JMO TECH CO., LTD

Motorcycle cluster solutions

EICMA 2024

Contents

01 JMO Profile

Company Profile

JMO Tech Co., LTD., founded in November 2010, is located in Shenzhen. At present, JMO has more than 200 employees including 50 research personnel.

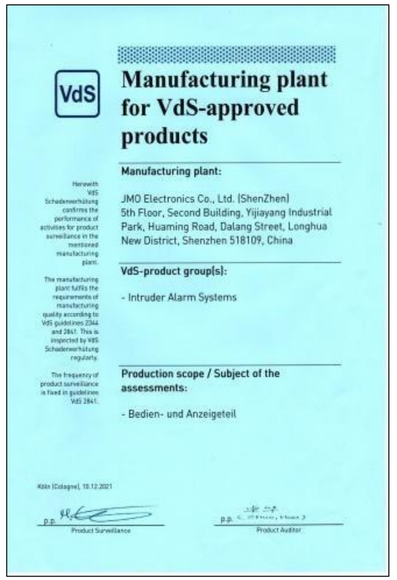
We are a high-tech enterprise with 19+ years experience in IOT total solution. Our main customers' applications include medical device, sport device, train device, automotive device, home appliance and so on.

19+ years ODM experience	**70+** Supplier	**50+** R&D Personnel	**100+** Customer	**98%** OTD Rate	**30+** Patent

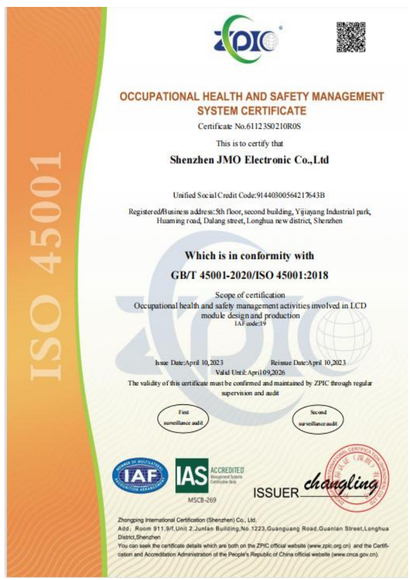
Company Certification

IATF 16949

ISO9001



VDS

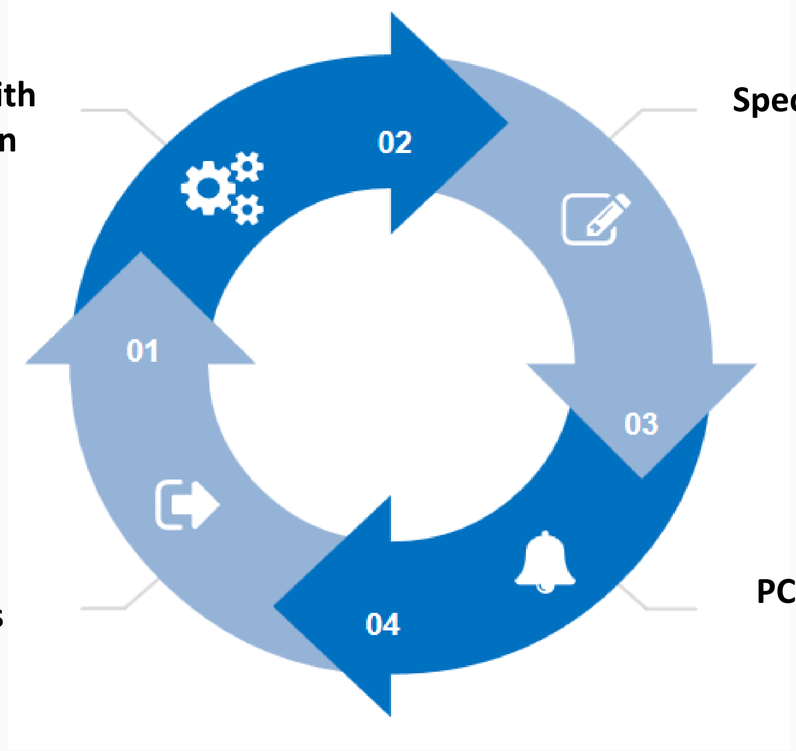


ISO45001

What We Do

Customized Products with Snapdragon IOT Solution

Special Displays



Finished Products

PCB Boards

WHY JMO?

Expertise and Innovation

With over 12 years of experience in IoT solutions, we bring unmatched expertise to the table. Our innovative approach ensures that you stay at the forefront of technology advancements.

End-to-End Solutions

From concept to delivery, we offer comprehensive solutions that streamline the entire process. Our R&D, design, and integrated system capabilities ensure a seamless journey from idea to reality.

Client-Centric Approach

We focus on your unique needs. Our solutions are precision-crafted to meet the demands of discerning clients like you, providing tailored, differentiating products.

Quality and Reliability

Quality is embedded in every aspect of our work. We adhere to the highest industry standards, guaranteeing reliable products that excel in performance and durability.

Agile and Responsive

We adapt swiftly to market dynamics, ensuring that your solutions remain relevant and competitive in a fast-paced landscape.

Global Reach

With our strong supply chain management, we offer a seamless end-to-end experience, delivering products to your doorstep, no matter where you are

02

Motorcycle Digital Cluster

01 General Product

Classic Digital Cluster - Basic Functions

Full-screen navigation
WIFI connectivity, real-time road information

Fault alarm alerts
Vehicle malfunction, timely alerts

Bluetooth Lite Navigation
Support intersection zoom picture display

Automatic day/night mode
Instrument brightness automatically adapts to light changes

Tire pressure monitoring
Real-time detection to prevent tire blowout

Automatic headlights
Intelligent light-sensitive control of headlights on or off

Cell phone message alert
Phone, WeChat, QQ, WhatsApp, Line, Skype, Kakao Talk and other message alerts

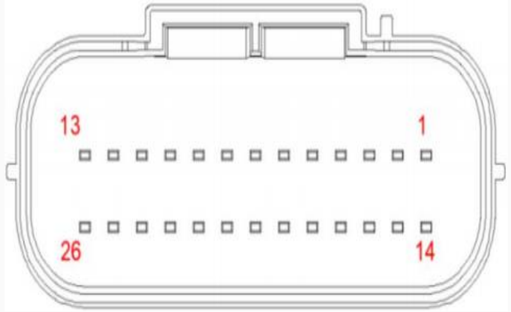
Weather and positioning
Real-time weather information and vehicle positioning display

