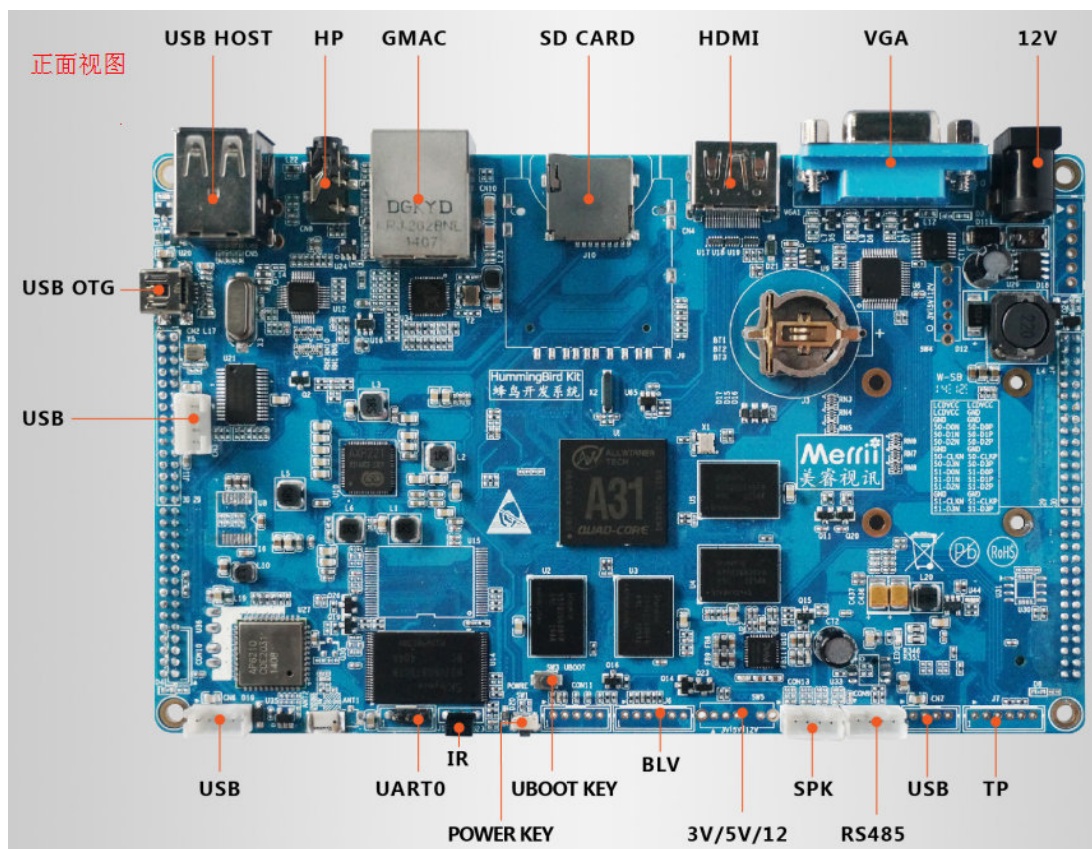


# Brief of A31 development system

A31 Hummingbird Development System based on Allwinner A31 SoC is released by Merrii, we can provide users with Android 4.4 and Linux3.3 to develop.

