



THE Vision SHOW

A Camera Interface with USB?

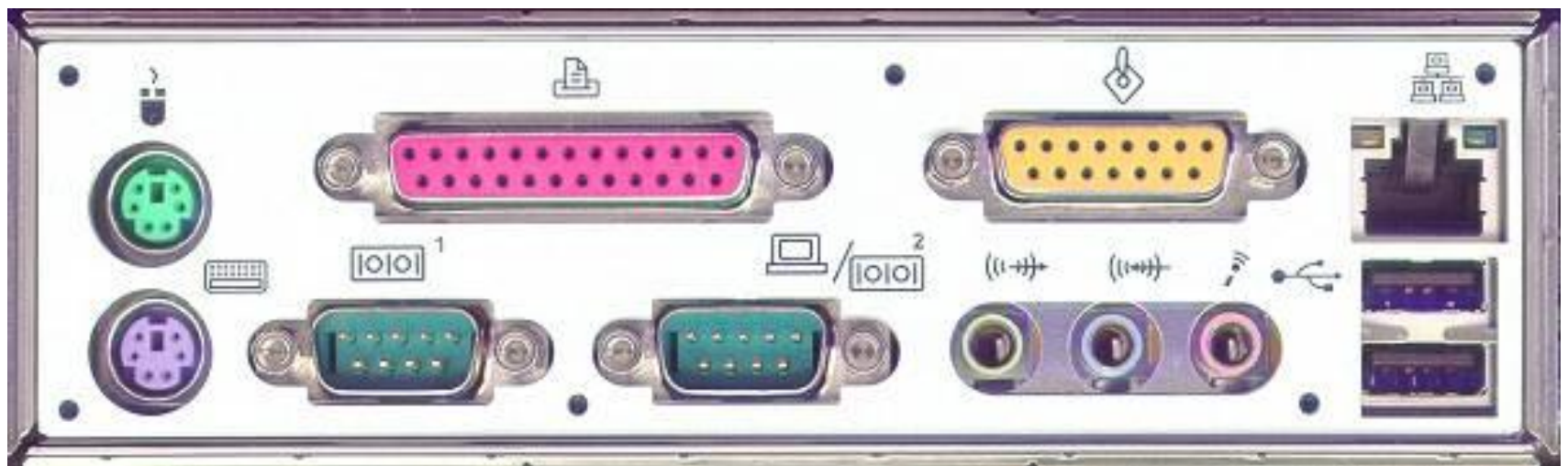
Daniel Diezemann
Product Manager
IDS

Yesterday



Yesterday
we had many connectors
for one application.





Today



Today
we have one connector
for many applications.



THE *Vision* SHOW



USB is mainstream.



6.200.000.000 devices
sold since 2001!*

Today: **400** in **5** seconds!



1

USB Background

2

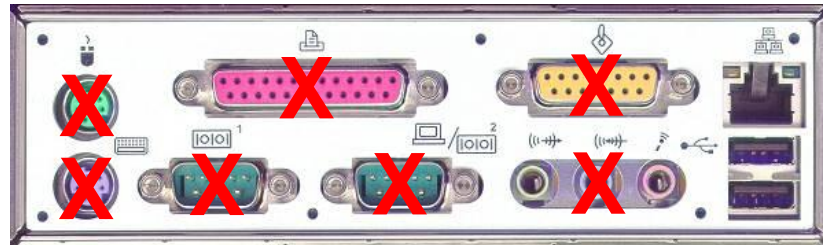
**USB as a
Camera Interface.**



USB

“Universal Serial Bus”

