8 OKT ← VAN DER VALK HOTEL EINDHOVEN D&E event 2019

kontron S&T Group

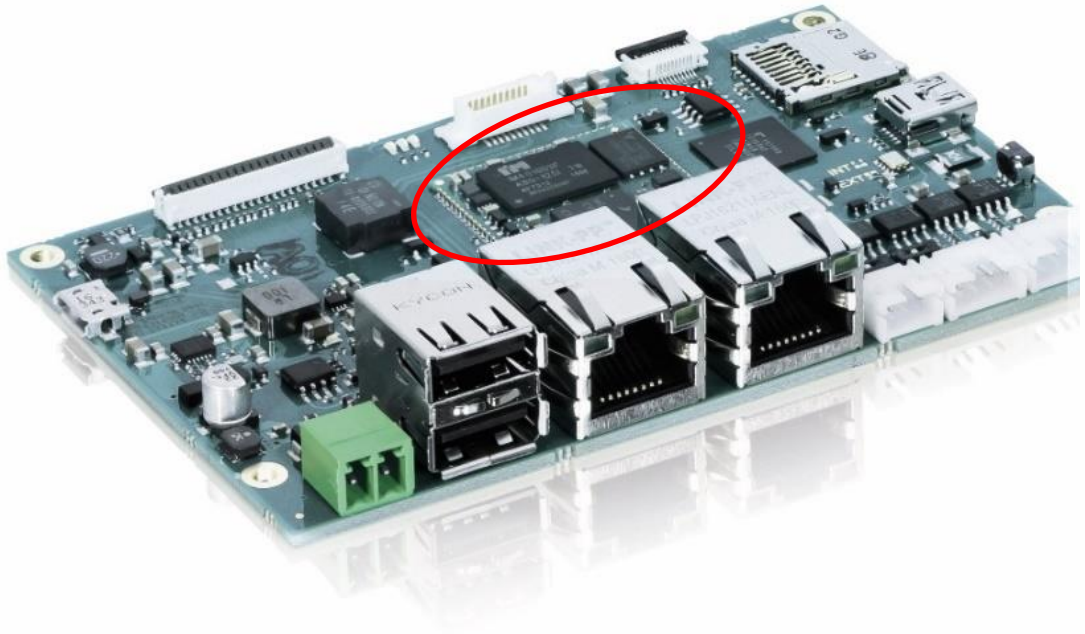
NOT „MAKE OR BUY“ BUT „BUY AND MAKE“

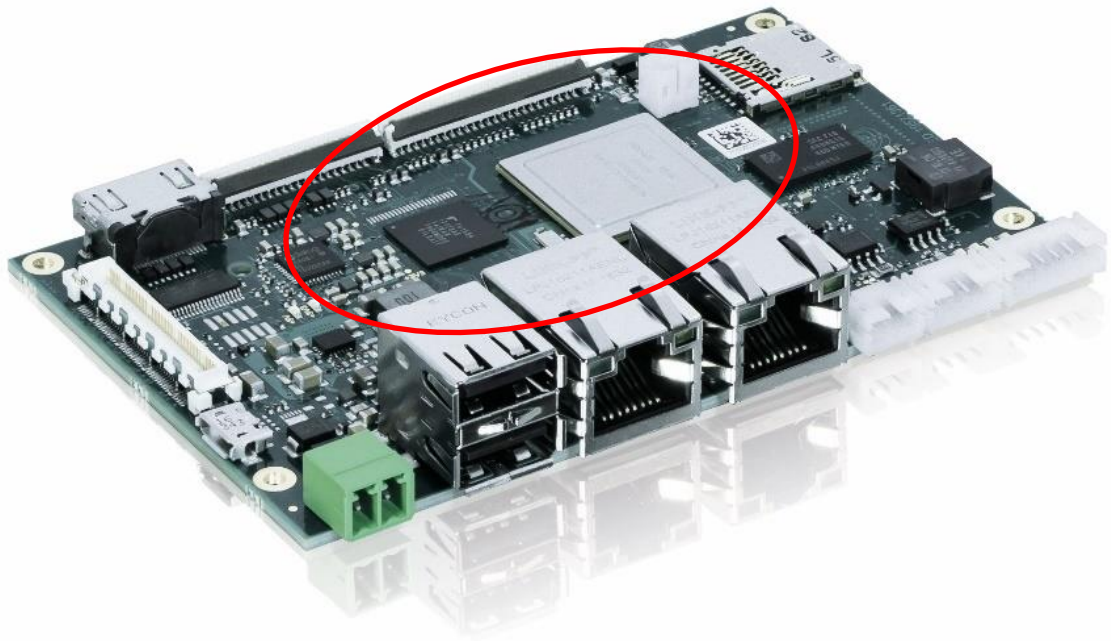
WHY BETTER DESIGN WITH A SOM INSTEAD OF AN ONBOARD CPU

Design Automation & Embedded Systems
Eindhoven, 08.10.2019

Holger Wußmann

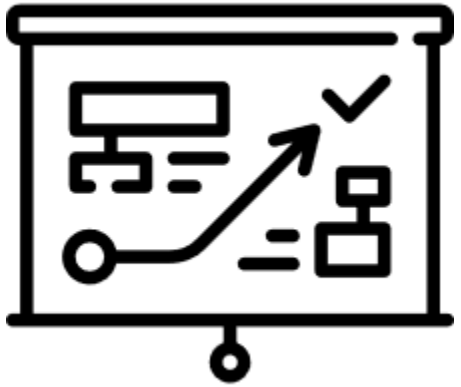
LOOKING LIKE TWINS: SOM VS. SBC





STRATEGIC ASPECTS

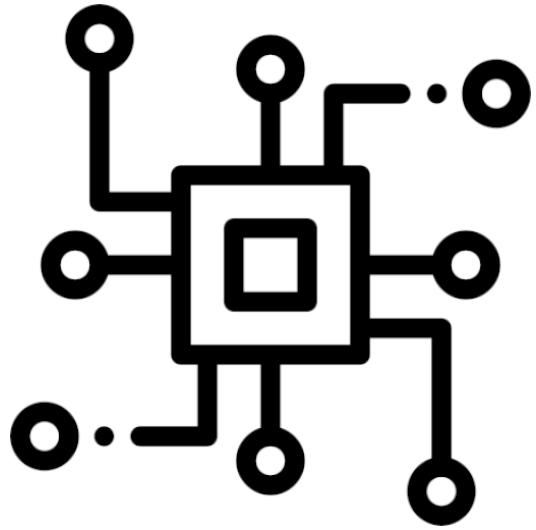
- Ready developed core module.
  - Shorter time to market
  - Less design risk
  - Long term available CPU core
- A product optimized in every respect



- Open X (Open Source, Open Hardware, Open Software)

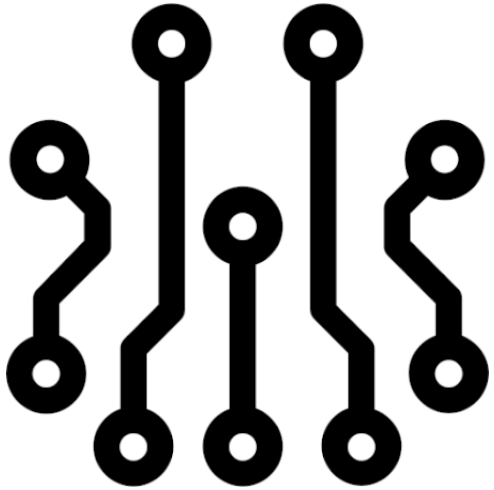
SCHEMATIC DESIGN ASPECTS

- You can use a ready developed module.
  - Core functions are complete and ready to use
  - CPU setup
  - CPU Multiplexing
  - Power supply (Power up/down sequencing)
  - Memory design done
    - DDR3/DDR4 RAM
    - Onboard NOR/NAND Flash or eMMC
  - Design is BOM optimized (I know what I need)



LAYOUT DESIGN ASPECTS

- You can use a ready developed module.
