www.fast-corp.co.jp
Ceres Vision	www.ceresvision.de	Faude Automatisierungstechnik	www.faude.de
China Daheng Group	www.daheng-image.com	FAW Freudenberg Anlagen und Werkzeugtechnik	www.faw-freudenberg.de
CLK	www.clkgmbh.de	FDS Research	www.fdsresearch.si
CLK	www.clkgmbh.de	FiberVision	www.fibervision.de
Cognex	www.cognex.com	Finger	www.finger-kg.de

Fuchs engineering	www.fuchs-engineering.de
Fuetec	www.fuetec.de
Futec Europe	www.futeceurope.com
G4 Technology	www.g4.com.tw
Gefasoft	www.gefasoft.com
Gefat Engineering	www.gefat-engineering.de
Gesellschaft für Bild- und Signalverarbeitung	www.gbs-ilmenau.de
GFal	www.gfai.de
Gidel	www.gidel.com
Goldlücke Ingenieurleistungen	www.giib.de
GOM	www.gom.com
Göpel Electronic	www.goepel.com
GPP Chemnitz	www.gppc.de
Grecon	www.grecon.de
Hasotec	www.hasotec.com
Heitec	www.heitec.de
Helms Technologie	www.helms-technologie.de
Hengstmann Solutions	www.hengstmann.com
Hexagon Manufacturing Intelligence	www.hexagonmi.com
I3 Tech	www.i3tech.de
Ibea	www.ibeade
ICW [industrie-elektronik]	www.icw-news.de
IIM	www.iimag.de
Ikegami	www.ikegami.de
Image House	www.imagehouse.dk
Image S	www.imagesrl.com
Imago Technologies	www.imago-technologies.com
I-mation	www.i-mation.de
Imess	www.imess.com
Impuls	www.impuls-imaging.com
IMR Automatisierungstechnik	www.imr-le.de
INB Vision	www.inb-vision.com
Industrial Vision Systems	www.industrialvision.co.uk
Infaimon	www.infaimon.com
Infratec	www.infratec.de
Inos Automationssoftware	www.inos-automation.com
Inray Solutions	www.inrays.com
Insensiv	www.insensiv.de

In-situ	www.in-situ.de
Inspectron	www.inspectron.ch
Insytems Automation	www.insytems.de
Intego	www.intego.de
Intopii	www.intopii.fi
IOS	www.ios-web.de
Ioss	www.ioss.de
Irida Labs	www.irdalabs.gr
IS Imaging Solutions	www.imaging-solutions.de
Isa Industrietechnik	www.isaweiden.de
Isomorph	www.isomorph.it
Isra Vision	www.isravision.com
ISW	www.isw-gmbh.biz
Itech Engineering	www.itecheng.com
IVS	www.industrialvision.co.uk
J&P Vision	www.jupvision.de
Japan F.A. Systems	www.jfas.co.jp
Jasvisio - Vision Artificial	www.jasvisio.com
JLI Vision	www.jli.dk
Joanneum Research	www.joanneum.at
K + P Krempien + Petersen	www.kup-image.de
Kaiser Computersysteme	www.isotronika.de
Kdorf Automation	www.kdorf.de
Keyence	www.keyence.de
Kirin Techno-System	www.kirintechno.co.jp
KMS Engineering	http://kms-e.de
L&P	www.lp-gmbh.de
Laetus	www.laetus.com
Leuze Electronic	www.leuze.com
Limess	www.limess.com
Lincoln Laser Company	www.lincolnlaser.com
Machine Vision Technology	www.machine-vision-technology.co.uk
Menzel Vision and Robotics	www.menzelab.com
Meta Vision Systems	www.meta-mvs.co.uk
Mevisco	www.mevisco.com
Micro Epsilon	www.micro-epsilon.com
Omron Microscan Systems	www.microscan.com
Mikrotron	www.mikrotron.de

Modi Modular Digits	www.modi-gmbh.de
Moser Industrietechnik	www.moser-gmbh.de
Msvision	www.msvision.com
Neogramm	www.neogramm.de
Neupro Solutions	www.neupro-solutions.com
Neuricam	www.neuricam.com
Neurocheck	www.neurocheck.com
Neurotechnology	www.neurotechnology.com
Nikka Research Deutschland	www.nikka-research.com
Nikon Metrology	www.nikonmetrology.com
Nokra	www.nokra.de
Norman N. Axelrod Associates	www.axelrodassociates.com
Norpix	www.norpix.com
Northwire	www.northwire.com
OCS	www.ocsgmbh.com
Octum	www.octum.de
Omron	www.industrial.omron.de
Opsis	www.opsis.de
Optel Vision	www.optelvision.com
OptoFidelity	www.optofidelity.com
OptoNova	www.optonova.se
Orbis	www.orbis.eu
Orbotech	www.orbotech.com
Orus Integration	www.orusintegration.com
Otto Vision Technology	www.otto-jena.de
Panasonic Electric Works	www.panasonic-electric-works.de
Parameter	www.parameter.se
Pattern Recognition Company	www.pattern-recognition-company.de
Paul Leibinger	www.leibinger-group.com
PCE Pharmacontrol	www.pharmacontrol.de
PCS Industries	www.pcindustries.com
Pepperl & Fuchs	www.pepperl-fuchs.com
Perceptron	www.perceptron.com
Peter Scholz Software + Engineering	www.scholz-sue.de
Phytec Messtechnik	www.phytec.de
Pi4_robotics	www.pi4.de

Pilz	www.pilz.de
Pixargus	www.pixargus.de
Plasmo Industrietechnik	www.plasmo.eu
POG Präzisionsoptik Gera	www.pog.eu
Pollux	www.pollux.com.br
Polygon	www.polygon-technology.de
Polytec	www.polytec.de/bv
PPT Vision	www.pptvision.com
Pressco Technology	www.pressco.com
Profactor	www.profactor.at
Prüftechnik Schneider & Koch	www.prsuk.de
Pulsotronic	www.bildverarbeitung.pulsotronic.de
Qualimatest	www.qmt.ch
Quiss	www.quiss.com
R&W Industrieautomation	www.r-u-w.de
Radix Controls	www.radixcontrols.com
Rbc robotics	www.rbc-robotics.de
Recognitec	www.recognitec.de
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Managing Directors
Dr. Guido F. Herrmann
Sabine Steinbach

Publishing Director
Steffen Ebert

**Product Management/
Editor-in-Chief**
Anke Grytzka-Weinhold

Deputy Editor-in-Chief
Martin Buchwitz
Tel.: +49/15146185676
martin.buchwitz@wiley.com

Editorial Team
Andreas Grösslein
Tel.: +49/6201/606-718
andreas.grosslein@wiley.com

Editorial Office Frankfurt
Sonja Schleif (Editor)
Tel.: +49/69/40951741
sonja.schleif@wiley.com

Editorial Assistant
Bettina Schmidt
Tel.: +49/6201/606-750
bettina.schmidt@wiley.com

Advisory Board
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Hochschule Darmstadt

Commercial Manager
Oliver Scheel
Tel.: +49/6201/606-748
oliver.scheel@wiley.com

Sales Representatives
Martin Fettig
Tel.: +49/721 145080-44
m.fettig@das-medienquartier.de

Dr. Michael Leising
Tel.: +49/3603/893112
leising@leising-marketing.de

Claudia Müssigbrodt
Tel.: +49/89/43749678
claudia.muessigbrodt@t-online.de

Production
Jörg Stenger
Claudia Vogel (Sales Administrator)
Maria Ender (Layout)
Ramona Kreimes (Litho)

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