embedded VISION SUMMIT 2018

COMPUTER VISION FOR INDUSTRIAL INSPECTION: THE EVOLUTION FROM PCs TO EMBEDDED SOLUTIONS

NEW ELECTRONIC TECHNOLOGY

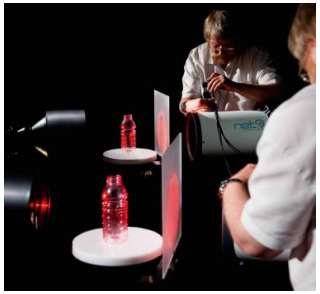
Dr. Thomas Däubler

May 22, 2018

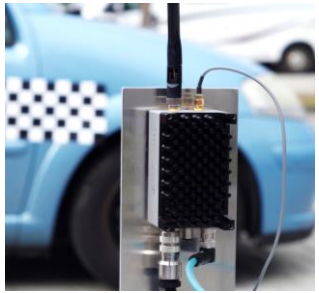
NET New Electronic Technology since 1996

- Develop and offer smart vision solutions: industrial & medical applications
- Consultancy: application-specific demand
- Growing demand for embedded vision
- Sustainable technology & market trends
- Product strategy: bringing visual intelligence to cameras

In-camera distortion correction



360° analysis in single image



Radar-aided 1D vision

Custom MIPI interface

and more...

What is the "right" vision system?

Agenda

WHAT IS THE "RIGHT" VISION SYSTEM?

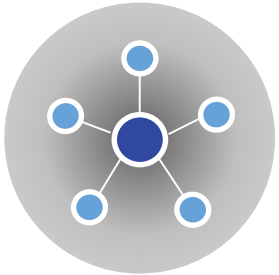
This has become more and more complex to answer for solution providers.

Topics:

- Learning from market developments
- Matching vision solution and strategy
- Successful approaches of solution providers for inspection systems
- Key findings and potentials of embedded solutions