Replacing
Hot plugging
Cable powered



Back in time: 1995

USB 1.0 started

USB 1.0 → Low Speed = 1.5 Mbit/s



USB 1.1 → Full Speed = 12 Mbit/s



2001

USB 2.0 started
Increased speed 40x

USB 2.0 → High Speed = 480 Mbit/s



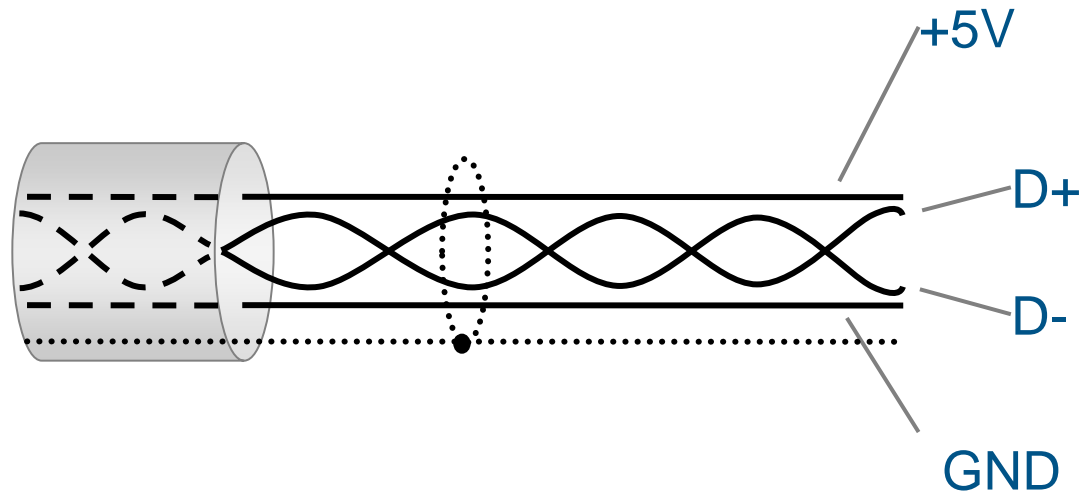
1

USB Background

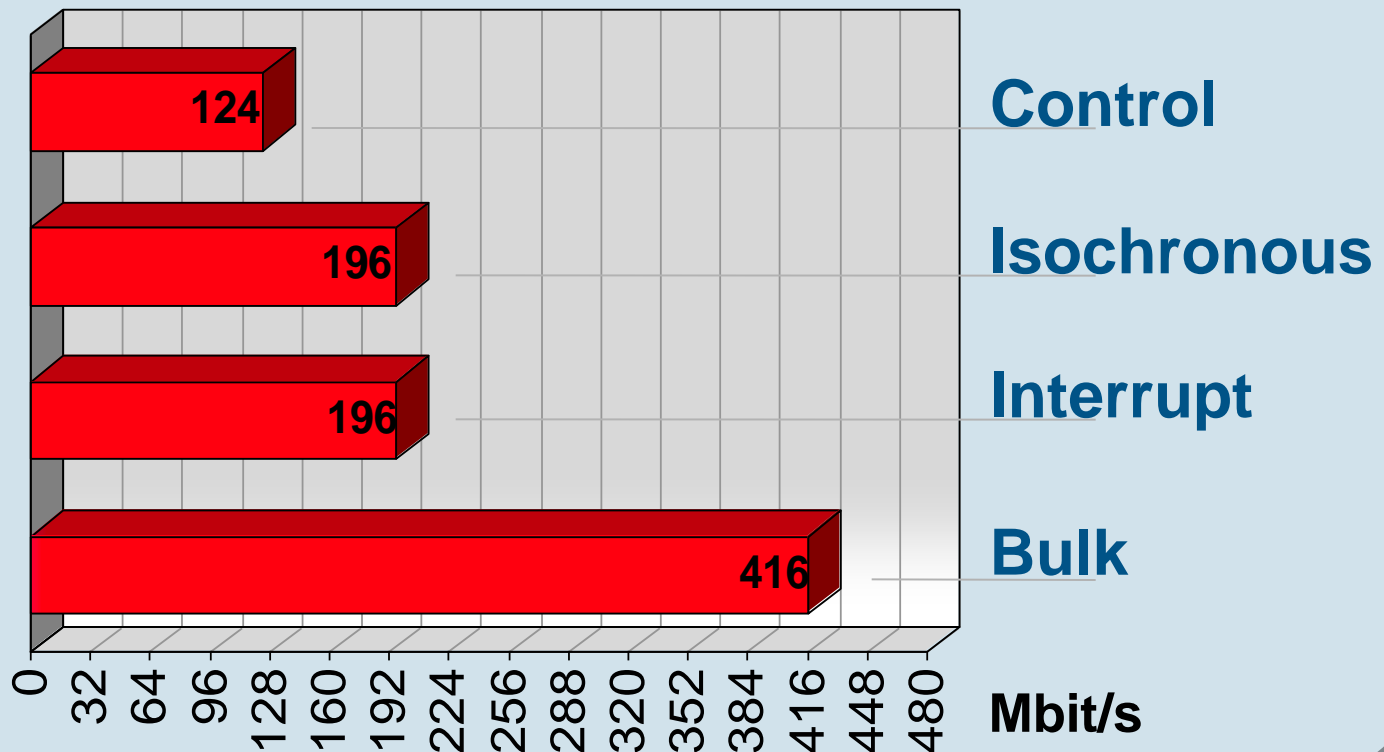
USB Cable

5V / 500mA: 2.5W

Shielded twisted pair
usually up to 5m.