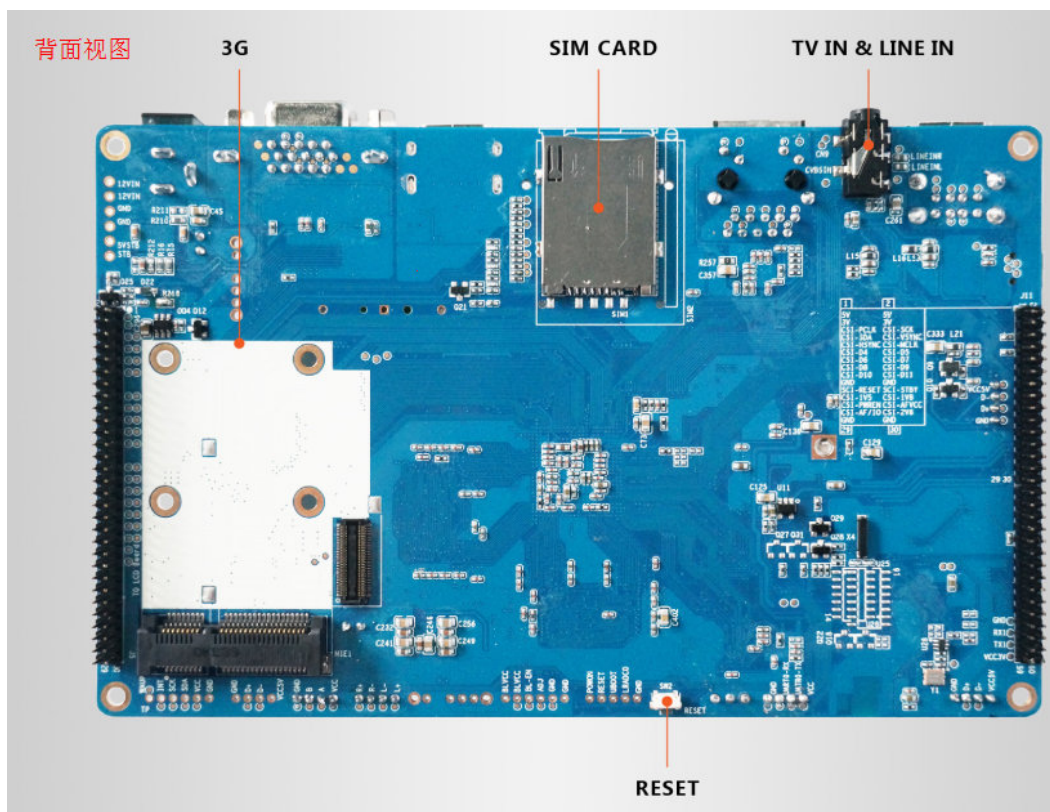
Hummingbird Development System is a mini board based on A31, there are two USB hosts, an OTG, a Gigabit Ethernet as well as line in and HDMI HD video output. Support VGA, CVBS input, MIPI interface, these parts are all integrated on the motherboard which is only slightly larger than a A5 paper. It has all the basic functions of a PC when connect TV and keyboard, such as spreadsheets, word processing, play games and HD videos etc.



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## Specifications Of A31 SoC

A31 Hummingbird Development System based on Allwinner quad core A31 processor. A31 processor enriched with interfaces, including CVBS input and output, HDMI, VGA, MIPI/CSI, dual-channel LVDS, dual-channel RGB/CPU LCD, SATA, USB, SPI and GMAC.

A31 processor applies the quad-core ARM Cortex-A7 CPU structure, including all characteristic of Cortex-A15, and the A31 processor is the most energy saving processor in present ARM platform. Equipped with PowerVR™ SGX544MP2 GPU, A31 not only improves the system performance, but also satisfy the excellent game compatibility. In addition, A31 supports 3840x1080 video encoding and decoding.

CPU	ARM® Cortex™ -A7 Quad-Core
	256KB L1 Cache
	1MB L2 Cache

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<b>GPU</b>	<p>PowerVR™ SGX544MP2</p> <p>Complies with OpenGL ES2.0, OpenCL 1.x, DX 9_3</p>
<b>Video</b>	<p>UHD H.264 4Kx2K video decoding</p> <p>Multi-format FHD video decoding, including Mpeg1/2, Mpeg4 SP/ASP GMC, H.263, H.264, etc.</p> <p>H.264 High Profile 1080P@60fps encoding</p> <p>3840x1080@30fps 3D decoding, BD/SBS/TAB/FP supported</p> <p>3840x1080@30fps 3D encoding</p> <p>Complies with RTSP, HTTP, HLS, RTMP, MMS streaming media protocol</p>
<b>Display</b>	<p>Dual-Channel LVDS 1920x1080@60fps</p> <p>4 lanes MIPI DSI 1920x1200@60fps</p> <p>Dual-channel RGB/CPU LCD 2048x1536@60fps</p> <p>Integrated HDMI1.4 1080p@60fps</p>
<b>Camera</b>	<p>Integrated Parallel &amp; MIPI I/F sensor</p> <p>Integrated powerful ISP, supporting Raw Data CMOS sensor</p> <p>Supports 5M/8M/12M CMOS sensor</p> <p>Supports 8/10/12-bit YUV/Bayer sensor</p>
<b>HawkView™ ISP</b>	<p>Static and dynamic defect pixel correction and lens shading correction</p> <p>Anisotropic non-linear Bayer interpolation with false color suppression</p> <p>Programmable color correction, dynamic range compression and contrast enhancement</p> <p>Advanced spatial de-noise filter</p> <p>AE/AF/AWB</p> <p>Anti-flick detection</p>
<b>Memory</b>	<p>Dual-Channel LPDDR2/DDR3/DDR3L Controller</p> <p>Dual-Channel NAND FLASH Controller with 64-bit ECC</p>
<b>PMIC</b>	<p>Specially designed PMIC AXP221</p> <p>21-channel power output and 2.2A Flash charging</p> <p>Comply with USB 3.0 power supply standard</p>
<b>Audio</b>	<p>Integrated HI-FI 100dB Audio Codec</p> <p>Three integrated differential analog mic amplifiers for headset and phone</p> <p>One digital mic interface with software noise cancellation</p>

