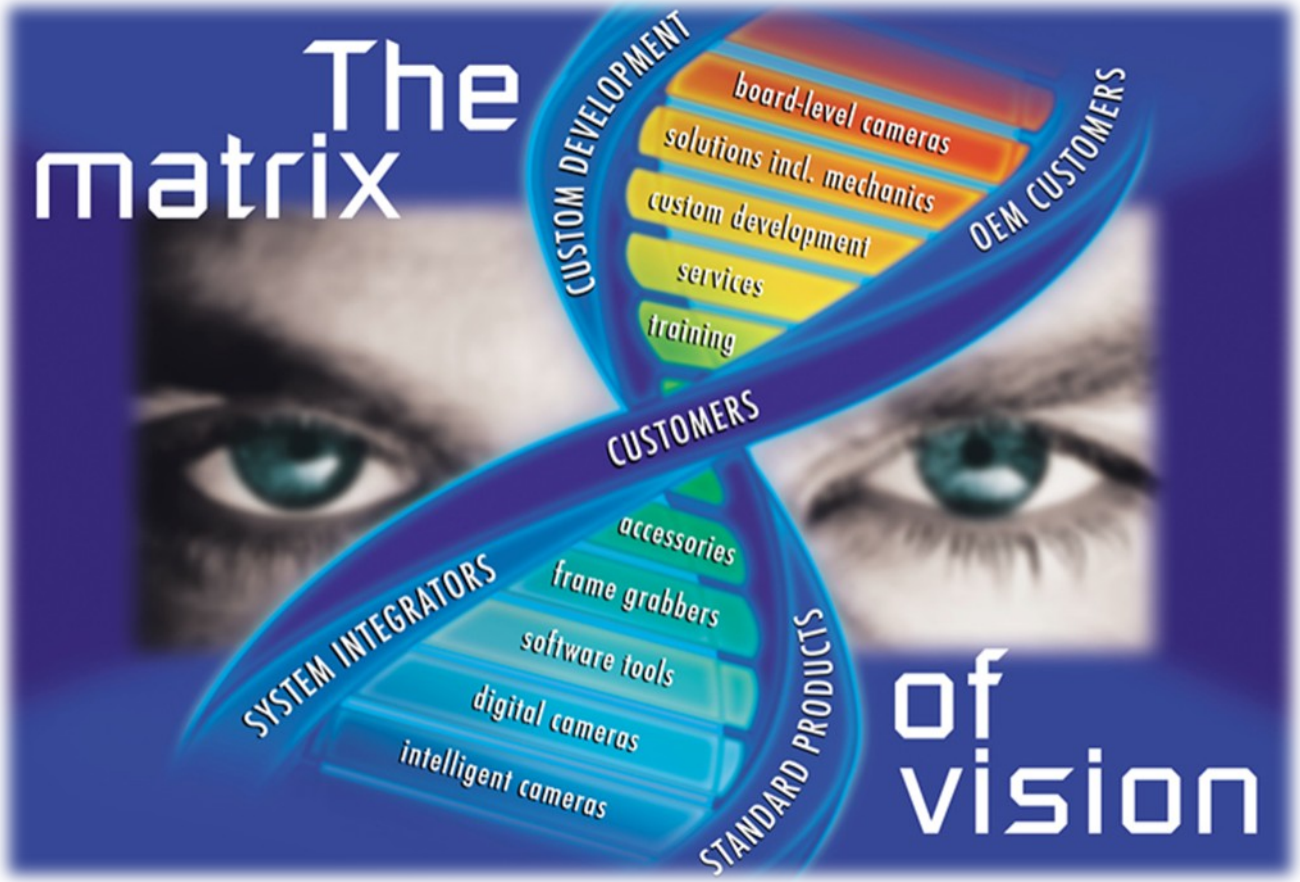
# MATRIX VISION



# MATRIX VISION

Your partner for:

- Image processing components
  - Industrial cameras
  - Smart cameras
  - PCI and PCI Express frame grabbers
  - Software tools
- Custom developments in hardware and software

administrative department

development department

# Camera series

- Smart camera mvBlueGEMINI
- 6D perception camera mvBlueSIRIUS
- Embedded Linux camera mvBlueLYNX-X
- Industrial USB 2.0 camera mvBlueFOX
- Industrial GigE camera mvBlueCOUGAR-X
- Industrial Dual GigE camera mvBlueCOUGAR-XD
- Industrial USB 3.0 camera mvBlueFOX3

# Markets

- Packaging
- Deposit and reverse vending machine
- Logistic
- Agricultural machinery
- Traffic
- Security
- Machine tools
- Measuring machines
- Medicine
- Sport

