

HAN Engineering - Embedded Vision Design

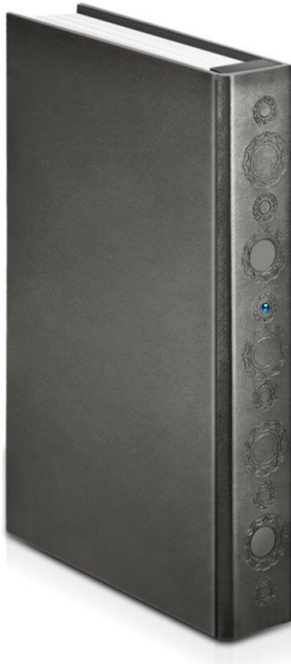
# EVD1 – period 2 Introduction



By Hugo Arends

# EVD1 – Purpose

Learn how to use computer vision on microcontroller based products



<https://www.bol.com>



<https://www.rabobank.nl>

# EVD1 – History

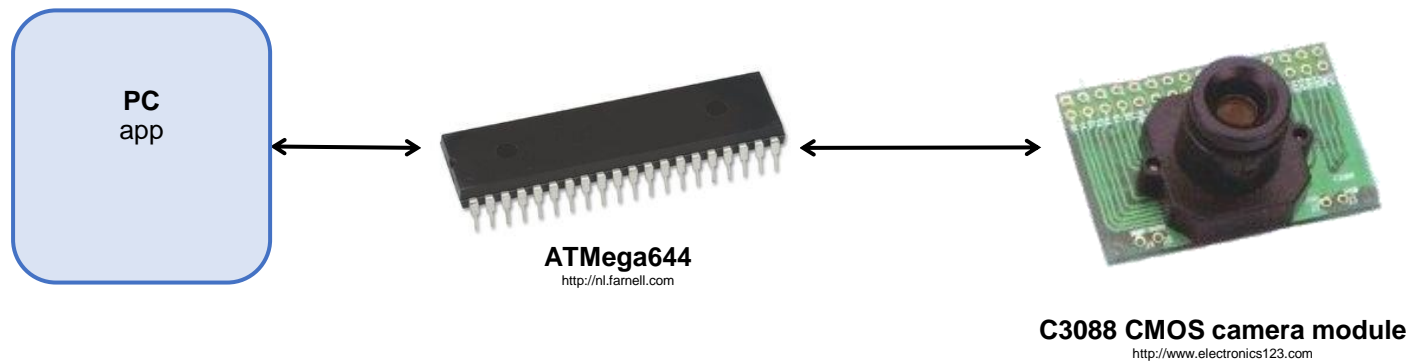


Requirements: Offer a development environment for image processing operators that can be ...

- ... used on both PC and embedded hardware
- ... used for benchmarking purposes
- ... easily debugged
- ... worked with at home
- ... used to realize challenging assignments for EVD project

# EVD1 – History

## EVD1 2009-2010

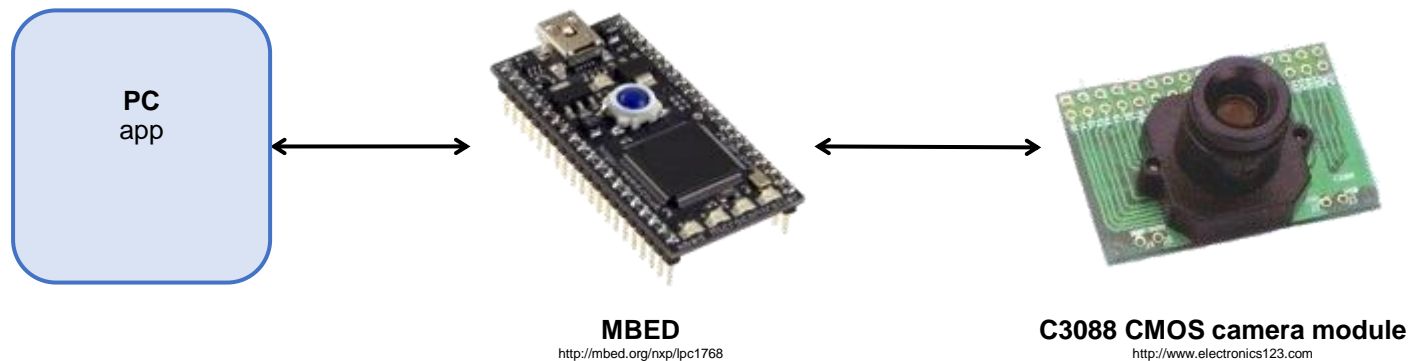


### Features:

- ~ 1 frame per minute data transfer
- vision operators 'on-the-fly'
- 4 kB RAM (picture 50x50 pixels)