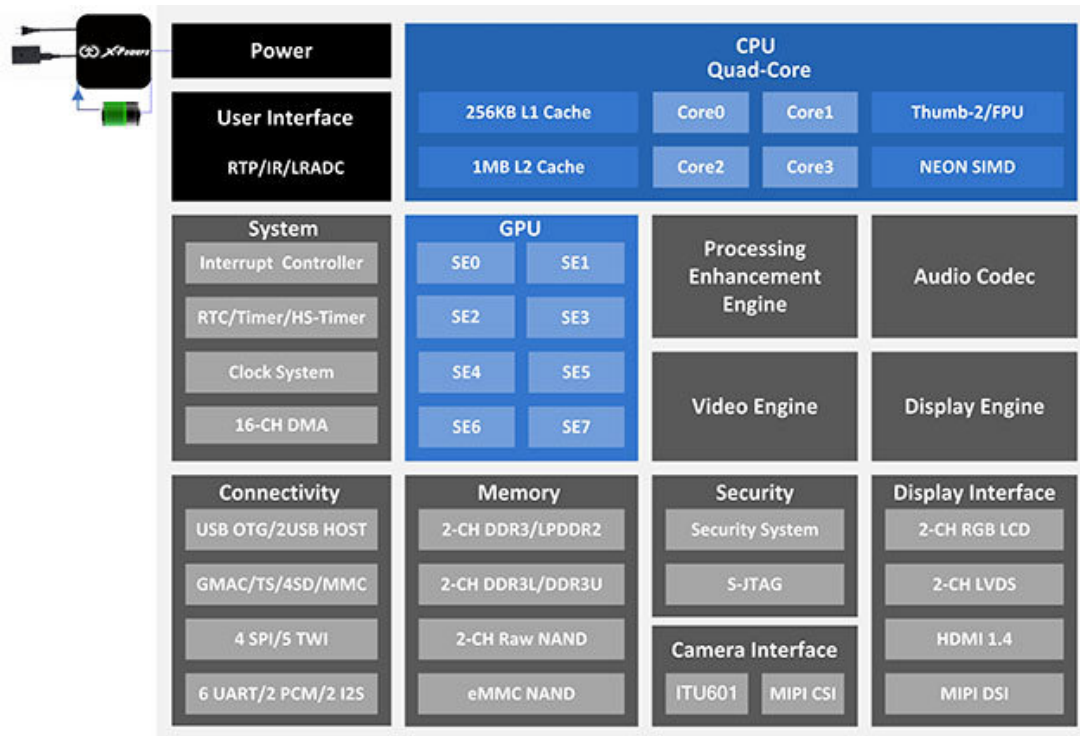
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OS	Supports Android 4.1/4.2 and above Compatible with Microsoft Windows 8
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## Structure of A31



## Highlights Of A31

The main specifications of A31 quad-core mobile application processor are as following:

- Quad-core Cortex™-A7 ARM CPU structure
- Equipped with a Power VR SGX544MP2 GPU and has eight logic cores.
- Support dual-channel DDR and NAND Flash.
- Integrated HawkView camera ISP, support HD image processing and fast image capture.
- Integrated MIPI DSI/MIPI CSI module
- integrated audio codec module

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Compare with Cortex-A8, the property of Cortex-A7 has promoted to 50% while the dimension is one-fifth of the A8, and its efficiency is five times of the A8. The A31 dual-core mobile application processor combines with the ARM high property. It can not only satisfy the property demands of website surfing, streaming video and 2D/3D games application, but also minimize the power dissipation.

