

socionext

or better quality of experience

Adhocracy Innovation with Imaging technology

Socionext Inc. Hiroyuki Komori July 5th, 2017

Copyright 2017

Video Steaming in the world

Video uploading : 65,000 clip/min, 300 hour/min on YouTube Video viewing : billions clip/day on YouTube

ref. Kevin Kelly. 2016. The Inevitable Viking Press



The world changing with imaging



540 million years ago

Cambrian Explosion



21st century

Image Explosion



socionex

Challenges for "Image Explosion Age"

- Enormous amount of images
- ➢ Real time
- Power efficiency

Dedicated Hardware with Flexibility

SOCIONEX

Adhocracy Innovation



socionext

Socionext focus area



socionext

- ➢ 8K TV Solution
- Ultra Low Latency Codec/Transcoder
- Image Recognition
- Free Viewpoint Video Distribution

SOCIONEX

8K TV Solution

"Art of Kyoto" Graceful & Delicate Picture Quality



4K·8K Broadcast Schedule in Japan



Source: http://www.soumu.go.jp/menu_seisaku/ictseisaku/housou_suishin/4k8k_suishin.html

SOCION

8K HEVC decoder SoC "SC1400A"

World's First 8K TV Solution for Satellite Broadcasting





Function		Specification
Product number		SC1400A
Package		BGA (45 x 45mm)
Process		28nm
Main memory	SiP	DDR3-1866 (32bit x4ch)
	External	DDR3-1866 (32bit x3ch)
Video decoder		HEVC 8K/60p 10bit (4:2:0) ITU-R BT.2073 (4 Slice Format Encoding)
Picture quality		8K/60p, HDR
Video output		HDMI2.0 x4
PCle		Gen2(1lane)

socionext

Copyright 2017

Ultra Low Latency Codec/Transcoder

For the increasing number of real time applications



Latency Requirement for Electronic Mirror





Requirement of Glass-to-glass delay time

SOCIONEX

delay time < 200 ms

Latency Requirement for Telesurgery

Various experiments in telesurgery revealed an acceptable latency of less than 200 ms



socione

4K HEVC real-time codec "MB86M30"

Ultra low latency HEVC encoding based on

- Wave front parallel processing
- Slice segment splitting





Function	Specification
,	H.265/HEVC Main, Main 10, Main 4:2:2 10, up to 4K/60p
Encoding/ Decoding	H.264/AVC BP, MP, HP, High 10, High 4:2:2, up to 4K/60p
	Ultra Low Latency Mode in HEVC
Transcoding	HEVC to HEVC, H.264 to HEVC, MPEG2 to HEVC, etc.
Multiple Channel Operation	Up to 4ch @HEVC/H.265 encoding, 1080p60
Power Consumption	6.3W (Typical)

socionext

Copyright 2017

Transcoder composition

Real-time HEVC transcoder demand is increasing due to expanding live video viewing over the Internet



Image Recognition

A solution suitable for Cognitive edge computing



Cognitive edge computing

"Cognitive edge computing" will be installed in every market and device



socione

Cognitive edge computing



SOCION

Target position

Both computing flexibility and power efficiency are necessary for wide application to many cognitive edge devices



socione

Our approach: Vision Processor Unit (VPU)

Hybrid of GPU and Dedicated HW is our answer



SOCIONE

VPU Programmability

Khronos Group's computer vision API "OpenVX" Compliant

Connected graph of visual node





Copyright 2017

socione

First VPU embedded into ADAS SoC "SC1810": GDC

Integrated SoC solution for ADAS





Function	Specification		
CPU	ARM [®] Cortex TM A9 Quad 1066MHz		
3D Engine	OpenGL ES PowerVR TM 8XE Series		
2D Engine	SEERIS [®] Proprietary IP		
lmage Recognition Engine	OpenVX [™] Vison Processor Unit Proprietary IP		
Display Controller	3 outputs 1920 x 1080p (maximum) RGB, YUV, FPD		
Video Capture	6 inputs 1920 x 1080p (maximum)		
Memories	DDR3/3L 1866MHz (maximum) 32bit, 64bit		
CODEC	H.264 CODEC. Motion-JPEG Decoder		

SOCIONEX

Application for ADAS

All Around View Monitor



Integrated Display Control

Approaching Object Detection by VPU



3D Sound Alert





socionext

Copyright 2017

Free Viewpoint Video Distribution

Challenge for new quality of experience of live video viewing



- "Image Explosion age", in which images come into our life in extraordinary numbers, has come.
- > Requirements for imaging solutions are as follows:
 - Processing power for enormous amount of image data
 - Real time processing
 - Power efficiency
- > These requirements are satisfied with:
 - Dedicated hardware
 - Combination of dedicated hardware and processor with software

socione

socionext

for better quality of experience