

Fujitsu GDC Product for Wraparound View System and Graphic Cluster Platform

Mar., 2011

Welch Ding (丁洁早)

Fujitsu Semiconductor (Shanghai) Co., Ltd.

Automotive division

shaping tomorrow with you

Fujitsu Semiconductor at a glance



Corporate Name	FUJITSU SEMICONDUCTOR LIMITED
Business Description	Design, development, manufacturing, and sale of LSI products
Location of head office	Nomura Shin-Yokohama Bldg., 2-10-23 Shin-Yokohama, Kohoku-Ku, Yokohama, Kanagawa, Japan
Representative	Haruki Okada : President
Date of Establishment	21st March, 2008
Capital	60 Billion JPY (600 Million US\$)
Shareholders	Fujitsu Limited (Tokyo Stock Exchange 6702), 100% shareholder
Fiscal Year	April 1 to March 31

World Wide FSL Group support area



● FSL support area

Fujitsu Semiconductor Korea Ltd. (FSK)

Seoul:MCU, Graphic support

Fujitsu Semiconductor Europe GmbH (FSEU)

London : Mixed Signal DC
Frankfurt : MCU, ASIC DC/Support
Munich : GDC/Support(GCC)
Linz : Software development(FEAT)

Fujitsu Semiconductor Ltd.(FSL)

Fujitsu Electronics, Inc(FEI)

Fujitsu Semiconductor America Inc. (FSA)

Detroit : MCU, Graphic support

Fujitsu Semiconductor Asia Pte Ltd. (FSAL)

Fujitsu Semiconductor Pacific Asia Ltd.(FSP)

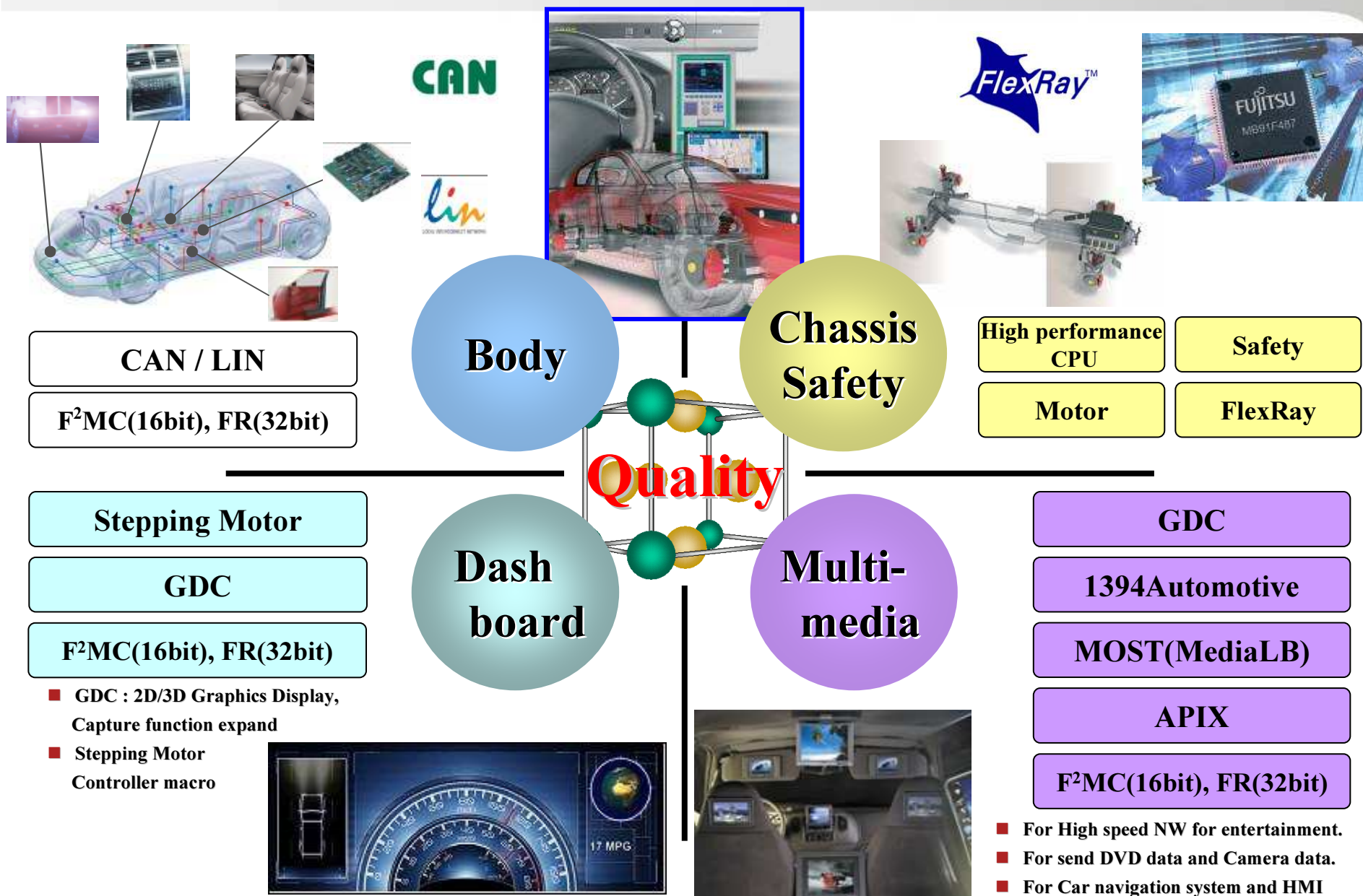
Fujitsu Semiconductor (Shanghai) Co.,Ltd.(FSS)

Shanghai : MCU, Graphic support
Hong Kong : MCU, ASIC DC, Graphic support

Supplying our products to almost all car makers worldwide **FUJITSU**



FSL Automotive Activity

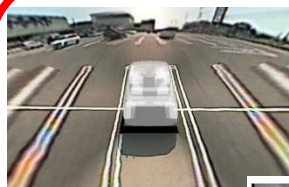


GDC Application Evolution

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ADAS

Surround Monitor
(Viewing+Sensing)