  - Complex DDR3/DDR4 RAM design done
    - Length adjustments
    - Signal delay adjustments
    - RAM-Timing already calibrated
    - High frequency design needed
    - Optional simulation needed
  - Space needed is defined right from the beginning
  - EMC is checked
    - decoupling capacitors are placed (in right number and right position)
    - Impedance controlled lines are designed



TECHNOLOGICAL ASPECTS

- Separation of normal and ultra-fine conductor structures (on baseboard and SOM)
- Separation of very small parts (0201) and bigger parts with thermal or mechanical requirements (production machines / pcb requirements)
- Mechanical decoupling of sensitive components from stressed components (BGAs separated from plugs and sockets)

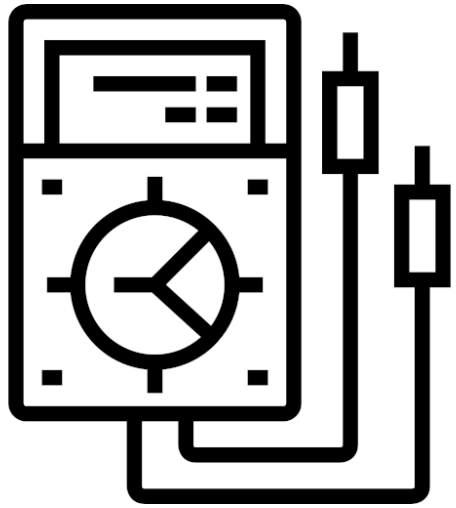
Technologie
Pinabstände

Produktion

TESTING ASPECTS

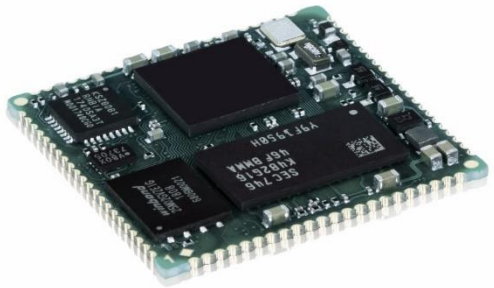
- Can be individually tested
- Can be tested deeper and more intelligent in terms of accessable testing points
- Significant less own testpoints needed
- Delivery tested and preconfigured

