

HAN Engineering - Embedded Vision Design

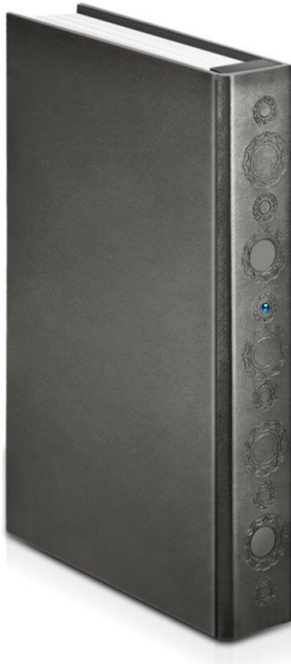
EVD1 – period 2 Introduction



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

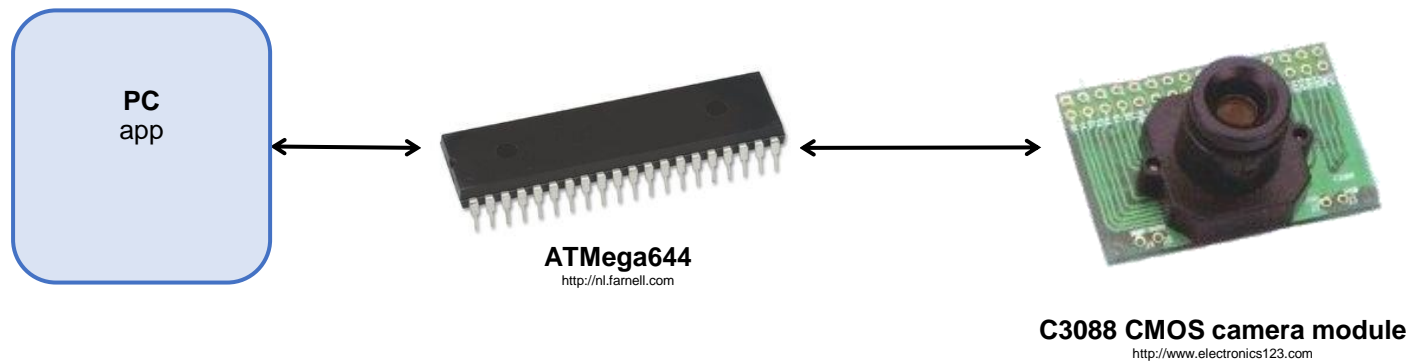


Requirements: Offer a development environment for image processing operators that can be ...

- ... 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

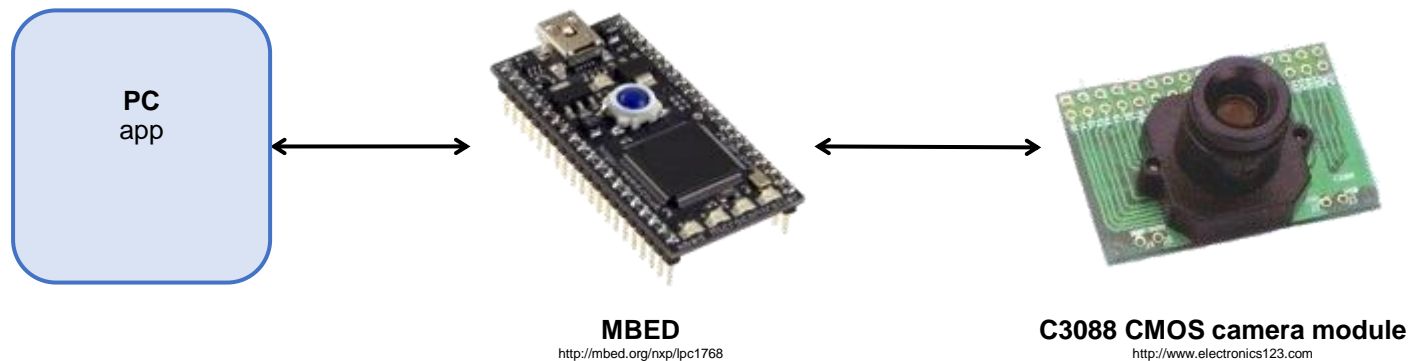


Features:

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

EVD1 – History

EVD1 2010-2011

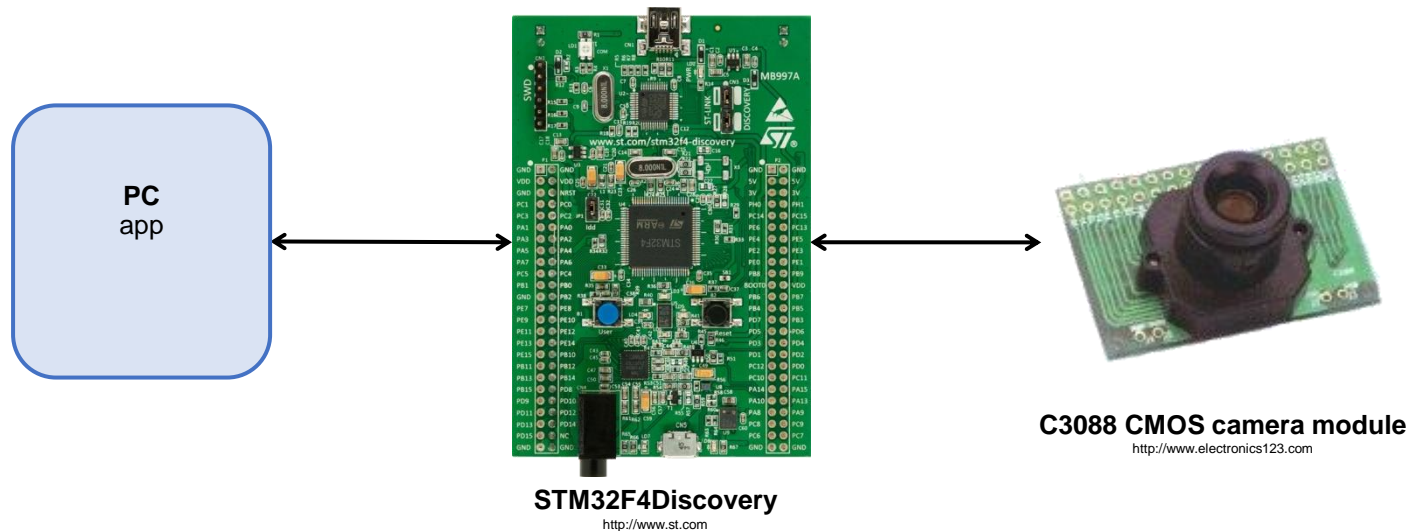


Features:

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

EVD1 – History

EVD1 2011-2012

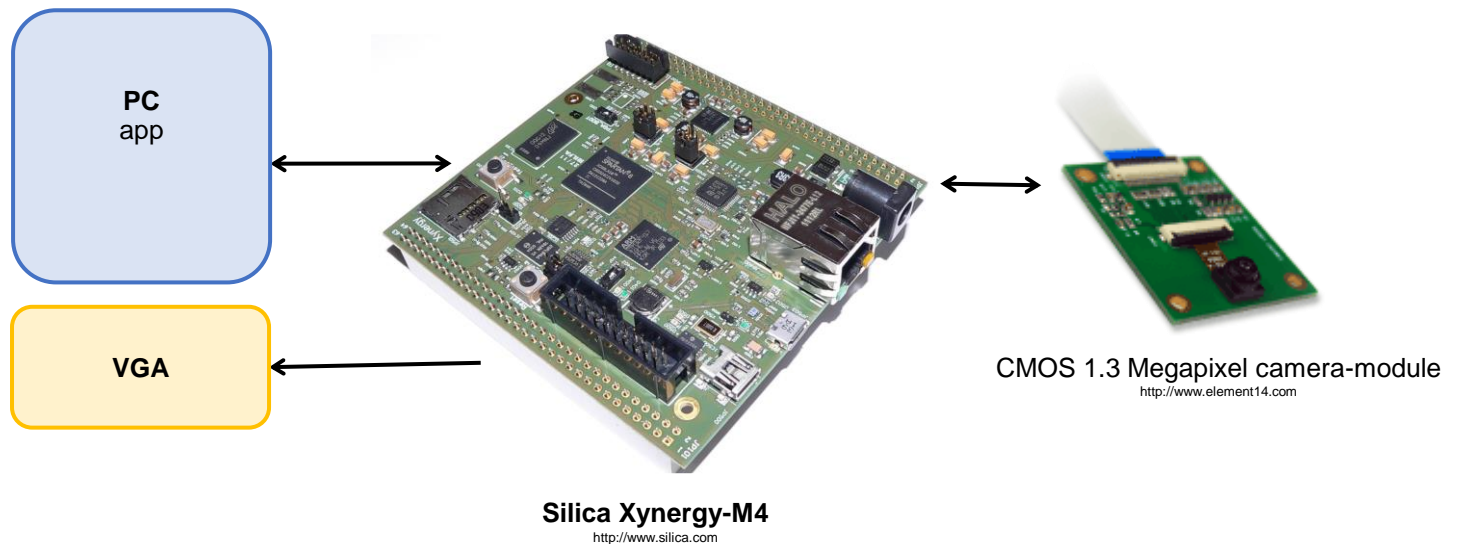


Features:

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

EVD1 – History

EVD1 2013-2014

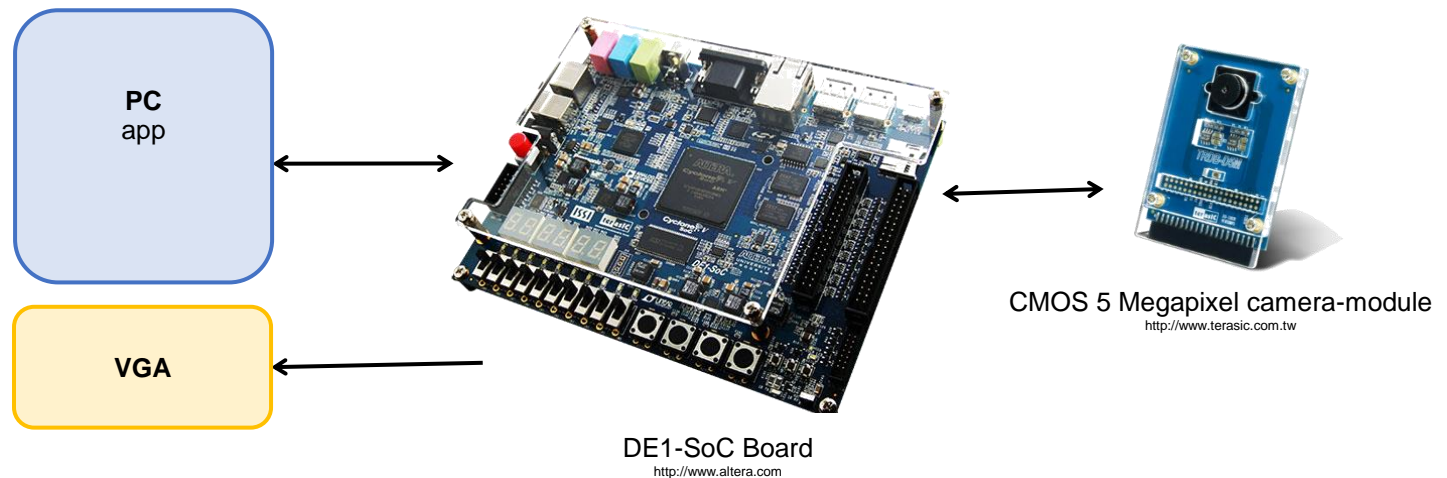


Features:

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

EVD1 – History

EVD1 2014-2015

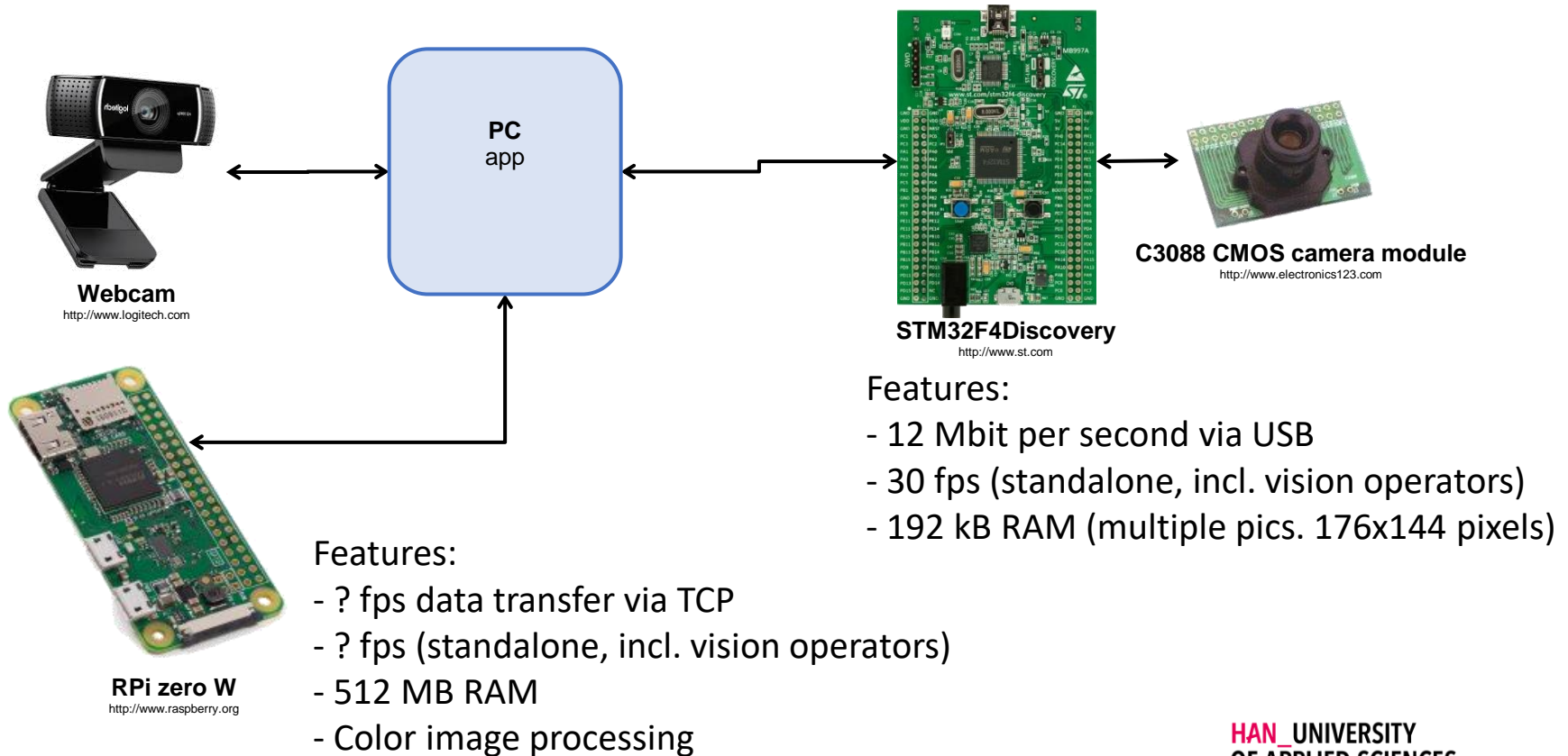


Features:

- ? 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)