OMNIVIEW

Approaching
Object
Detection



Center stuck

Navigation



HMI

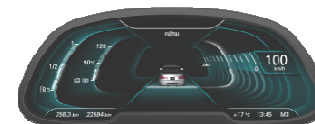


Camera

Camera

Camera

Cluster

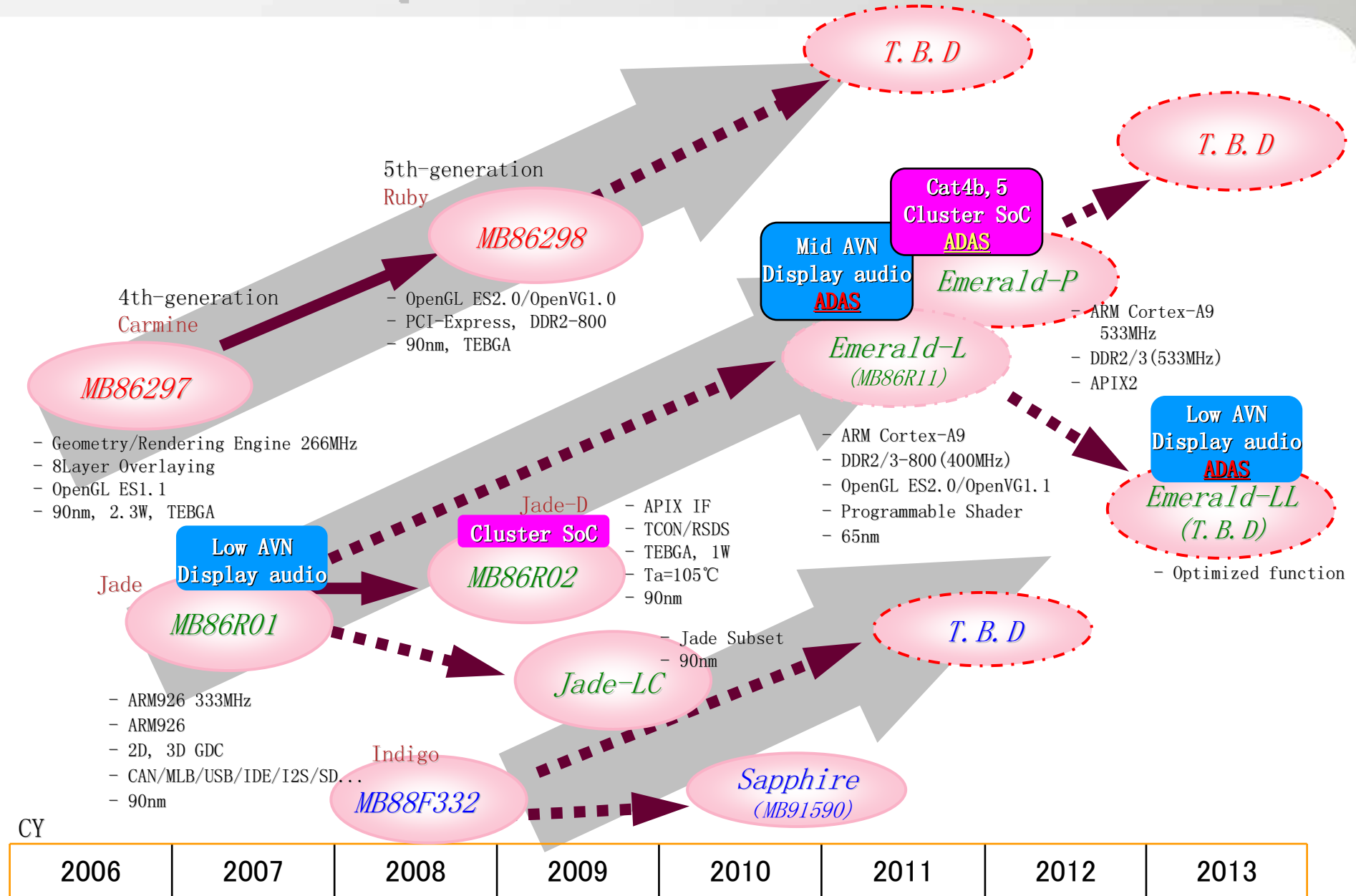


Rear seat entertainment



GDC Roadmap

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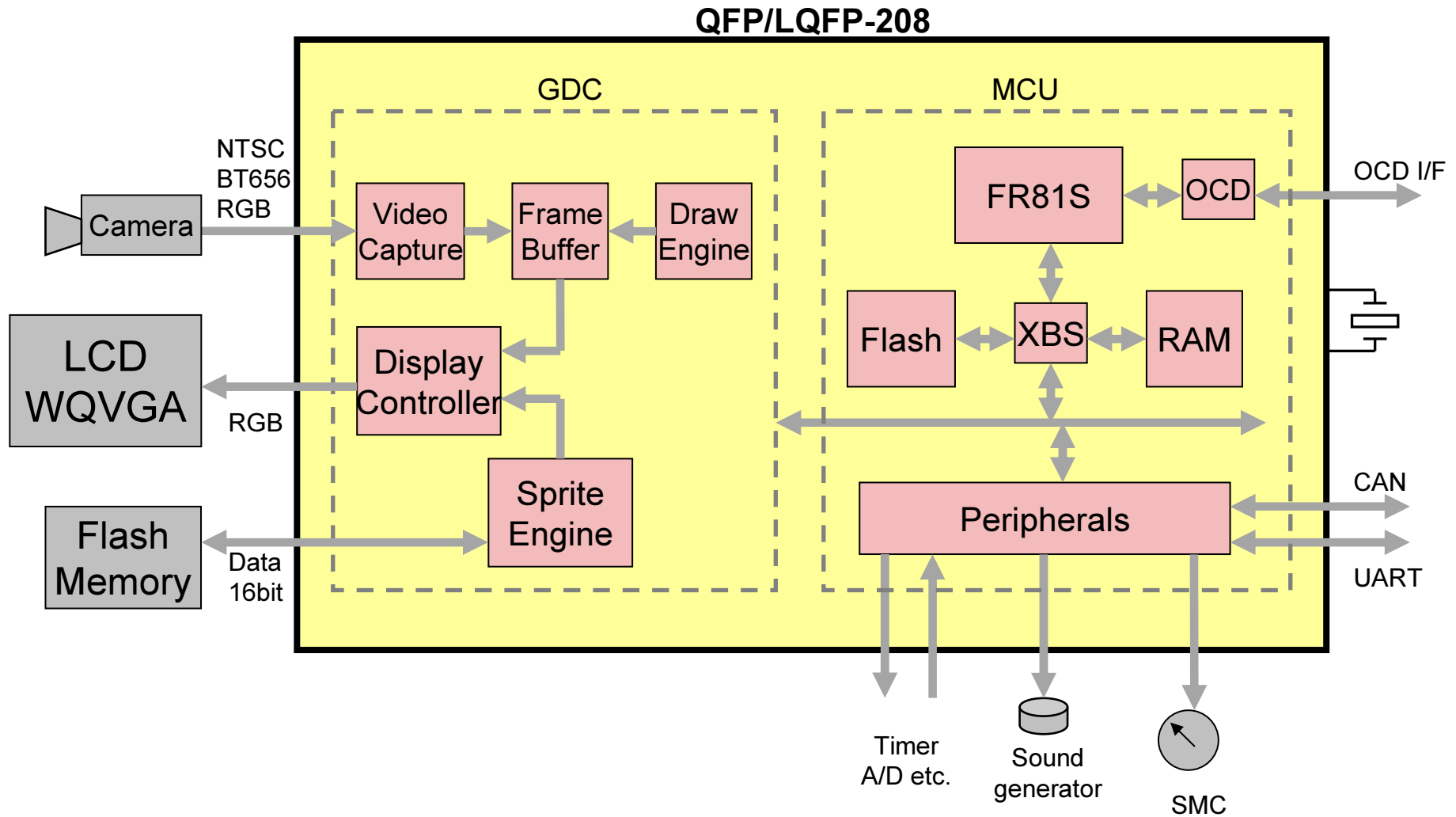
MB91590 to design Graphic Cluster Platform

