# INDUSTRIAL AUTOMATION TECHNOLOGIES AND THE REALIZATION OF FACTORY 4.0

Cameron Gieda – Vision Systems Specialist – Sick Inc. USA

SICK
Sensor Intelligence.

# SICK - AT A GLANCE

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- Founded in 1946 - **more than 65 years of sensing technology**
- About **5,800 employees** around the world
- Present **in more than 80 countries**:
  With almost **50 subsidiaries and equity investment**
  **+ numerous specialized agencies**
- Group sales of **EUR 902.7 million** in the fiscal year 2
- **Widest product and technology range** in the sensor industry



**SICK** - one of the leading manufacturers of sensors and sensor solutions for industrial applications worldwide

# INDUSTRY INVOLVEMENT

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## Process automation



- Power
- Waste & Recycling
- Cement
- Combustion Engines
- Chemical & HPI
- Metal & Steel
- Mining
- Oil & Gas

## Factory automation



- Packaging
- Food & Beverage
- Pharma & Cosmetics
- Consumer Goods
- Print & Paper
- Electronics & Solar
- Machine Tool
- Metal Working
- Wood & Furniture
- Construction Materials & Glass
- Tire, Rubber & Plastic
- Textile
- Handling & Assembly
- Automotive and Part supplier
- Robotics
- Motion & Drives

## Logistics automation



- Storage & Conveyor
- Retail
- Courier, Express, Postal & Cargo
- Airports
- Industrial Vehicles
- Traffic
- Ports
- Cranes
- Building Management
- Building Security

# PRODUCT SNAP SHOT

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Photoelectric sensors



Proximity sensors



Magnetic cylinder sensors



Identification solutions



Detection and ranging solutions



Fluid sensors



System solutions



Analyzers and systems



Gas flow measurement



Motor feedback system



Encoders



Vision



Opto-electronic protective devices



Safety switches



sens:Control – safe control solutions



Registration sensors



Distance sensors



Automation light grids



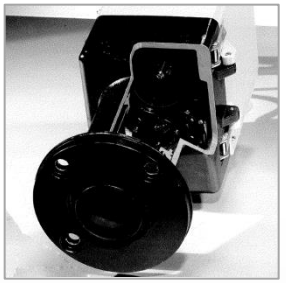
Software

# HISTORY OF DEVELOPMENT

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| | |
|---|---|
| 1950 | First photoelectric switch based on autocollimator principle |
| 1952 | First light curtain for accident prevention |
| 1956 | First flue gas monitor |
| 1978 | First in-situ gas measurement device |
| 1989 | First distance sensor based on laser time-of-flight technology |
| 1993 | First time-of-flight safety scanner |
| 2001 | High-speed 2-D code reader |
| 2004 | First 3-D smart camera / ultrasonic gas flow meter |
| 2007 | High-end CCD sensor with integrated illumination |
| 2009 | Navigation based on natural landmarks |
| 2010 | Color Ranger E: the world's first high-speed 3D camera with high-performance color measurements |