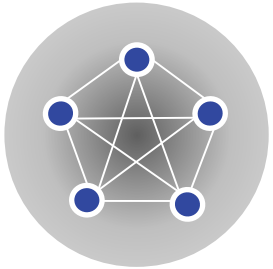
Classes of vision architectures

PC-BASED VISION



- PC-centered, 1:x
- Conventional image processing chain
- The PC does the job

EMBEDDED VISION

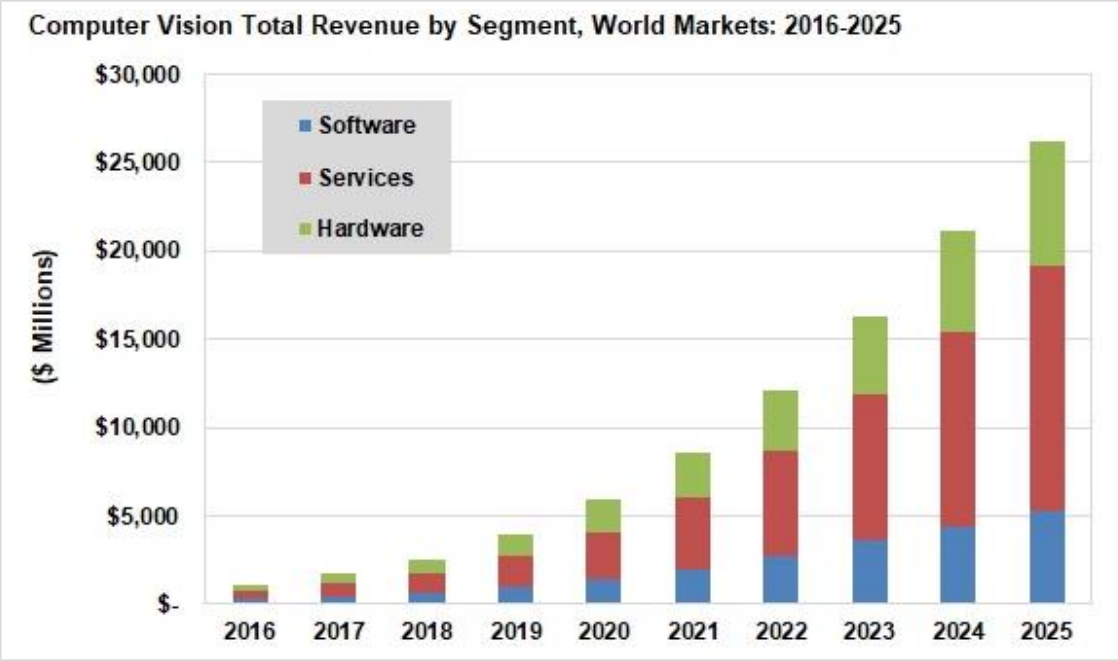


Dedicated image processing units for vision systems

- Decentralized
- Stand-alone, networks x:x
- Change of workflow

Vision market

SOLUTION DRIVERS



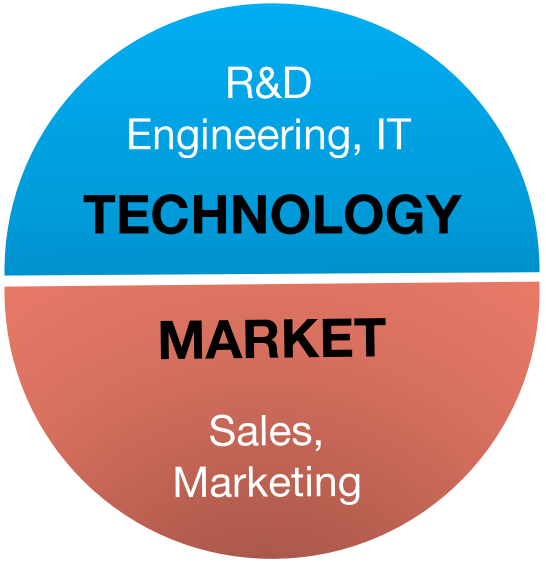
- Factor 26 (!) in less than a decade
- Services: a key driver for the solution
- Hardware falls relatively as embedded function grows
- Software: New image processing technologies (Deep Learning) are just beginning to take momentum

The two sides of the same coin

"[…] the fact that one can easily embed a computer vision-enabled chip in a camera opens up the field for countless applications.

The market for such cameras could easily reach into billions of dollars over the next several years."

Anand Joshi, Principal Analyst at Tractica



Evolution to (industrial) embedded vision

TECHNOLOGICAL DEVELOPMENTS & DECISION VARIABLES

Digital transformation
workflow and interfacing

Communication standards reliability/ uncertainty, choice

Image processing units
performance vs. costs

IP functions
edge, cloud / property?

Image sensors
size & information matters

Form factors
if size matters

- Develop or buy
- Image processing
- Standards
- Adaptation
- Size
- Performance
- Price & availability
- Compliance

Evolution to (industrial) embedded vision

MARKET DEVELOPMENTS & DECISION VARIABLES

Market strategy: growth, positioning, differentiation

Custom vs. standard
not primarily a cost issue

Buy or make
competence, resources

Automation

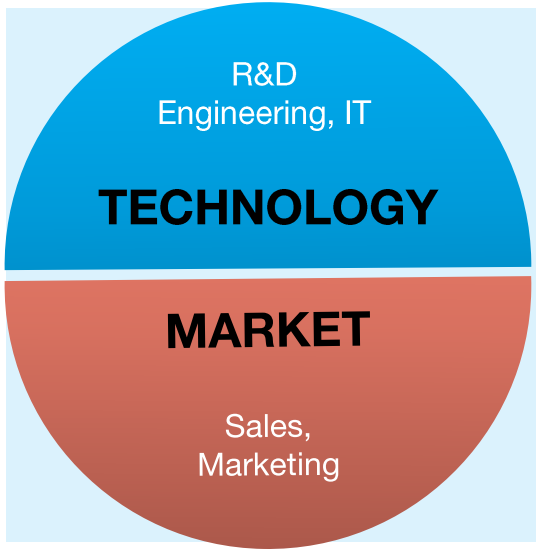
networked structures, decentralized IP, process control:

x:x architectures

Product cycles: time-to-market, flexibility

- Develop or buy
- Image processing
- Standards
- Adaptation
- Size
- Performance
- Price & availability
- Compliance