MB91590 Series SOC



- **Technology** : 90nm Embedded Flash Logic
 - **Package** : QFP/LQFP208
 - **CPU** : FR81S 128MHz/80MHz
 - **MCU Resources** : see feature list
 - **GDC**
 - **Resolution** : max 800 × 480 (actual target 480x240)
 - **Frame buffer** : 800KB internal (external VRAM is not needed)
 - **Sprite function** : 512 sprite
 - **Graphic function** : Line
 - **Video input** : NTSC/Digital RGB555 Zoom-in/out, rotation
 - **Selling Points for OEM**
 - Sing chip solution (MCU + GDC)
 - Internal big VRAM for graphic frame buffer
 - GDC has line image drawing engine
 - Support direct analog camera input (PAL/NTSC video)
-

MB91590 Block diagram

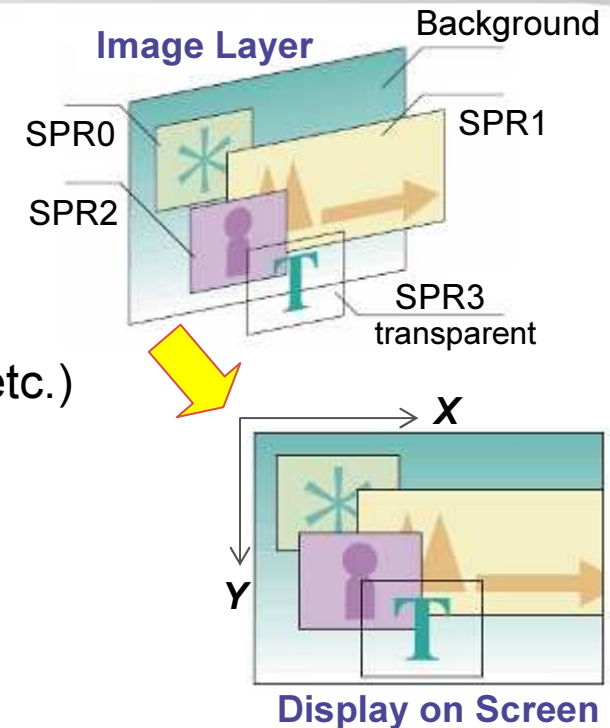


Feature of GDC on MB91590



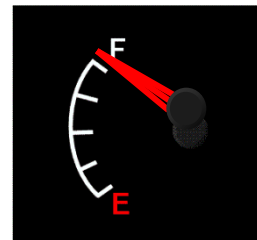
■ Sprite Engine

- Bit map (sprites) overlay display with line buffer
- 8bpp indirect color, ARGB-1555
- Max 512 sprite
- 32 special sprite (blinking, auto move, animation etc.)
- Auto image control and auto initial value setting using command list



■ Line image engine

- Bold Line, Dotted line
- Anti-aliasing



■ Video capturing

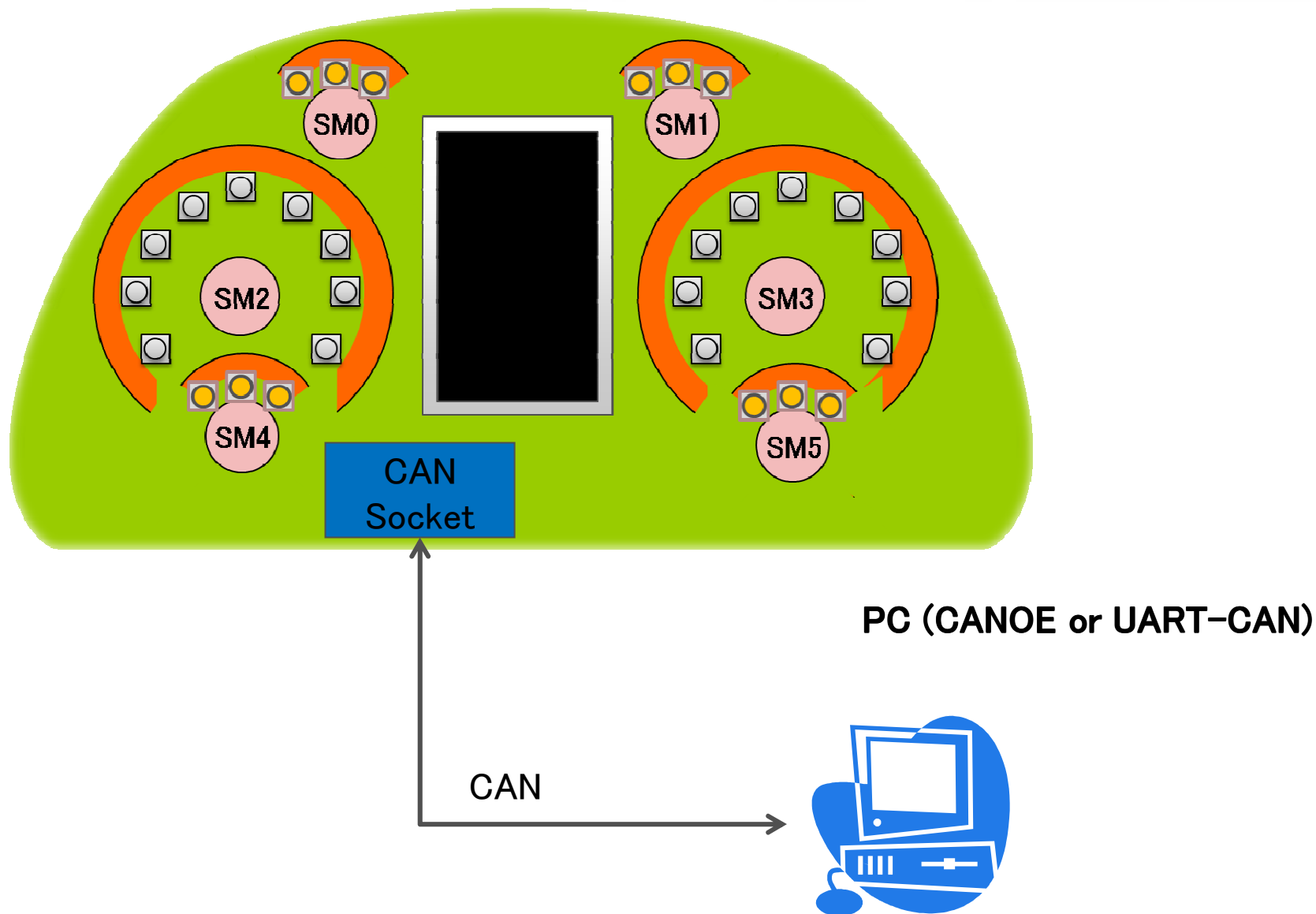
- Analog NTSC, BT656, Digital RGB input
- Scaling, 90°/180°/270° rotation



■ 800KB internal RAM

- Can be used as frame buffer for video capture, line drawing, source of sprites
- RLD (Run Length Decoder) can be use