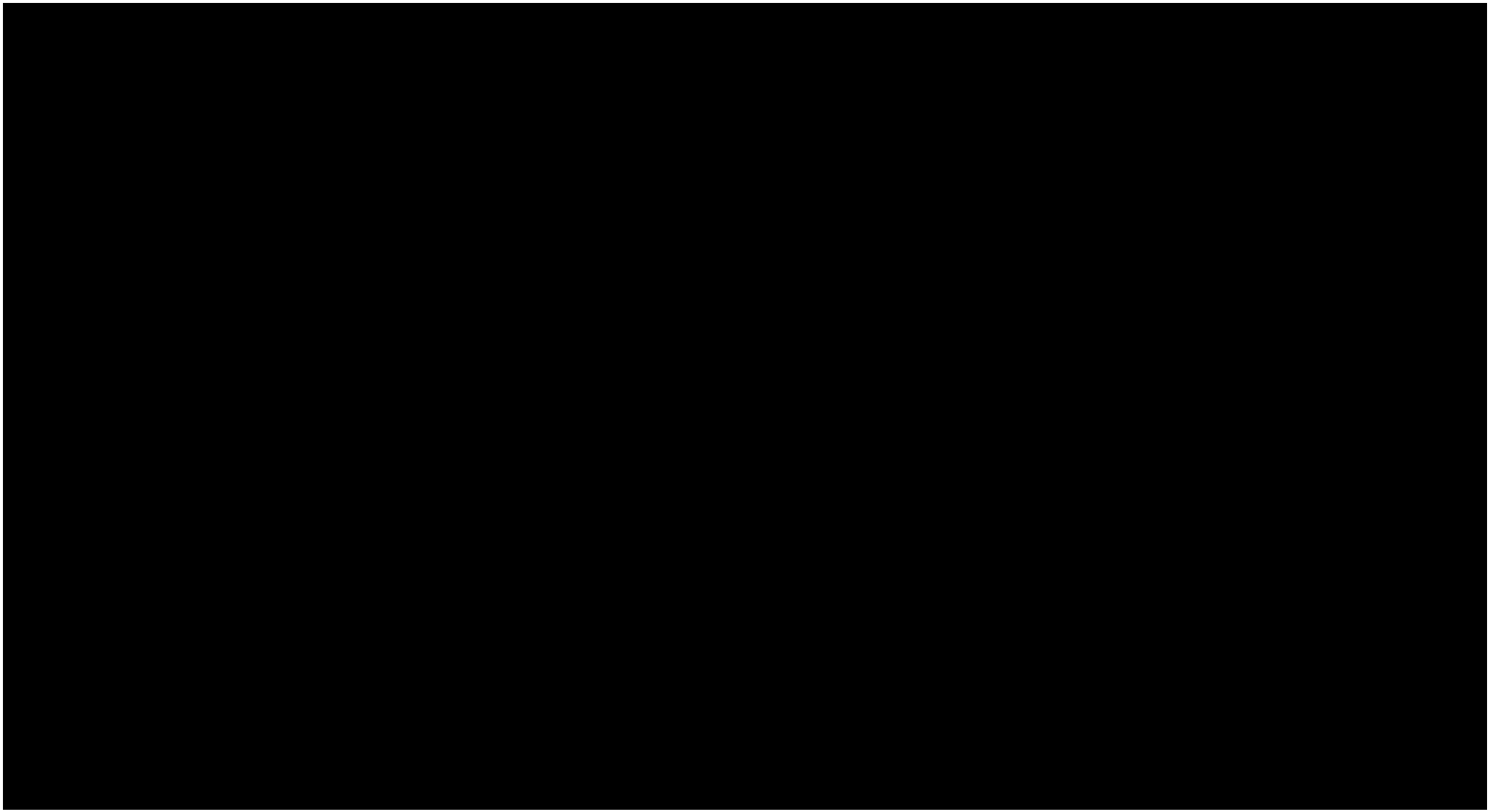






# Networking and Distributed Intelligence - Looking Forward



# INDUSTRY 4.0 THE INTERNET OF INDUSTRIAL THINGS

## DISTRIBUTED INTELLIGENCE ON THE FACTORY FLOOR

At Sick we have a term called “Sensor Intelligence “ which is a core philosophy for our future product development.

If we take the example of a simple photoelectric switch – Sensor Intelligence describes all the

Information a switch can provide beyond it’s state of on or off such as diagnostics.

Over a sensor network like IO-Link we can pull the following data –

Time stamped switching events

Temperature

Sensor  health ( LED life, dirty lens etc.)