Different transmission types



Control Transfer

Device setup and status.
Used by every USB device.

Isochronous Transfer

Guaranteed (but low) bandwidth
No guarantee of delivery.
Suitable for time critical data.



Interrupt Transfer

Polling mechanism

Guaranteed latency

Error detection & retry

Used for **camera message transfer.**



Bulk Transfer

Fastest mode for large data (e.g. images)

Bandwidth not guaranteed

Delivery guaranteed

Can use up to 90% of spare bus bandwidth

No guaranteed latency

Used for the **camera data transfer**



Transfer Speed

Theoretically

Total	480 Mbit/s = 57 MB/s
Bulk	416 Mbit/s = 50 MB/s

Effective (Bulk)

Desktop on-board	30...40 MB/s
Laptop on-board	15...40 MB/s
PCI-USB-board	15...30 MB/s



USB camera

Typical frame rates:

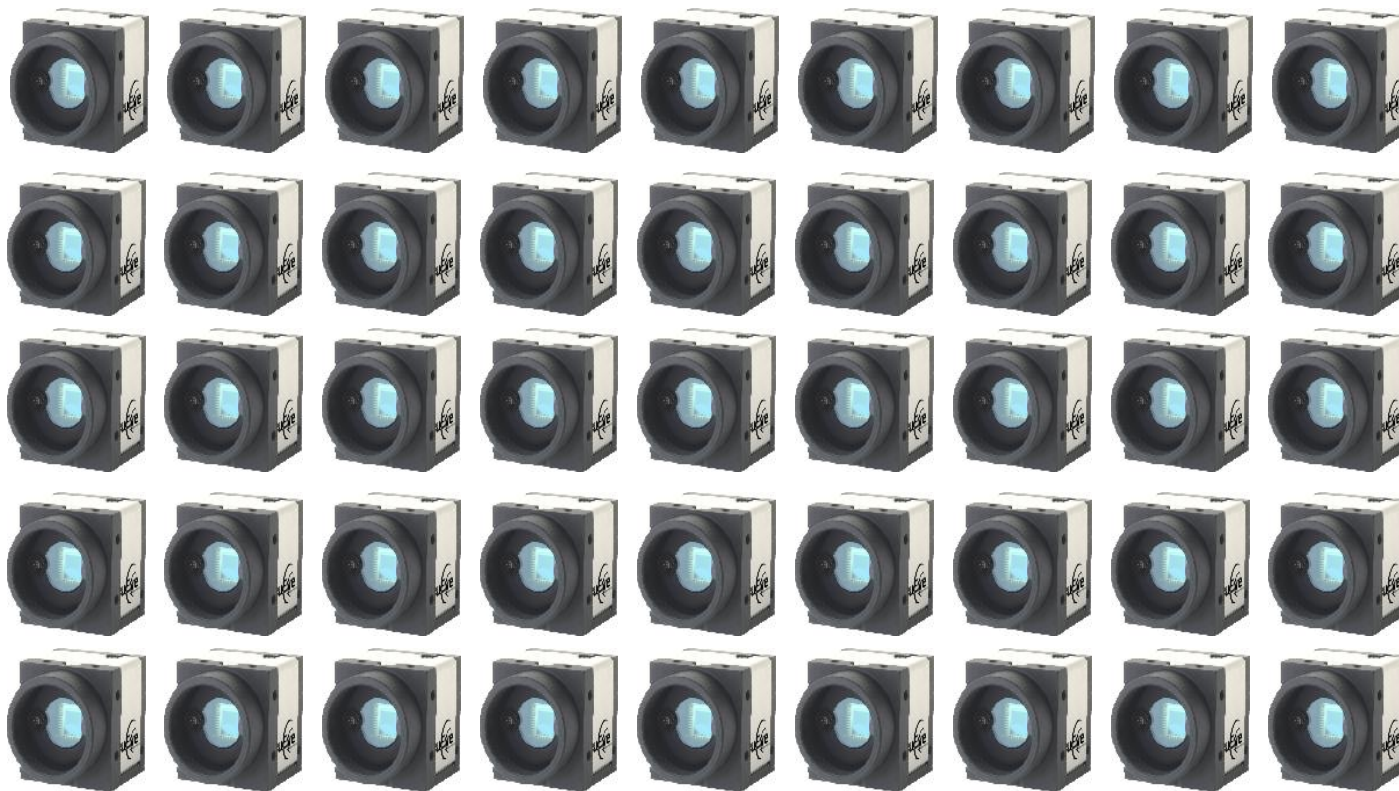
0.3M	VGA	100 fps
0.36M	WVGA	87 fps
1.3M	SXGA	25 fps
2.0M	UXGA	17 fps
3.2M	SUXGA	11 fps
5.0M	QSXGA	6 fps
9.0M	QUXGA	4 fps