# EVD1 – History

## EVD1 2010-2011

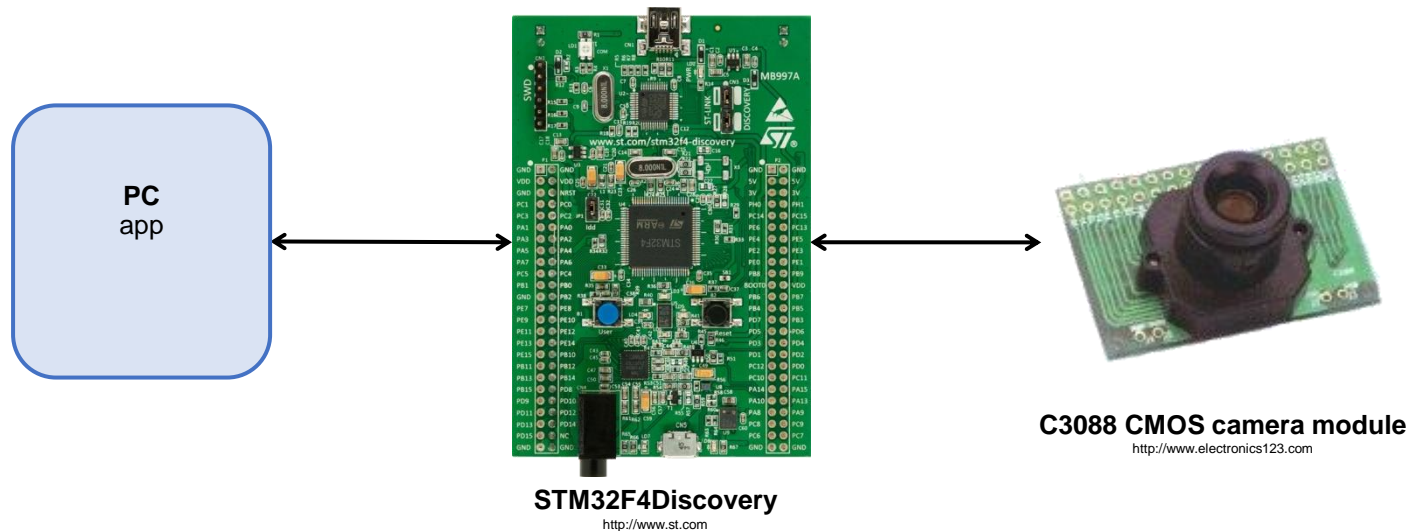


### Features:

- ~ 1 fps data transfer
- ~ 3 fps (standalone, incl. vision operators)
- 32 kB RAM (picture 176x144 pixels)