Sensor settings ( for cloning or swapping out and old sensor)

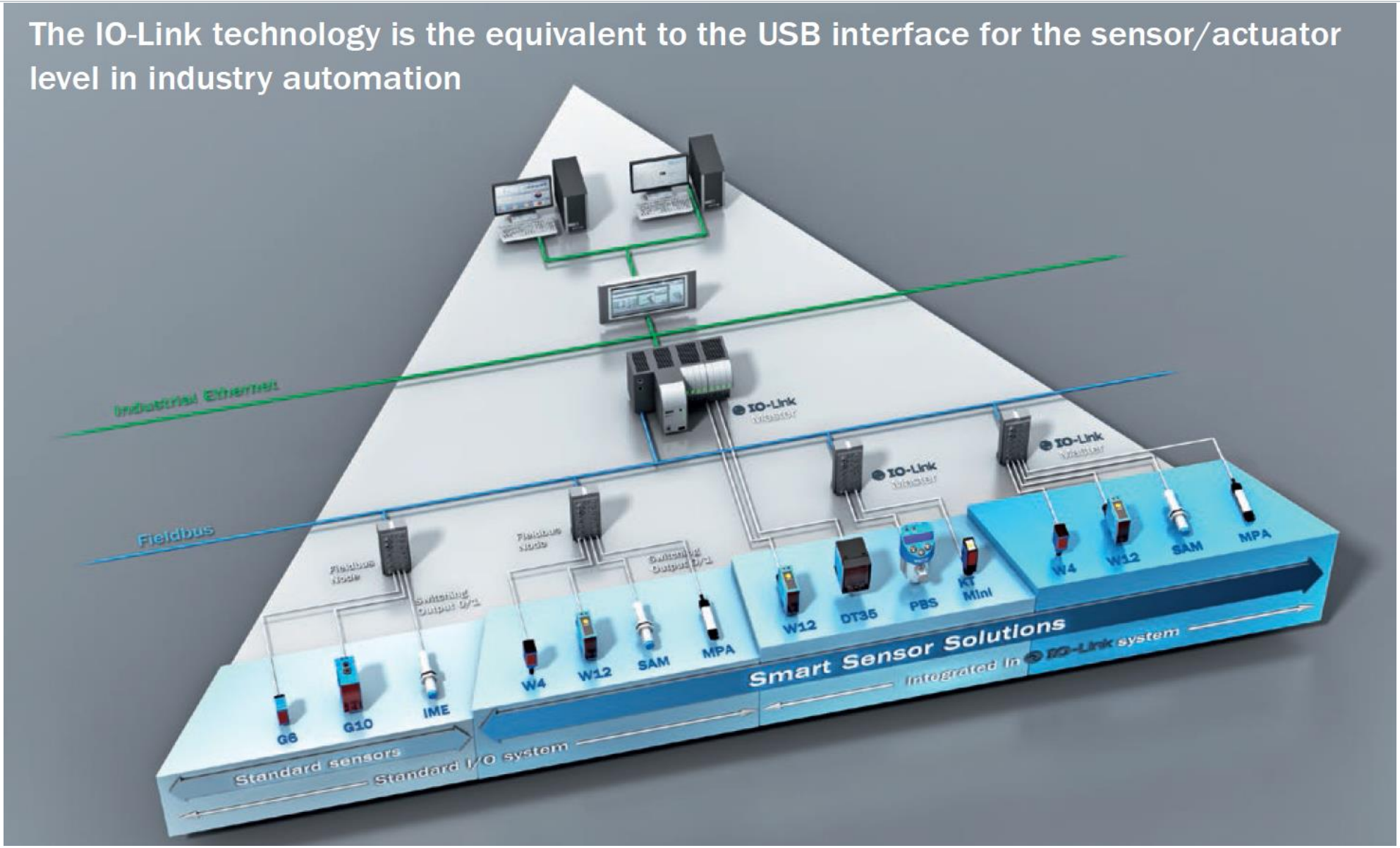



All of this data can be viewed remotely in real time.

