

FIIF



SICK
Sensor Intelligence.

Sami Lehtonen
Market product manager
Vision, Measuring, Ranging, Ident

- Erwin Sick perusti yrityksen **1946** saatuaan luvan USA:n hallitukselta harjoittaa insinöörin ammattia Saksassa
- Ensimmäinen **valoverho 1950** Münchenissä.
- Vuonna 1956 ensimmäinen **merkittävä patentti valokennoille**. Tästä rakentui SICKin kivijalka pitkäksi ajaksi.
- Ensimmäinen **laserskanneri** näki päivänvalon vuonna 1969.
- SICK oli ensimmäinen yritys maailmassa, joka teki es
SICK – maailman johtava
anturien ja erilaisten anturisovellusten
kehittäjä sekä valmistaja



→ *SICK – maailman johtava anturien ja erilaisten anturisovellusten kehittäjä ja valmistaja*

72 vuoden kokemus anturiteknologiasta

9,800 työntekijää ympäri maailman

88 maata, jossa SICK edustettuna. Yli 50 omaa tytäryhtiötä.

1,500 Konsernin myynti vuonna 2017

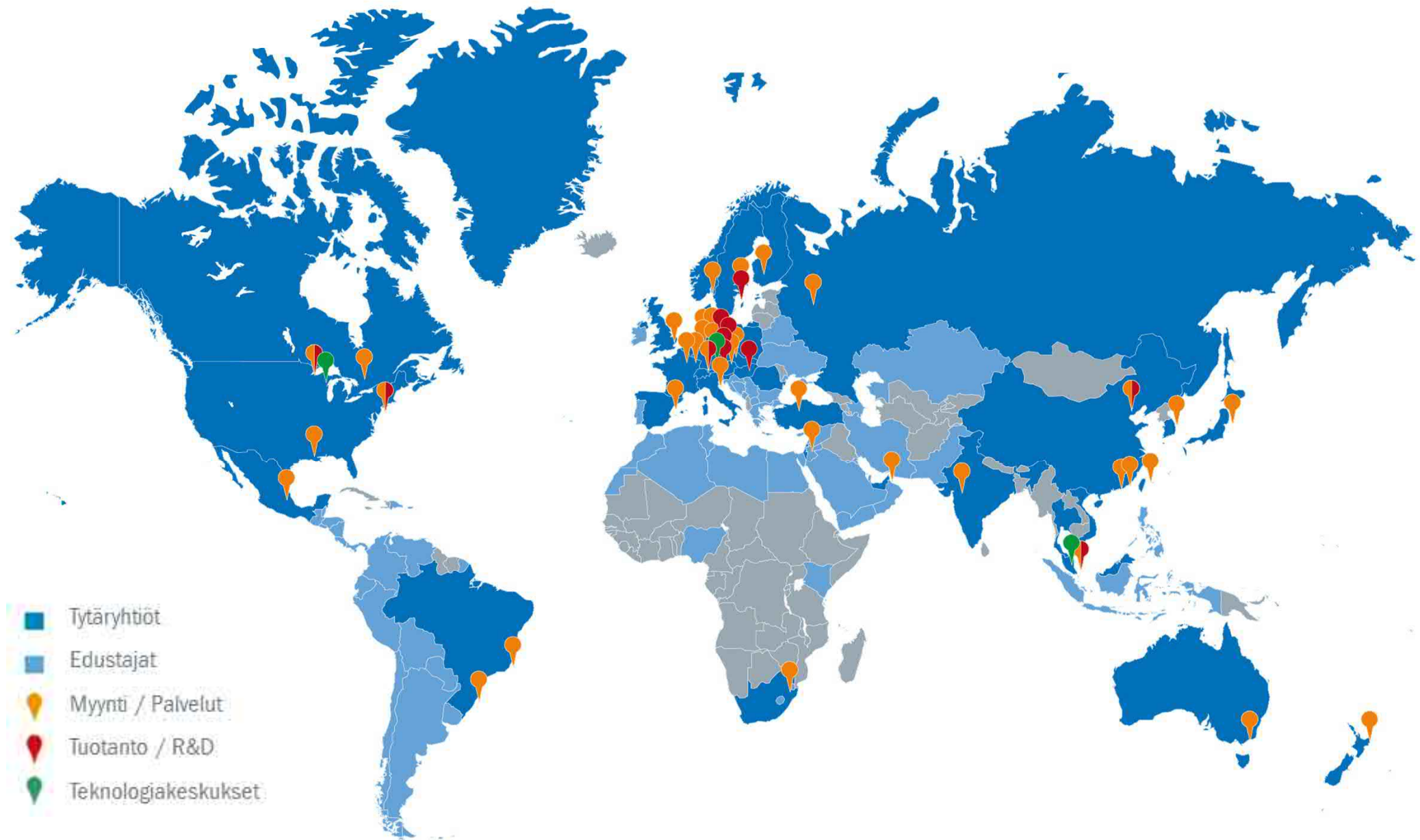
40,000 tuotetta. Laajin tuote- ja teknologiatarjonta anturisovelluksiin.

3,000 patenttia ja johtava teknologian kehittäjä. Sensor Intelligence.

AINA LÄHELLÄ SINUA

GLOBALI PAIKALLINEN PALVELU JA TUKI ERI TILANTEISSA

SICK
Sensor Intelligence.



- **27 vuotta** anturien ja anturisovellusten myyntiä Suomessa. Läsnäolo ja apu turvattua myös tulevaisuudessa.
- **43 työntekijää**, kaikki palvelemassa ja auttamassa asiakkaitamme.
- **Liikevaihto 21 M€** vuonna 2018, kiitos asiakkaillemme.
- Tuotteiden lisäksi ammattitaitoista **sovellusosaamista** ja halua aitoon yhteistyöhön asiakkaiden ja kumppanien kanssa.
- **Aidosti ihmisiä arvostava yritys**
- Yksi Suomen parhaista työpaikoista.



SICK – markkinajohtaja myös Suomessa



SICK ANTURISOVELLUKSIA ERI ALOILLA JA ARJESSA

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SICK ANTURISOVELLUKSIA ERI ALOILLA JA ARJESSA

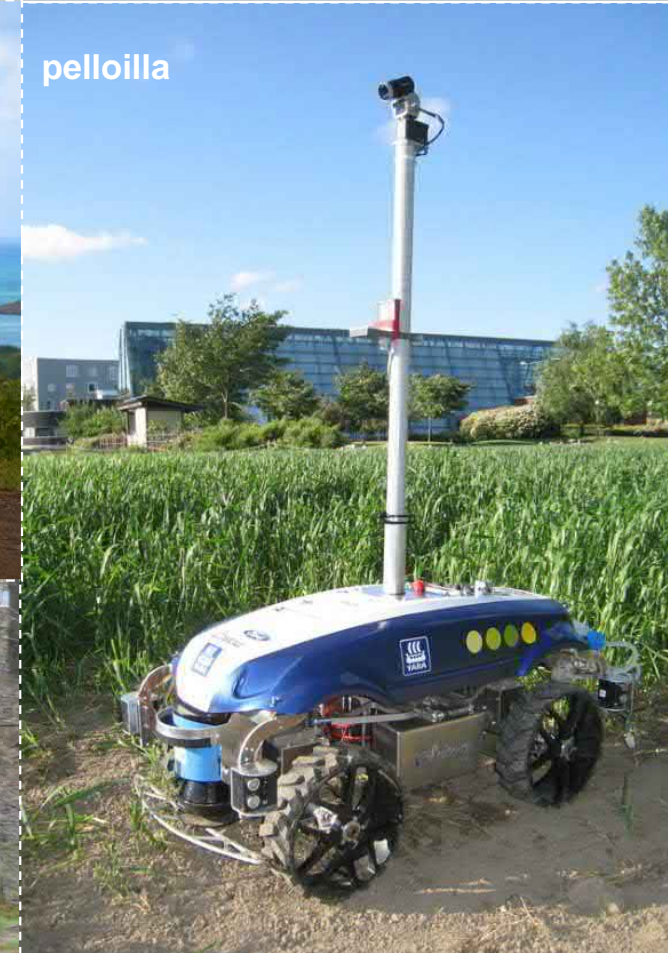
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Lentokentät