#### - Games

Game rendering quality is becoming better in the quad-core A31 eight significant platform, the picture is more delicate and less jagged; Meanwhile, A31 chose the same series GPU as apple which is enhance game compatibility with more than 95%.

#### - Video

A31 reflects the fourth-generation video processing technology of Allwinner, it supports 4Kx2K video decoding, Blue-ray 3D @ 30fps and four-way 720P video codecs simultaneously. The 4K player supports multiple video display suspended; video engine interface is more open, open the standard OpenMax interfaces.

#### - Website page

Web browser supports suspension video, the main page load time can reach less than 5 seconds with further improvement page loading speed under the circumstances with sufficient Bandwidth.

#### - Camera

A31 integrated 4 lanes MIPI CSI interfaces, support up to 12 million pixel camera and 1080P @ 60fps video recording. You can achieve face detection, panorama shot, auto focus, 3D camera and other functions

#### - Low power consumption

A31 life increased by more than 20%, over 30 days of standby supported, over 100 hours of music playback, over 10 hours of video playback and more than 8 hours of web browsing

#### - Storage

A31 supports 16-bit dual-channel NAND, read and write speed increase of 100%.

#### - Display

A31 supports eDP or 4 lanes MIPI interface retina screen, the resolution up to 2048x1536.

#### - Tools

Allwinner-Technology launched two upgraded version firmware tools, Phoenixsuit and OTA, firmware modification tool DragonFace, and mass production testing tools DragonFire, DragonBoard and DDRTest.

### Software features

File System Support: ROM/CRAM/EXT2/EXT3/EXT4/FAT/NTF/JFFS2/YAFFS2 etc.

Driver Support: LCD, Touch Screen, UART, Gigabit Ethernet, HDMI, SATA,VGA etc.

Support from Nand Flash,SD card booting.

Default Android4.4 system and Android4.4 and linux 3.3 source code will be provided.

### Linux OS Features:

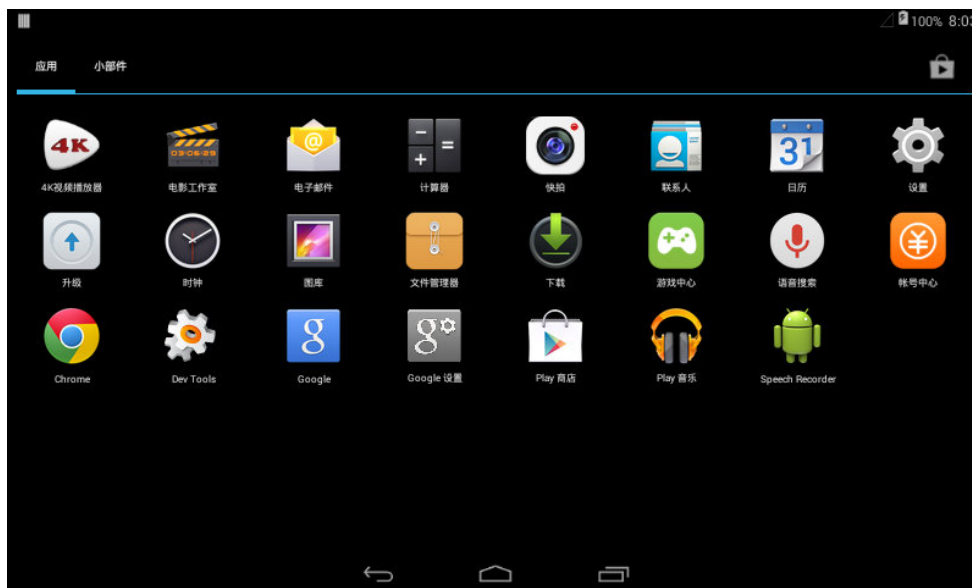
- Linux version: linux 3.3
- Graphics library: Qt