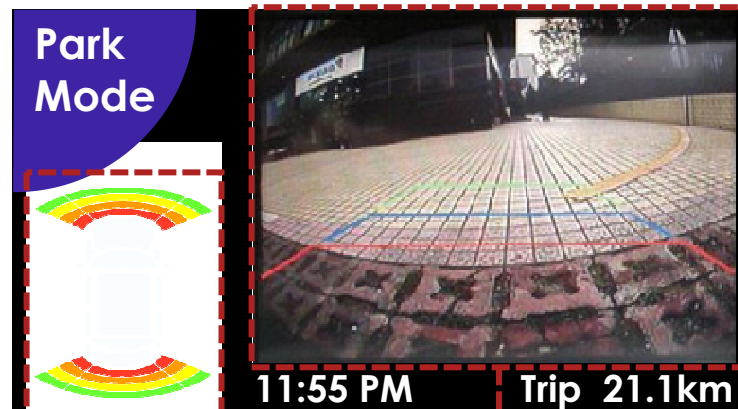
MB91590 Demo Proposal - Connection Diagram



TFT LCD Display (1)

■ Normal Mode

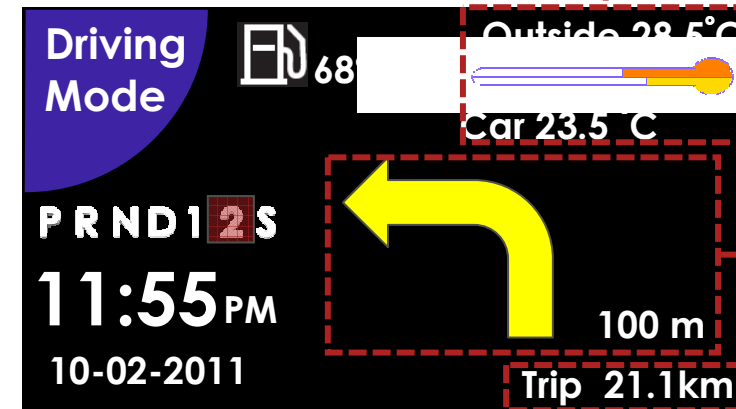
Parking Mode



Sonar detection

Rear view camera

Driving Mode



Mileage

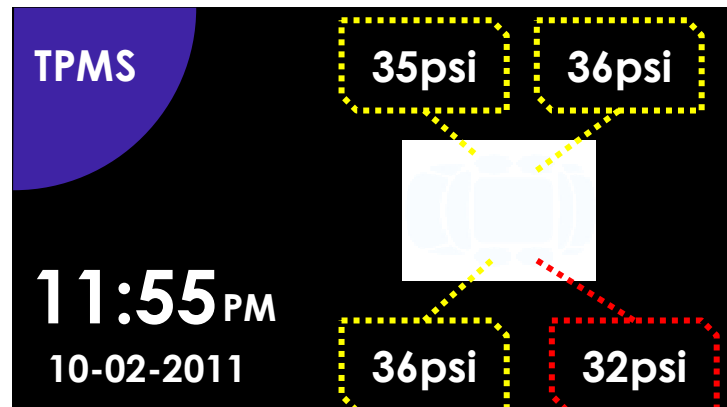
Navigation information

Change to Park mode

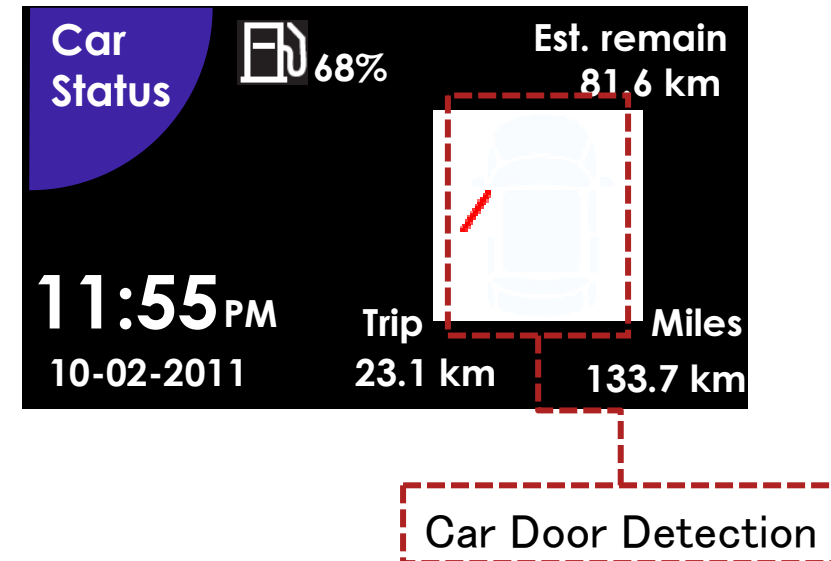
TFT LCD Display (2)