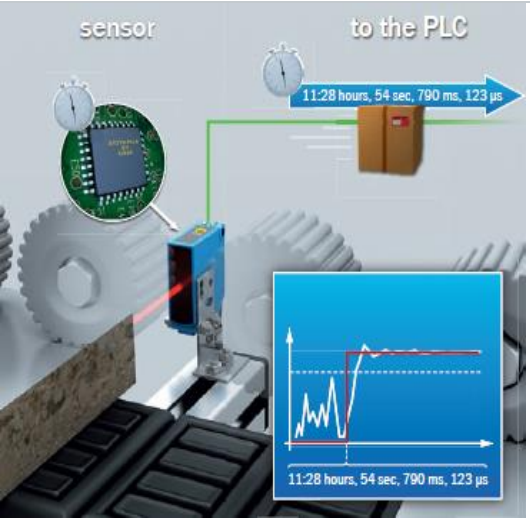
It’s also possible to set up simple logic operations among connected sensors.

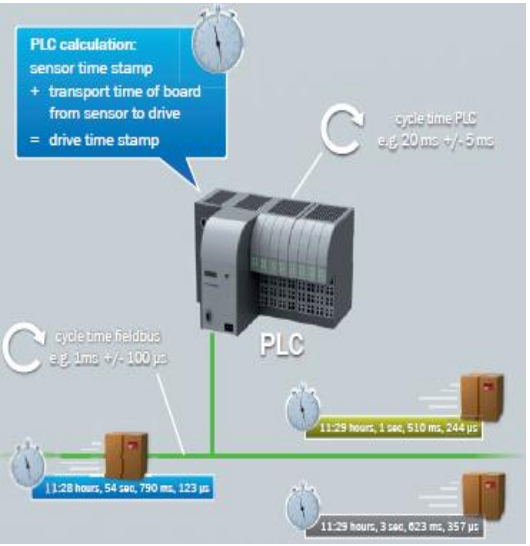
# CONNECTED SENSOR IN A FACTORY ENVIROMENT

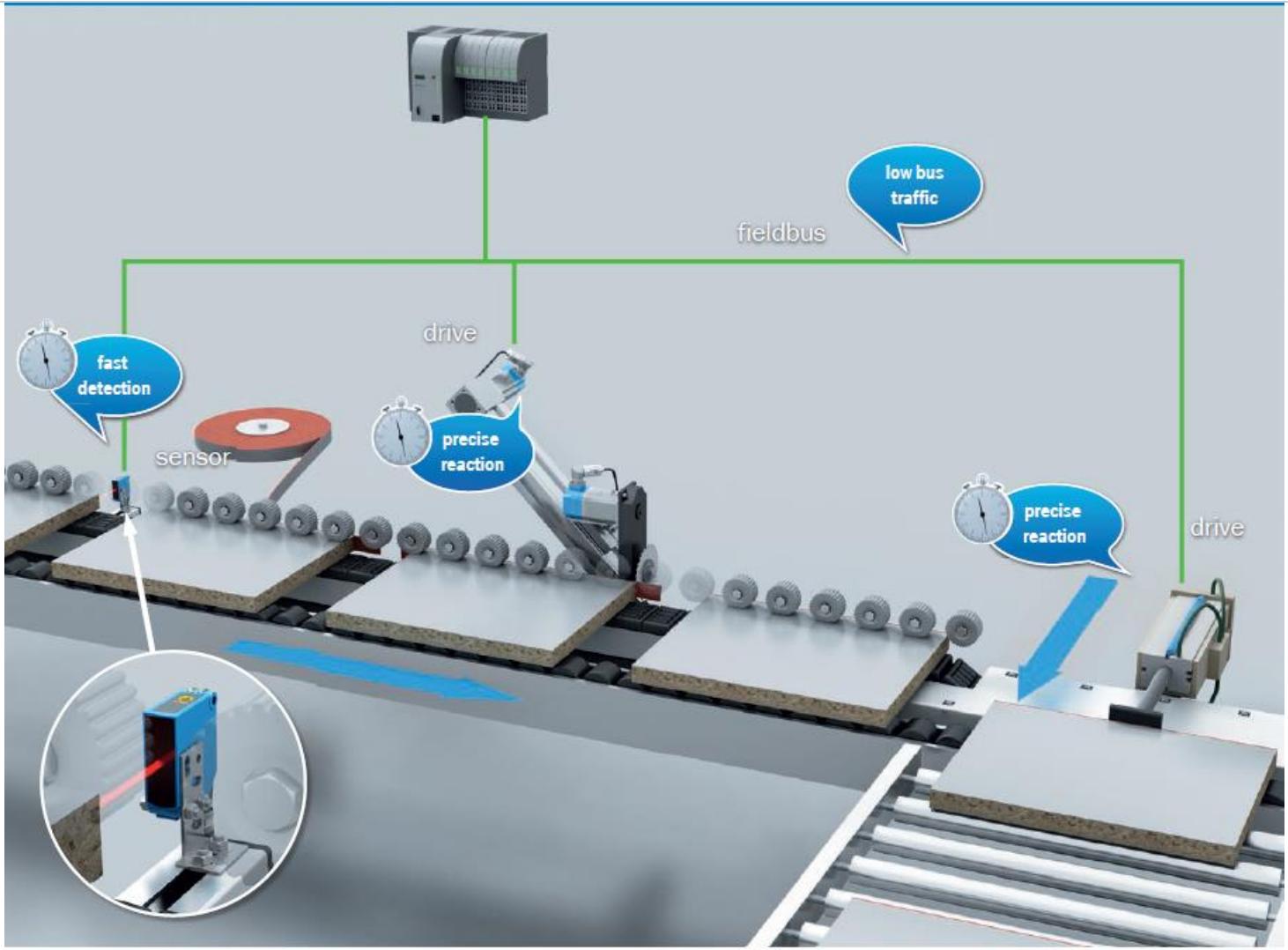
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# IN AN ACTUAL APPLICATION -