01 General Product

Classic Digital Cluster - Introduction

26 Pin Definition

PIN	Definition	Description	PIN	Definition	Description
1	CAN-H	/	14	CAN-L	/
2	High Beam	+12V	15	Water Temperature	Resistance value
3	Turn Left	+12V	16	RPM Signal	PWM
4	Vehicle Speed Signal PWM	Voltage-based Vehicle Speed	17	Button 3 (Up)	GND
5	ABS Malfunction	GND	18	Button 4 (Down)	GND
6	Engine Malfunction	GND	19	Neutral	GND
7	Low Oil Pressure	GND	20	gear 1	GND
8	Button 2 (Confirm)	GND	21	gear 2	GND
9	Button 1 (Back)	GND	22	gear 3	GND
10	Oil level	Resistance value	23	gear 4	GND
11	Turn Right	+12V	24	gear 5	GND
12	IGN	Key-controlled power supply	25	gear 6	GND
13	Power On	Battery Power 12V	26	GND	Battery Negative



PWM: Pulse Width Modulation

ABS: Anti-lock Braking System

RPM: Revolutions Per Minute

01 General Product

Classic Digital Cluster - Introduction

Screen Size：3.54inch，4.17inch，5inch，6.86inch，7inch

Support functions (standard functions):

- Vehicle information display,
- panoramic navigation (support real-time road information),
- Bluetooth simple navigation (support intersection enlarged picture display),
- caller ID, WeChat, QQ, SMS information display (support cell phone rest screen transmission),
- tire pressure monitoring,
- weather and positioning information display,
- riding track record and view,
- vehicle fault information display,
- automatic day and night mode,
- automatic headlights, etc.

Call Reminder;

Message Display;

Dynamic Navigation;

Driving Record (dual camera);

01 General Product

Classic Digital Cluster - Functions

Automatic headlights
Intelligent control of headlight switch, high and low beam change

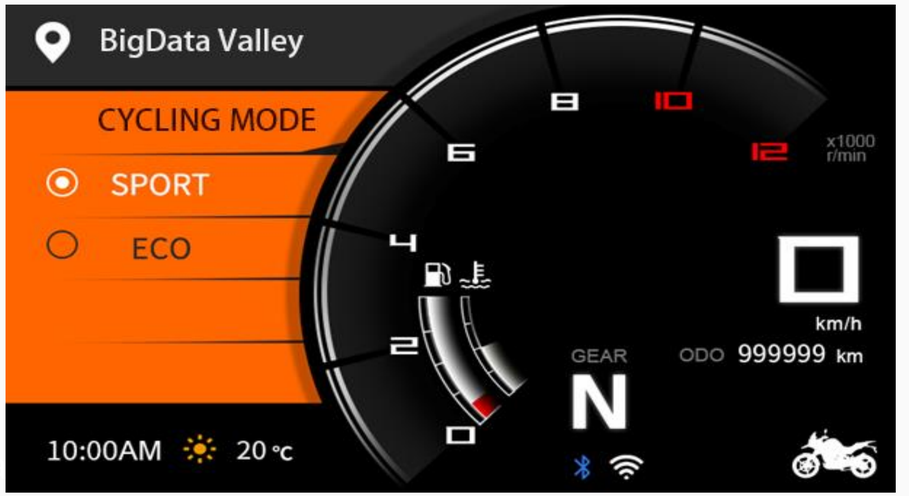
Automatic day and night mode
Intelligent sensing of ambient light, instrument brightness automatically adapts to light changes

ECO mode
Economical and energy-saving, low fuel consumption preferred

SPORT mode
Stronger power, enjoy the pleasure of speed

Tire pressure monitoring
Real-time detection, prevent tire blowout

ABS system setting
Front and rear wheels on or off, anti-lock



Call Reminder;
Message Displa
Dynamic Navigation;
Driving Record (dual camera);

02 Motorcycle Digital Chassis with Snapdragon

Connected 2-Wheelers - Features for OEMs

02 Motorcycle Smart Digital cluster with Snapdragon

Connected 2-Wheelers - Features for Riders

02 Motorcycle Smart Digital cluster with Snapdragon

http://jmodisplay.com/news_detail.php?id=40&cid=1&page=1

Feature List

Platform	Item	Function	Safety
MCU	Cluster	TT	QM
	Power	Control the power state of MCU and SOC according to the motorbike	QM
	Upgrade	Do upgrading according to the request of SOC	QM
	Vehicle Control	Handle CAN/LIN signals from/to the motorbike for hard key input and vehicle functions	QM
	Diagnostic	UDS over CAN for error detection and factory test	QM
SOC	Cluster	Speedometer/Odometer/Battery/Alarm sound etc.	QM
	Audio	Support audio input from Bluetooth headset in the helmet	QM
		Support audio output to Bluetooth headset in the helmet	QM
		Support audio types of media, phone, navigation and notification	QM
		Support Bluetooth phone, CarPlay and Android Auto	QM
	Bluetooth	Support connecting with phone and acting as sink device	QM
		Support connecting with headset and acting as source device	QM
		Support HFP/PBAP/A2DP/AVRCP/RFCOMM	QM
		Support phone and music functions	QM
	CarPlay	Support wired and wireless connection	QM
	Android Auto	Support wired and wireless connection	QM
	Launcher	Home page of Android system, which is used to run other apps	QM
	SystemUI	Status bar and navigation bar of Android system, which is used to show notification and do some functions quickly	QM
	Settings	Settings for audio, display, Bluetooth, CarPlay, Android Auto, etc.	QM
	Camera	DVR for front and rear cameras	QM
	3rd party apps	Apps provided by 3rd party suppliers and integrated in the Android system for media related functions	QM
	OTA	OTA master function for upgrading MCU and SOC	QM
	Engineering	App for development and testing	QM

Software Architecture

MCU + Android system

* Android 13+ version
* Raw implementation or FreeRTOS

Implement cluster on Android native

* Use Kanzi as the graphic engine
* Has standalone display layer on top of other views