3d-mallinnus



pellolla



Paikoitus



Liikkuvat koneet



kaivoksissa

- Long experience (>25y) and from wide range of applications and industries with well proven technology
- Collaborative mindset, making our customers successful and focus on their core values
- Superior 3D technology platform (m30 benefits, values)
- Intimate customer SW-support (Special calibration, FOV extension by alignment, EzR SDK etc)
- Customized HW solutions (Ruler-X3)

- Things to include
 - ▶ M30 description
 - ▶ Ranger3 description
 - ▶ AppSpace?
 - ▶ Ranger-X3 overview

SICK – YOUR MACHINE VISION PARTNER

YOUR INDUSTRY – OUR FOCUS



Wide range of 2D and 3D Vision products for each task



25 years of experience in 3D Vision applications from various industries world wide by proven technology



Proprietary 3D CMOS sensor technology for superior performance, 3D data quality and unmatched abilities























Collaborative mindset to make our clients successful

- Devoted key customer support
- Customized software tools
- Customized hardware solutions



SICK'S VISION PORTFOLIO OVERVIEW

	2D vision		3D vision		
Configurable 	Inspector 	Lector62x 	Lector63x 	TriSpector1000 	
		Lector64x 	Lector65x 		
Programmable 	InspectorP6xx 		IVC-3D / Trispector P 		
Streaming 	picoCam 	midiCam 	Ranger 	Ruler 	ScanningRuler 
			Visionary-B 	Visionary-T 	
SICK AppSpace 					
Sensor Integration Machine - SIM4000 					

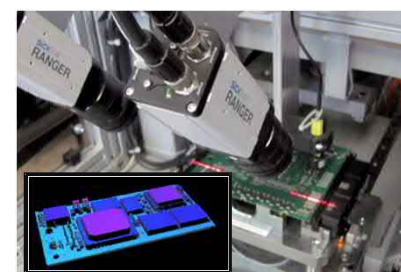
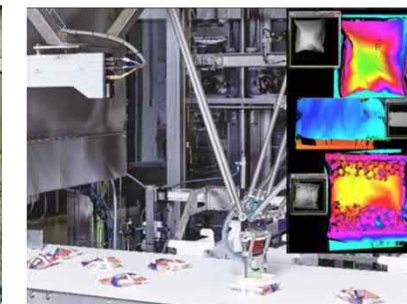
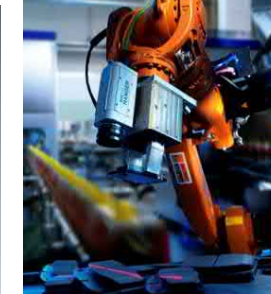
SICK 3D VISION

INDUSTRIES AND APPLICATIONS

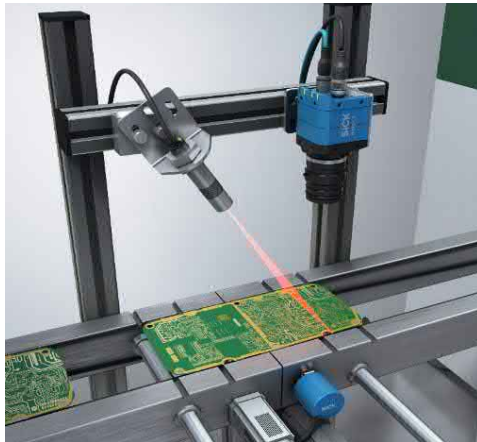


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- **SICK 3D products** are key components in inspection machines and applications in a wide range of industries world wide
- **They are used by**
 - ▶ OEM to build advanced inspection systems
 - ▶ SI and EU to solve wide range of inspection tasks
- **Industries and application examples**
 - ▶ Tire and rubber quality control
 - ▶ Board grading and Log measurement (Wood)
 - ▶ Components and PCB inspection
 - ▶ Robot Belt/Bin picking and Palletizing
 - ▶ Railway and Road inspection
 - ▶ Box content/ quality control in Consumer goods
 - ▶ Quality grading and Portioning of food



BENEFITS FOR YOUR APPLICATION



Electronic component and PCB inspection



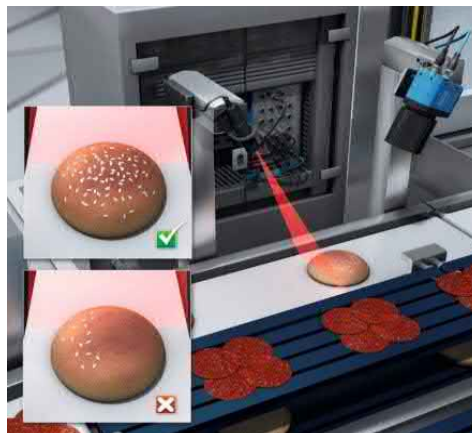
Tire quality control



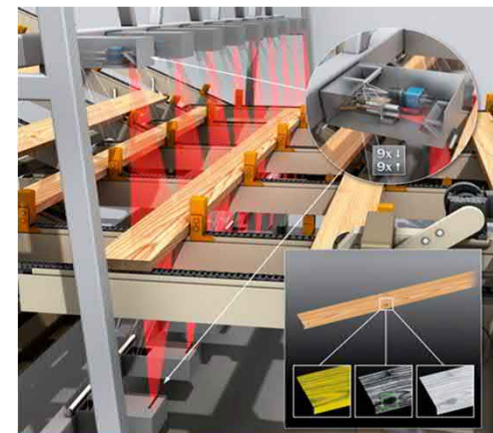
High speed railway and road surface inspection



Metal and steel inspection



Packaging and food quality control



Quality inspection of wood and board

SICK AppSpace

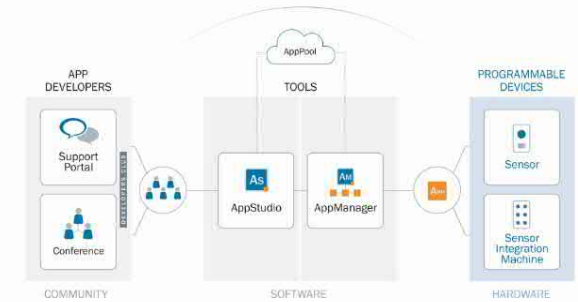
GIVING SPACE TO YOUR IDEAS AND SOLUTIONS

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Sensor Intelligence.



■ **What it is:**

- ▶ SICK Programmable devices
- ▶ SICK AppStudio: Development platform **by developers for developers**
- ▶ SICK AppSpace Developer' s Club: Community for developers



■ **What it enables:**

- ▶ With SICK AppSpace a sensor can get 100 %tailored to the customer needs
 - Customers IP or specific application solution in SICK's hardware
- ▶ SICK AppSpace eco-system to open paths to new possibilities for application solutions
- ▶ New business models and opportunities with integration partners and OEMS