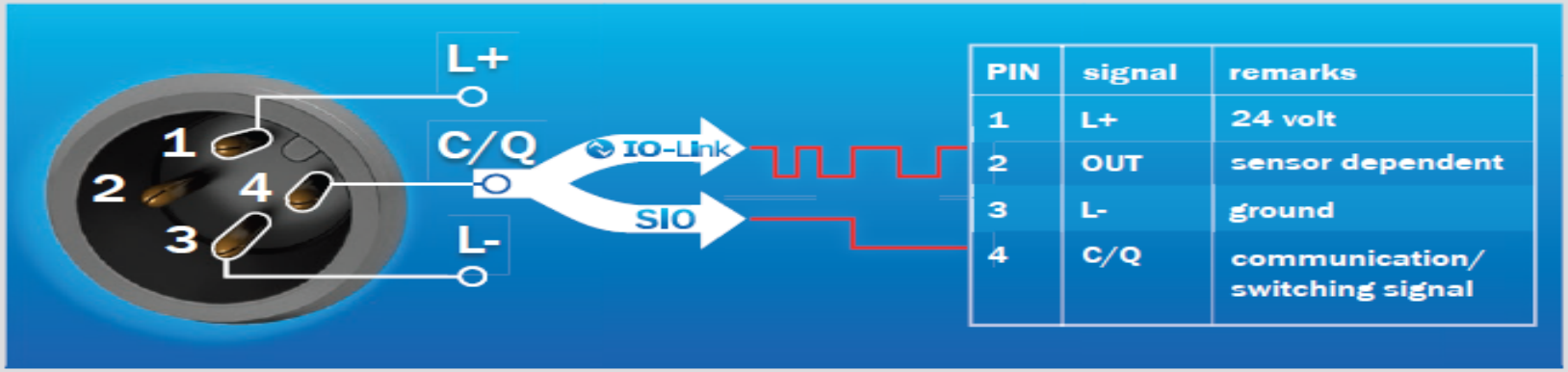



# IO-LINK COMMUNICATIONS – WIRE REDUCTION

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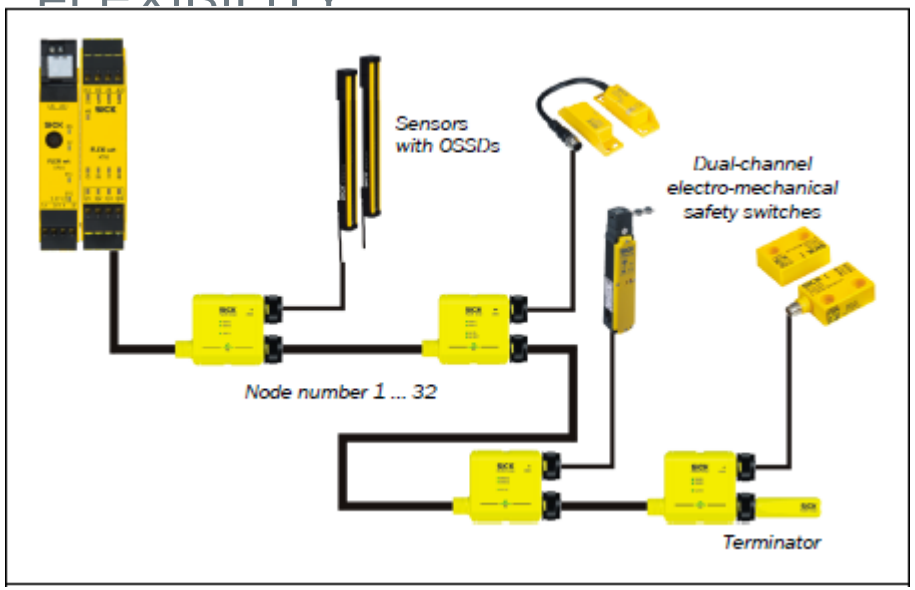