Implement limited cluster view with MCU

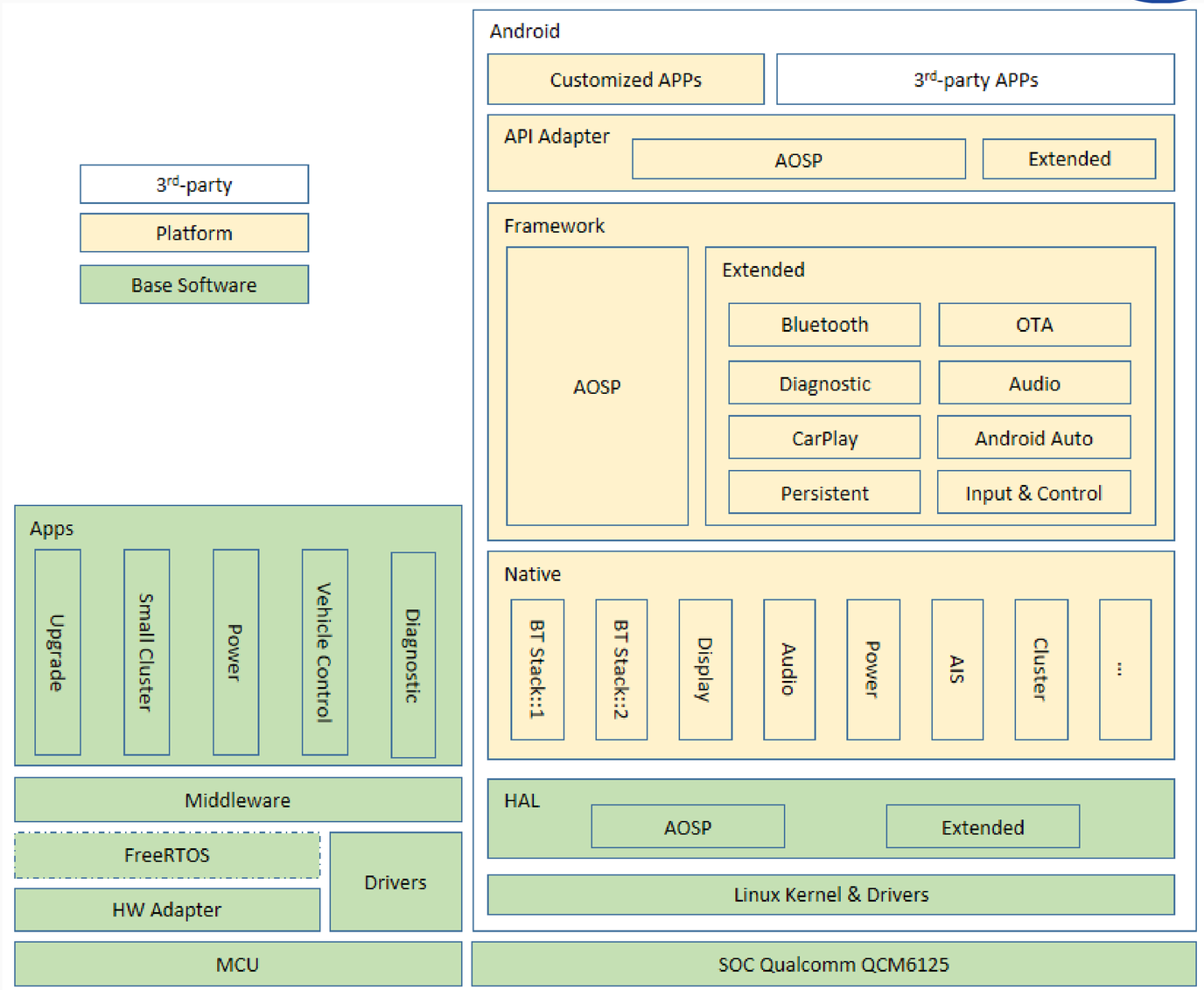
* Control TT and limited necessary UI
* Show necessary view in case Android is down
* Share display with Android system
    * Standalone display system
    * Overlay cluster view on top of Android

Dual Bluetooth chips

* Support phone and headset at the same time
* Separate Bluetooth stacks for each chip

Make full use of projection

* Support CarPlay and Android Auto
* No standalone navigation



Key Solution - Display

Shared display between MCU and Android

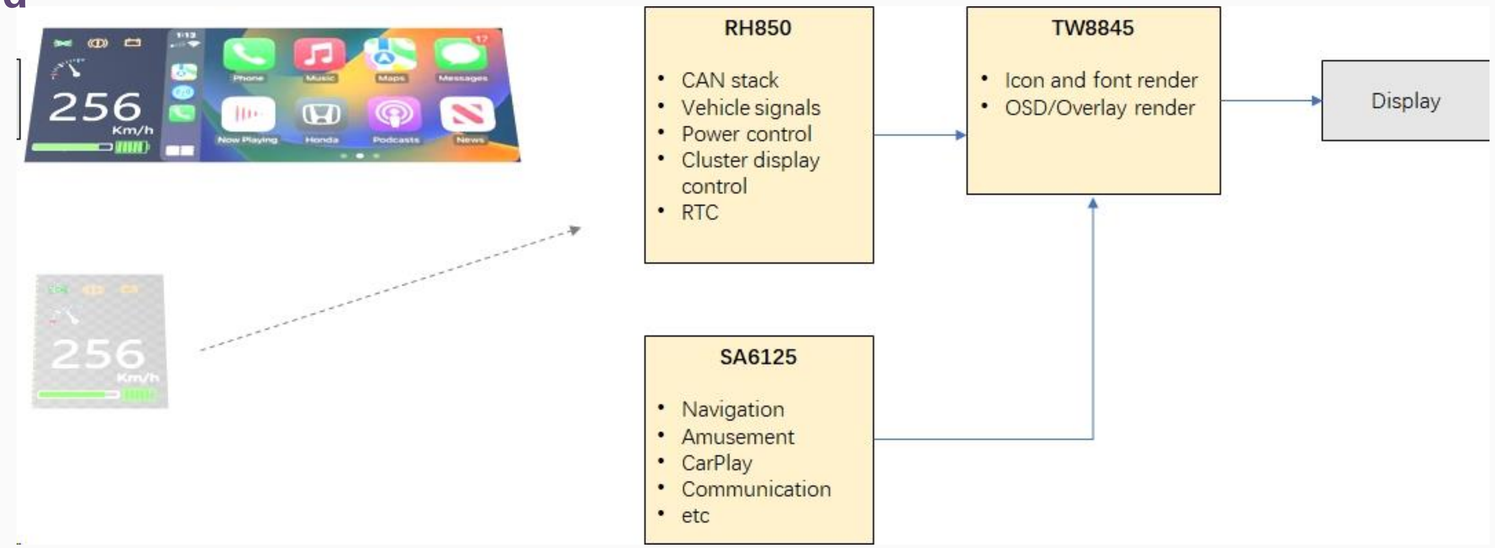
* Separate display system between MCU and Android via video switch chip
* Video switch chip is controlled by MCU
* Overlay the cluster view controlled by MCU on top of Android system
* Just showing limited cluster view using MCU

