CEVA TECHNOLOGY
SYMPOSIUM SERIES

Project ARKS, the only “Vision DSP Oriented IoT Platform”, designed from Algorithm to Application

Ready for Voyage on ARKS to Blue Ocean

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SOHO Enterprise

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The VISION of Soho Enterprise

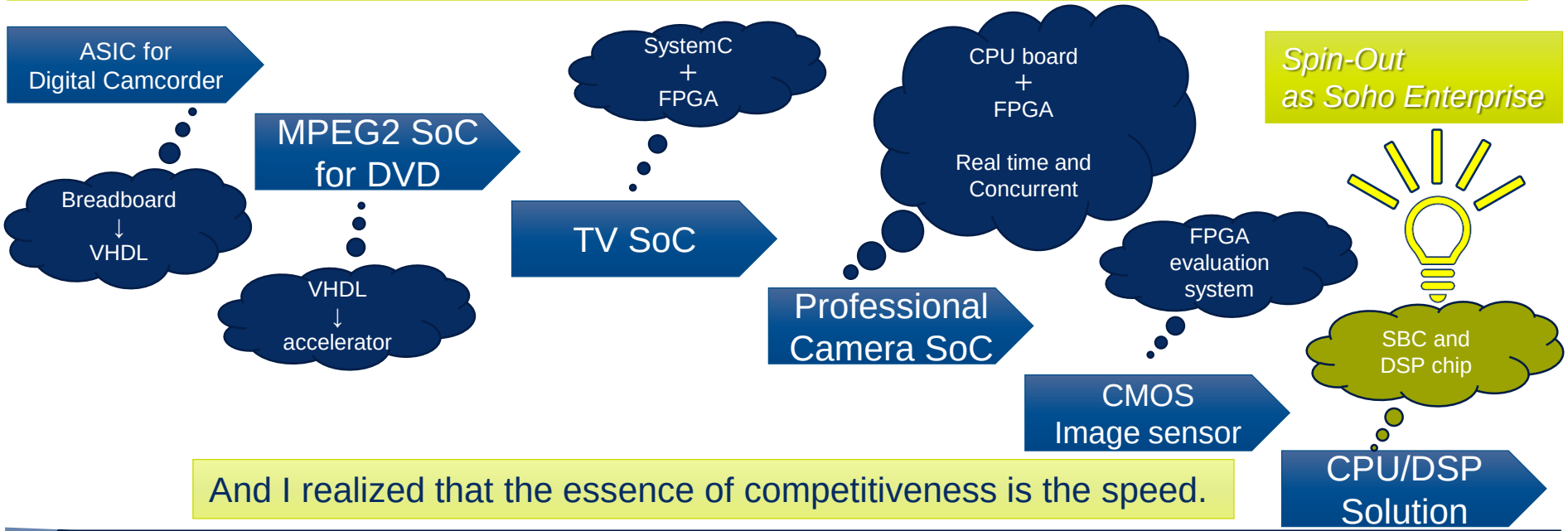
- Innovation that contributes to creation of customer innovation
  - Develop the “vision processing library” working on our vision sensing board which can be easily implemented into the customer’s vision application.
  - Accelerate the development with “vision algorithm library” on vision sensing board
  - Contributing to the realization of a safe and comfortable society by sensing technology

Introduction

Personal Career

1990 — 28 years — 2018

I've been thinking how to shorten the TAT of development and minimize the cost



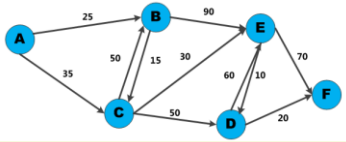
And I realized that the essence of competitiveness is the speed.

HW — SW

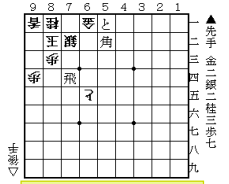
Those who take time control the business