# Key features
# MV cameras

- Wide range of CMOS and CCD sensors
  - Color, gray scale and NIR sensors
- All cameras with FPGAs
  - Reduces host CPU load
  - Camera internal functions
- Internal image memory for reliable image transfer
- Digital inputs and outputs

# mvBlueCOUGAR-X

- Gigabit Ethernet camera
- Resolutions up to 10 Mpix with up to 14 bit per pixel
- 64 MB local image memory
- Internal temperature sensors
- Options:
  - POE / POE-I
  - Extended temperature range
  - IP67
  - PLC inputs

# mvBlueCOUGAR-XD

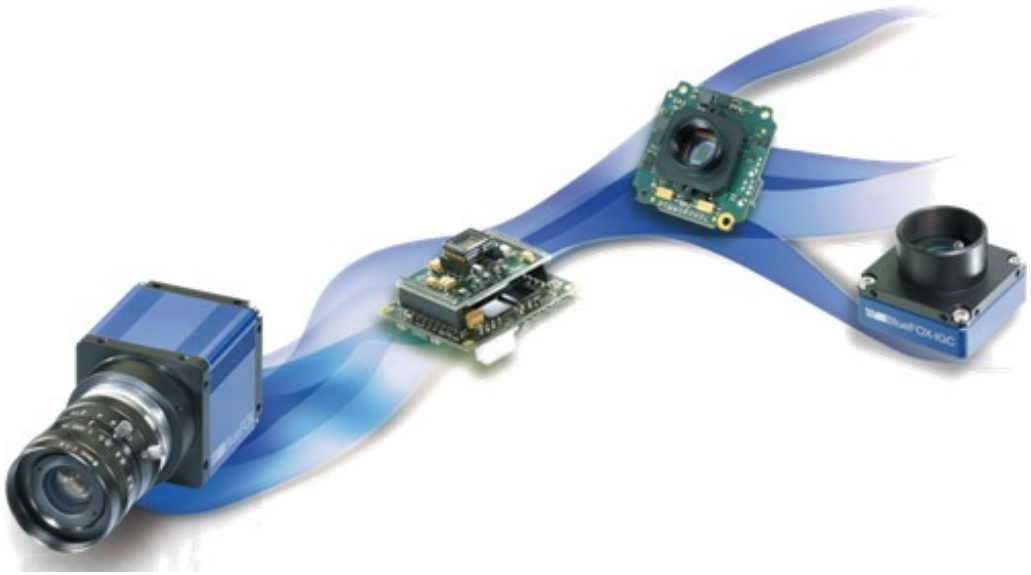
- Dual GigE camera
- Only high-graded sensors:
  - Dual & Quadtap CCD with up to12 Mpix
  - Top-notch global shutter CMOS up to 4 Mpix
- 256 MB image memory
- Support of motorized lenses (zoom, focus, iris)

# Camera technology
# mvBlueFOX3

- USB 3.0 CMOS camera
- USB3 Vision standard
- Resolution up to 10 Mpix
- 256 MB image memory
- USB 2.0 compliant
- High-performance industrial driver
- Own series for Sony global shutter CMOS sensors

# Camera technology
# mvBlueFOX

- USB 2.0 cameras
- Resolution up to 5 Mpix using up to 12 bit per pixel
- 8 MB image memory
- Variety of technical models with different shapes:
  - Single-board



# Smart camera
# mvBlueGEMINI


- Combines power & performance:
  - Range of functions and power of smart camera +
  - Easy use of vision sensors
    - How?
- mvIMPACT Configuration Studio (mvIMPACT-CS)
  - Create inspection without any programming knowledge and without any knowledge of image processing
  - Intuitive, multi-platform software with wizards
  - Usage of efficient and stable algorithms
    - Combination of these algorithms as useful high-level image processing tools
  - Algorithms optimized for mvBlueGEMINI hardware