**1 USB port has the bandwidth
of 4 analog cameras.**

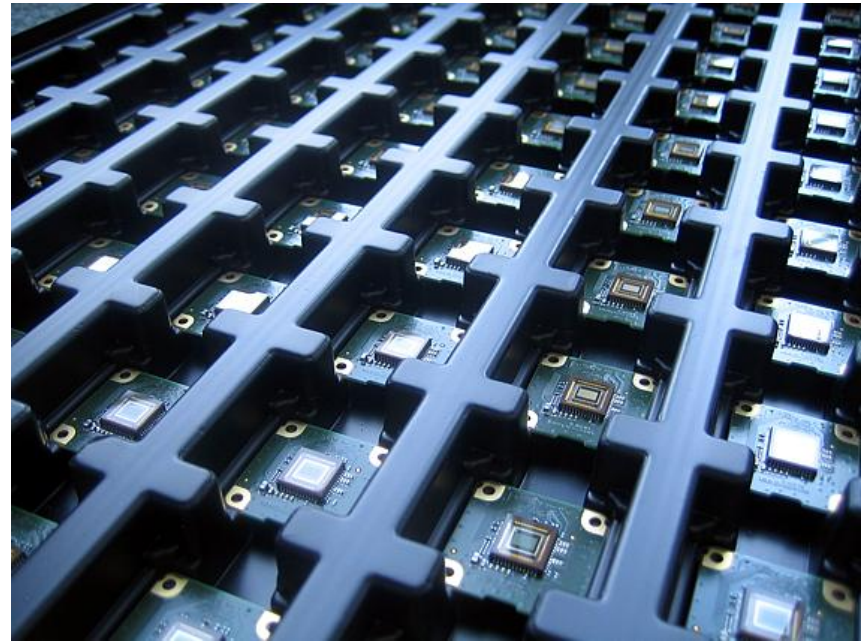
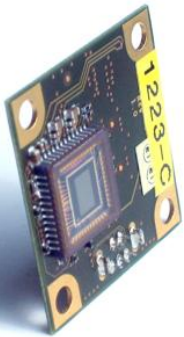


Or how would you define
'multi-camera'?



Low price.
Ideal for high volume.

Highly integrated USB cameras.



Future?

2009: Wireless USB as fast as USB 2.0

2010: USB 3.0 with “super speed”: 4.8 Gbit/s



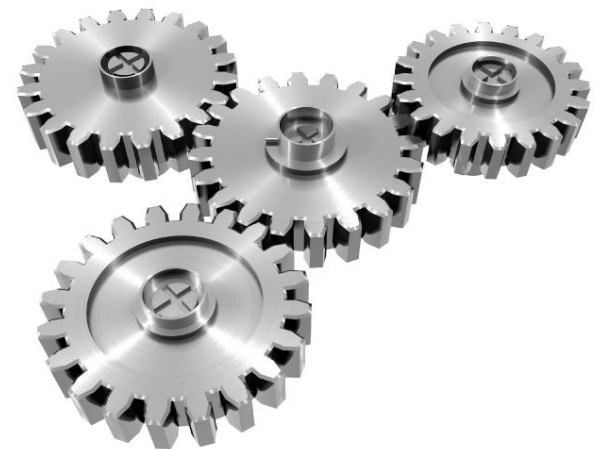
A conclusion

Camera costs
PC Interface cost
Multi camera suitability
Bandwidth
Power Supply



2

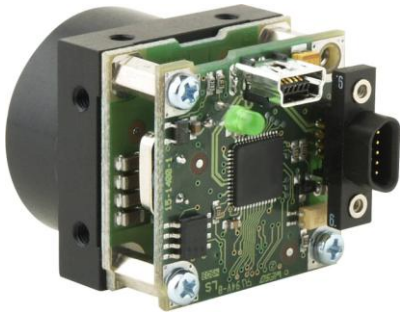
USB as a Camera Interface



Different families for different applications



Robust Metal Housing



CS-mount housing

Small.