The Original Concept of Service

Excellent Ideas



Vector Process SW

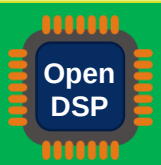


Minimum steps

CEVA-XM4

Algorithm optimization by
Human Intelligence based on …

Scientific Approach

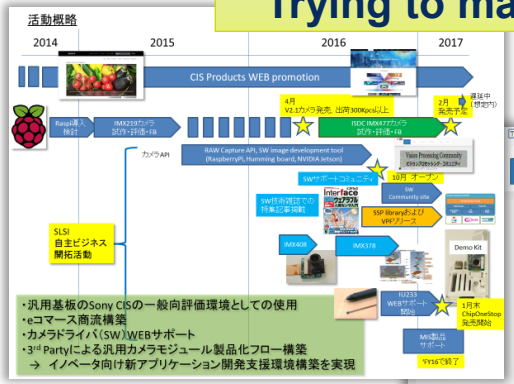


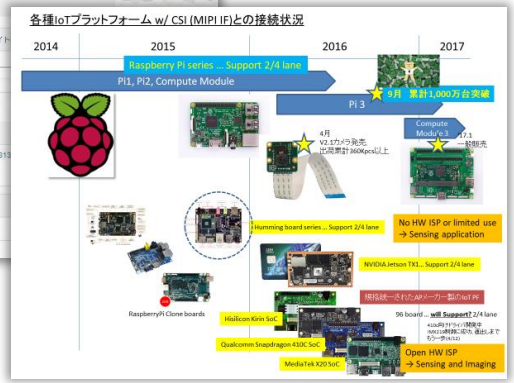
Open Platform

Consider
Performance Limitation

History to spread Vision Technology to the OSS community

Trying to make the “open innovations” happen





Camera Driver(API)
and Vision Processing Framework
on SBC
distributing from WEB community

Meet Rockchip and ASUS

Project ARKS

ARKS 3D Sensing kit

ToF + Stereo

Soho Enterprise

Foundation of
Soho Enterprise

What is Project ARKS?

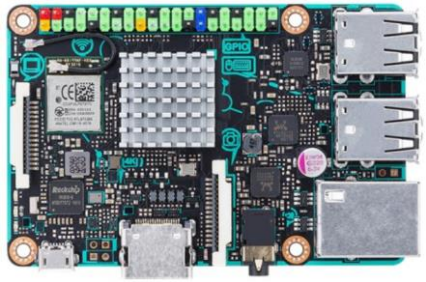
3D sensing DSP board on SBC for “OSS” community.

- Add high speed 3D sensing capability to SBC as IoT platform
- Fully SW-driven Solution for Rapid Development
  - Constructed on tinker board, x2 performance against Raspi.
  - Seamless development from algorithm evaluation to application
- Multiple MIPI interface
  - Flexibility of the image sensor option
  - High affinity for multi-camera application
- Simplified HW configuration and Small form factor
  - Easy to install into the system and high portability for FT

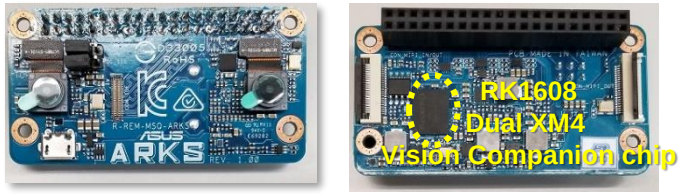
What is ARKS Cognitive HAT

The only “Vision DSP Oriented IoT Platform”

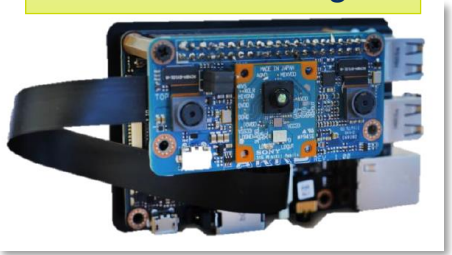
ASUS tinker board



ARKS Cognitive HAT



ARKS 3D Sensing kit



DSP SW development is NOT allowed for user

ARKS
DSP Vision System
Development Kit

Open to CEVA XM4 SDT users

RK1608 block diagram

RK1608B

System Peripheral
- Clock & Reset
- PLL x2
- System register
- Timer
- Interrupt Controller
- DMAC
- PMU
- Mailbox