Implement full function of cluster in Android native layer

* Use Kanzi as graphic engine for better effect
* Use separate display layer for cluster

Full screen of Android when needed

* Full screen navigation for example



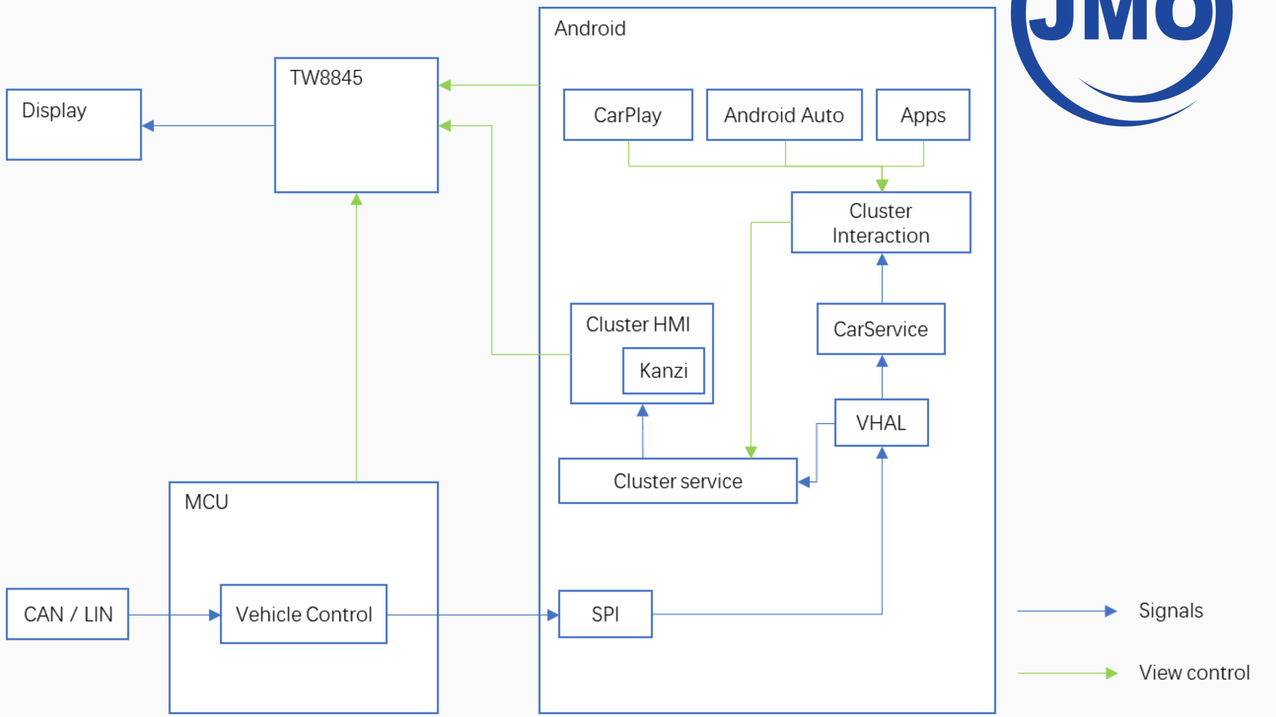
Key solution - Cluster

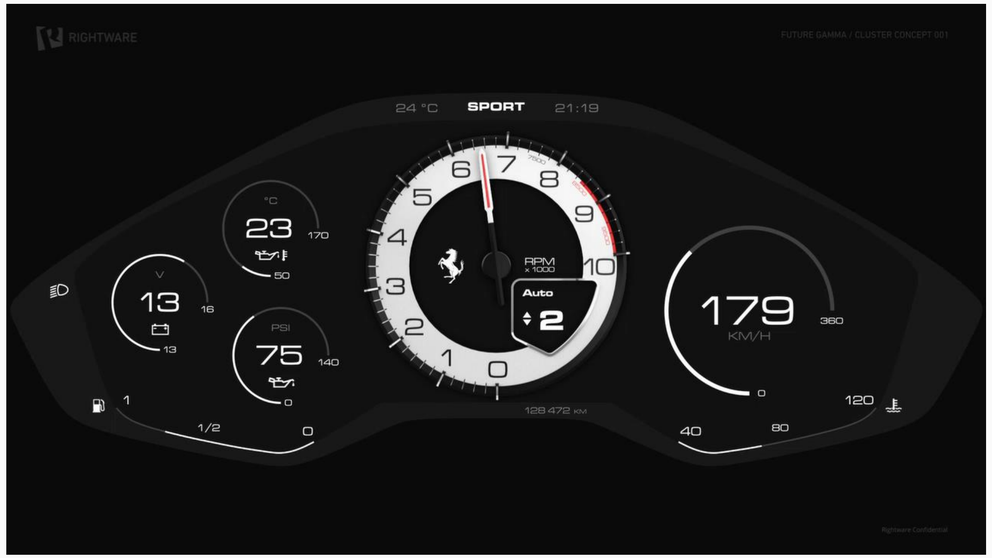
Control limited cluster view by MCU

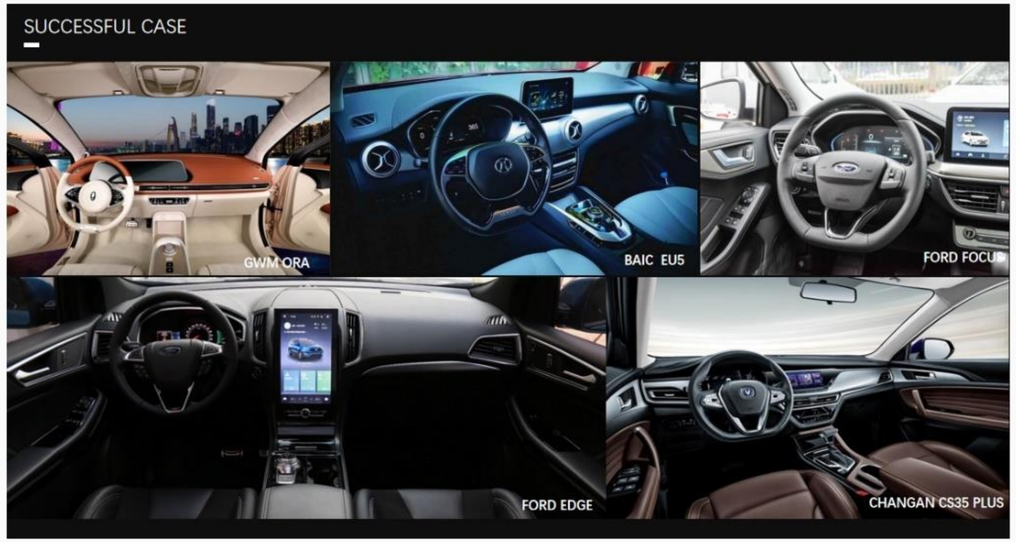
* Reduce the cost of MCU
* Only show safety related views and limited necessary views in case Android is down
* Store cluster related resources in TW8845 and show them as MCU requested

Run cluster service & HMI on Android native layer

* Full use of SOC capability to show better view