Light weight.



Connections



Humidity and dust?

No problem!



Industrial connectors



Boardlevel series

wide range
cost sensitive applications



M12 and M14 lenses

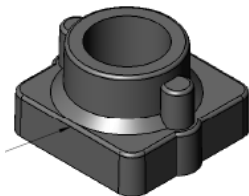
Small size.

High resolution.

Wide angle.



+



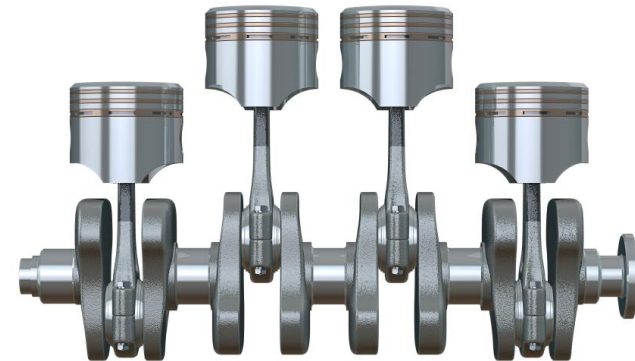
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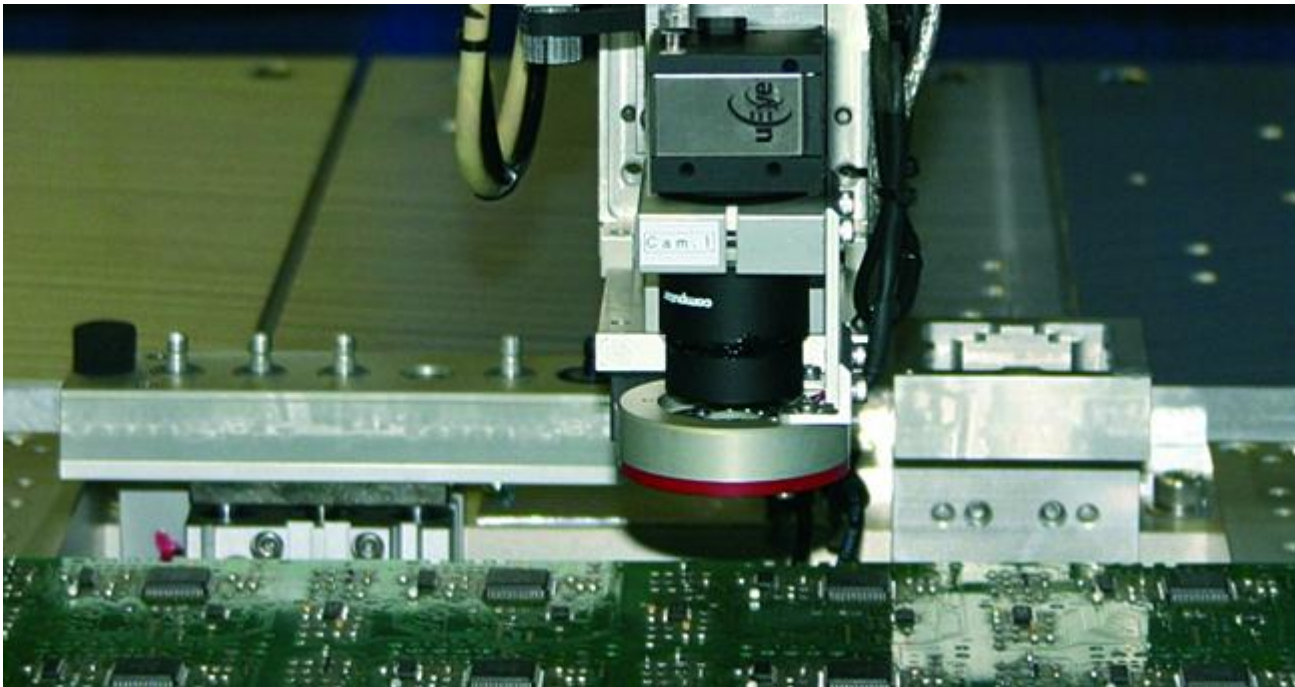
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uEye Applications