CEVA-XM4
- DSP0
- I-TCM | I-cache | D-TCM

CEVA-XM4
- DSP1
- I-TCM | I-cache | D-TCM

Internal AXI/AHB/APB BUS

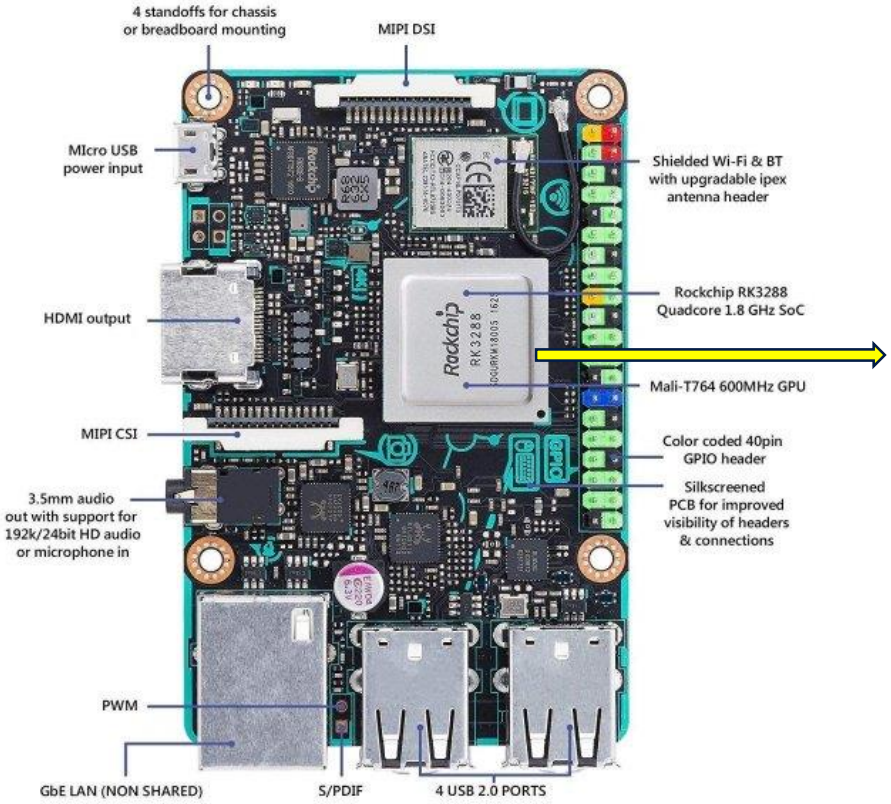
Connectivity
- UART x1
- SPI x1
- GPIO
- JTAG
- I2C slave
- I2C master

Multimedia I/F
- Three MIPI CSI-2 RX 4 lanes/channel
- One MIPI CSI-2 RX/TX 4 lanes/channel
- One MIPI CSI-2 TX 4 lanes/channel
- Bypass module