* Ensure the stability and performance of the cluster
* Use Kanzi as graphic engine for the better effect







Key solution – Bluetooth

Use dual Bluetooth chips

* One is for connecting phone devices
* Another is for connecting riders headset

Two independent Bluetooth implementations

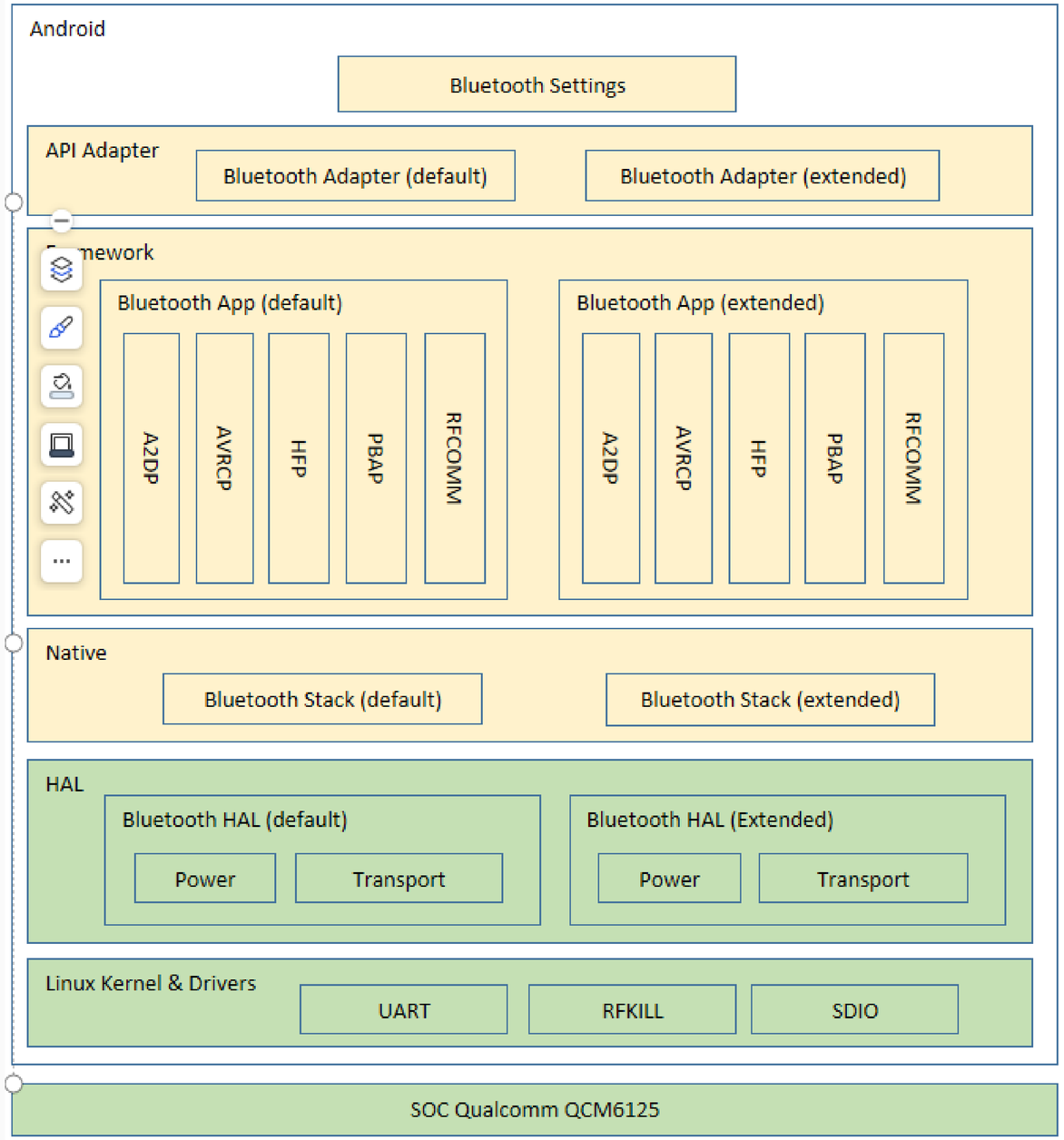
* Similar implement with different interfaces
* Run as different roles
* Add extended API for Bluetooth headset

Customized Bluetooth settings

* Manage headset devices with extended interfaces
    * Invisible for 3rd party apps
* Manage phone devices with AOSP interfaces
    * Also used by CarPlay & Android Auto
    * Device management for CarPlay & Android Auto