■ **More than a Machine Vision story**

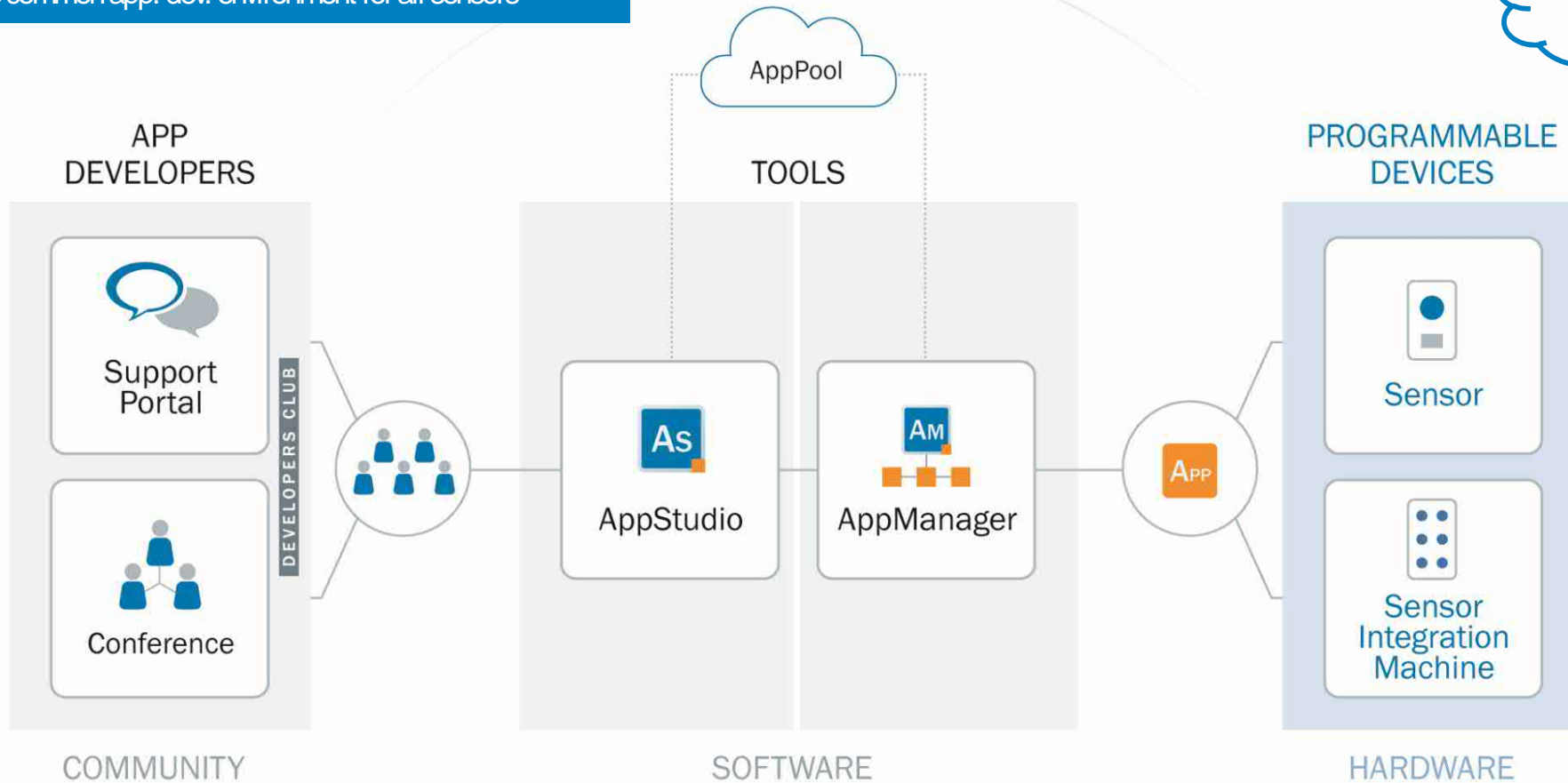
- ▶ SICK AppSpace evolves to the entire SICK portfolio
- ▶ Part of the big picture of Cloud, Smart Services and Industry 4.0
- ▶ SICK AppSpace continuously improves and evolves



SICK AppSpace

RECENT DEVELOPMENTS AND PLANS

- + Your solutions running in SICK's sensors
- + One common app. dev. environment for all sensors

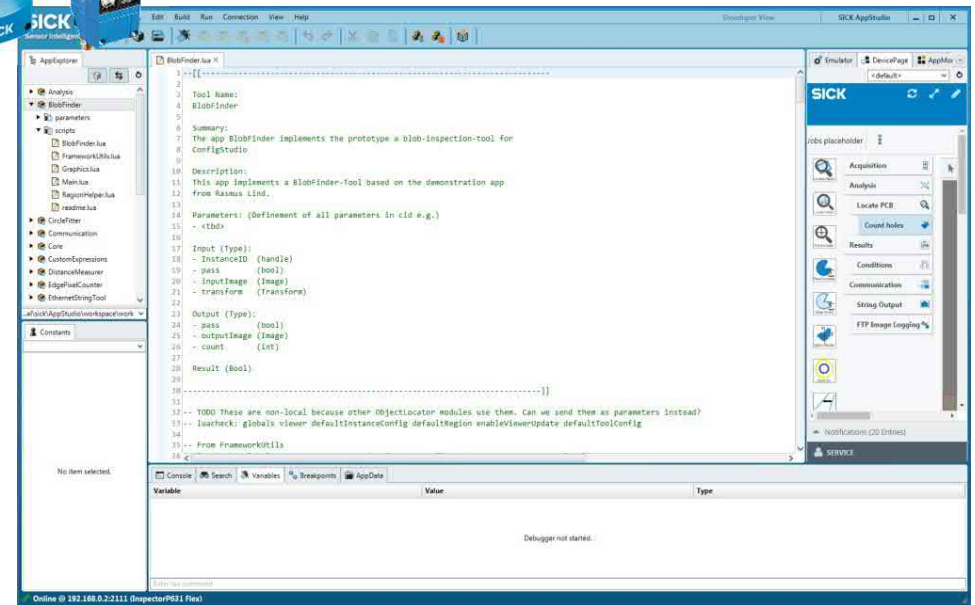
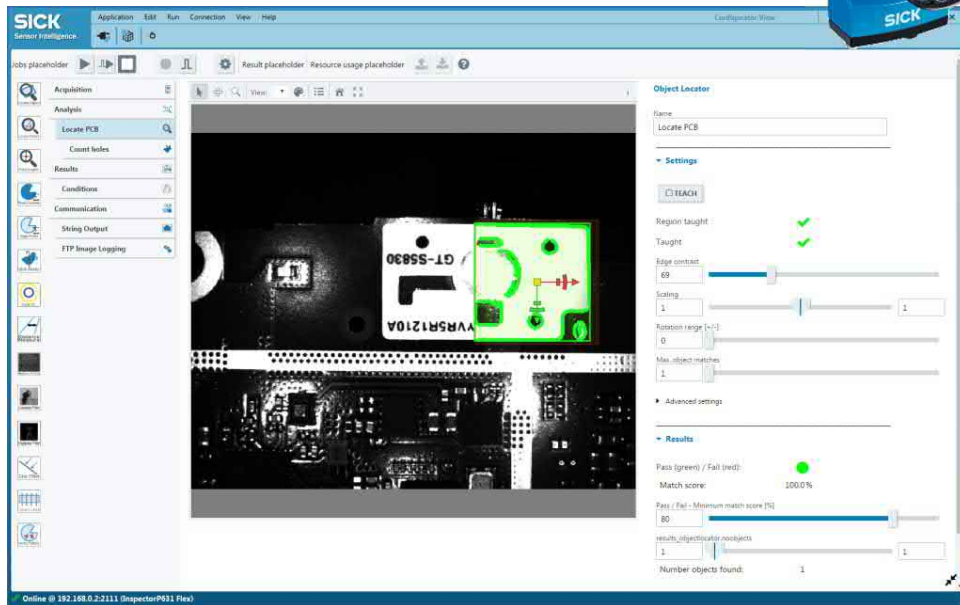


Analytics Solutions
Tire, Package, Baggage...

VISION APPTEMPLATES SEAMLESS FROM FEASIBILITY STUDY TO SPECIFIC SOLUTION

QUICKLY SOLVE 90% AND...