External Memory I/F
- LPDDR2-1066 32bits
- LPDDR2 DRAM KGD

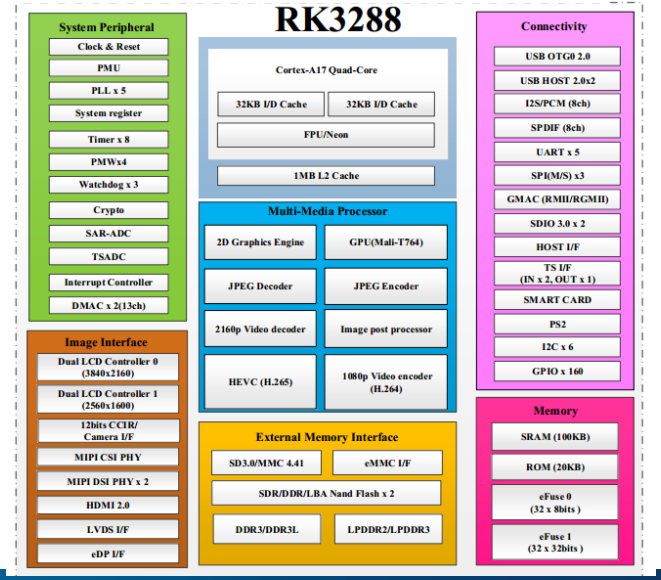
Embedded Memory
- SRAM (8kB)
- ROM

tinker board and RK3288 block diagram

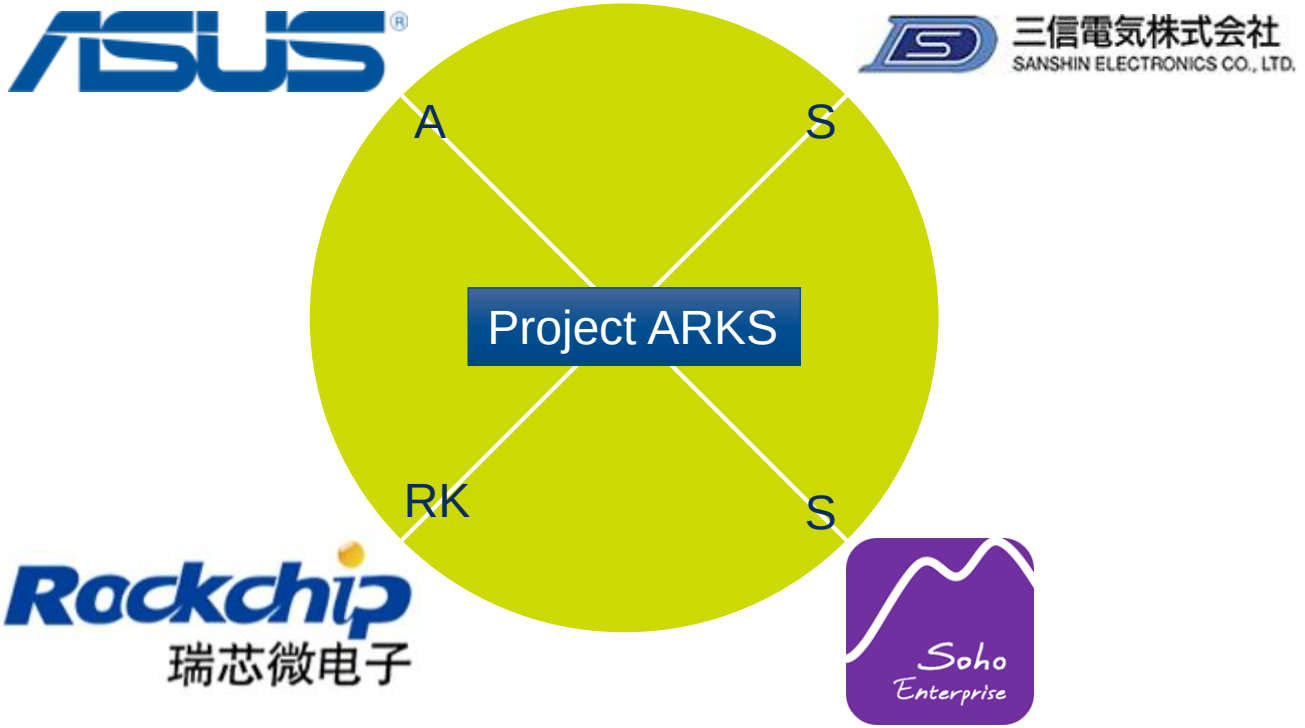


RK3288

- Quad-core Cortex-A17 up to 1.8GHz
- Mali-T764 GPU
- Dual-channel DDR3/DDR3L/LPDDR2/LPDDR3
- 4K UHD H265/H264
- BT.2020/BT.709
- H264 encoder
- TS in/CSA 2.0
- USB 2.0
- HDMI 2.0 with HDCP 2.2
- MIPI/eDP/LVDS/RGMII



Project Members



So, what is the benefit for XM4 users?
… It can be a Real Concurrent Development Platform

Conventional way

Non-Realtime

Realtime

Re-spin

Algorithm Study → SW Simulation → PoC Prototyping → ASIC → Concept Evaluation → problem

Consumes many human resources and much time in different technology areas

ARKS way

Realtime

Incremental direction correction possible

Algorithm Study

Tentative PoC modeling

SW Simulation

PoC Prototyping

Concept/ performance Evaluation

Conceptual bug free!
All Green Development!