■ Normal Mode

Tyre pressure monitor

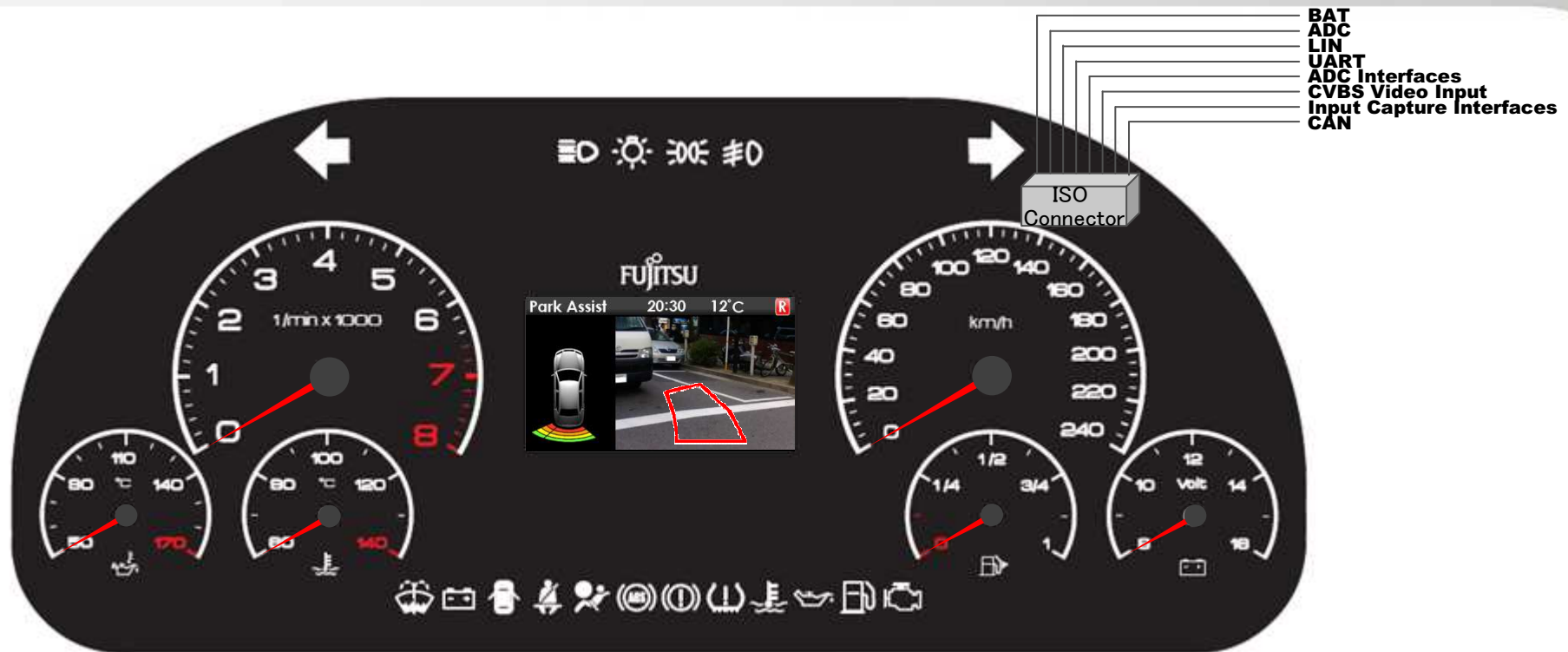


Car status monitor



**Tyre pressure
warning**

MB91590 Reference Solution



Hardware Features

- 6 Stepper Motors
- LED Backlight Control
- 18 LED Signal Indicators
- Sound Generator
- 480 x 272 LCD Panel
- CVBS Video Input

Software Features

- Motors driving (ZPD, Normal Drive)
- Car Info UI display
- Parking Assist
- Alert Sound Playback

MB91590 Reference Solution Software Package



■ MB91590 Reference Solution Sample Project

- Stepper Motor Driving
- Rear View Camera Video Input & Parking Assistance
- Access Library Display Driver
- Sound Generation Driver

■ HMI Authoring Tools

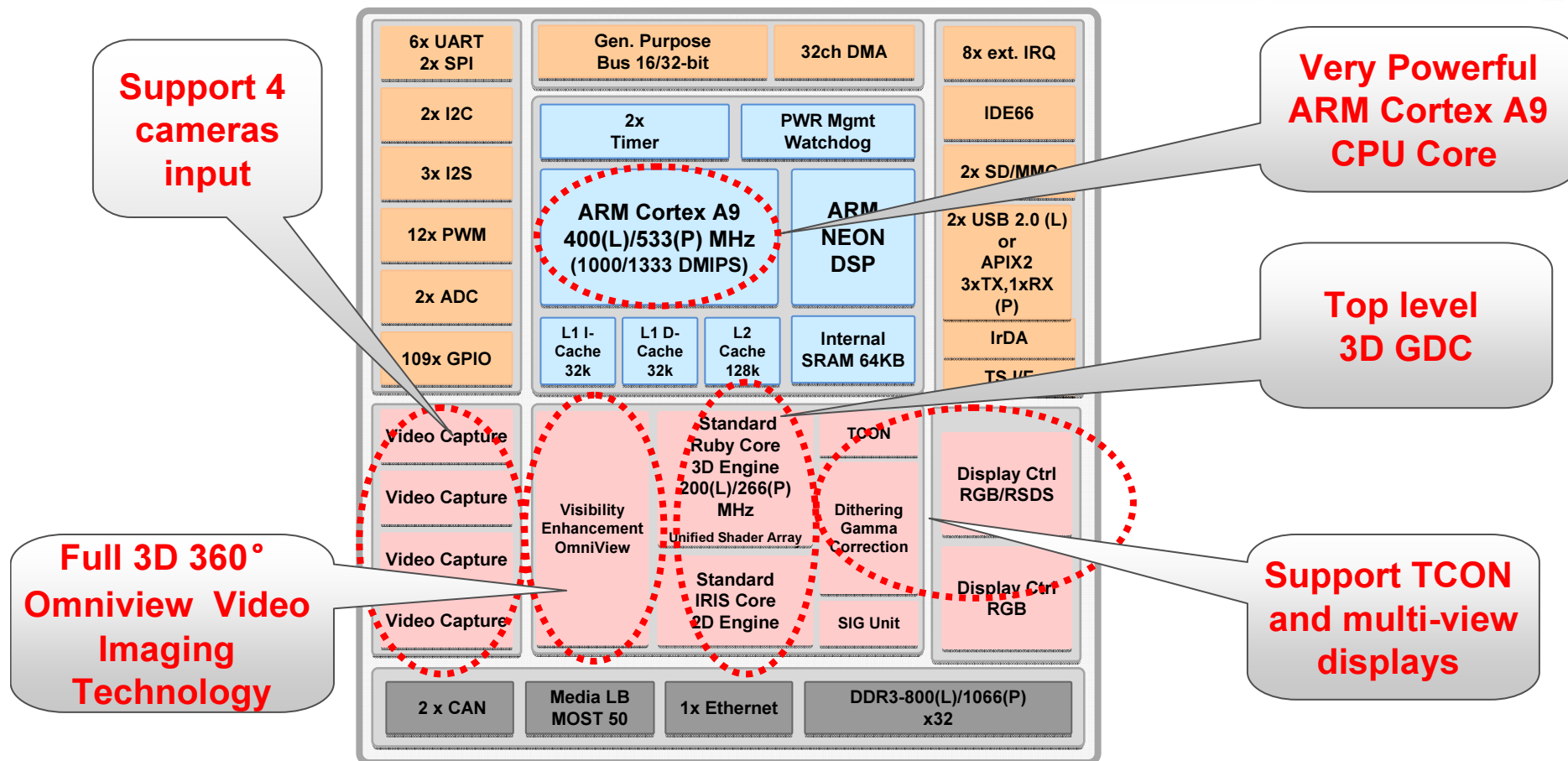
- GHDS

■ Documentation

- Schematics
- PCB Layout
- Reference Solution Board Manual
- Application Note
- SW Modules User Manual
- SW User Manual

MB86R11 to design 3D OMNIVIEW System Platform

MB86R11 Emerald Spec



- Cortex A9 400/533MHz with NEON
- OpenGL ES2.0 Support Graphic Engine
- DDR2/DDR3-800/1066M 16/32bits
- 4 x Video Capture (1280x720p)
- 2 x Display output

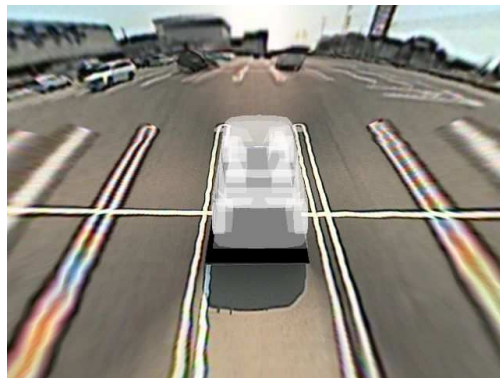
- PBGA(L)/TEBGA544(P) PKG (Ball pitch 1mm)
- Various interface (I/O Peripherals)
- USB2.0 Host/Func x1 Host x1 or (APIX2 Tx 3ch, Rx1ch),
- ADC, I2C, I2S, Common Parallel bus, SPI, UART/USART,
- SDIO/MMC, MediaLB, CAN, PWM, IrDA, TS, Ethernet, P-ATA, GPIO