- Will be tested by a robot



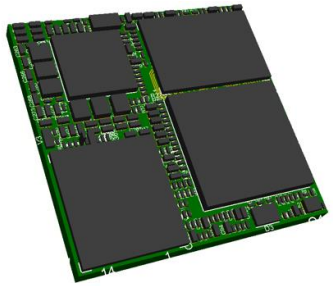
SYSTEMS ON MODULE: I.MX6ULL/I.MX8MM/MP157

SOM-i.MX6UL/ULL



SOM-STM32MP157

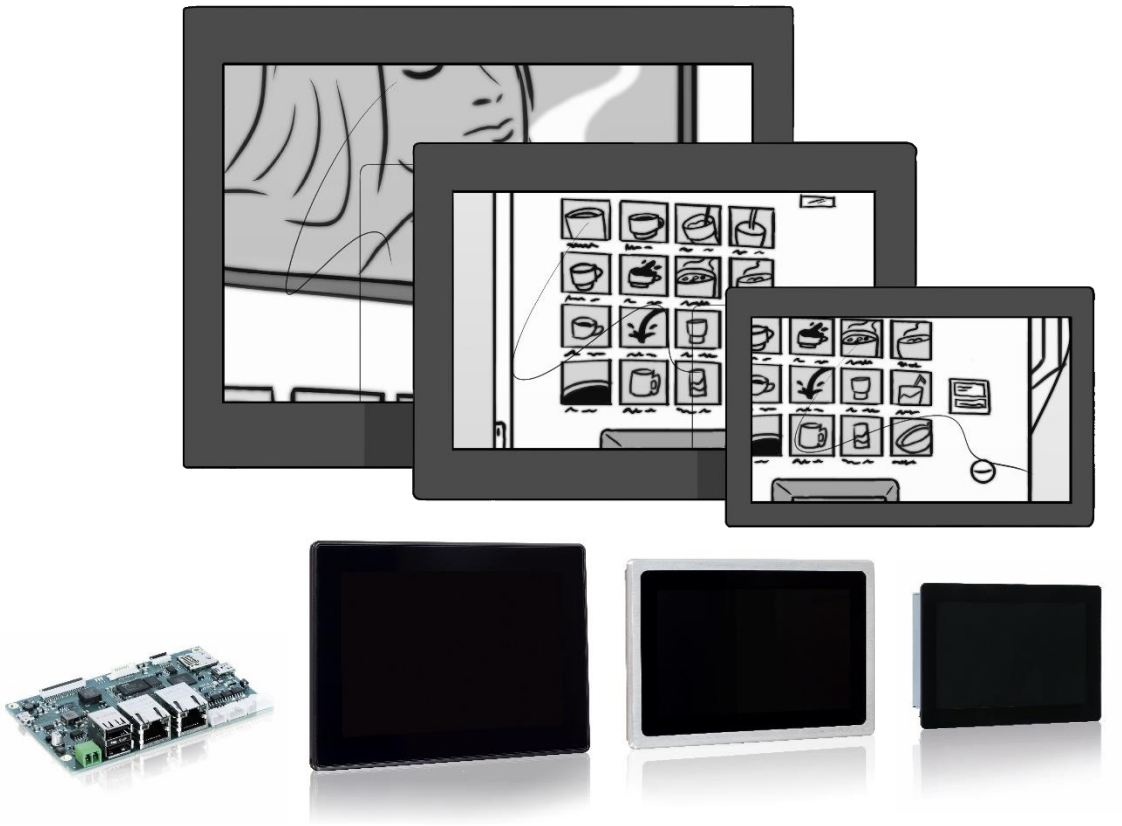
SOM-i.MX8MM



HMI ASPECTS

- Generic graphics interfaces on SOM
- Converter to individual display on base or adapter
- Family adapter concept

DISPLAY-LINE: MULTITOUCH-PANELS BASED ON BOARDS AND SOMS



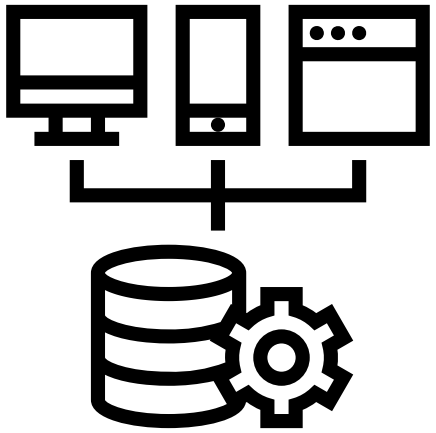
- **Size**
- Standard size: 5 / 7 / 10,1 inch
- Custom formats: possible, MOQ 500 p.a.