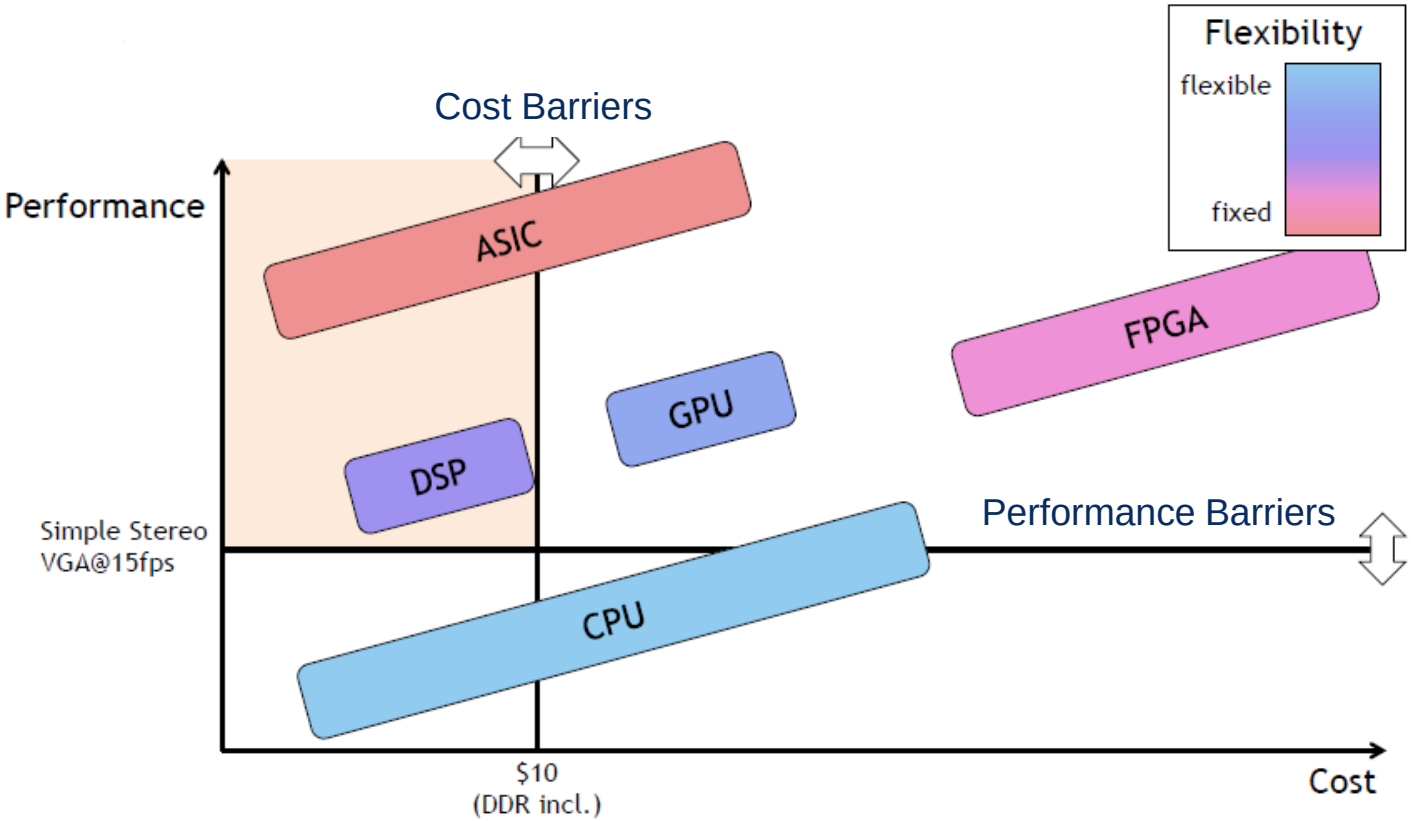
ASIC → Success

Seamless development in one environment

You can
*Save time and money
*Reduce the risk of development with ARKS DVSDK

Why Choosing CEVA-XM4

Why Choosing CEVA-XM4 (DSP solution)



Libraries ready for use

CEVA-CV, CDNN, … covers wide variety of vision applications

Extend to these categories for XM4 users

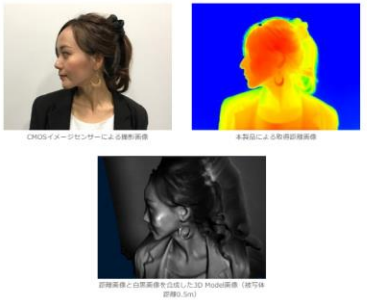
Project ARKS is focusing on this category for OSS community