MB86R11 Concept

- User interface like a mobile phone



- Around monitor and Image Recognition by Camera



- Visibility Enhancement Technology
- W/W Standard ARM CPU~Rich Development Envelopment、Software、ISV

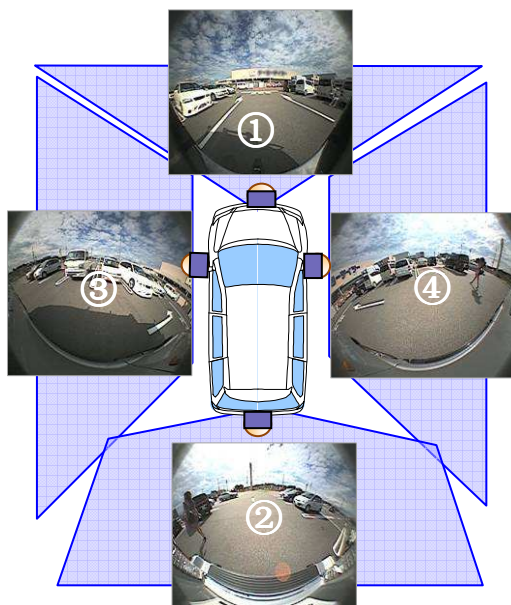
Visibility Enhancement Technology

- Optimize image contrast on a pixel to pixel basis
- Brighten up dark region without any artifact

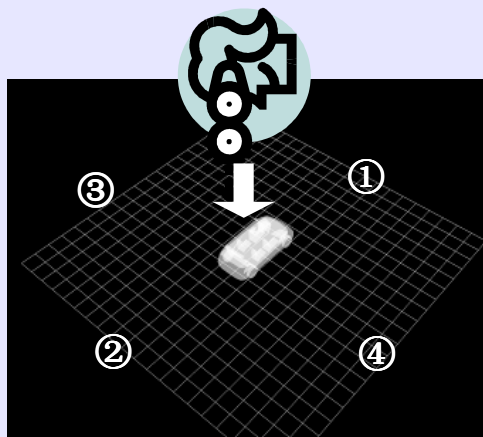


What's OMNIVIEW?

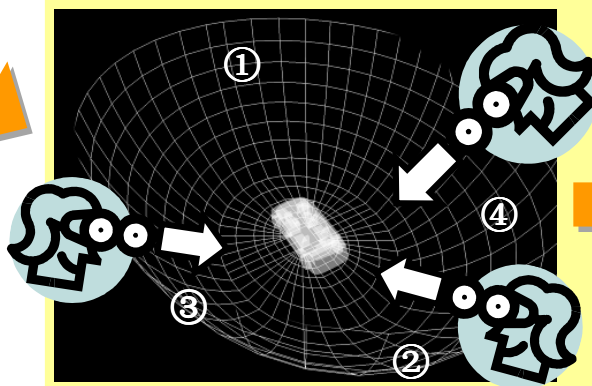
Surrounding view
with 4 cameras



Conventional: Near-field Top view (~ 2-3m)



OMNIVIEW: can change view point as you like



Input image from Camera

Using 4-cameras,,,

(Front)



(Back)



(Left)

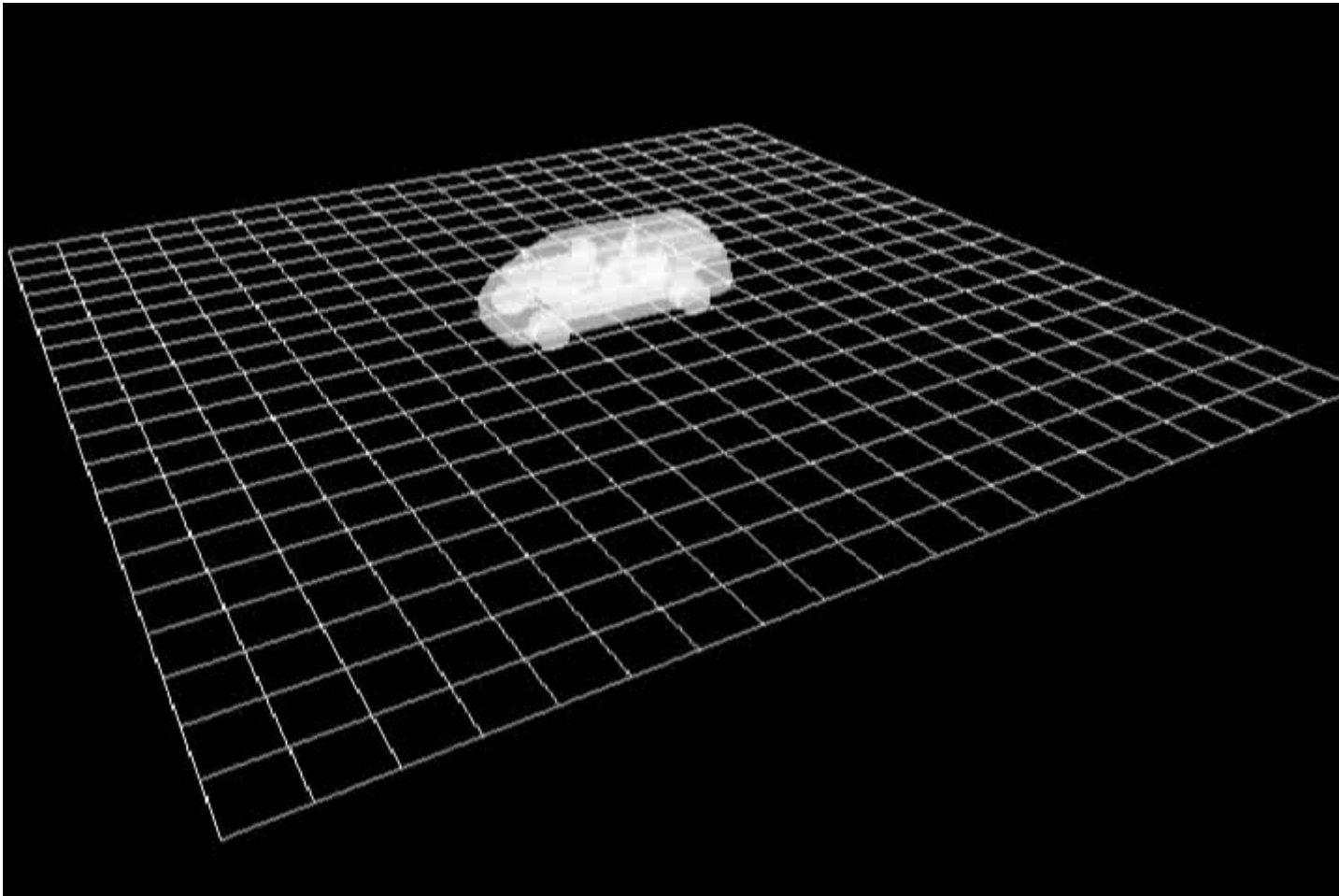


(Right)