## Overview of IO-Link communication

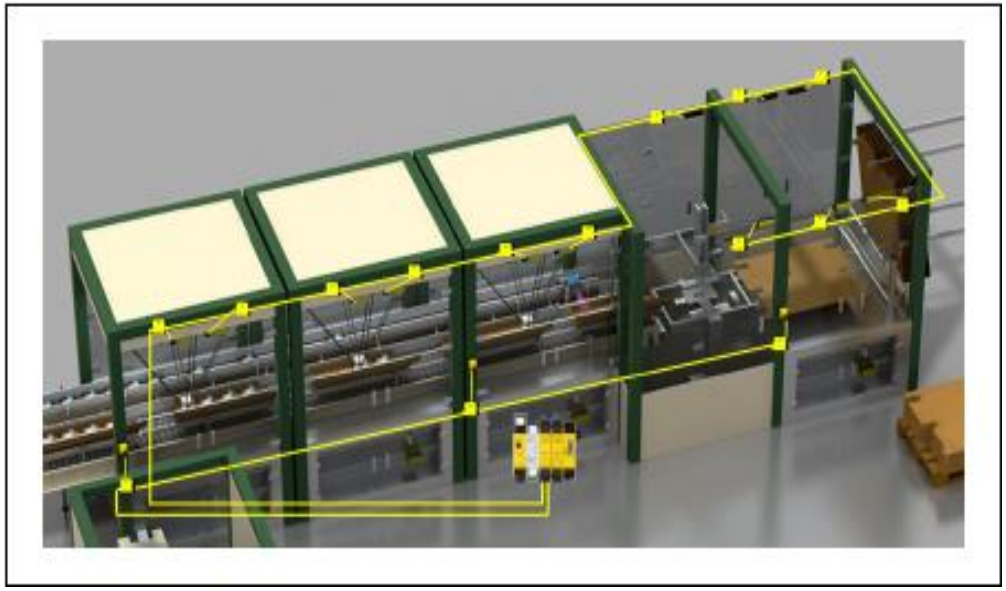



| PIN | signal | remarks |
|---|---|---|
| 1 | L+ | 24 volt |
| 2 | OUT | sensor dependent |
| 3 | L- | ground |
| 4 | C/Q | communication/ switching signal |