Implement Bluetooth music normally

* With AOSP Bluetooth related interfaces
* No need to take care another Bluetooth chip



Key Solution – CarPlay

JMO's CarPlay solution a first for the two wheel market

Full use of iOS device capability

* Integrated SIRI, phone, navigation and music related functions
* Supports many 3rd-party apps customized for CarPlay
    * More and more apps added
* FOTA - Keep up to date easily
    No need to do anything in the SOC

Support wired and wireless connection

* USB connection
* Wi-Fi connection

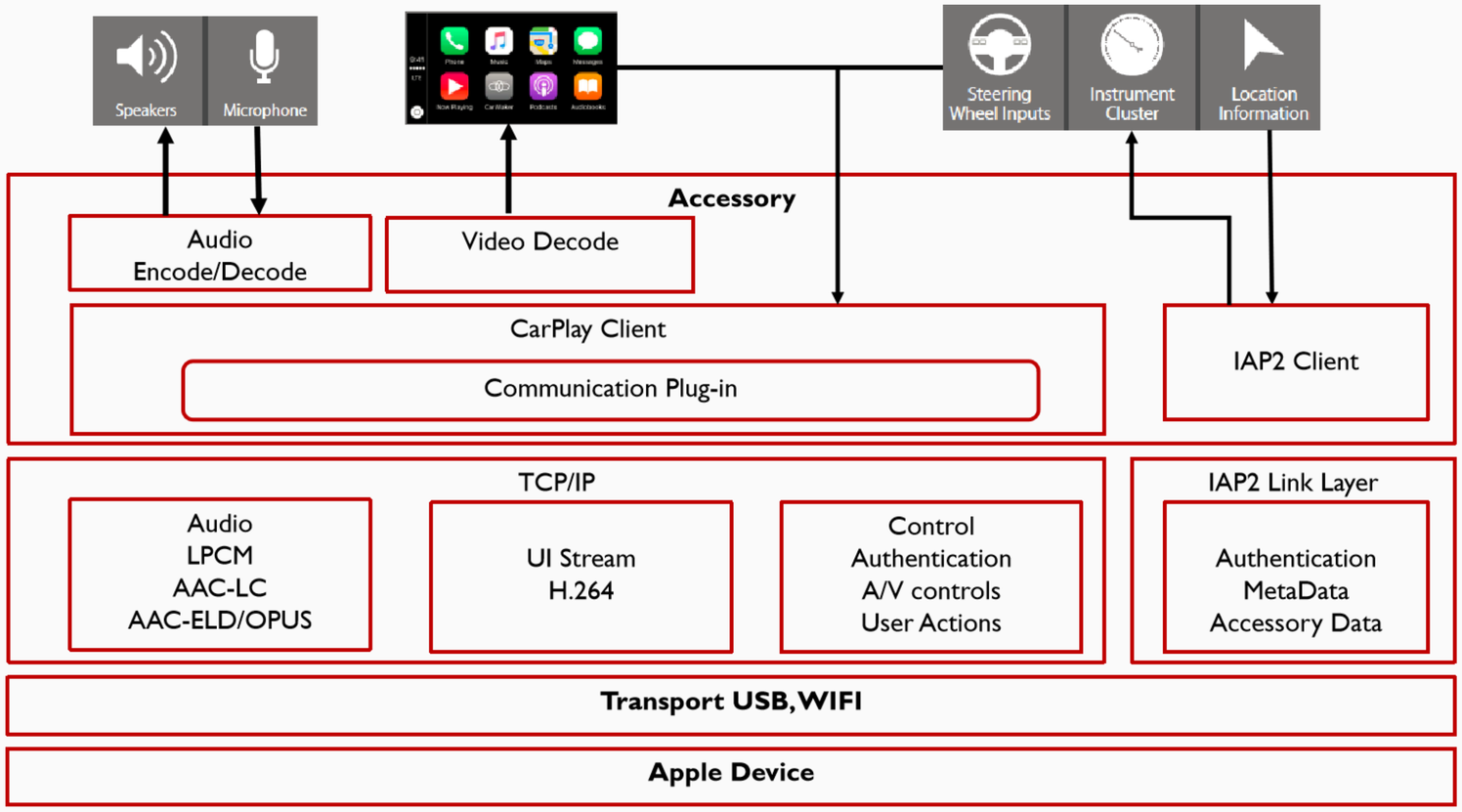
Needs Mfi chip for authentication

Requires CarPlay certification

* May need 6 ~ 10 months
* Need 3rd-party laboratory
* Need bench with necessary peripherals

No need for local navigation app

* Use Apple map or 3rd-party map in CarPlay



Key Solution – Android Auto

JMO's CarPlay solution a first for the two wheel market

Full use of Android device capability

* Integrated VR, phone, navigation and music related functions
* Supports many 3rd-party apps customized for Android Auto
    * More and more apps added
* FOTA - Keep up to date easily
    * No need to do anything in the SOC