# EVD1 – History

## EVD1 2011-2012

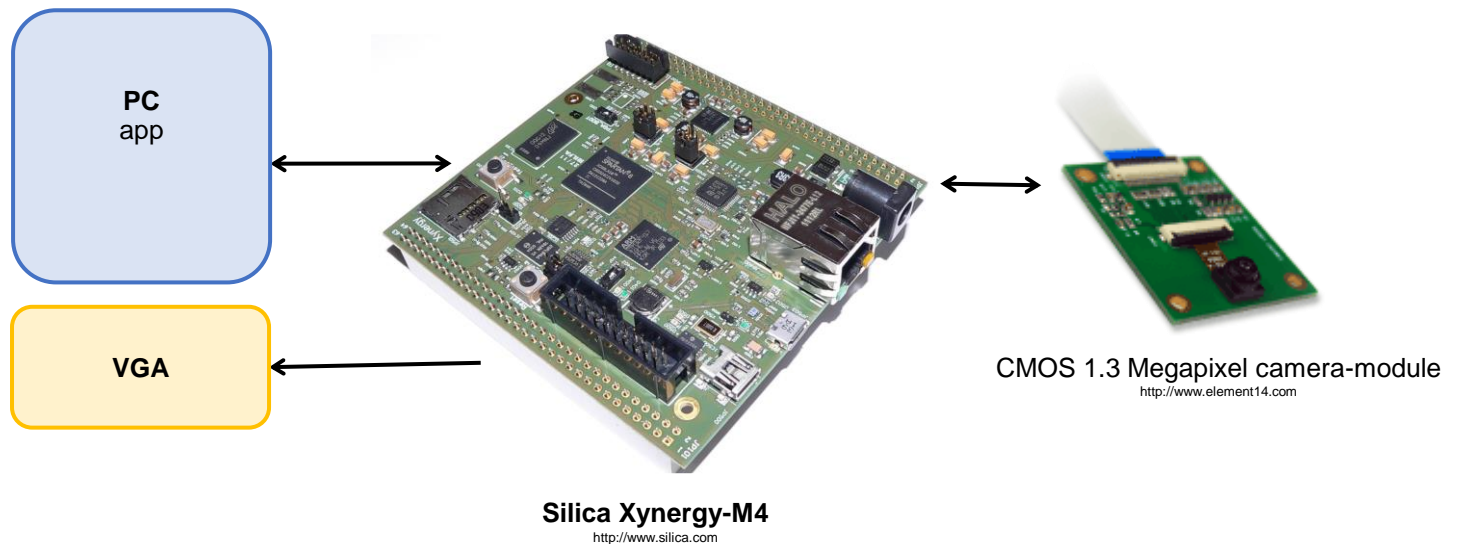


### Features:

- 30 fps data transfer
- 7 fps (standalone, incl. vision operators)
- 192 kB RAM (multiple pics. 176x144 pixels)

# EVD1 – History

## EVD1 2013-2014

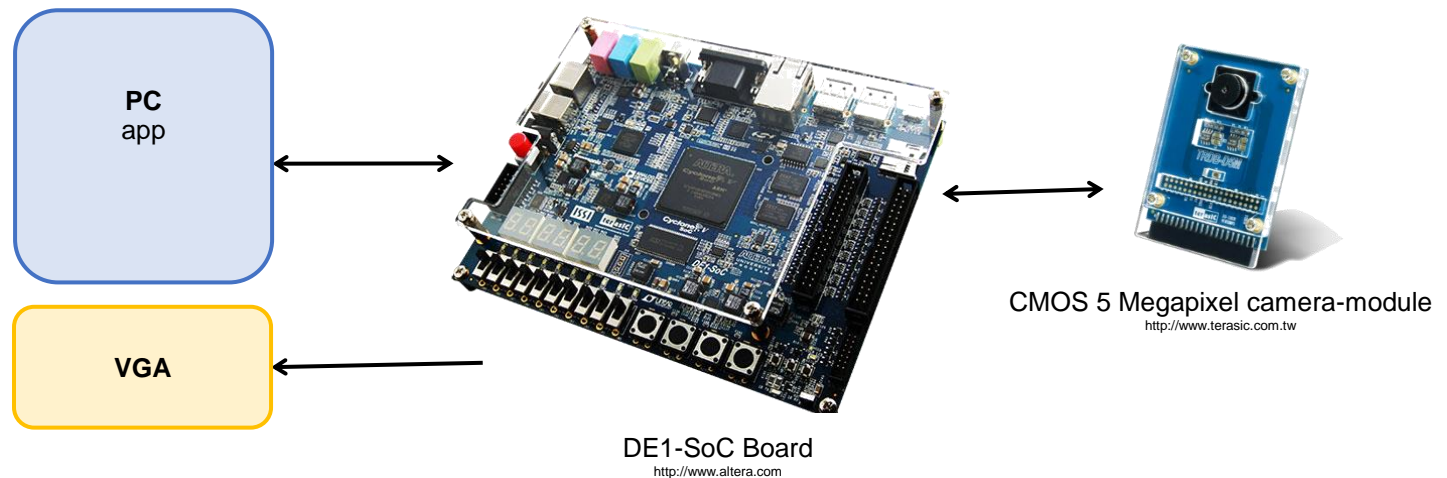


### Features:

- ? fps data transfer
- ? fps (standalone, incl. vision operators)
- 64 M x 16 bit RAM