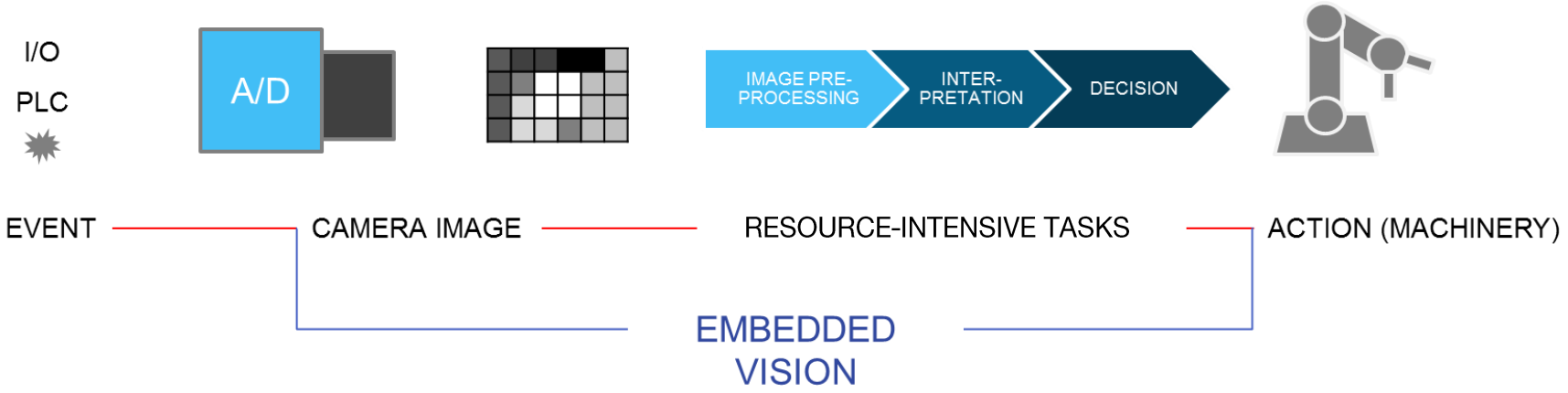
MATCH STRATEGY AND KNOWLEDGE OF DECISION VARIABLES



- Market offering/demand
- Competitive advantages
- Solution approach
- First mover / innovator

- Develop or buy
- Image processing
- Standards
- Adaptation
- Size
- Performance
- Price & availability
- Compliance

The value chain of vision solutions as analytic tool



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- Competitive advantages
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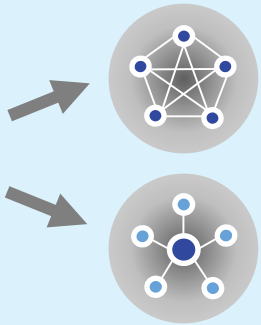
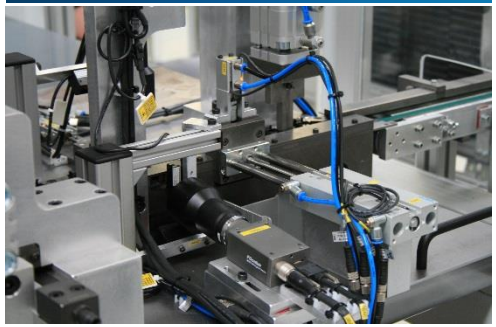


Meet complexity with „services“ to create an optimal image processing value chain!