Algorithm porting on CEVA-XM4 actual cases

Many different algorithms on single platform

Stereo depth

ToF depth



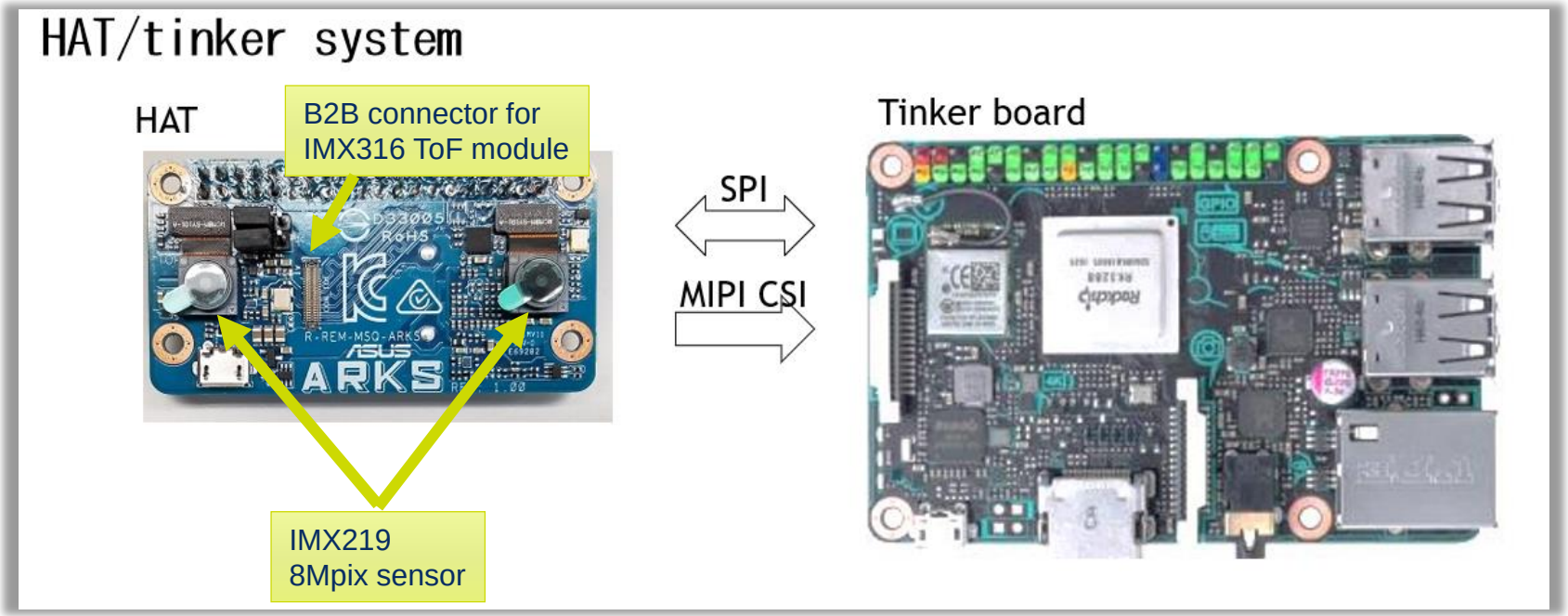
source:
https://www.sony.co.jp/SonyInfo/News/Press/201712/17-114/index.html