MV



Non Industrial



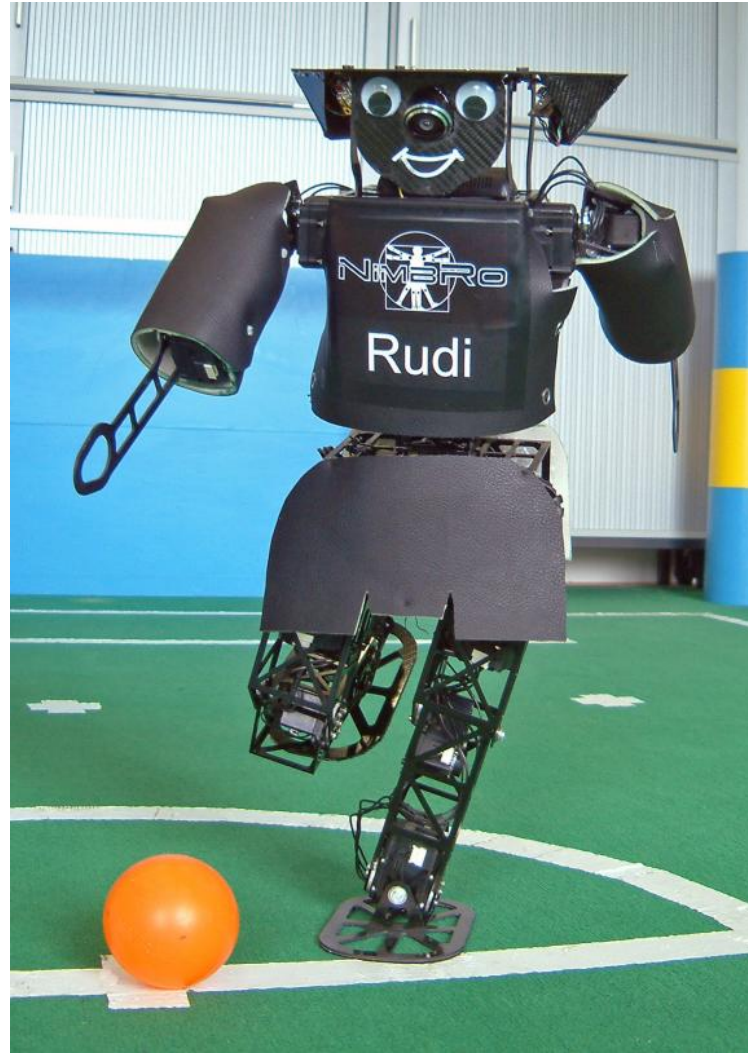
Microscopy



QC



Robotics



Eye Tracking

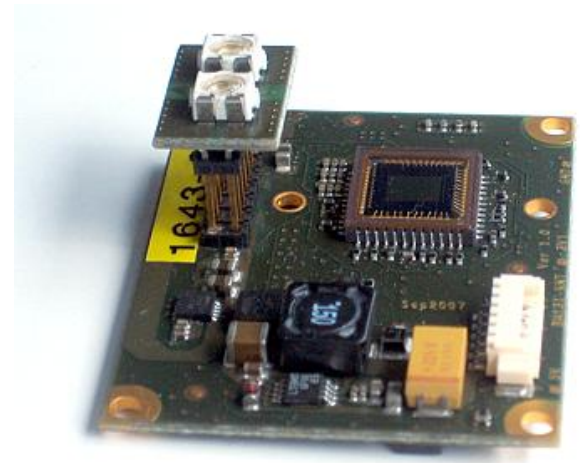
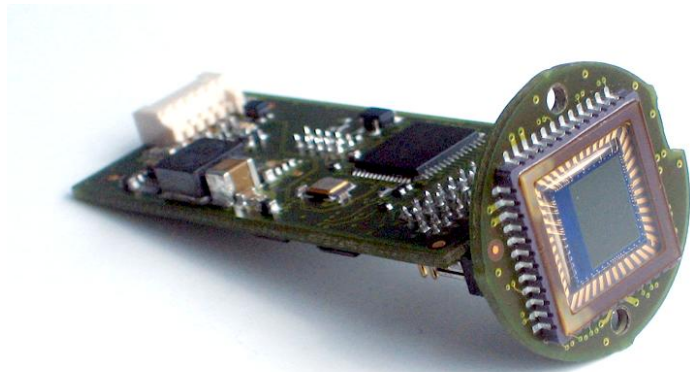


Special front



If 1000 variations don't fit...

...we do custom designs!



uEye Key Features

Long term availability

Same driver

Free SDK

3rd party software interfaces

Camera update by driver



Questions?





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