...PROGRAM THE LAST 10% DETAILS

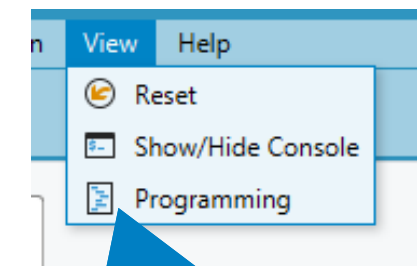
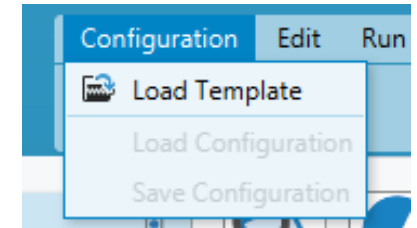
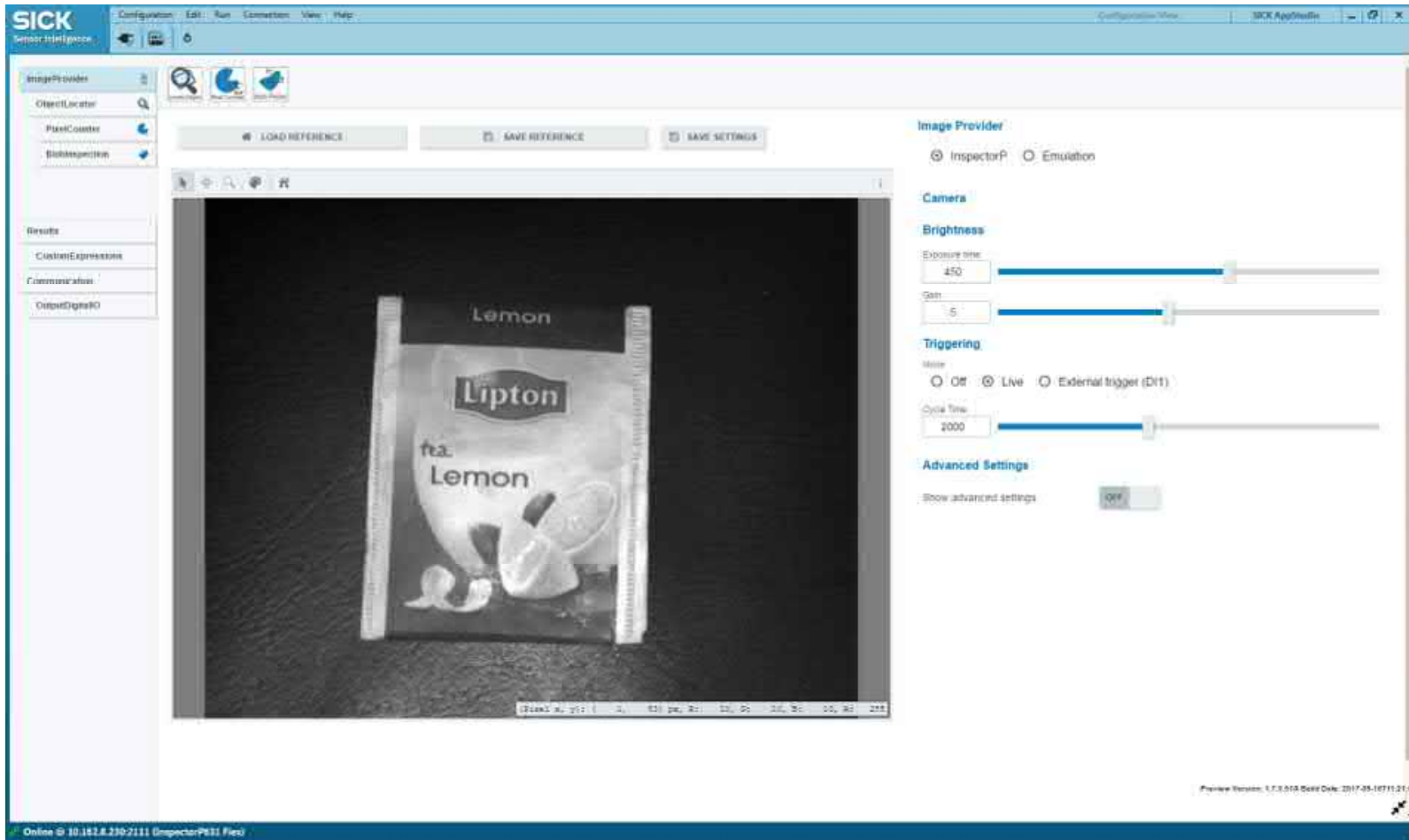


FEATURES

- 2D Vision AppTemplate (VAT2D) pre-installed on all InspectorP6xx variants
- Tools to solve general applications
- Easy to use configurable user interface
- Full programmability with open source code
- Open source code for customization and add-on

CUSTOMER BENEFITS

- Quickly solve and improve general vision applications
- Quick configurable feasibility study
- Specific needs quickly solved with AppStudio programming
- Jump-start development
- Framework for continuous tool and feature expansion
- Open for company specific look and feel



- + Build own tool set for re-use => Customer's own platform of modules for rapid development
- + Eg Communication tool to PLC/ Robot, I/ O module, Image processing tools, etc etc.

Purchased license of AppStudio required for access and possibility to develop, edit and add tools and templates

SICK APPSPACE

PRODUCT RANGE - PROGRAMMABLE DEVICES





InspectorP63x

- 1.3 and 1.9 MP monochrome
- Flexible optics and lighting
- S- and C-mount



InspectorP64x

- 1.7 MP monochrome
- Flexible optics and lighting
- C-mount



InspectorP65x

- 2.1 and 4.2 MP monochrome
- Flexible optics and lighting, or Dynamic Focus
- C-mount



SETTING A NEW STANDARD FOR HIGH SPEED 3D

RANGER3
BIG 3D PERFORMANCE IN A SMALL PACKAGE



Fast, Compact and Versatile

Superior 3D performance and image quality in compact housing

- ▶ **Unique performance and quality** by SICK designed CMOS 3D sensor chip
- ▶ **Powerful. Reliable.**
 - World class speed with 7kHz full sensor and up to 46kHz (1600x128px region)
 - 2560 x 832 pixels (6µm) sensor for 3D using 1" C-optics
 - Reliable and accurate 3D algorithm (1/ 16th sub-pixling) at full speed
 - High light sensitivity and High Dynamic Range mode
- ▶ **Compact. Industrial.**
 - Compact metal house, IP65/ 67 protection by accessory
 - Filter and Scheimpflug concepts for improved 3D data quality
 - Operating temperature 0-50° C (by appropriate mounting)
 - Ggabit Ethernet and Power I/ O using M12 connectors for reliable connection
 - Compliant to the GgE Vision/ GenICam standards for easy integration

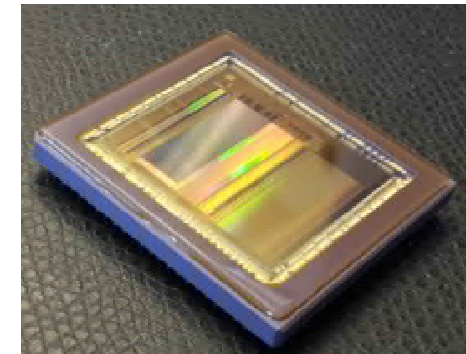


- **SICK has developed a unique high-speed 3D CMOS sensor**

- ▶ Rapid On-Chip Calculations (ROCC) for outstanding 3D speed and quality with high accuracy
- ▶ Superior 3D Speed, always high 3D accuracy: 7kHz full sensor, up to 75kHz at full X-resolution (2560px) possible
- ▶ Reliable and accurate 3D using novel algorithms



ROCC



M30 - SICK proprietary 3D imager

- **SICK is offering a new generation Ranger for superior performance**

- ▶ Superior 3D performance and image quality in compact housing
- ▶ Great 3D Speed at high accuracy, even for large height ranges:
 - 7kHz full sensor and up to 30kHz in full X-res (bandwidth limited, 1x GgE)
 - Up to 46kHz by reducing X-resolution (1600px)
- ▶ Start of new Ranger portfolio, variants to follow