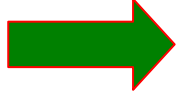


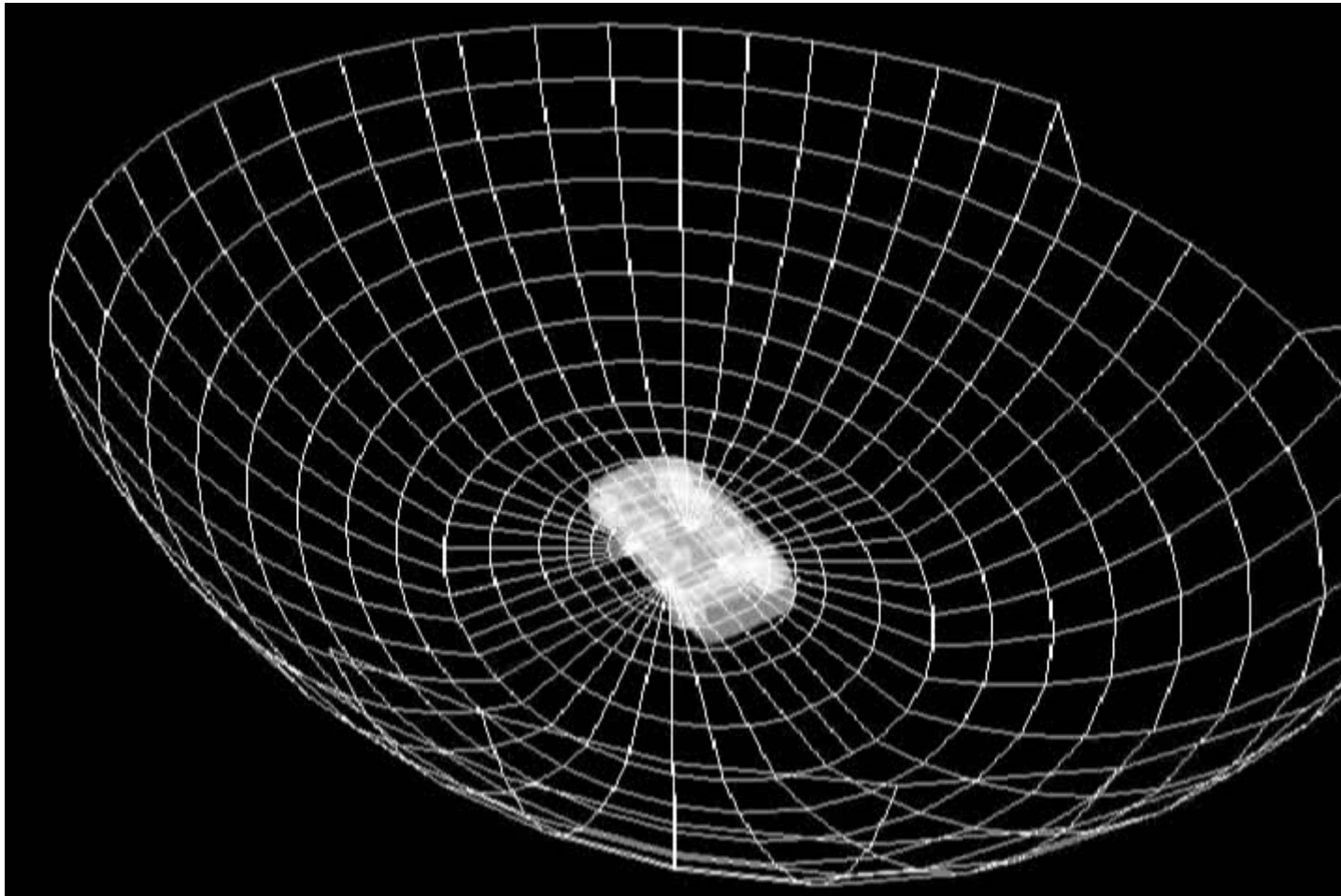
Conventional tech. (Only Top-view)

In case of conventional top-view,
 can identify objects only near vehicle.



In case of OMNIVIEW,

 can identify wide-area with flexible view point.