# EVD1 – History

## EVD1 2014-2015



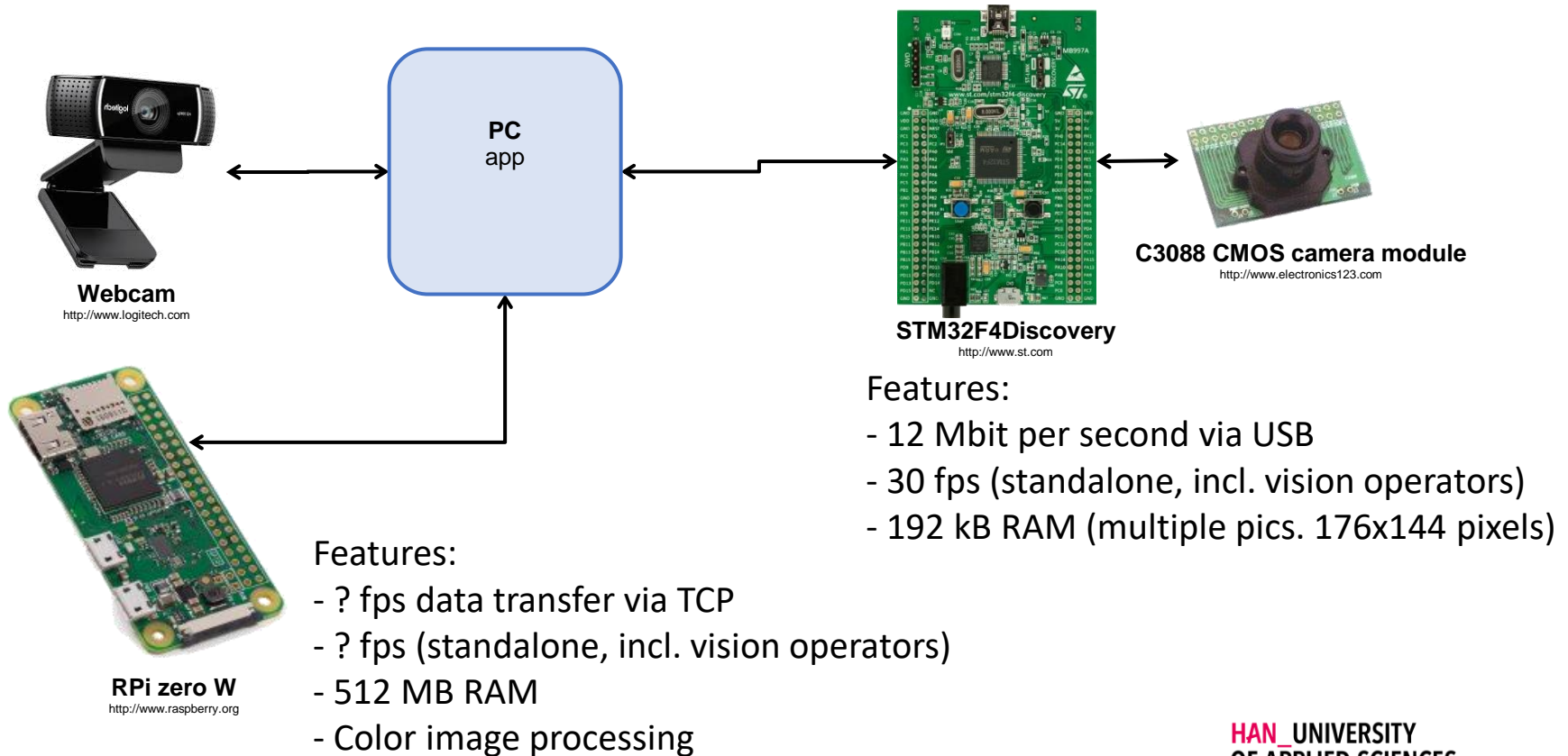
### Features:

- ? fps data transfer
- ? fps (standalone, incl. vision operators)
- Altera's Cyclone® V FPGA
- Dual-core ARM Cortex-A9 (HPS)
- 1GB DDR3 SDRAM (FPGA), 64 MB SDRAM (HPS)



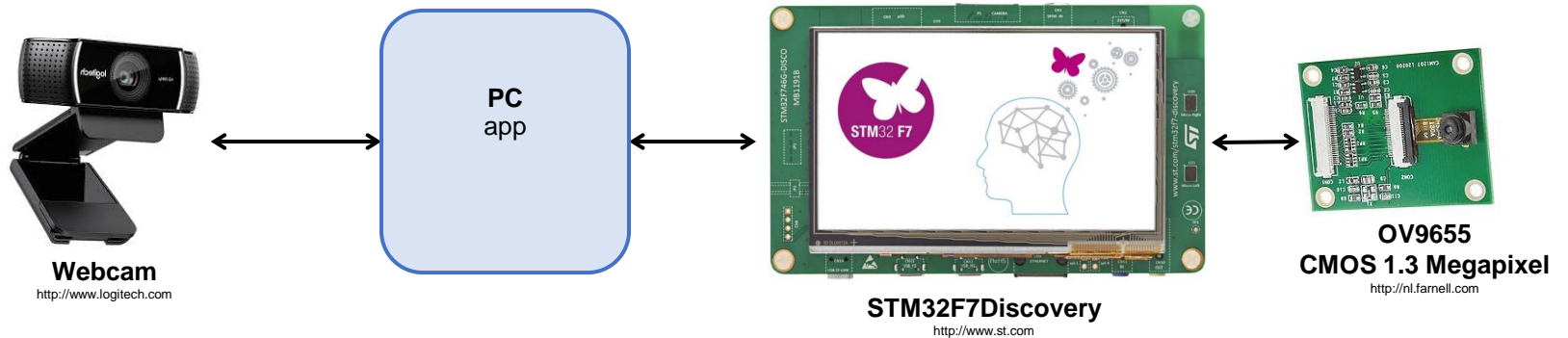
# EVD1 – History

2017-2018



# EVD1 – History

2020-2021

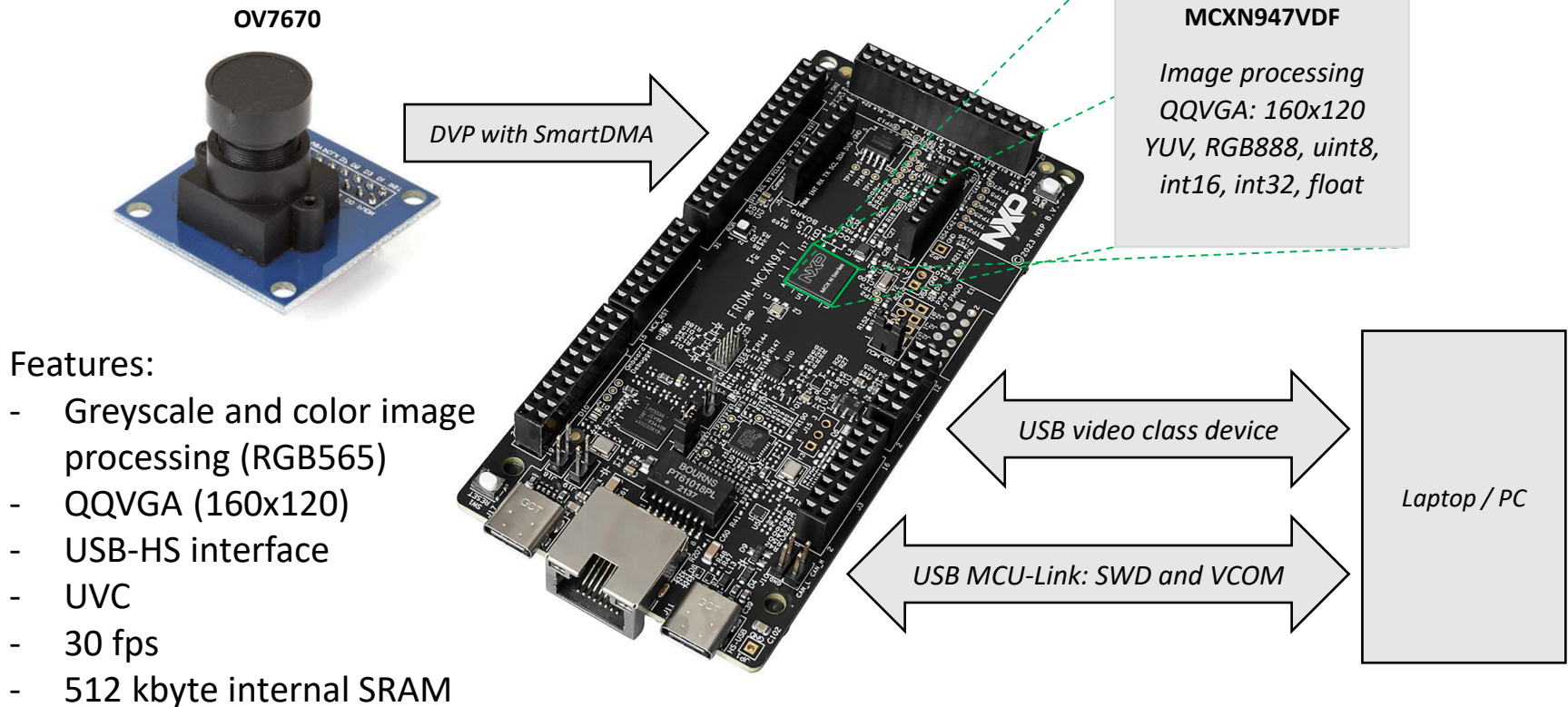