**x10
faster**



Ranger3 - SICK's new generation of 3D Cameras

NEW GENERATION 3D PRODUCTS

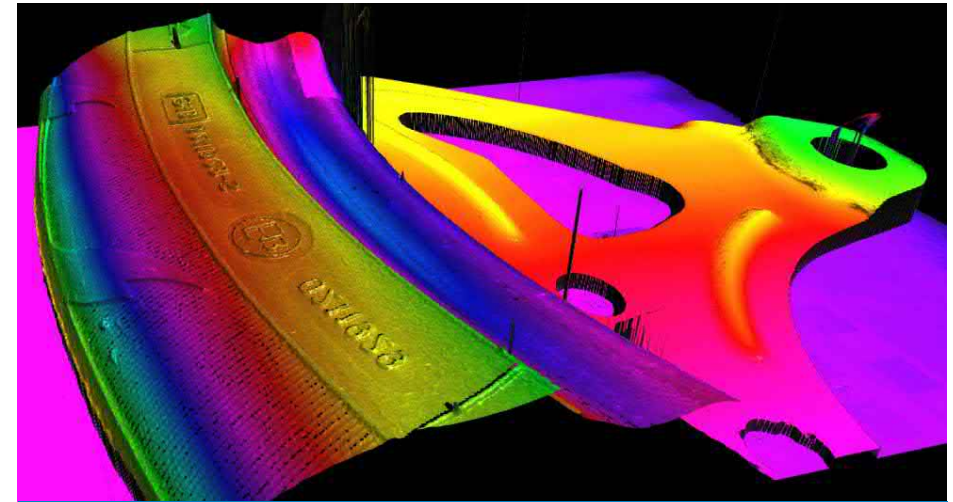
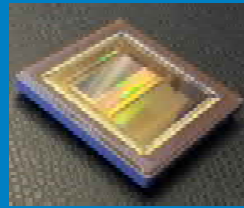
CUSTOMER VALUES



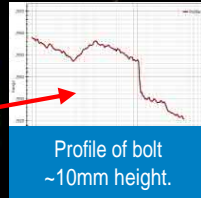
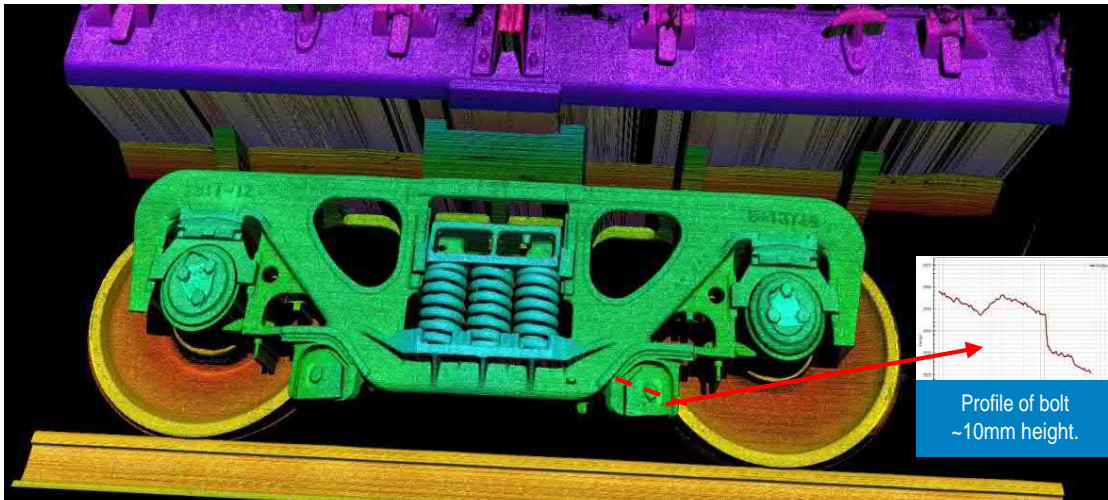
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The new SICK 3D CMOS sensor enables

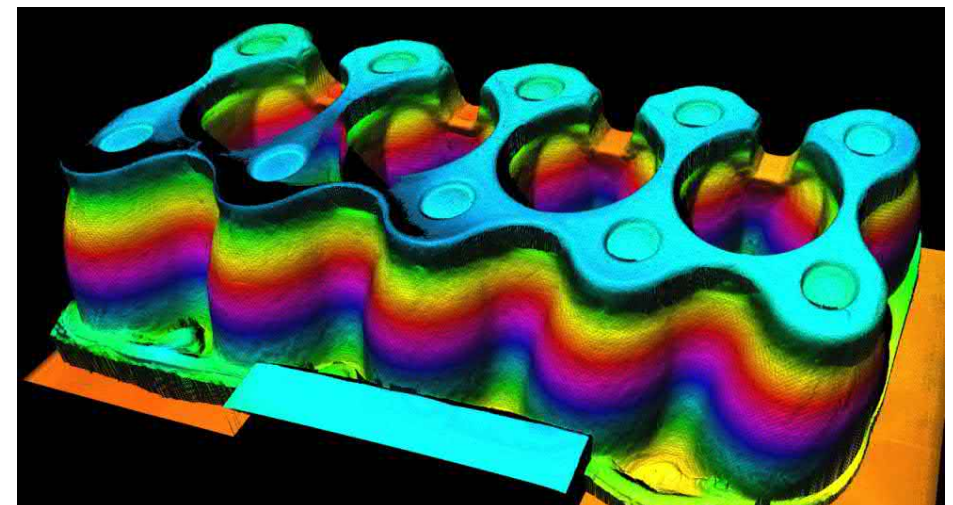
- **More reliable measurements**
 - Both on dark and bright parts
- **Reduced integration and maintenance effort**
 - Easy to get good data on wide range of materials
- **Improved quality by more accurate measurements**
 - High sensor resolution and high precision 3D algorithm
 - Very high 3D speed
 - Large depth of field without speed reduction



Reliable 3D with high dynamic range (20kHz):
Dark rubber and shiny metal



High speed 3D at large FOV (30kHz, >1,5m DOF):
Train scanning at 120km/h (eqv.) with sub-millimeter resolution