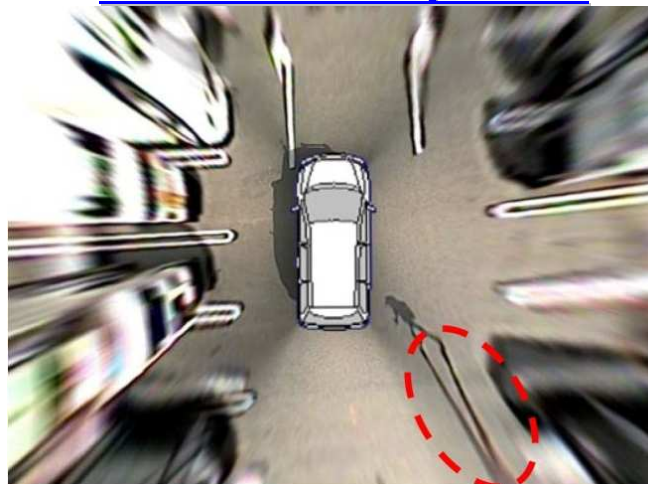
Advantage / Use case of OMNIVIEW

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Advantage

<Conventional>

Near-field Top view



can NOT identify
vehicle and pedestrian

<OMNIVIEW>

Flexible view point

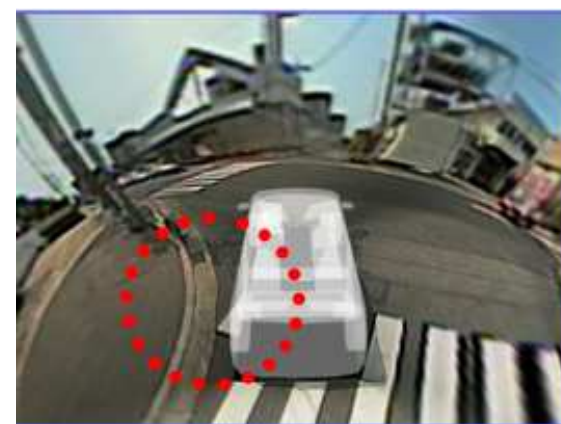


can identify pedestrian

Use case



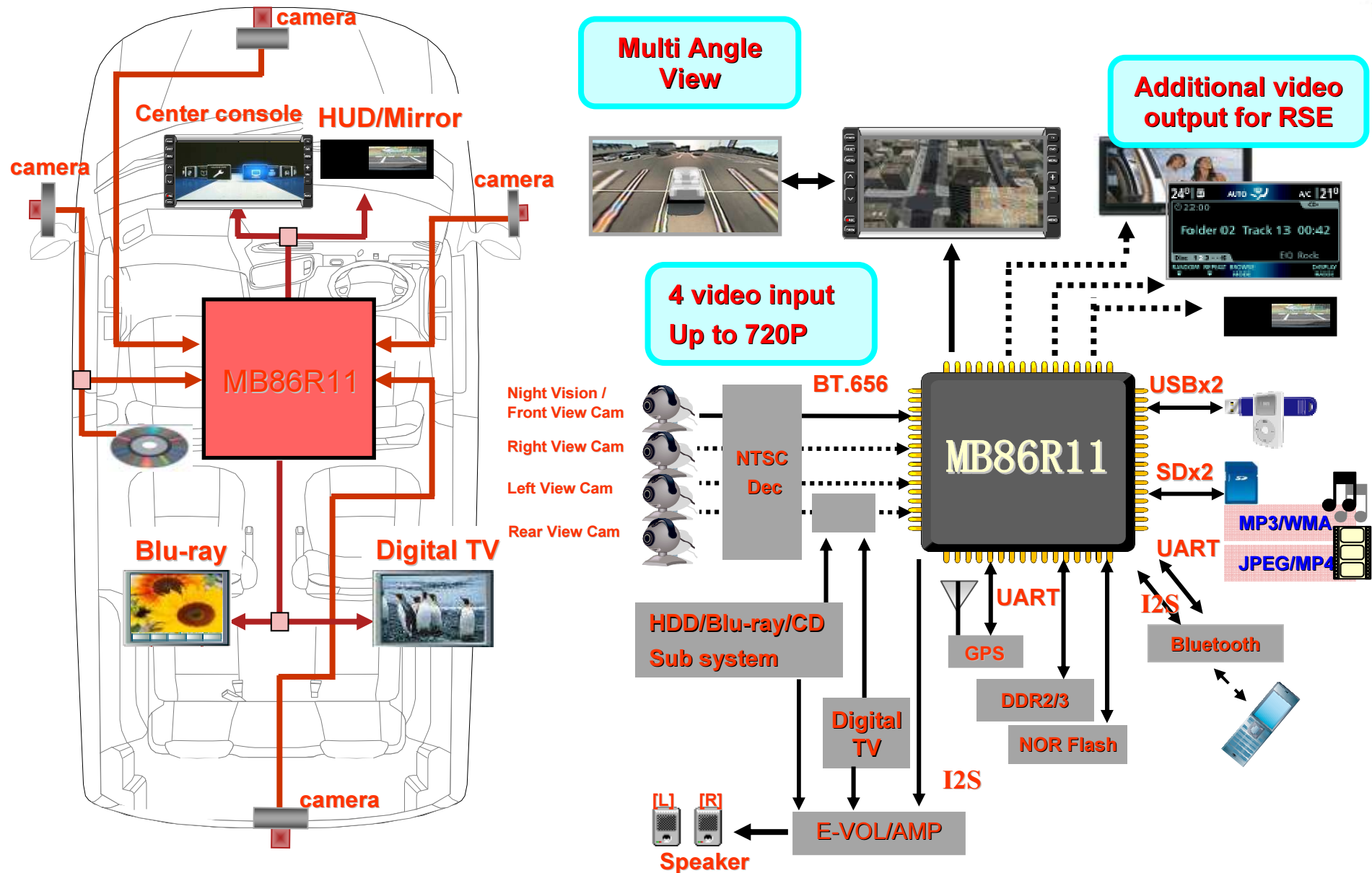
<Lane Change>
Confirm approaching car



<Turn left (JP)>
Confirm left-side space

MB86R11 Car Infotainment System

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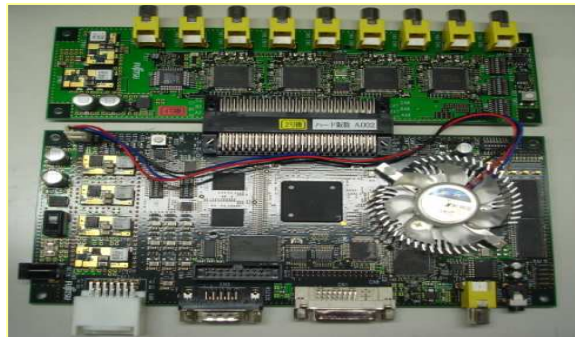


Software – Automotive OmniView

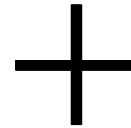
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- Evaluation Kit for AutoOV -

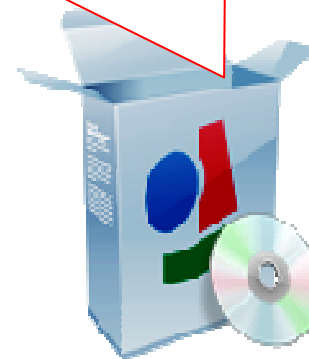
Video capture, 3D function



Evaluation board

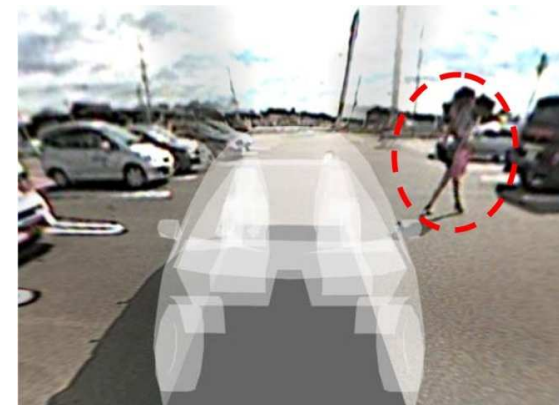
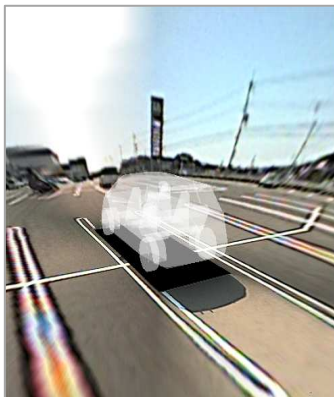


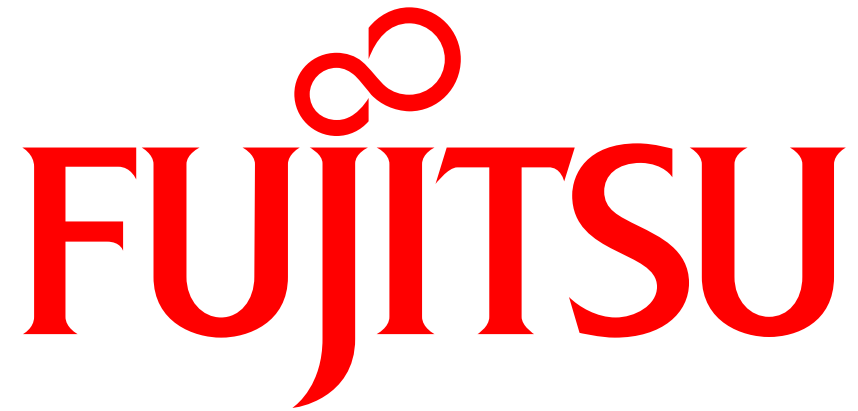
- Authoring tool
- Library
- Document



Software

Packaging





shaping tomorrow with you