### U I interface under Linux



### Android OS Features:

- Android Version: android 4.4



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## Description Of Hardware Interface

Name	Description
<b>CPU</b>	ARM® Cortex™-A7 Quad-Core PowerVR™ SGX544MP2
<b>PMU</b>	X-Power AXP221 “flash charging core” , 2.2A PWM charging switch、 smart power management specialist , accessible to 12V power adapter, battery , USB5V power input , providing 21 line power output , including5-line high-current DC / DC, maximum efficiency can be reach to 95%.
<b>DRAM</b>	4*4G 16 Bits DDR3 , forming dual-channel 32 bits 2048M Bytes DRAM
<b>NAND Flash</b>	Hynix H27UBG8T2CTB , 4G Bytes MLC 64bit ECC NAND Flash , eMMC 和 tSD NAND Flash, It can act as system's boot device
<b>TF Card</b>	Support up to 32G card memory, support card test
<b>WIFI</b>	Wifi BT two-in-one module
<b>3G</b>	Onboard MINI PCI-E 3G module interface, support data communication
<b>Ethernet</b>	10M/100M/1000M IEEE802.3 , use Realtek RTL8201CP RJ45
<b>USBHost/USBOTG</b>	1*USB OTG 2.0 , 2*USB Host , 2-3*USB extended Pin
<b>Headphone/Line-in</b>	Support stereo headphone output/line in
<b>Speaker</b>	Onboard 10W stereo amplifier IC
<b>TV-IN</b>	CVBS Input,
<b>VGA</b>	VGA output pin interface
<b>HDMI output</b>	HDMI v1.4 , support 1080P@50/60fps at the most
<b>LCD/LVDS</b>	Provide interface as LCD screen to extend development, support every size of screen: CPU screen below 3 Inch ,RGB screen above 3 inch, LVDS screen above 8 inch
<b>Camera</b>	Provide CSI and MIPI camera interface
<b>TP</b>	Support quad-line resistive touch screen and capacitive touch screen with TWI interface
<b>UART</b>	Provide UART interface, TTL level
<b>Keys</b>	RESET , POWER_ON etc
<b>IR</b>	IR only supports infrared remote control
<b>DC</b>	12V DC IN.

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## Description of Extended PIN

Support these wiring pin functions: UART0, 1,4,5. (UART1 with fluid control)

CSI, MIPI, SPI2, TWI2, GPIO\*3, LCD, CTP, RTP

J4

Pin	Pin Name	IO type	Pin	Pin Name	IO type
1	VCC-5V		2	VCC-5V	
3	VCC-5V		4	GND	
5	GND		6	GND	
7	LCD0-D1		8	LCD0-D0	
9	LCD0-D3		10	LCD0-D2	
11	LCD0-D5		12	LCD0-D4	
13	GND		14	GND	
15	LCD0-D7		16	LCD0-D6	
17	LCD0-D9		18	LCD0-D8	
19	LCD0-D11		20	LCD0-D10	
21	LCD0-D13		22	LCD0-D12	
23	LCD0-D15		24	LCD0-D14	
25	GND		26	GND	
27	LCD0-D17		28	LCD0-D16	
29	LCD0-D19		30	LCD0-D18	
31	LCD0-D20		32	LCD0-D21	
33	LCD0-D22		34	LCD0-D23	
35	LCD0-CLK		36	LCD0-DE	
37	LCD0-VSYNC		38	LCD0-HSYNC	
39	LCD-BL-EN		40	PWM0	
41	LCD-PWR-EN		42	TP-WAKEUP	
43	TPX1		44	TP-INT	
45	TPX2		46	TWI1-SCK	
47	TPY1		48	TWI1-SDA	
49	TPY2		50	VCC-3V	
51	DSI-D0P		52	DSI-D0N	
53	DSI-D1P		54	DSI-D1N	
55	DSI-D2P		56	DSI-D2N	
57	DSI-D3P		58	DSI-D3N	
59	DSI-CKP		60	DSI-CKN	