Support wired and wireless connection

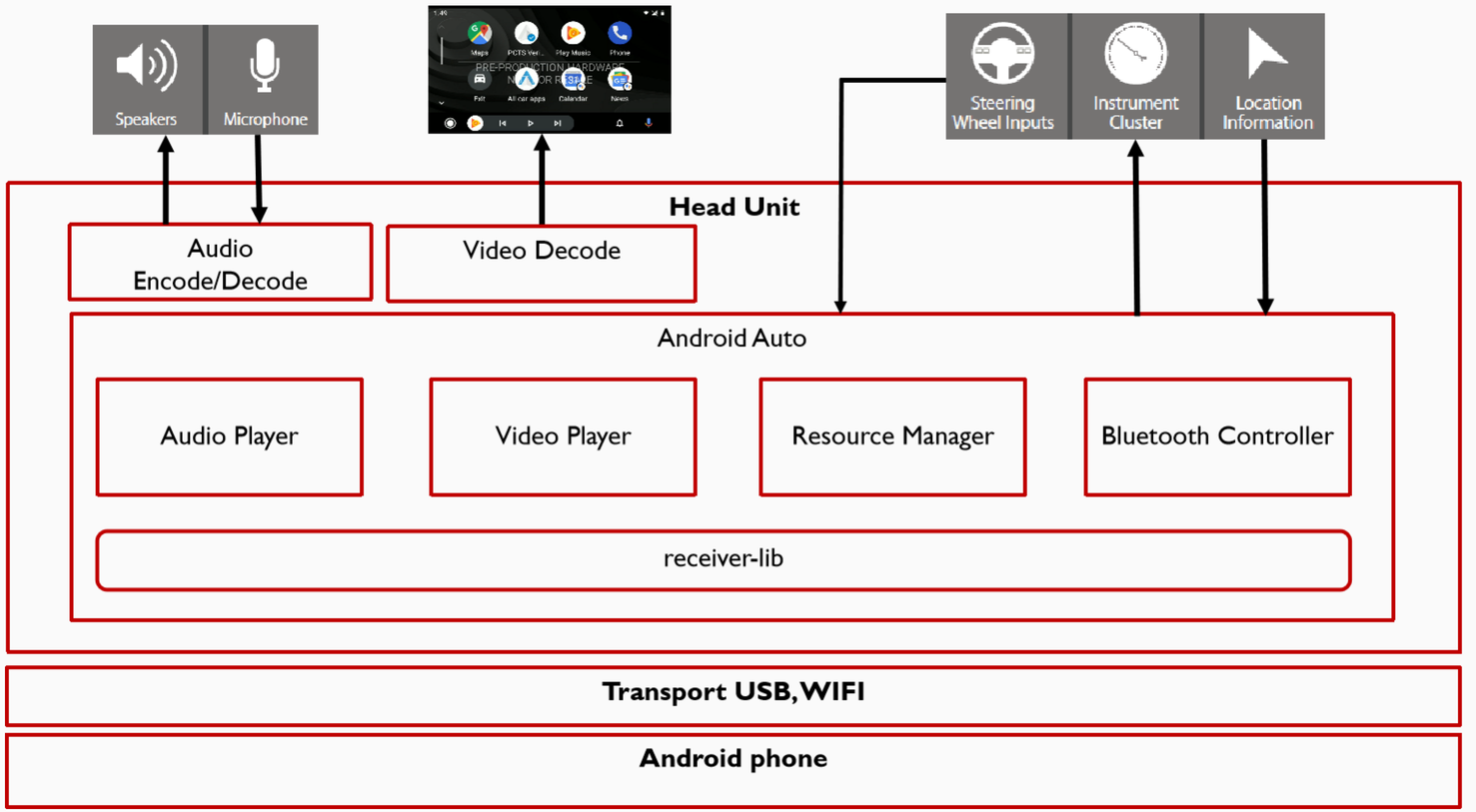
* USB connection
* Wi-Fi (5G) connection

Requires Android Auto certification

* May need 6 ~ 8 months
* Need 3rd-party laboratory
* Need bench with necessary peripherals

No need local navigation app

* Use Google map or 3rd-party map in Android Auto



Key Solution – Camera for Rider Assistance and Anti-theft

Leveraging JMO ruggedized camera for motorcycle applications

Support DVR of front and rear cameras

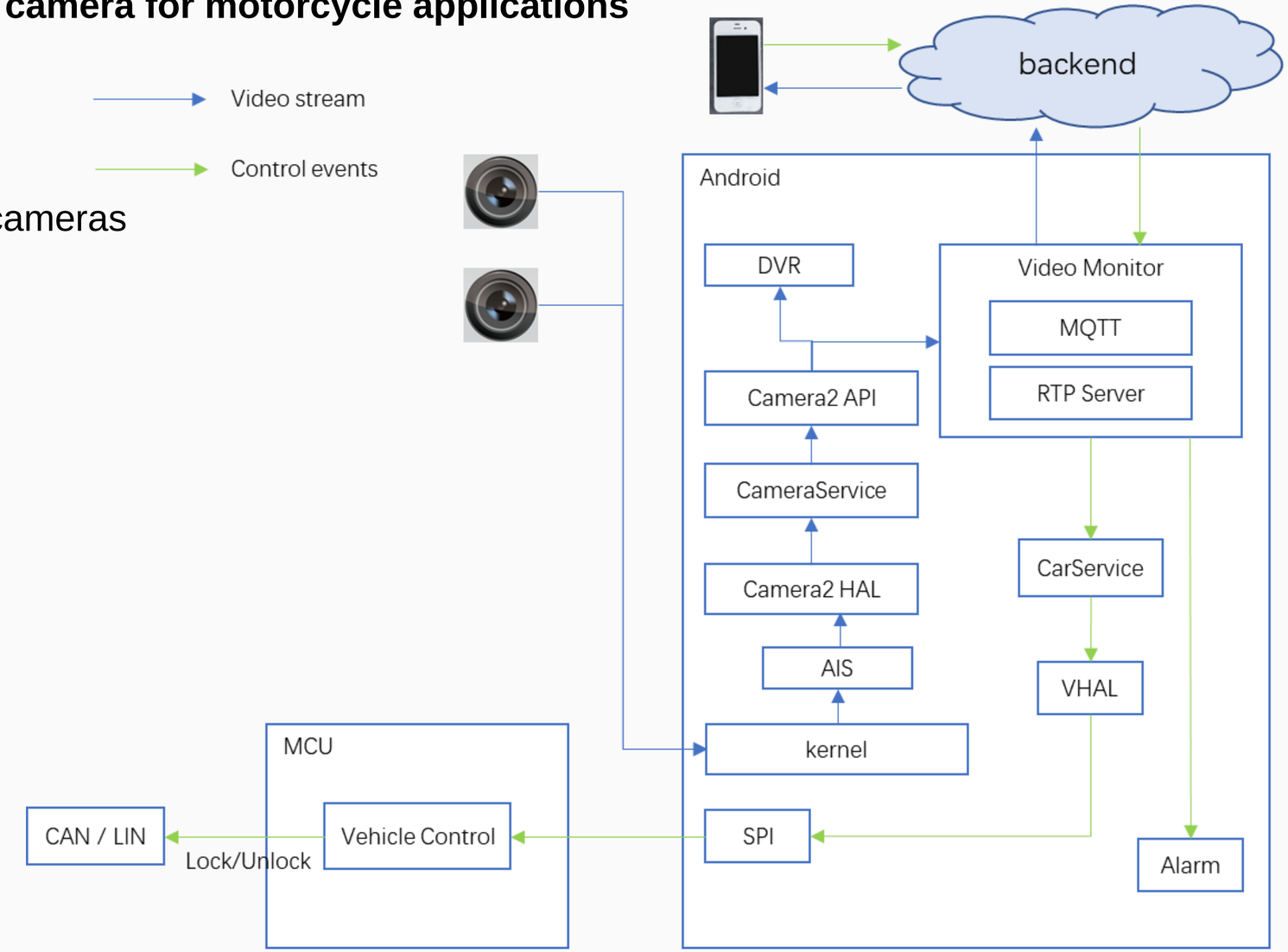
* Switching preview between front and rear cameras
* Save video data separately
* Playback video data separately