- Serial, bidirectional point-to-point connection for signal transmission and power supply – and no new bus system!
- Backward-compatible with discrete PNP output sensors.
- Operating modes: standard I/O mode (SIO), IO-Link mode
- Three transmission rates: 4,800 (COM 1), 38,400 (COM 2), 230,400 baud as an option (COM 3)
- Unshielded, standard 3-wire industrial cable for connections
- M12 plug connector
- Pin assignment: pin 1: 24 V, pin 3: 0 V, pin 4: switching and communication cable (C/Q)
- Maximum cable length: 20 m
- Maximum power consumption for power supply: 200 mA
- Process data (such as switching signals or distance values) is transmitted cyclically; service data (such as parameters) is transmitted acyclically

# FLEXI-LOOP INDUSTRIAL SAFETY NETWORK
## DESIGNED TO REDUCE SAFETY I/O AND INCREASE FLEXIBILITY



- Flexiloop Sensor cascade eliminates most of the safety I-O in a systems and distributed each node around the machine.
- Not only is there a large reduction of hardware, many feet of wire is saved as well as the time required to terminate safety circuits.

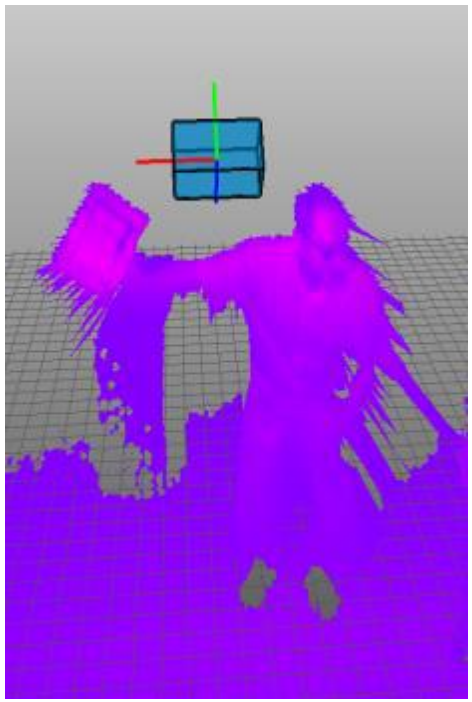
# SMART VISION TO GUIDE SMART ROBOTS
## EYESIGHT FOR ROBOTS






Sick’s new CX Camera can p

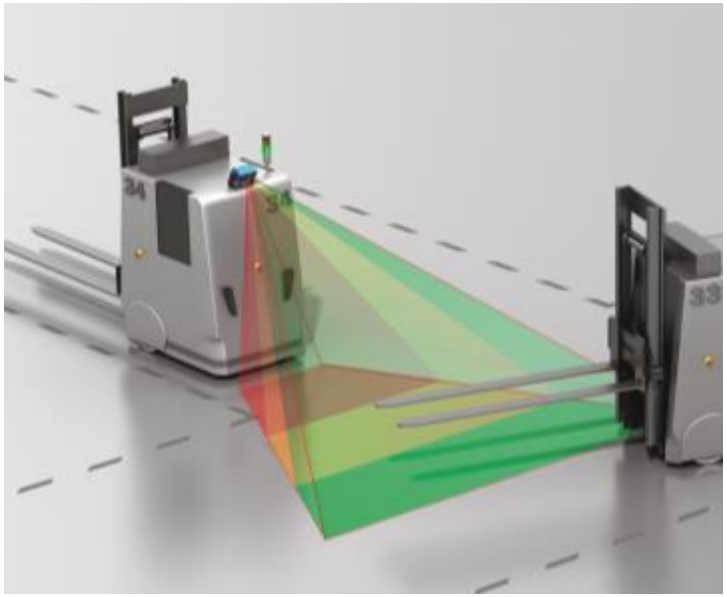
Real time 3D data



Point Cloud Snap Shot



Box Dimensioned



Collision Avoidance

# VIELEN DANK FÜR
# IHRE AUFMERKSAMKEIT.

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