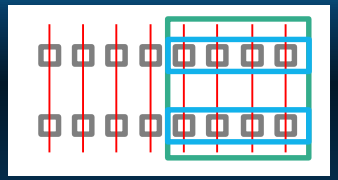
Solution approaches for industrial inspection

PART INSPECTION

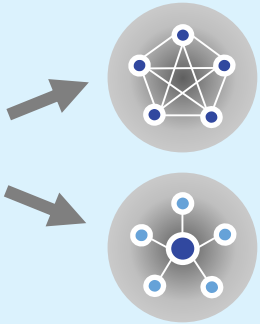


WEB INSPECTION

ABSENCE / PRESENCE



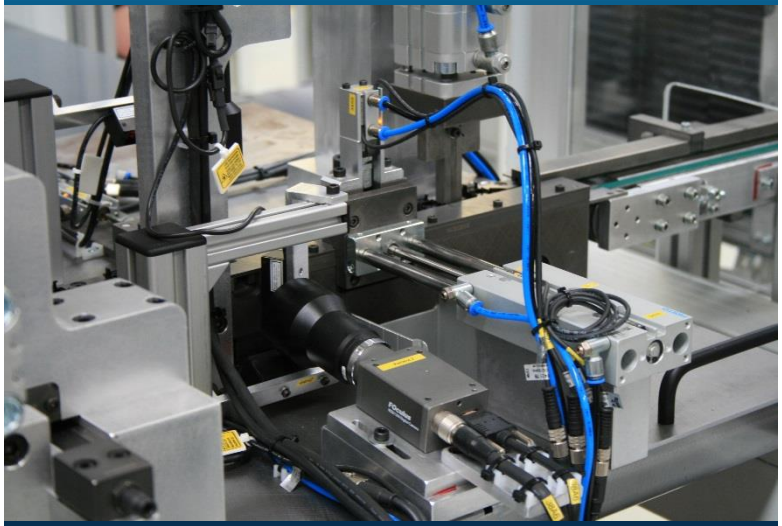
- Market demand
- Competitive advantages
- Solution approach
- First mover / innovator



Meet complexity with „services“ to create an optimal image processing value chain!

Never change a running system – really?

PART INSPECTION



OWN IP STANDARD HARDWARE

PC-based vision

- Inline and random inspection of connectors
- Process reliability, quality
- Geometry, order, positioning, orientation

Evaluation

- From era with low performing embedded IP units
- Architecture solves task without drawbacks
- Market: advanced entry inspection
- Solution: camera-embedded functions possible with running system