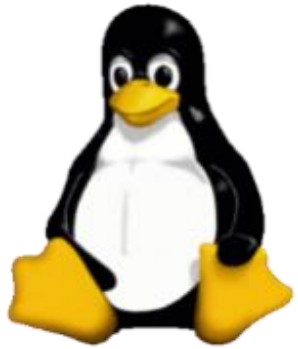
- **Front**
- Only glass
- Glass with metal frame

- **Software**
- Linux
- C
- Webterminal
- (CODESYS)

SOFTWARE ASPECTS

- Bootloader (Uboot)
- Linux BSP (Yocto based)
- GUI via QT
- Individual Software





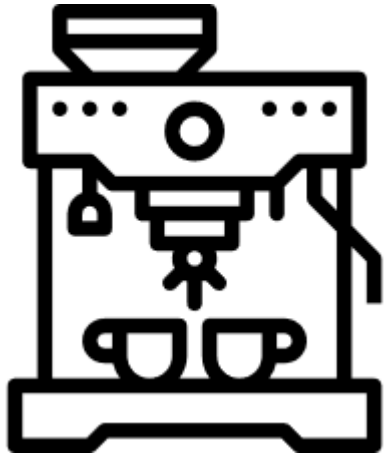
COST ASPECTS

- Separation of the (small) 8+ layer SOM and the (larger) 4 layer baseboard
- benefit from higher quantities
- product maintenance free of charge

SUMMARY OF ASPECTS

- Designing a system based on a modern, complex CPU is not a simple thing.

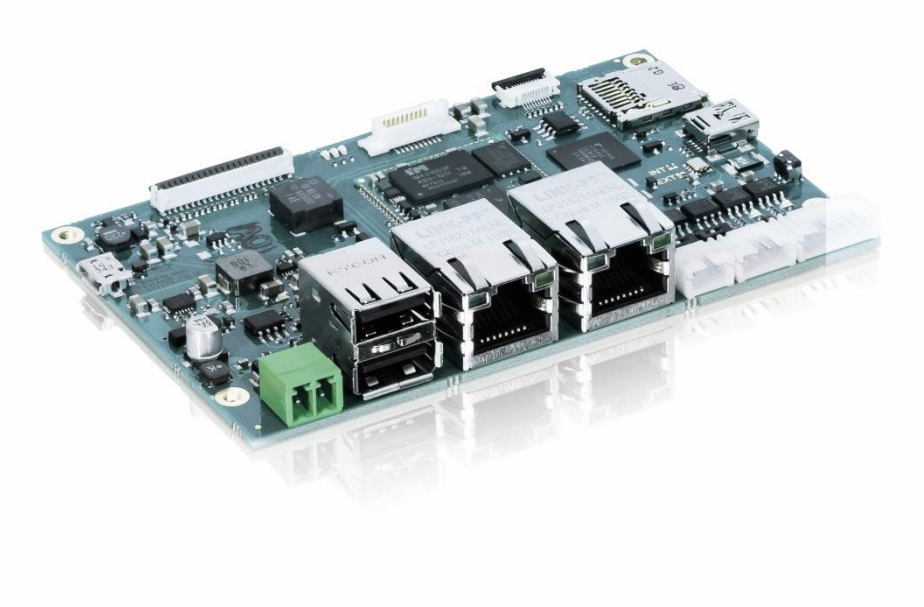
- Concentrate on your USP:
  The scope and the features of your product are your USP.
  The features, the functionality, the interfaces are placed on the baseboard.
  - You get the schematic and the BOM of our baseboard (Open source hardware).
  - You get the Linux BSP (Open source software)
  - You can get design support (Review of schematic and layout)