Short setup time:
Same settings for eg. Packaging material

M30 - HIGH PERFORMANCE 3D SENSOR CHIP

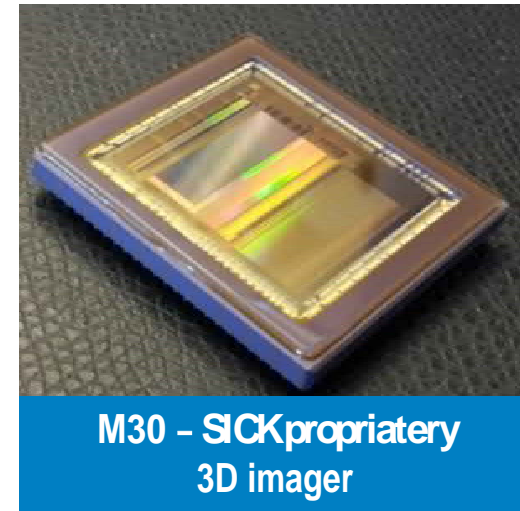
SICK ENGINEERED CMOS SENSOR TECHNOLOGY



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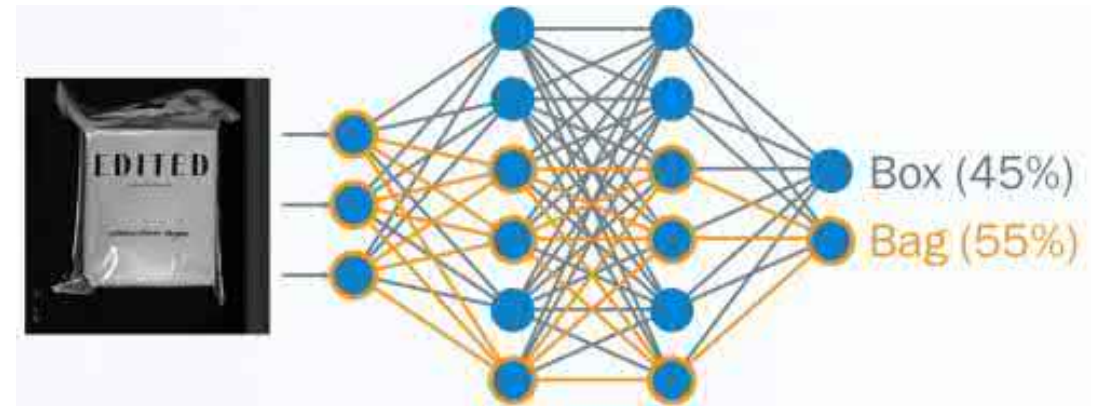
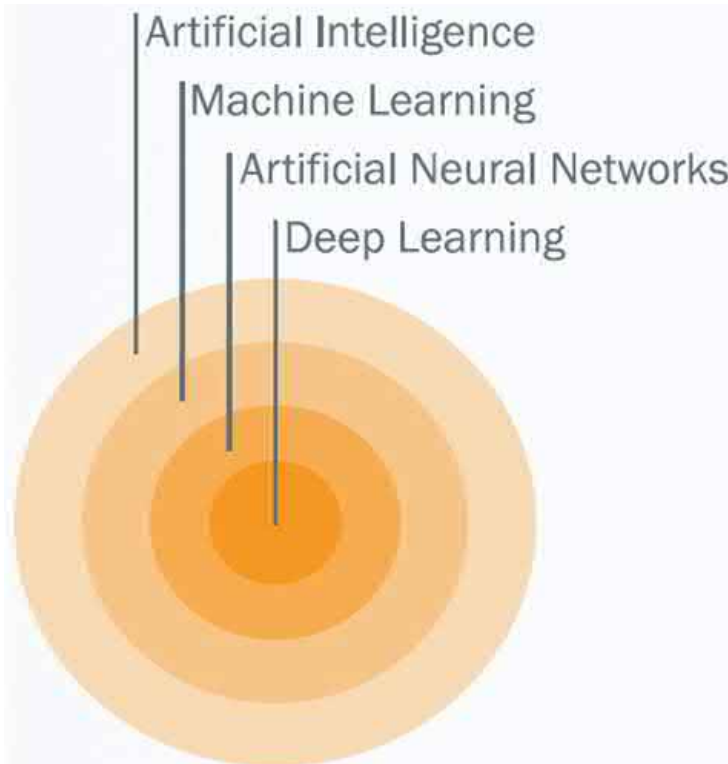
■ Features and performance

- ▶ CMOS sensor, Rapid-On-Chip-Calculations for superior 3D performance
- ▶ Market leading 3D performance and image quality
- ▶ Resolution: **2560 x 832 pixels (6µm)**
- ▶ Speed: **75kHz** at 80 rows, **30kHz** at 200 rows, **7kHz** full sensor
 - at highest precision 3D (16bit) and full X-resolution
- ▶ High resolution grayscale or/ and **RGB-color** in parallel at **5120px** resolution
- ▶ MultiScan for complete inspections (e.g. 3D+Color+Laser Scatter) by one camera



■ High data quality

- ▶ High light sensitivity allows for higher speeds w/ o need for higher laser power
- ▶ Dynamic and accurate 3D detection algorithm on chip (1/16th sub-pixel)
- ▶ High Dynamic Range mode to further extend ability to measure on mix of very dark and bright objects
- ▶ Global shutter pixels (PPD) for improved usability and 3D data quality
- ▶ “Local-global-shutter” with individual AOI exposure time for optimal image quality in MultiScan
- ▶ Multiple peak extraction for reflection handling



LEARNING

Layer 1



Layer 2



Layer 3



Layer 4



- Visual and plain result



- Errors interpretable



<https://leonardoaraujosantos.gitbooks.io/artificial-intelligence/content/> :

“Deep Learning is a machine learning technique that can learn useful representations or features directly from images, text and sound”

QUANTUM LEAP IN COMPUTER VISION TASKS AND IN SPEECH RECOGNITION

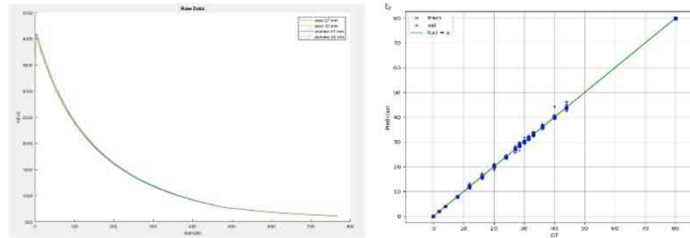


DEEP LEARNING INDUSTRIAL DATA?

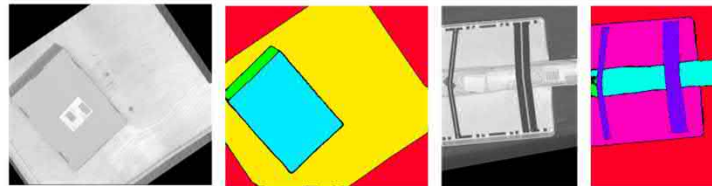


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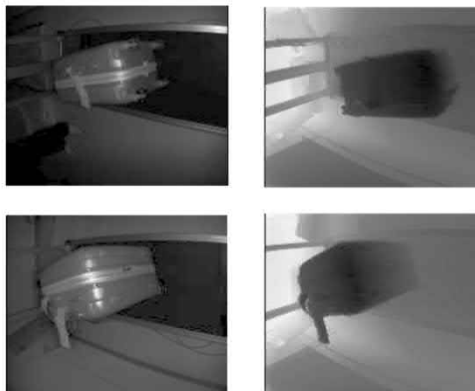
1D DATA



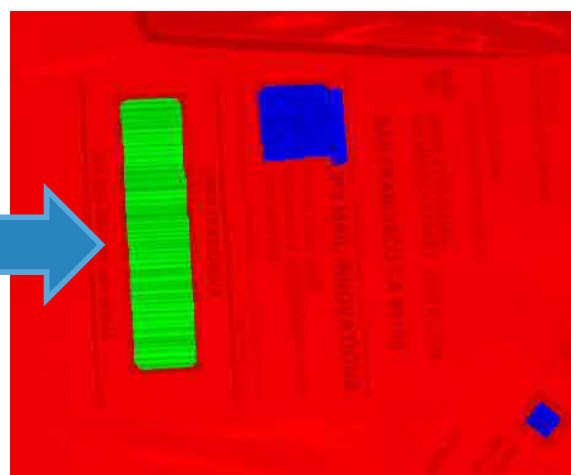
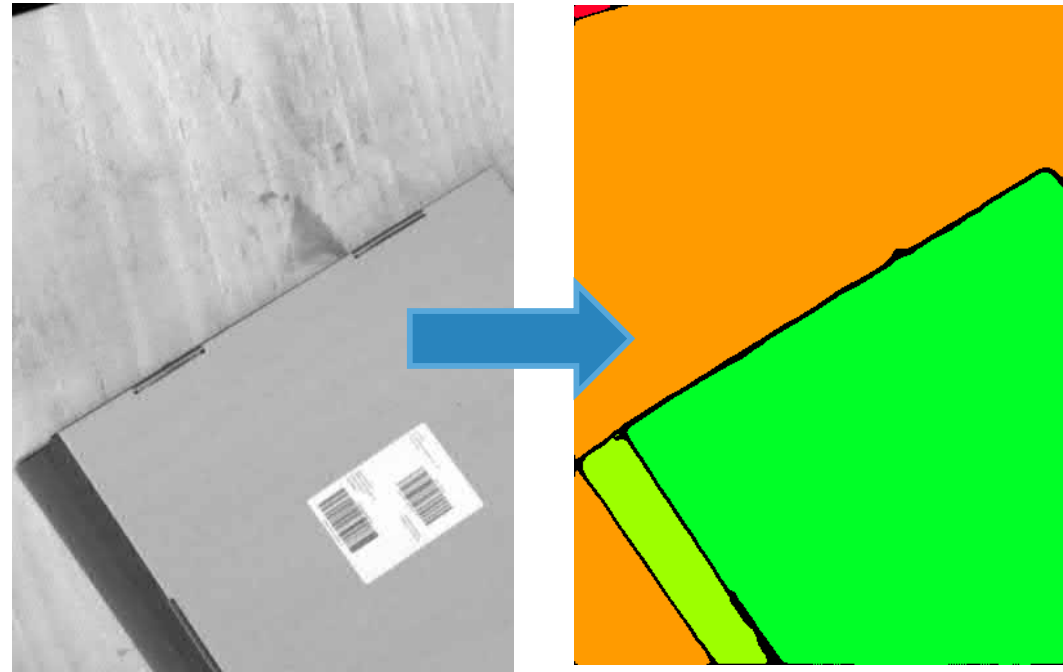
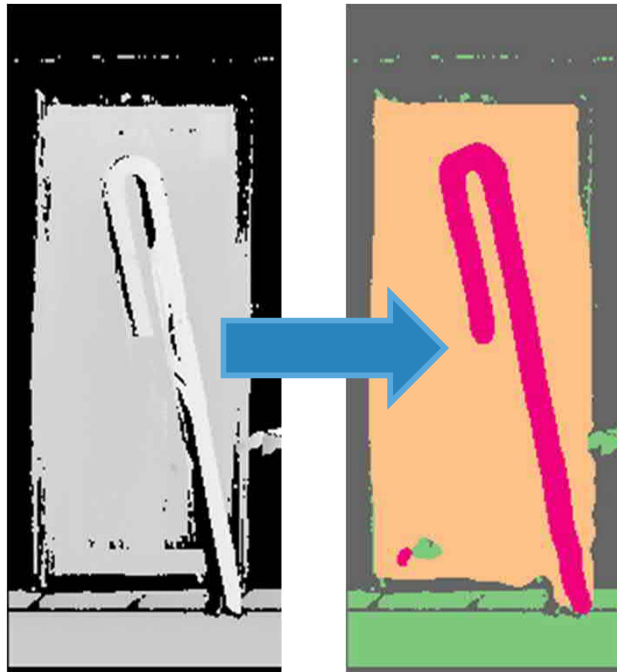
2D DATA