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## J11

Pin	Pin Name	IO type	Pin	Pin Name	IO type
1	VCC-5V		2	VCC-5V	
3	VCC-3V		4	VCC-3V	
5	CSI-PCLK		6	CSI-SCK	
7	CSI-SDA		8	CSI-VSYNC	
9	CSI-HSYNC		10	CSI-MCLK	
11	CSI-D4		12	CSI-D5	
13	CSI-D6		14	CSI-D7	
15	CSI-D8		16	CSI-D9	
17	CSI-D10		18	CSI-D11	
19	GND		20	GND	
21	CAM-RESET#		22	CAM-STBY-EN	
23	CSI-1V5		24	CSI-1V8	
25	CSI-PWREN		26	AFVCC-2V8	
27	CSI-AF-IO		28	CSI-2V8	
29	GND		30	GND	
31	CSI2-D0N		32	CSI2-D0P	
33	CSI2-D1N		34	CSI2-D1P	
35	CSI2-D2N		36	CSI2-D2P	
37	CSI2-D3N		38	CSI2-D3P	
39	CSI2-CKN		40	CSI2-CKP	
41	MIPI-CSI-MCLK		42	GND	
43	GND		44	TWI2-SCK	
45	UART5-RX		46	TWI2-SDA	
47	UART5-TX		48	SPI2-CS0	
49	UART1-RTS		50	SPI2-CLK	
51	UART1-CTS		52	SPI2-MOSI	
53	GND		54	SPI2-MISO	
55	UART1-RX		56	PM4	
57	UART1-TX		58	PM5	
59	VCC-3V		60	PM6	

**Prospect and Purpose**

Due to the expansion interfaces of hummingbird development system are much

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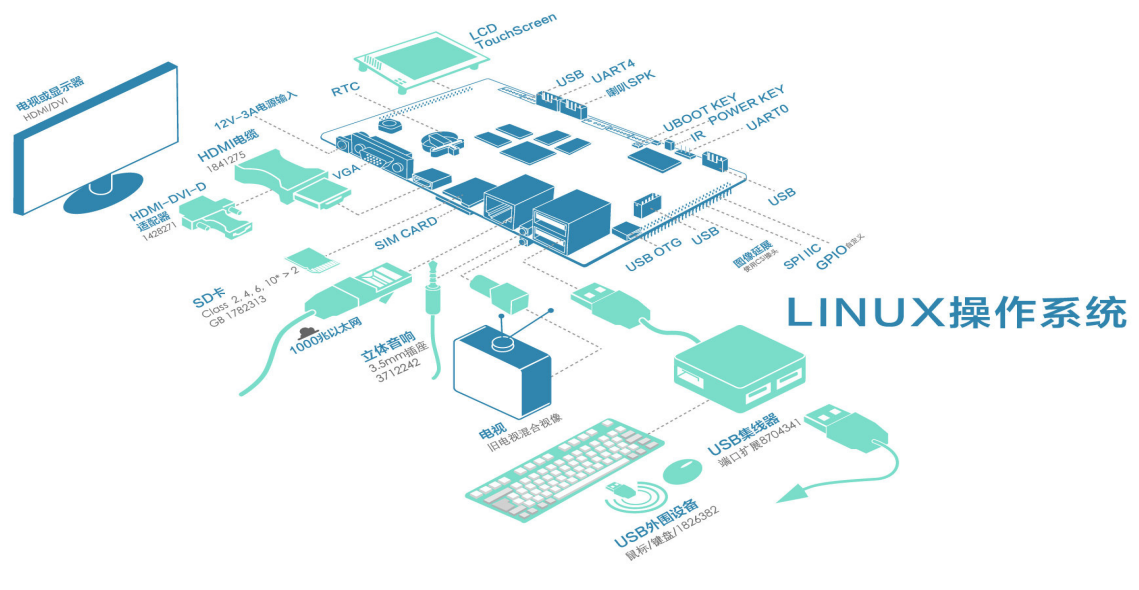
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more than some other similar products, and it has got global high attention. Thus making it very powerful, rich social environment and market value. the more people participate, the more rapid development, the greater the potential market, followed by the more purposes. Currently, besides the children's education above-mentioned, it also can be used as basic computer, home theater HD player etc.

#### Following uses:

- multimedia player
- PlayStation
- IPTV
- Emulation box
- Auto PC
- Car GPS
- smart robot
- Server
- Electronic Album
- remote surveillance
- Home alarm apparatus / automation system

... ..



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