BASEBOARDS

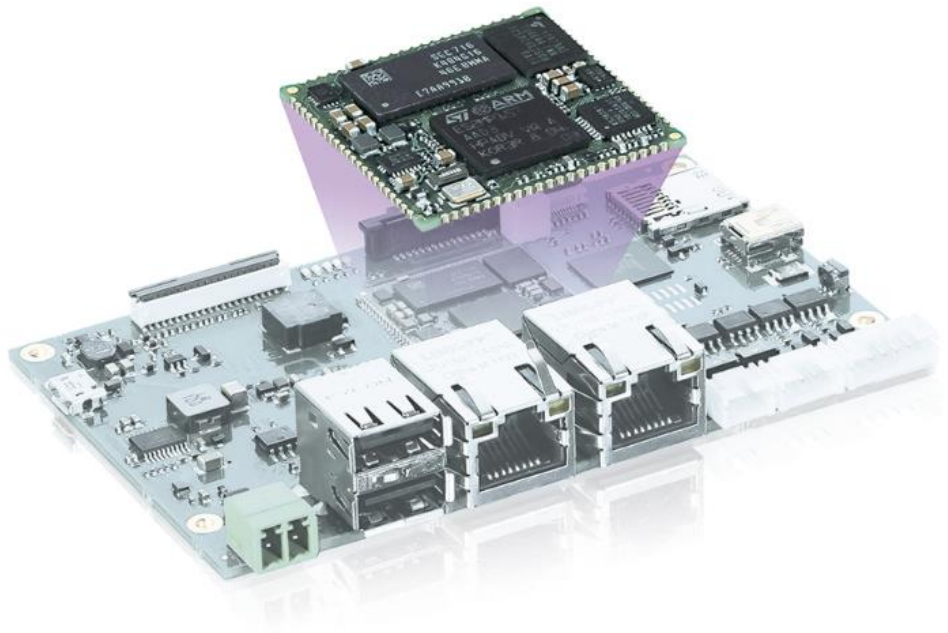
i.MX6 ULL

formfactor 4,3”



STM32MP157

formfactor 4,3”



#thankyouforyourtime

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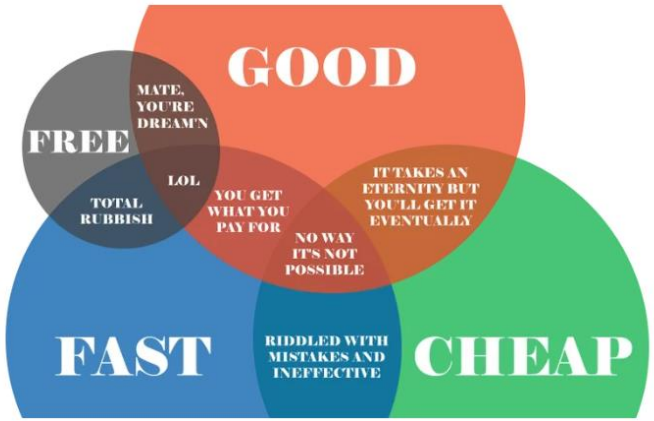
#backlog


Budget/Cost
Quality
Scope
Time/Schedule


Budget/Cost
Resources
Risk
Quality
Scope
Time/Schedule
Quality


GOOD
FREE
FAST
CHEAP
MATE, YOU'RE DREAM'N
LOL
TOTAL RUBBISH
YOU GET WHAT YOU PAY FOR
NO WAY IT'S NOT POSSIBLE
IT TAKES AN ETERNITY BUT YOU'LL GET IT EVENTUALLY
RIDDLED WITH MISTAKES AND INEFFECTIVE

KEY TECHNOLOGIES

FOR CUSTOM DESIGNS

Display / Touch / Glass

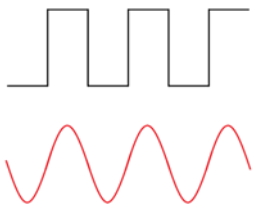
- Any size
- Any touch technology
- Any custom decor-glass

Fieldbus Communication

- CANbus
- EtherCAT
- Profibus / ProfiNet
- Modbus
- RS 485

I/O Modules

- Digital and Analog I/O
- Counter / PWM
- Temperature



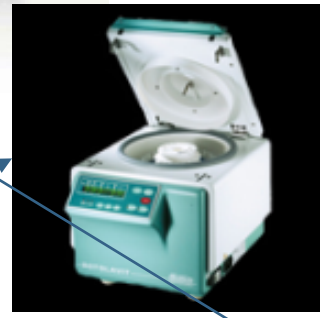
Wireless

- Bluetooth, BLE
- WiFi (even R-Standard)
- GSM/LTE

I.M. DIE ERSTEN ERFOLGE

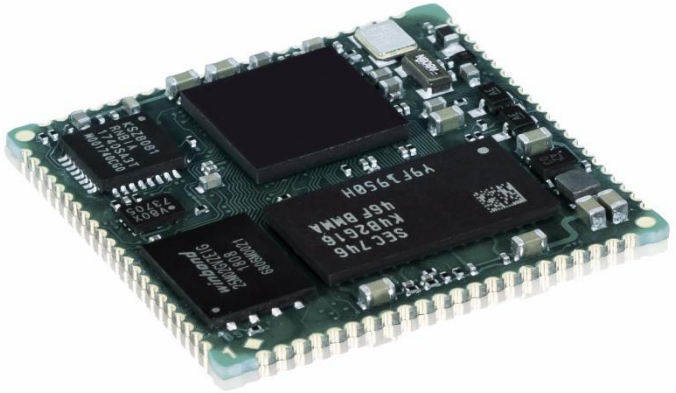
Realisierte Projekte

- JUDO: WASSERENTHÄRTUNG / DOSIERPUMPEN
- BERGHOF: DISPLAY-SPS
- ROMTOM / COBOX (ESS)
- CAB: ETIKETTENDRUCKER
- MR. FRIENDLY: MEDIAPLAYER IM URINAL
- SOMFY: WANDDISPLAY ALS RAUMCONTROLLER
- LEITNER: MULTIMEDIA-DISPLAY (EEA)
- SIELAFF: BEDIENTERMINAL VENDING-AUTOMATEN
- HETTICH: MEDIZINISCHE ZENTRIFUGEN
- TZM: UNIVERSAL MEDICAL GATEWAY (EEA)
- (OHNE BILD)