Features:

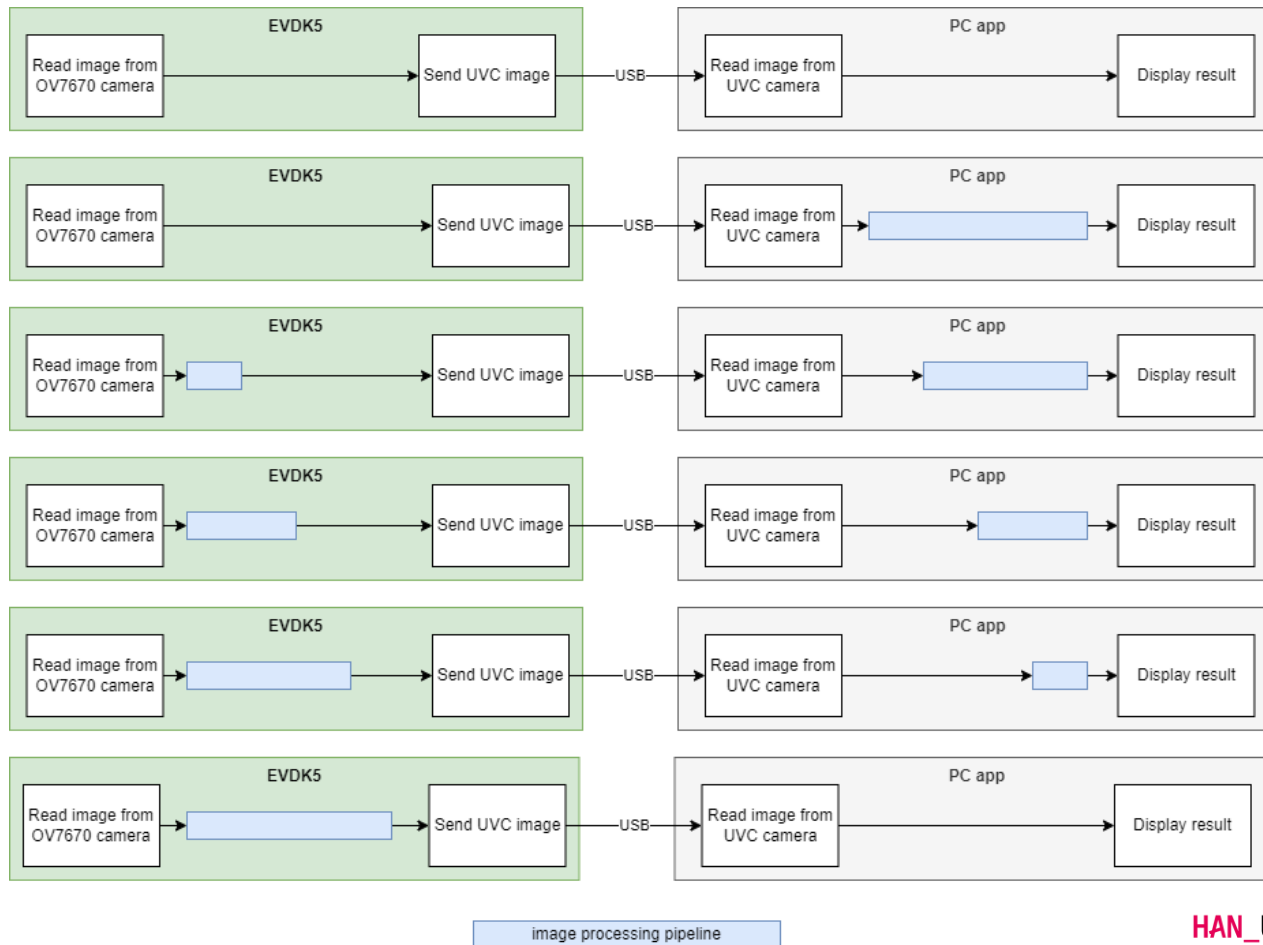
- Greyscale and color image processing (RGB565)
- Two image sizes: QVGA and QQVGA
- LCD
- 12 Mbit per second via USB
- 15 fps (standalone, QQVGA, incl. vision operators)
- 340 kbyte internal RAM and 4 Mbyte external SDRAM