Focus on core competencies

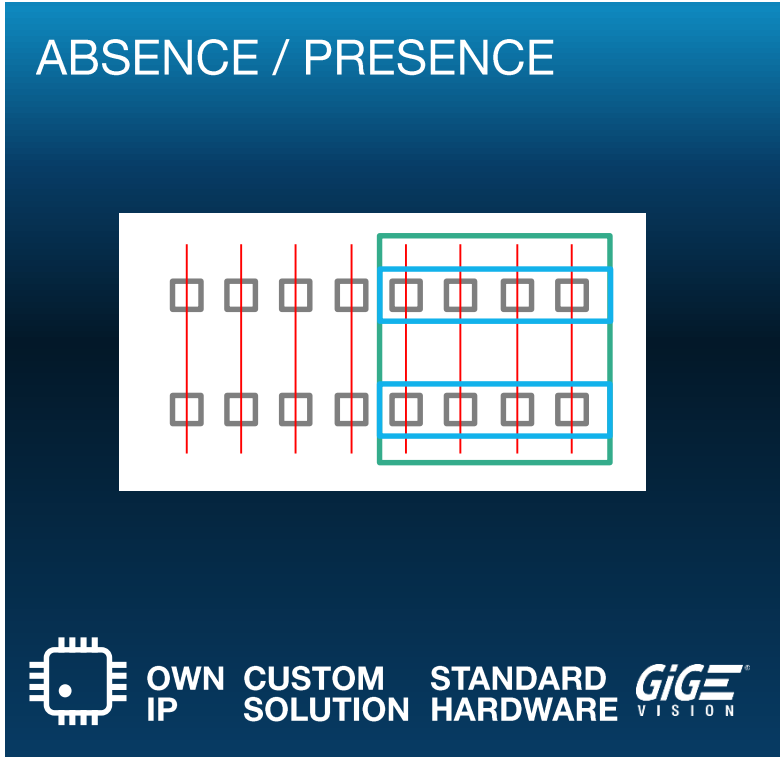
Embedded vision

- Textile cutting machines, print inspection
- Quality finishing, surface control, 2D /3D
- 2D /3D, markings, color, position, orientation, height

Evaluation

- Decentralized IP solves effectively data processing of real-time multi-camera application
- Protection of IP cores, cost-effective
- Market: maximal application flexibility
  → adaption of own functions, scalability

Disruptive improvements



Embedded vision

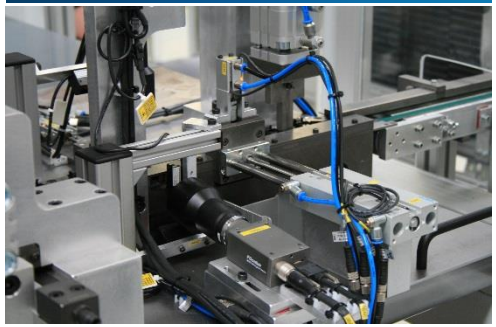
- Testing logic IC handler
- Process control
- Absence / presence

Evaluation

- PC-based solution would lead to violation of law
- Embedded vision made solution possible in first place (legal facts)
- Performance advantages with embedded vision: reduction of data rate lead to disruptive application improvements

Breakdown of solution approaches

PART INSPECTION



„The running system“

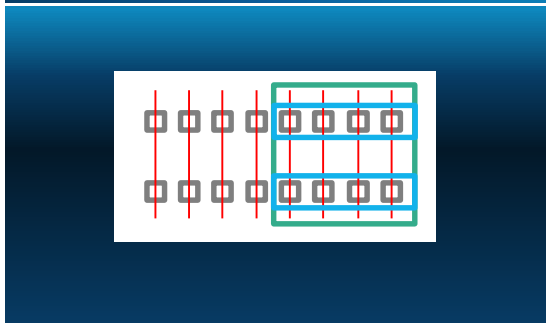
- The PC does the job
- Application-wise sufficient
- +EV: market potentials

WEB INSPECTION

„Core competencies“

- Embedded IP for handling of real-time multi-camera apps
- Protection of IP cores
- Cost-effective
- Maximal flexibility

ABSENCE / PRESENCE



„Disruptive improvements“

- EV made solution possible
- Data reduction lead to disruptive improvements

Implications for the “right” vision system

KEY FINDINGS AND POTENTIALS OF EMBEDDED SOLUTIONS

- Knowledge of decision variables as necessary condition for assessment
- Services important part of the solution as standard would not do (here)
- Confirmed ambivalence (technology + market) for evolution
- The value chain of vision solutions as analytic tool offers potentials to lift competitive advantages
- Existing IP cores with EV: market development as to improved positioning
- Vision follows strategy: the right vision system to be individually answered

Resources

- Slide 6: https://www.embedded-vision.com/industry-analysis/market-analysis/computer-vision-hardware-software-and-services-market-reach-262-bi, Embedded Vision Alliance, found April 3, 2018
- Slide 7: https://www.embedded-vision.com/industry-analysis/market-analysis/edge-intelligence-computer-vision-market, Anand Joshi, Principal Analyst at Tractica, Embedded Vision Alliance, found April 3, 2018