SYSTEM ON MODULE: NXP I.MX6UL / ULL

SOM-i.MX6UL/ULL



- NXP i.MX6UL / ULL Cortex A7 Serie, 1 Core
- 528 / 800 / 900 MHz
- 256 MB to 512 MB / 1 GB DDR3
- 256 MB to 512 MB Flash

- 1x USB2.0 Host, 1x USB OTG
- 2 x 10/100 Mbit Ethernet
- RGB Display Interface
- Capacitive Touch Interface

- Up to 2x CAN
- Up to 5x UART
- Up to 48 GPIO (RGB)
- Up to 8x Analog Inputs
  Up to 4x PWM

- RTC
- Embedded Linux, CODESYS V3

SYSTEM ON MODULE: STM32MP157

SOM-STM32MP157

- STM32MP157 Dual Cortex A7 + Cortex M4
- 2x 650 MHz / 1x 200 MHz
- 256 MB to 512 MB DDR3-RAM
- 256 MB to 512 MB NAND-Flash
- 2 MB NOR-Flash

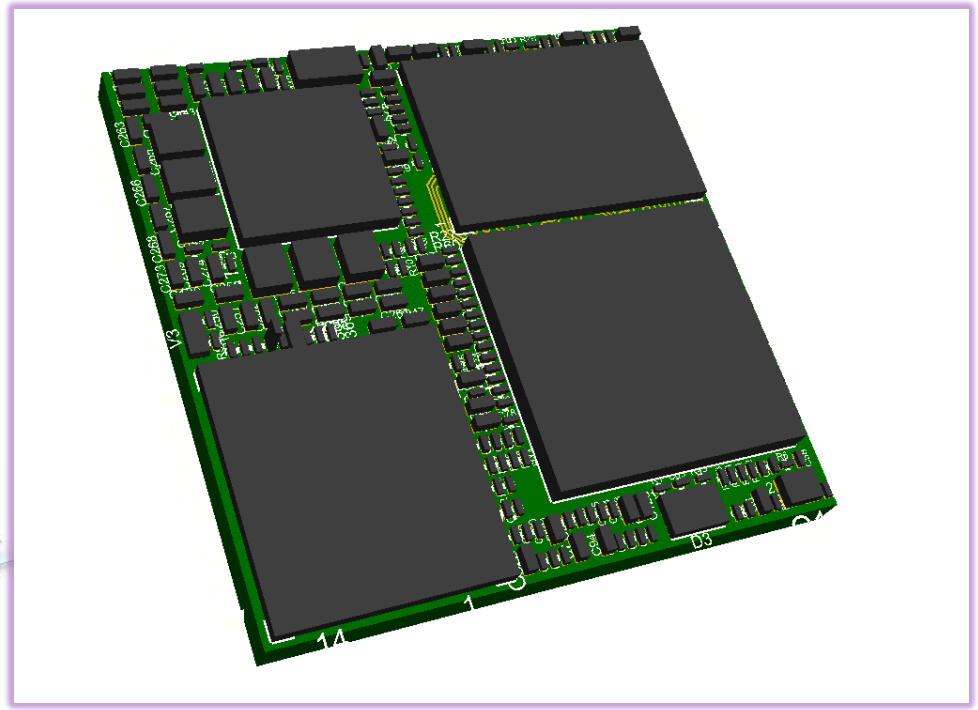
- 2x USB 2.0
- 1x USB as OTG
- 1x 10/100 Mbit Ethernet
- LCD Interface 1x DSI, 1x RGB

- Up to 2x CAN
- Up to 8x UART
- Up to 6x I2C
- Up to 6x SPI
- Up to 98x GPIO
- Up to 17x Analog IN
- Up to 4x PWM, 2x DAC
- 3 x SDIO 4.0, 8 bit
- RTC