# EVD1 – Present: EVDK5

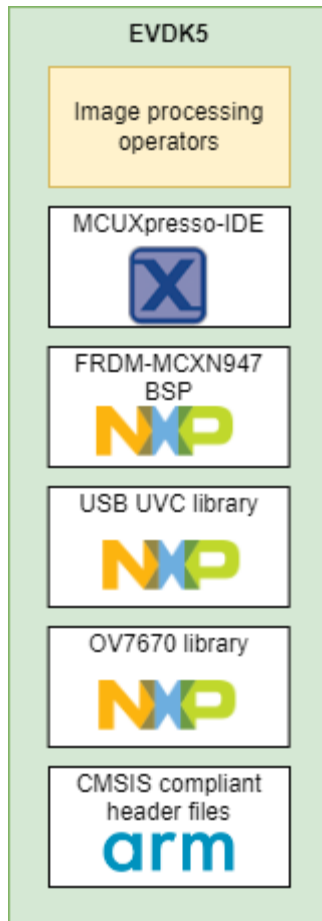
2024-2025



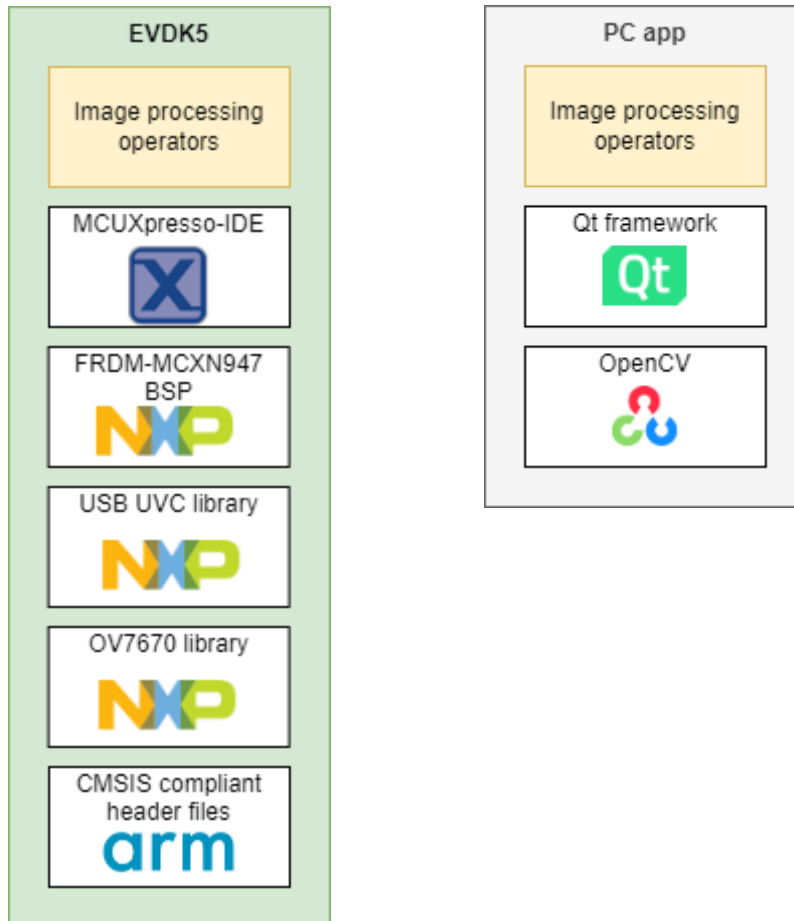
# EVD1 – Workflow



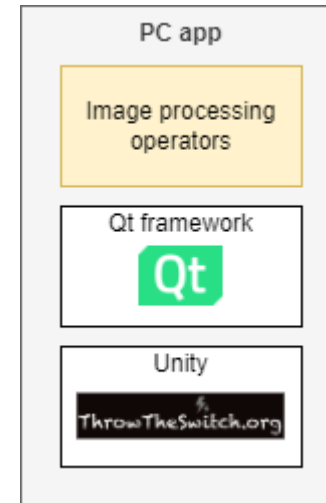
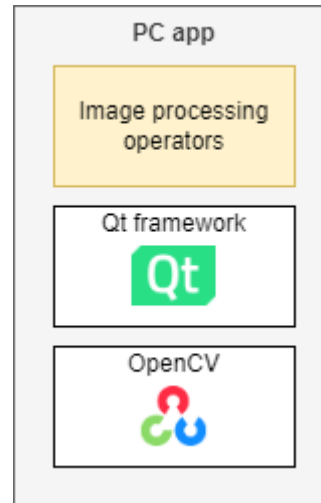
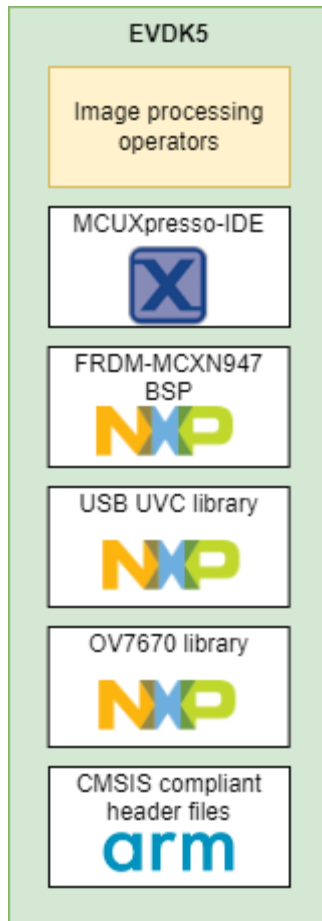
# EVD1 – Tools and software



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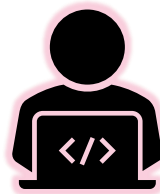


# EVD1 – Demo





# EVD1 – Assignment



*Study guide*  
***Final Assignment***

# EVD1 – Assignment



*Study guide*

***Week 1***

*1 SDE setup*

*2 FRDM-MCXXN947 changes*

*3 Hello Webcam!*

# EVD1 – Assignment

- Working together is allowed, copying is not!!
- Unique operator selection starts in the coming weeks