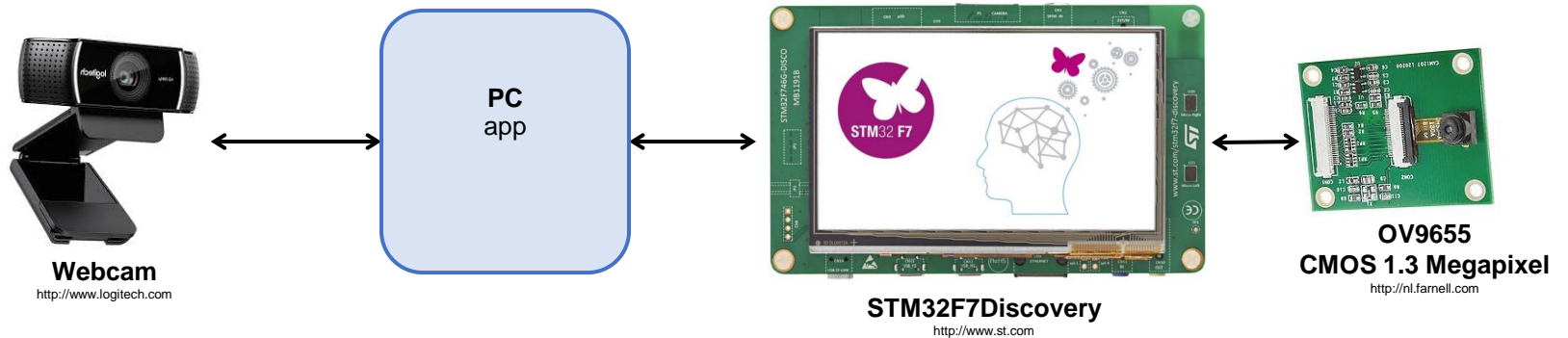
EVD1 – History

2017-2018



EVD1 – History

2020-2021

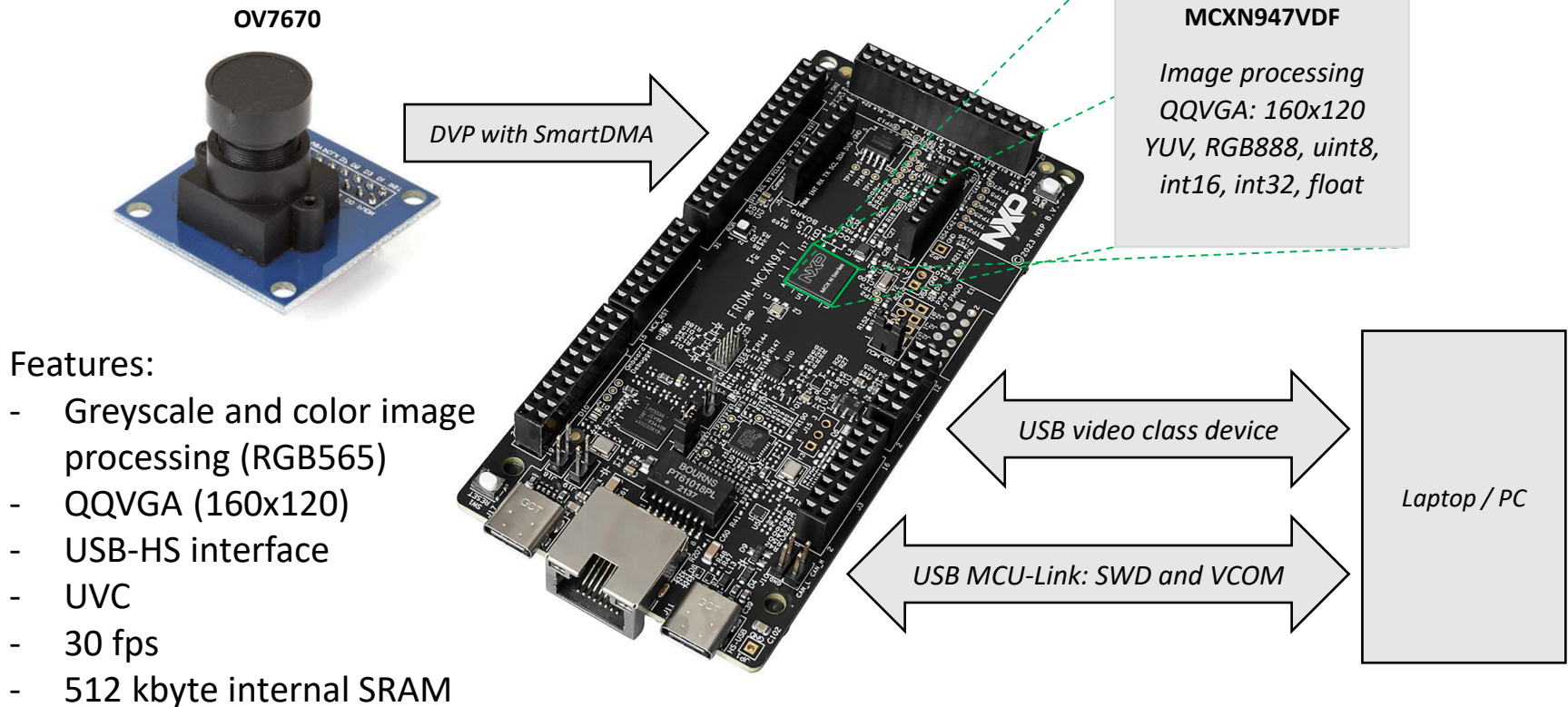


Features:

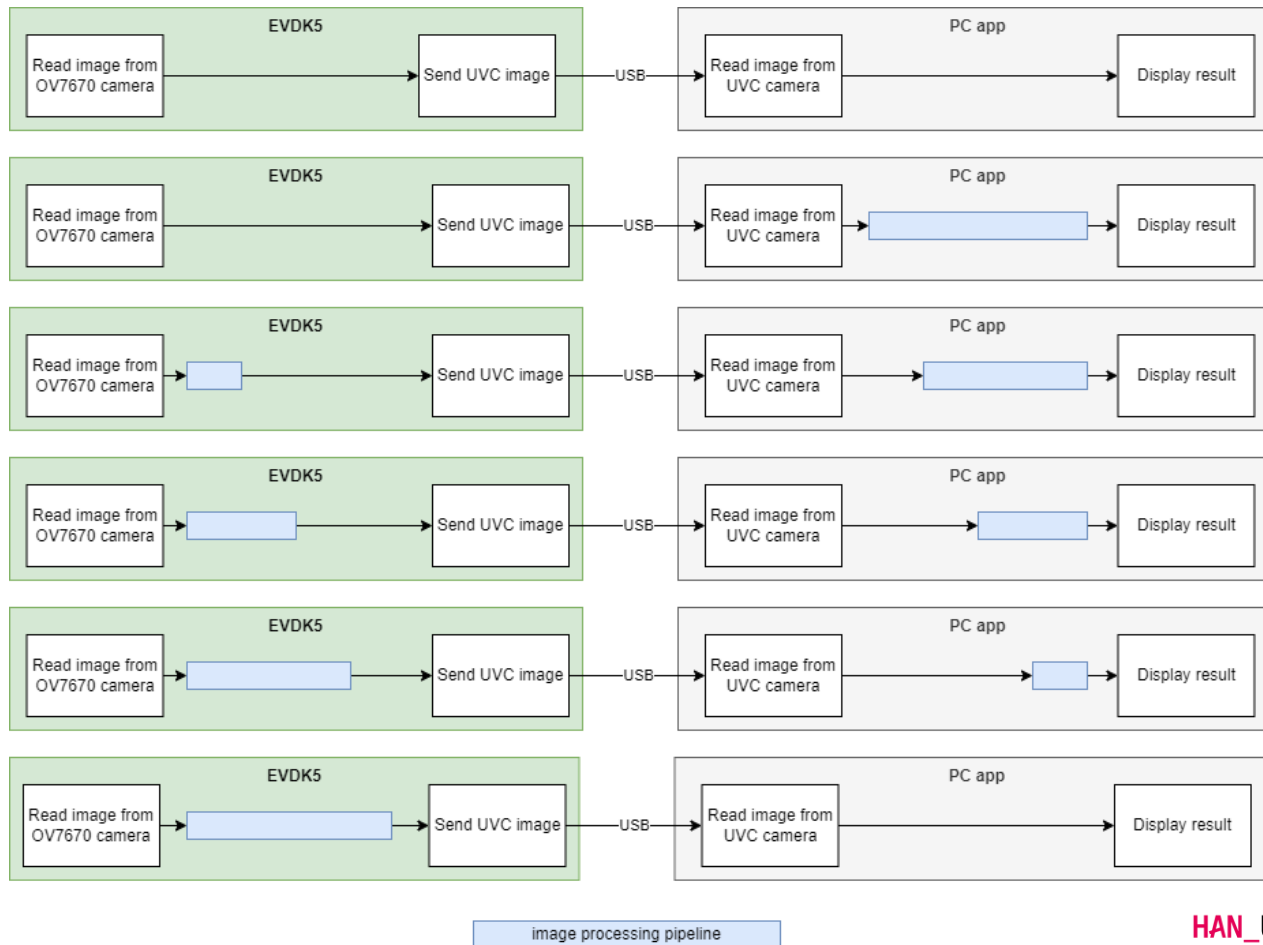
- Greyscale and color image processing (RGB565)
- Two image sizes: QVGA and QQVGA
- LCD
- 12 Mbit per second via USB
- 15 fps (standalone, QQVGA, incl. vision operators)
- 340 kbyte internal RAM and 4 Mbyte external SDRAM