Support video monitor mode

* Part functions of sentry mode
* Remote viewing of cameras
* Trigger lock/unlock actions remotely
* Trigger alarm sound remotely

Requires customization for 3rd-party backend

* Customize monitor service in the backend
* Customize monitor app in the phone



Key Solution – FOTA

Support both of local update and remote update

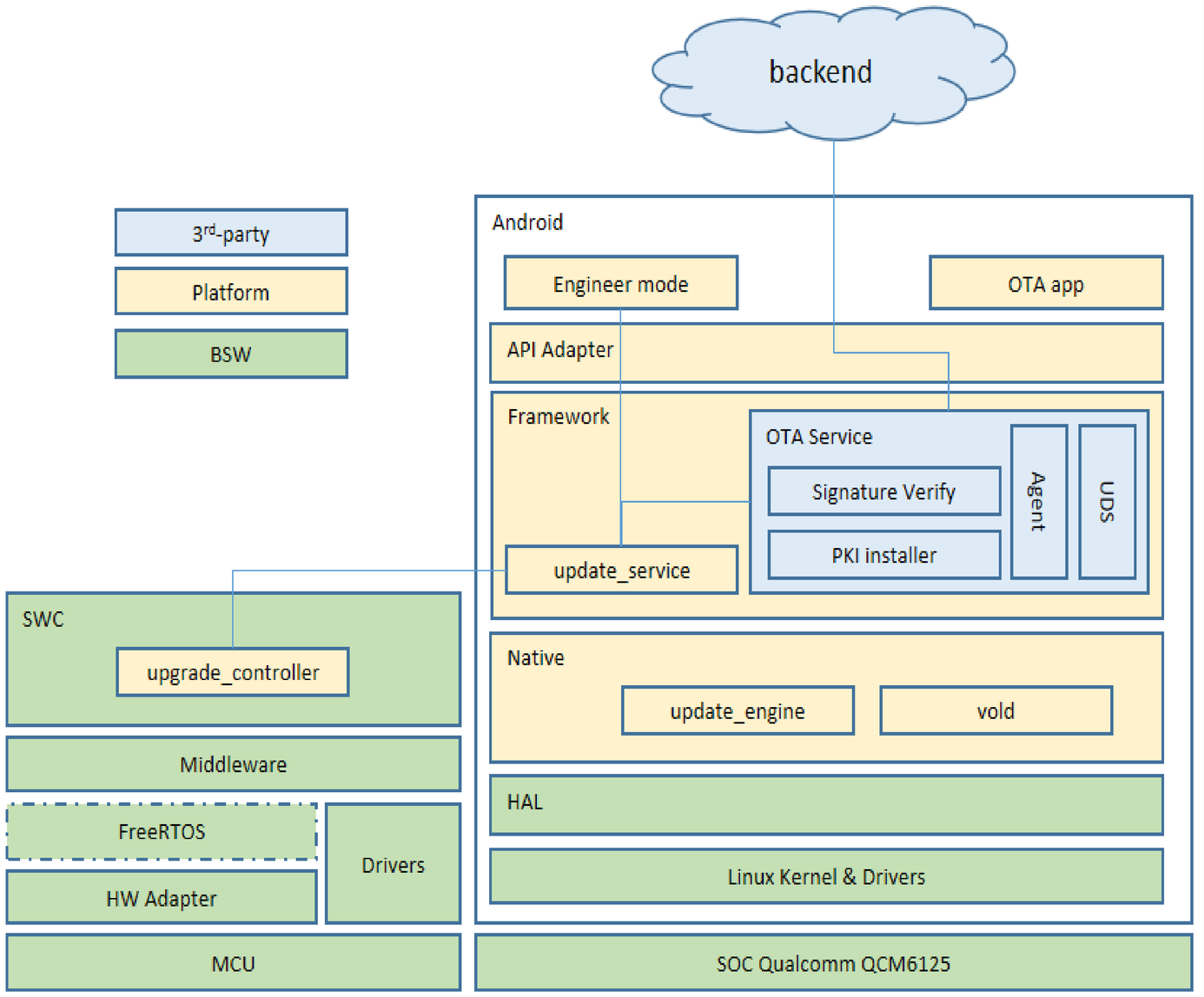
* Upgrade SOC and MCU with U-disk
* Upgrade SOC and MCU via backend

Support silent upgrading

* Support A/B partitions on both SOC and MCU
* System works normally during upgrading
* Need to reboot to run new software
* Only upgrade SOC and MCU themselves

Need to customize for upgrading other ECUs

* Work as OTA master
* Upgrade other ECUs by UDS
* Version management



03

JMO Supply Chain

Supplier Chain

Comprehensive Supply Chain Management System

Display

Close to 20 years of experience in the display screen industry

SMT

Collaborating with a professional SMT processing factory

Casing

Different casings, different supplier selections

Battery

Professional battery manufacturers to ensure product safety

PCB

We can develop PCB boards and also have professional manufacturers for production

Accessories

We have professional suppliers for a variety of accessories.

Comprehensive Supplier Chain

JMO

TIANMA

CORNING Gorilla Glass

E Ink

INNOLUX

BOE | 30th

HKC

宏联电路 HonLynn

OED Open Explore Dream 开放 探索 梦想

Himax Drive for better vision

EVE

HY

ASKPCB 奥士康

HannStar

TCL 华星

LG Display

SYE 生益电子

HUAXIANG TECHNOLOGY 华翔科技

DESAY 德赛 科技无限 文明共享

AGC

THANK YOU