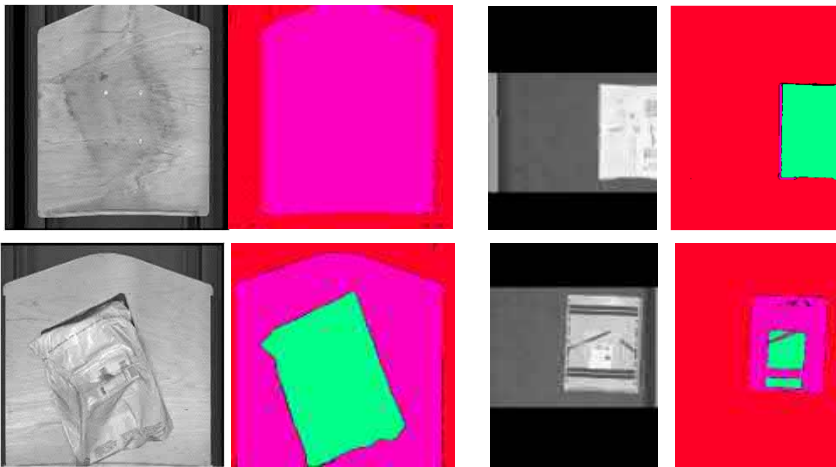
2.5 / 3D DATA



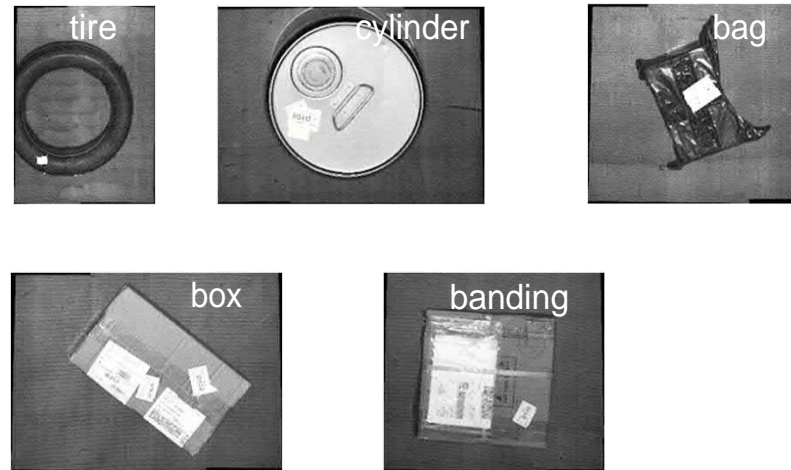
DEEP LEARNING EXAMPLES AT SICK



Empty Tray Detection



Object Classification

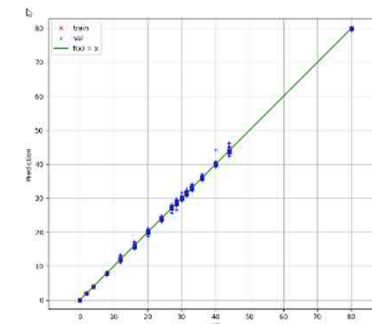


Packaging Classification



SICK

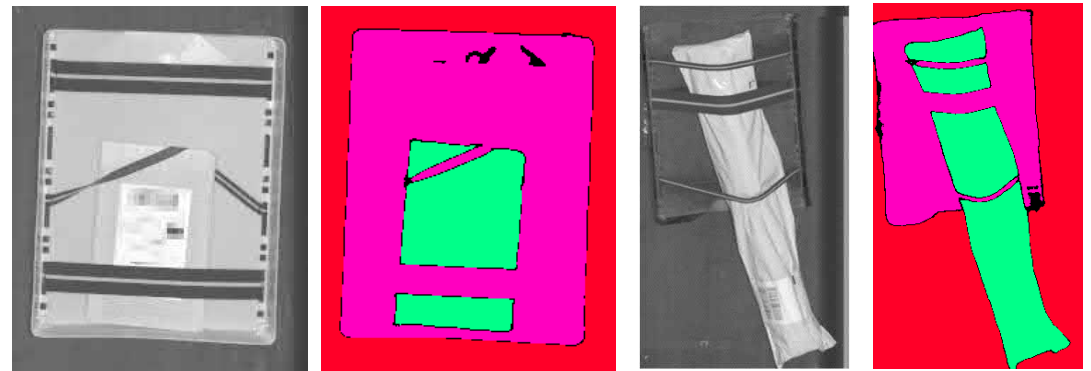
Distance Calculation



Chicken Quality Classification



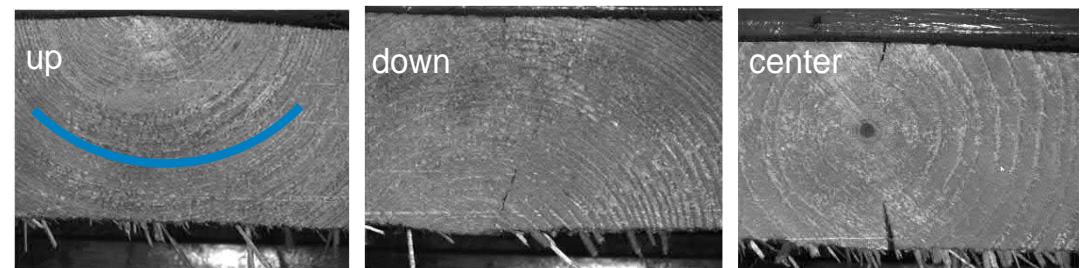
Tote Detection



Straps Detection