EVD1 – Present: EVDK5

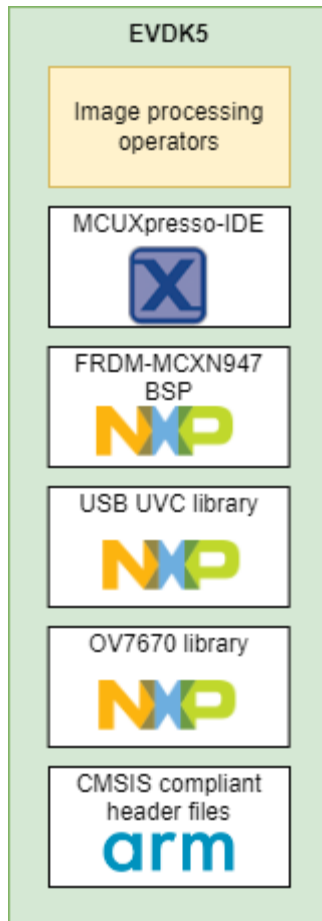
2024-2025



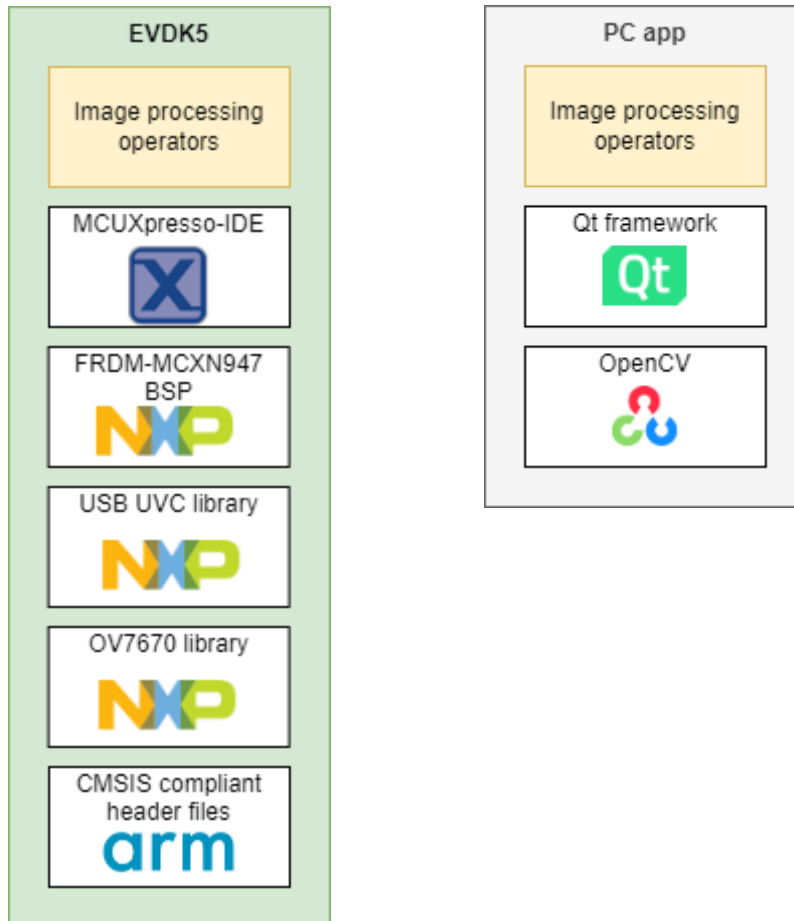
EVD1 – Workflow



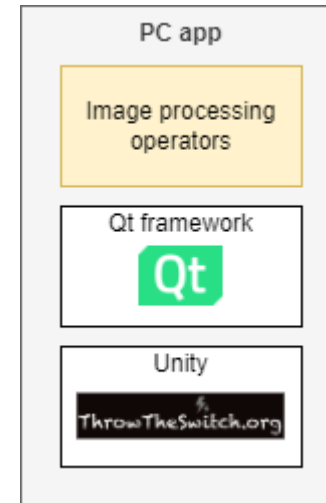
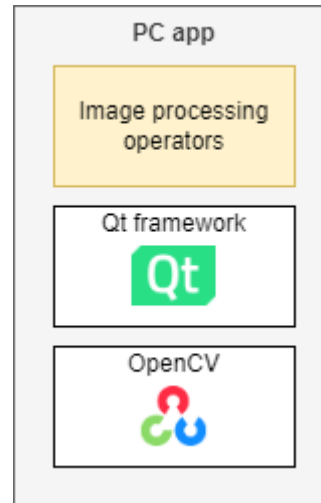
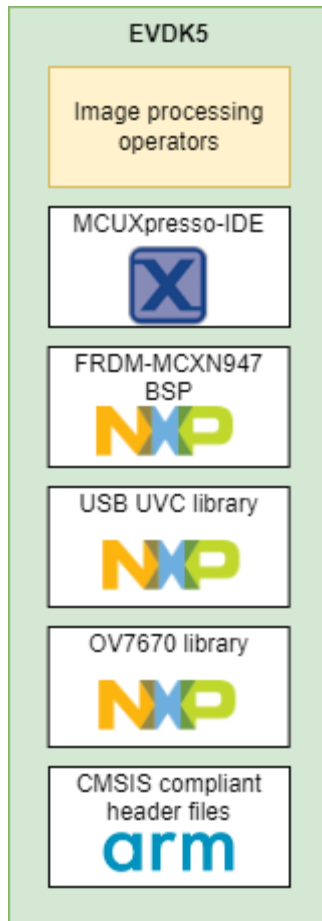
EVD1 – Tools and software



EVD1 – Tools and software



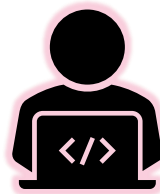
EVD1 – Tools and software



EVD1 – Demo



EVD1 – Assignment



Study guide
Final Assignment

EVD1 – Assignment



Study guide

Week 1

2 SDE setup

3 FRDM-MCXXN947 changes

4 Hello Webcam!

EVD1 – Assignment

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