- Embedded Linux, CODESYS V3

SYSTEM ON MODULE: ARM I.MX8M MINI

i.MX8M mini



- i.MX8M mini
- 4 x 1.6 GHz
- 1 GB LPDDR4 RAM
- 4 GB eMMC
- 1 MB NOR-Flash

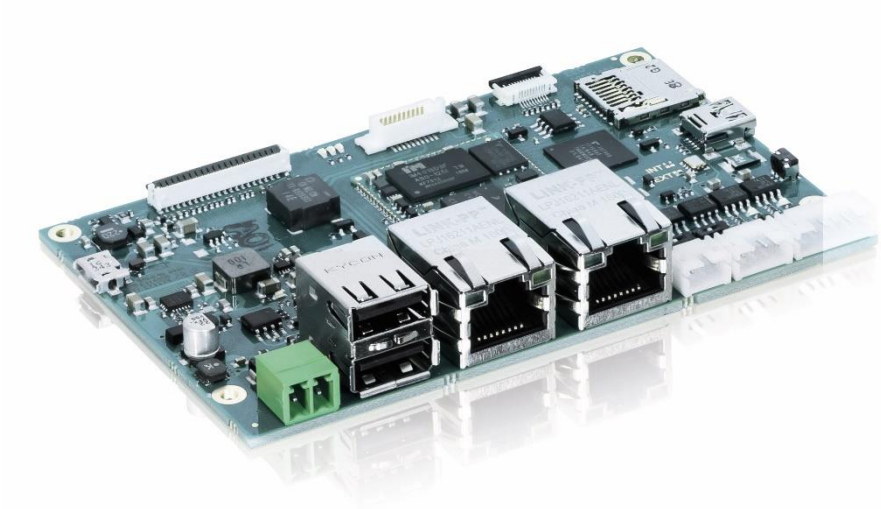
- 2 x USB 2.0 OTG
- 1 x Gigabit Ethernet
- 2D / 3D GPU
- 1 x MIPI DSI (4-lane) with PHY
- 1 x PCIe 2.0 (1-lane) with L1 low power substates

- Video Playback
  1080p60 VP9 Profile 0, 2 (10-bit) decoder, HEVC/H.265 decoder, AVC/H.264 Baseline, Main, High decoder, VP8 decoder
- Audio
  5x SAI (12Tx + 16Rx external I2S lanes), 8ch PDM input
- Camera Interface
  1x MIPI CSI (4-lane) with PHY
- Embedded Linux, CODESYS V3

BASEBOARD WITH I.MX6 SOM

i.MX6 ULL

formfactor 4,3”



- NXP i.MX6ULL Cortex A7 900 MHz

- 256 MB up to 1 GB DDR3
- 256 MB up to 512 MB Flash
- 4 up to 128GB eMMC
- MicroSD-Slot

- 2 x 10/100 Mbit Ethernet
- 2x USB2.0 Host, 1x USB OTG
- 1 x CAN (alternative: 1x RS485)
- 1x RS 232
- 2x DIO, 2x AI

- RGB Display Interface
- Capacitive Touch Interface

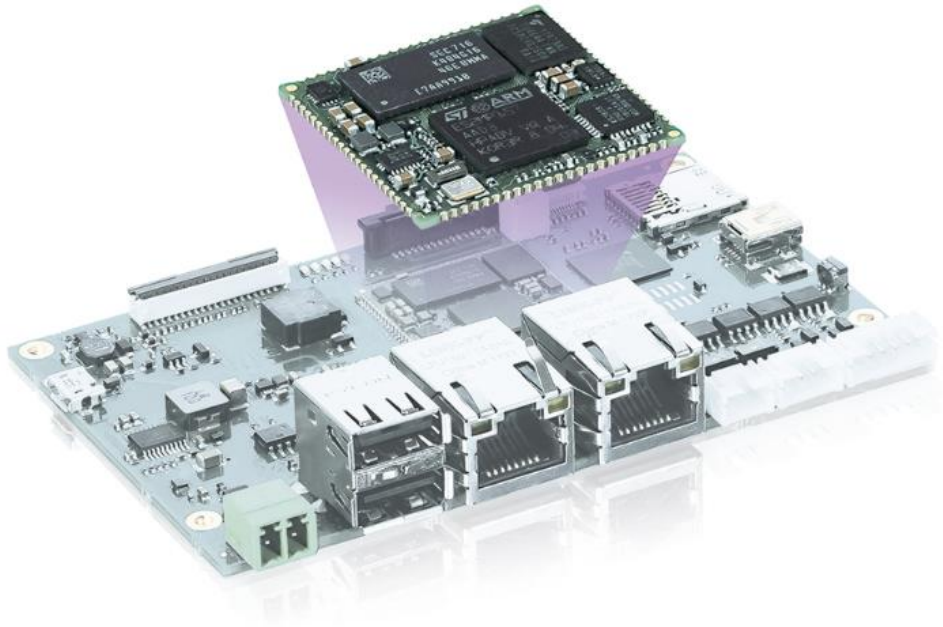
- RTC
- 1x Extension Slot

- Linux, CODESYS V3

BASEBOARD WITH STM32MP157 SOM

STM32MP157

formfactor 4,3”