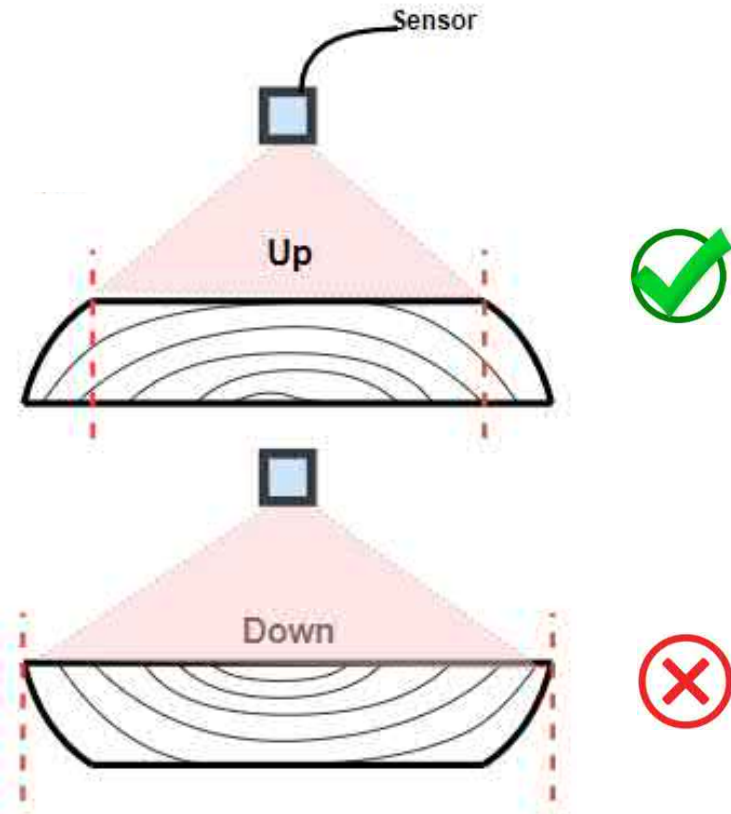


Wood Classification

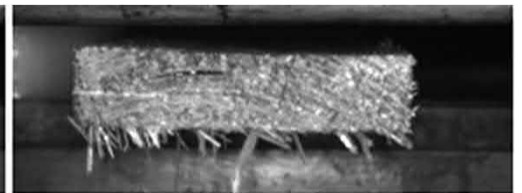
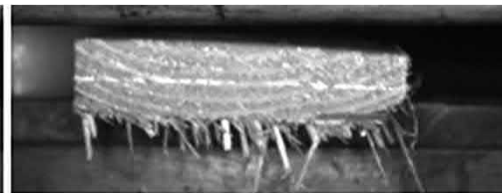
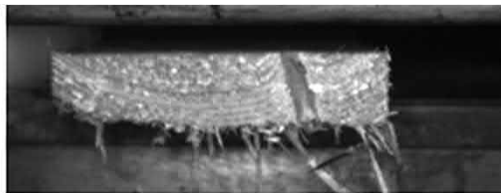
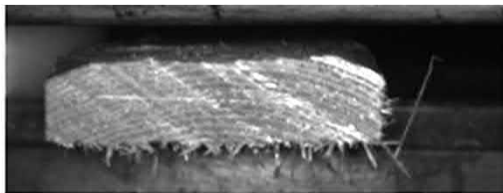
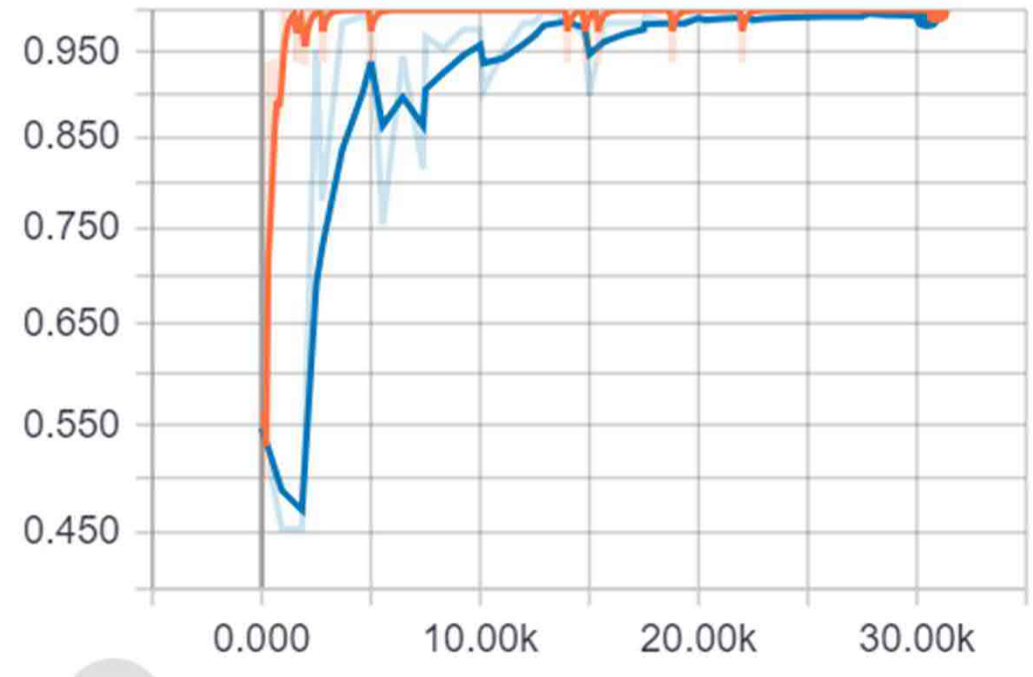


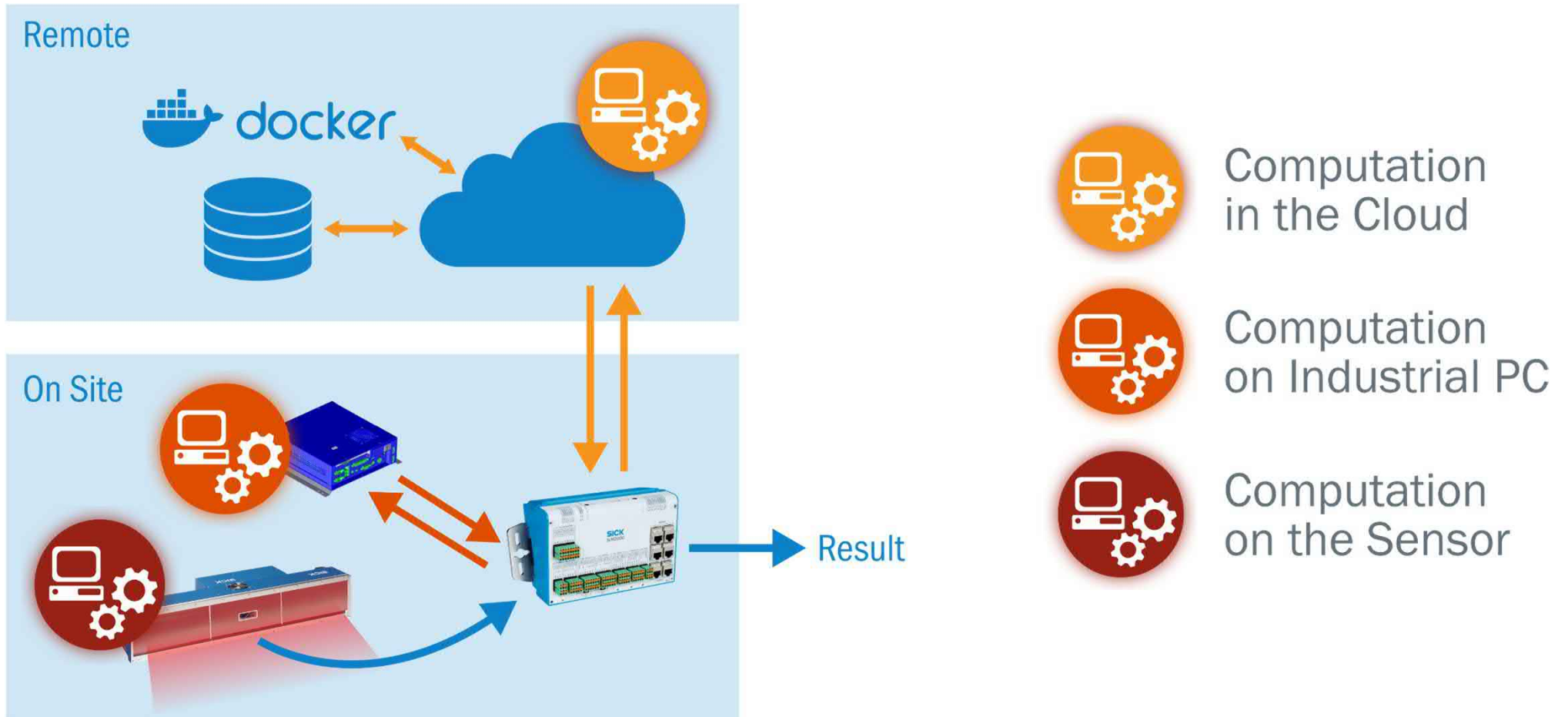
DEEP LEARNING INITIATIVE

APPLICATION WOOD FLIPPER



accuracy





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