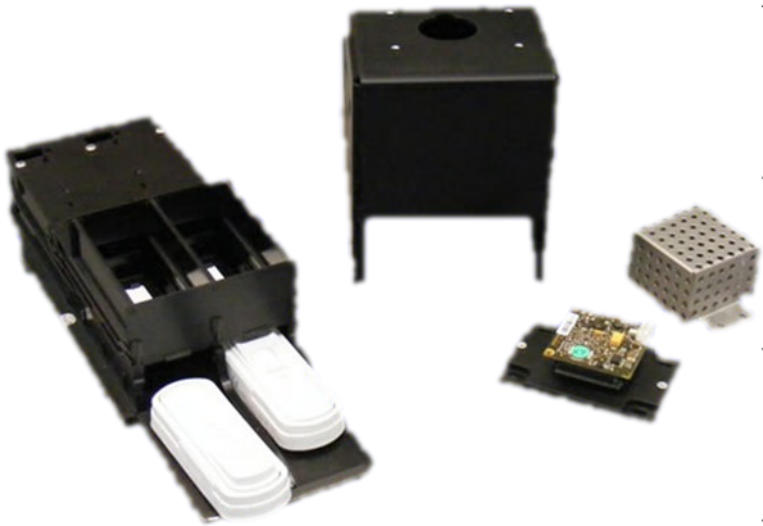
powered by HALCON

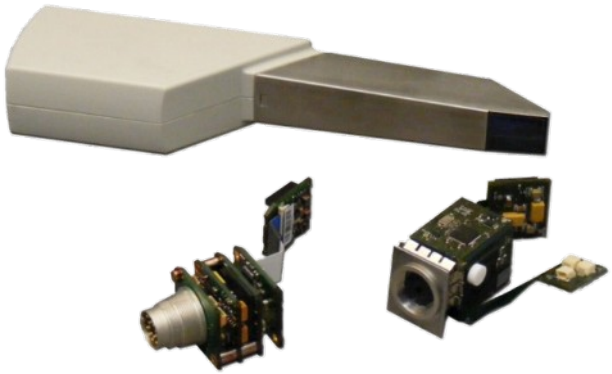
# Customized solutions

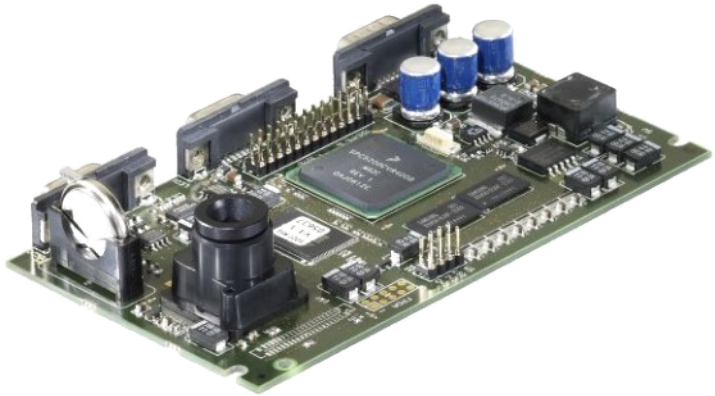
Customizing of standard products

Application specific SW development:

- Blood analysis system
- 3D dental camera







# What is a SBC?

Computer consisting only one pcb

Essential components

- CPU
- Clock signal generator
- RAM
- Reset-logic
- ROM

Typically all functionalities implemented in one chip

Developed for specific tasks

# What is a SBC?

Interfaces

- LAN / Wifi / Bluetooth
- VGA / HDMI
- USB2.0 / USB3.0
- SATA
- GPIO / I²C / UART
- CSI / DSI
- CAN-Bus
- JTAG
- RS232


Source: Wikipedia

# Advantages

Low energy consumption but high computing power

- Less engery costs
- Less heat emission

Physical dimensions

- Better integratibility
- Allows mobile devices

Low system costs

- In most cases 40€ to 200€

# Disadvantages

Existing software needs to be compiled for ARM architecture

- Software can be cross compiled if a toolchain is available
- Software can be compiled directly on the target system

Extensibility is not that good as on ‚ordinary' PCs

Performance is in most cases not compareable with ordinary PCs

# Popular devices

- Raspberry Pi
- Odroid XU3/4
- Odorid C2
- Jetson Tegra K1
- Beagle Bone Black
- Wandboard

# Available drivers

ARMv6 (Raspberry Pi 1):

- Only mvBlueFOX USB2.0 cameras

ARMv7:

- mvGenTL Acquire
- mvBlueFOX

ARMv8 (aarch64):

- mvGenTL Acquire
- mvBlueFOX

# Finding the right SBC

What is important?

- Computing power (CPU / GPU)
  - Is the computing power sufficient for image grabbing and/or image processing?
- Interfaces
  - Do I need USB interfaces or GigE-Interfaces?
  - Is there additional hardware which must be supported?
- Operating System
  - Does the operating system support the drivers?
  - Does it support necessary settings, like jumbo frames, custom usbcore memory settings?

# Usage Scenarios

Mobile devices

- Drones
- Handheld devices
- Smartphones and Tablets

Source: Wikipedia


Source: Wikipedia

Highly integrated systems

- Smart cameras
- Preprocessing units



Cost sensitive applications

IoT applications

Decentralized systems

# Thank you

Do you got any questions?