RGB-D ToF depth upscale

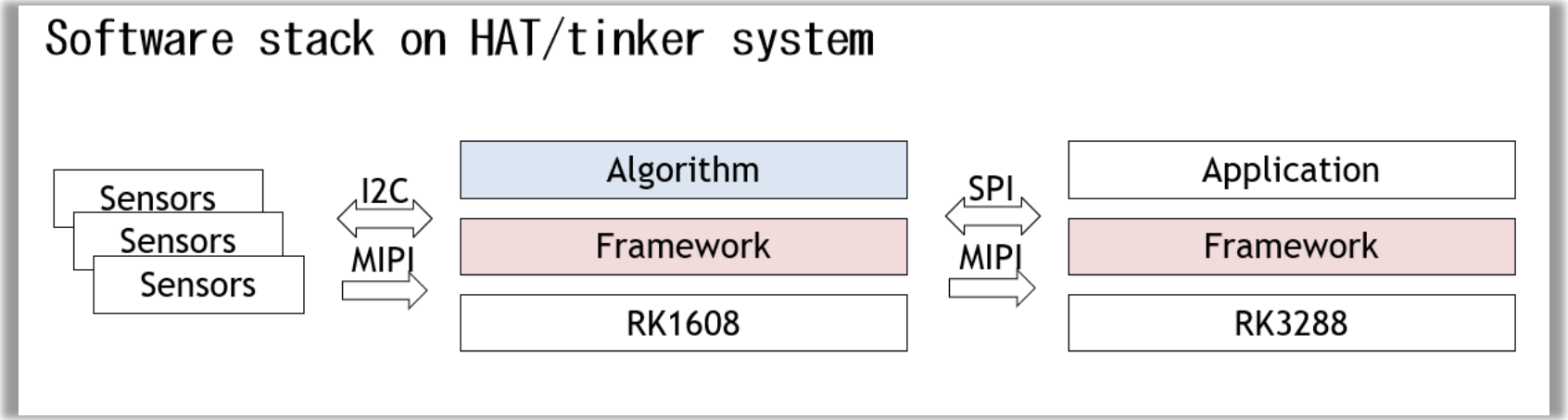
Feature point matching

System Configuration

HW Configuration

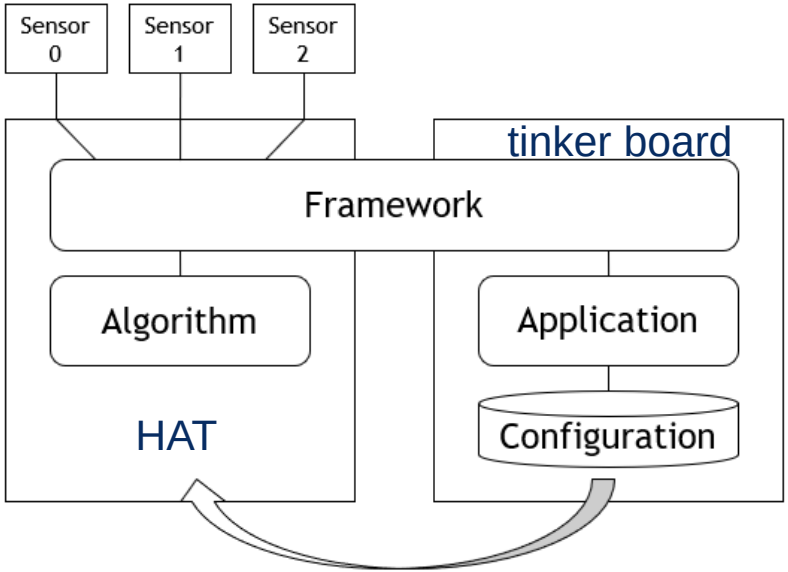


SW Stack Diagram



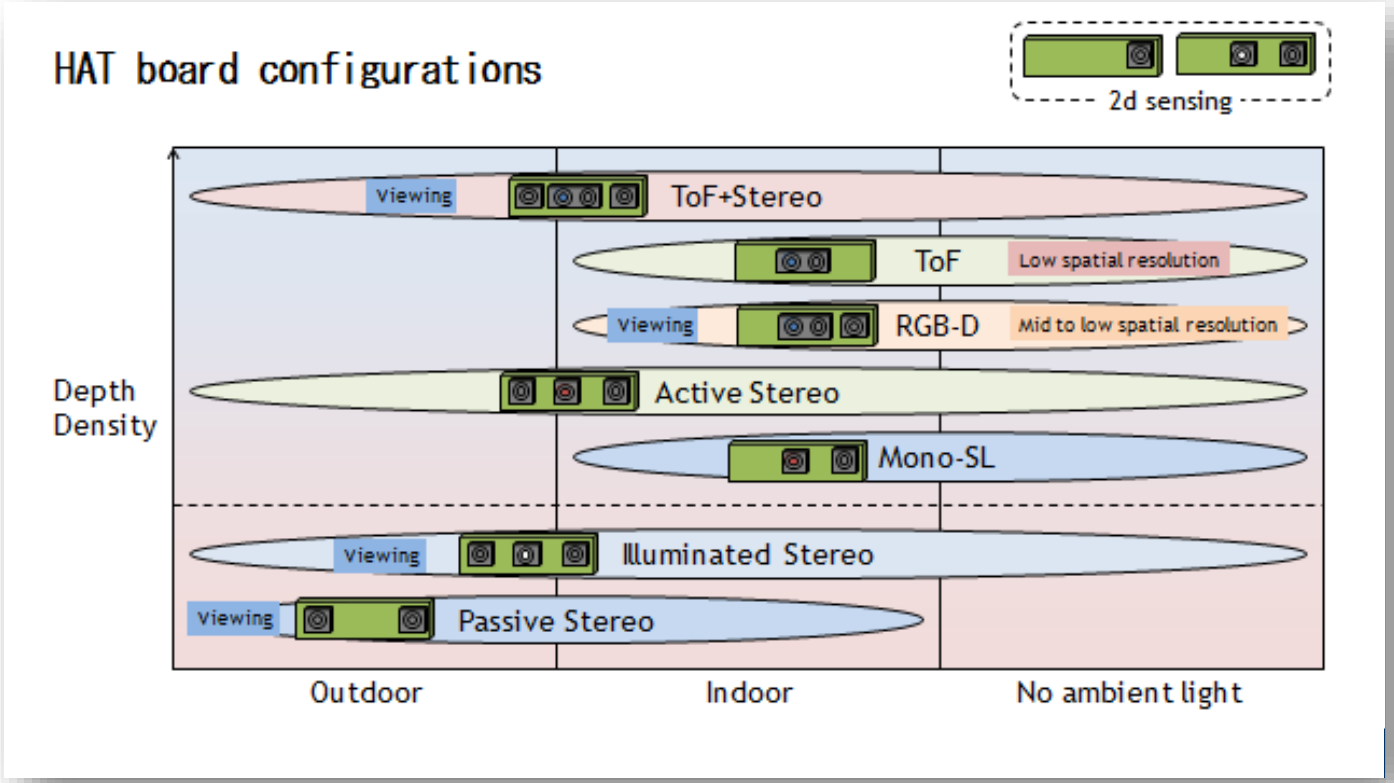
SW Framework

One unified configurable framework software



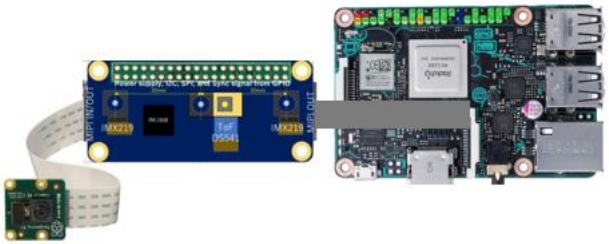
Configure sensor, framework and algorithm by configuration file

Flexible Sensor Configuration

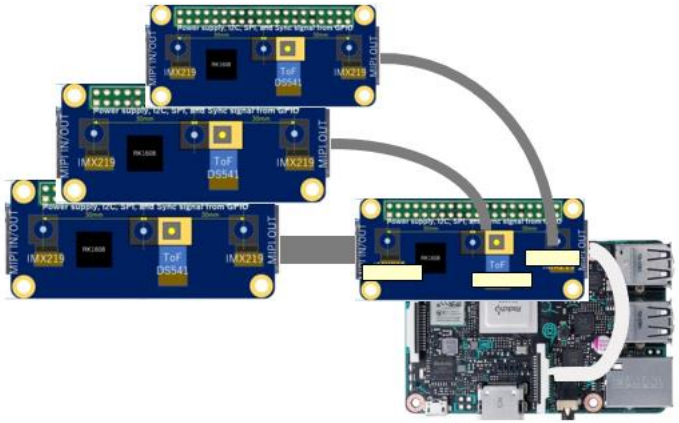


Extensibility (future option)

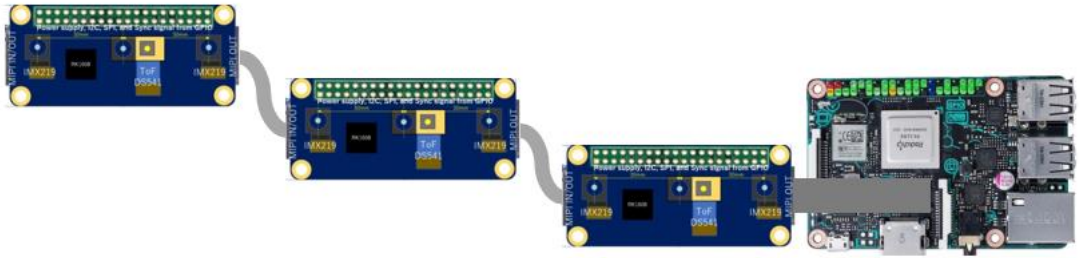
"Depth sensing preprocessor for AP"



"Many Sensors"



"Cascading many DPSs"



Roles of Project Members

Roles

- ASUS
  - IoT Platform Manufacturer and Supplier
    (tinker board, Customized tinker-OS, ARKS Cognitive HAT, and DSP Framework)
- Rockchip
  - AP and DSP Chip Developer and Custom Order Service of the SoC
- SANSHIN ELECTRONICS
  - ARKS Product Distributor in Japan
  - RK Product Distributor and Technical Support for them
- Soho Enterprise
  - Business owner of ARKS DSP Vision System Development Kit
  - Sensor Driver Customize and Camera Technical Support
  - Sensor Module Prototyping Support with Module Vendors

Thank You

Soho Enterprise

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