- STM32MP157 (2x Cortex-A7@650MHz, 1x Cortex-M4@200MHz)

- 256 MB up to 512 MB DDR3
- 2MB NOR-Flash
- 256 MB uo to 512 MB Flash
- 4 up to 128GB eMMC
- MicroSD-Slot

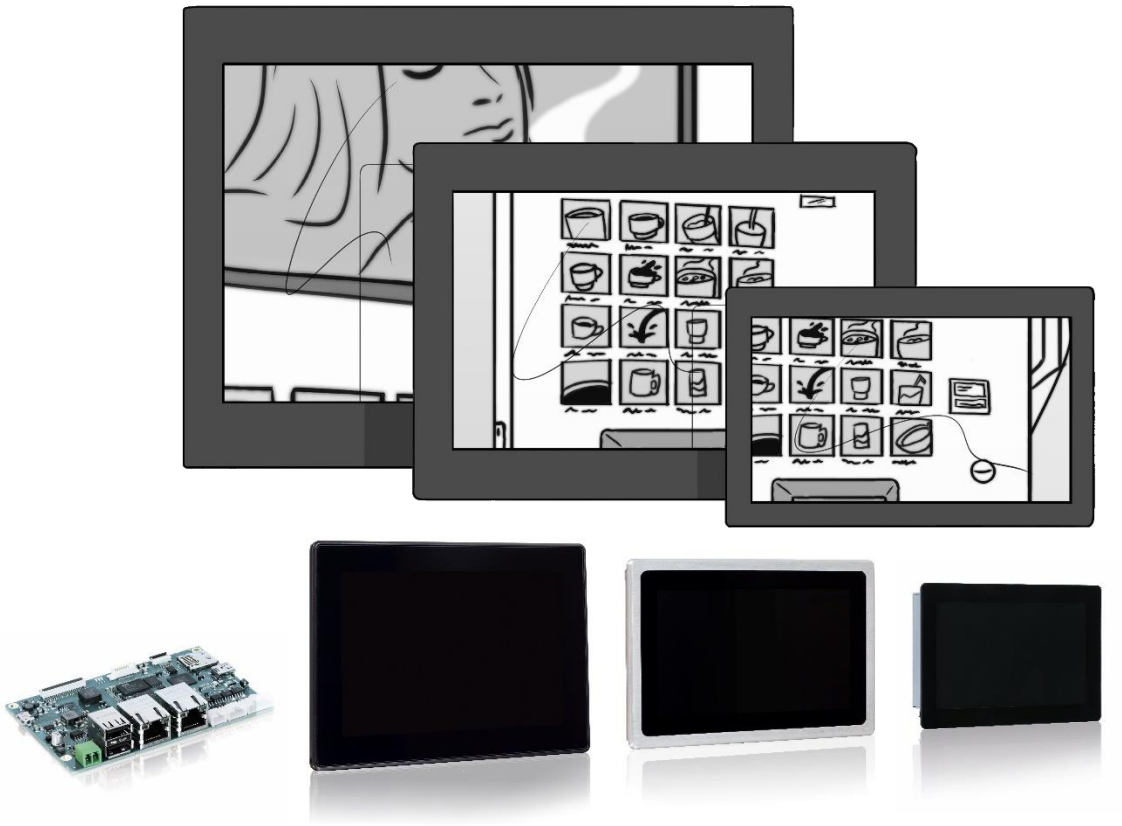
- 2 x 10/100 Mbit Ethernet
- 2x USB2.0 Host, 1x USB OTG
- 1 x CAN with RS485
- 2x digital IO DIO, 2x analog IN AIO

- RGB or DSI Display Interface
- Capacitive Touch Interface

- RTC

- Embedded Linux (Yocto)

DISPLAY-LINE: MULTITOUCH-PANELS BASED ON BOARDS AND SOMS



- **Size**
- Standard size: 5 / 7 / 10,1 inch
- Custom formats: possible, MOQ 500 p.a.

- **Front**
- Only glass
- Glass with metal frame

- **Software**
- Linux
- C
- Webterminal
- (CODESYS)

COFFEE VENDING MACHINES

FRESH BREWED COFFEE AND HOT DRINKS

- Floor-mounted appliances
- Tabletop units
- Display
- Touch
- HMI electronic and machine control unit
- Interface to payment systems (MDB)
- Data logging (EVA-DTS)
- User Interface defined bei UX-experts

BAKERY OVEN

GLASS-TOUCH-HMI AT HIGHER ENVIRONMENTAL REQUIREMENTS

- Baking stations
- Bakery systems
- Bakery cooling systems
- Increased temperatures
- Increased humidity / steam
- network

TOUCH-DISPLAY

CONNECTED EMBEDDED CONTROL

- i.MX6 Freescale Prozessor
- Linux
- Display / Touch (resistive)
- Wifi (connection to the company server)
- Bluetooth (connection to the service smartphone)