Ch 3 ． New Media Base Technology（ 1 ）

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1. New media system composition

Terminals in new media systems are usually smart phones and mobile platforms. However, computer is also an integrated processing system to acquire, edit, store, process and present media. Almost all new media materials should be edited by traditional multimedia computer system. Therefore, multimedia computer is also an indispensable part of new media.

New media system refers to the hardware equipment and software system that completes the processing, production, dissemination and display of new media materials. Although new media is mainly used as the medium of mobile terminals such as mobile phones, ipad and other display devices. But in terms of its component parts, today's smart phone is a small computer. Meanwhile, complex new media source material should be produced by a computer.

The multimedia computer system can edit and process text, sound, graphics, image, animation, video image and other media well. Therefore, this chapter elaborates new media knowledge based on the introduction of computer hardware composition.

1.1 Multimedia computer system composition

 (1) Hardware

Computer hardware includes five parts: arithmetic unit, controller, memory, input equipment and output equipment. In terms of appearance, microcomputer hardware includes: host, monitor, keyboard, mouse, speaker. In addition, there are printers and scanners, computer important output, input equipment, etc..

I think you're familiar with this, and I won't talk about details here.

(2) Movement terminal equipment

The new media technology enables people to collect, receive and disseminate information at anytime and anywhere, greatly enriching the people to receive new knowledge. Mobile terminal equipment has become the main equipment of new media reality, meeting the requirements of new media transmission.

Mobile terminal refers to the computer equipment that can be used in movement. In the broad sense, it includes mobile phone, laptop, tablet computer, POS machine and even on-board computer. But in most cases, it's a phone or a smart phone or tablet with multiple applications.

① smart phone

The smart phone is compared to the ordinary phone, which has the function of sending, receiving messages and calls, and the smart phone is embedded multimedia computer in it.

Let's look at a main board of iPhone 5S.
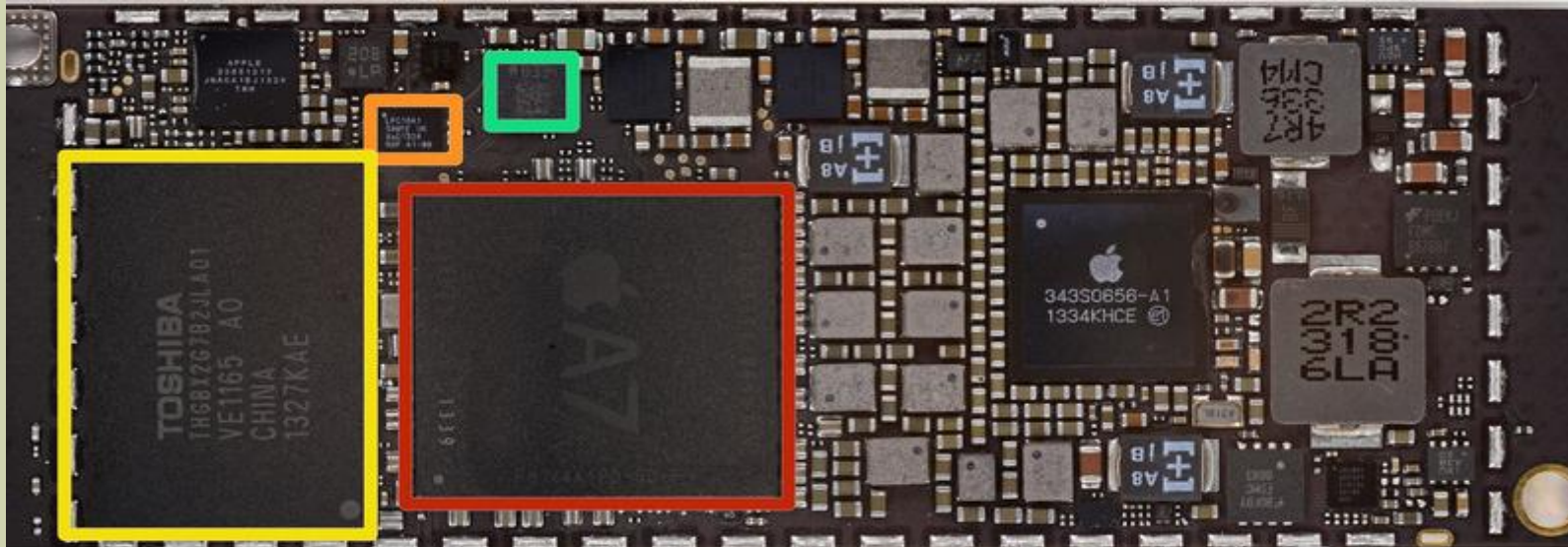
The red part is the A7 processor, the yellow part is flash memory, the green part is accelerator, the Orange part is M7 coprocessor

② **Laptop**

At present, the laptop has developed into a major platform device for mobile office and mobile commerce with the same functions as the desktop computer. In some applications, it even exceeds the desktop computer and is easy to carry.

The biggest difference between a laptop and a smart phone is the system architecture. For example, the operating system of a laptop is windows operating system, while the mobile phone is an android or IOS.

③ iPad

The concept of a tablet computer was proposed by Microsoft in 2002, but the hardware was still immature at the time, and the Windows XP operating system was designed for traditional computers, which was not suitable for tablet operation (Windows7 is not suitable for tablet operation), so it wasn't popular. But in 2010, tablets was popularity at an exploded speed.

The iPad redefines the concept and design of the tablet computer, and it has been a great success, thus making the tablet truly a product that drives huge market demand. The concept of the Tablet is different from Microsoft's Tablet. The iPad made people realize that computers aren't the only ones with Windows. Apple's IOS system does that, too.

Tablets, also called portable computers, are small, portable personal computers that use touch screens as basic input devices. It has a touch screen (also known as digital pad technology) that allows users to work with a stylus or finger rather than a traditional keyboard or mouse. Users can enter information via a built-in handwriting recognition, a soft keyboard on the screen, voice recognition or a real keyboard, if one is available.

④ **Mobile device operating system**

A. IOS

IOS is an intelligent operating system developed by the apple's, this iOS takes the form of closed source code, so it   can only be adopt to the apple's products, such as iPhone and iPad. according to the data from the iOS accounted for 30% of the global smart phone market share system, with 43% market share in The U.S.

(2) Android

Android, an open-source mobile operating system based on the Linux platform released by Google in late 2007, has since been refined for netbooks and MID. The platform, which consists of operating systems, user interfaces and application software, it claims to be the first truly open and complete mobile software for mobile terminals.

2. Basis of digital technology

2.1 Digital audio technology

Audio is the information used in new media system. Audio can be input or output. In computer system, the hardware to process audio information is audio card, usually called sound card, which is an indispensable part of multimedia system. In most cases, the sound card is integrated in the motherboard. For professional users, the sound card is installed in the extension slot of the computer.

(1) Audio

Sound is produced by the vibration of sound source, because of the vibration of sound source, with the help of the surrounding air medium, this vibration in the form of mechanical waves from near to far, thus forming sound waves.

The sound produced by a sound source is an analog signal, which can be represented by waveform, which can be approximately regarded as a sinusoidal decaying curve.

The human ear can only feel the sound waves between 20Hz and 20000Hz, and the vibration waves beyond this range cannot cause the sense of hearing organs.

(2) processing of sound

The sound that the human hears is a kind of sound wave, the computer process the wave turn mechanical vibration into electrical signal through the microphone, it is a kind of continuous simulation signal.

The computer can only process digital signals. The computer can process sound when the Analog signals are converted into digital signals. This conversion is Analog/digital (A/D) conversion, which is realized by the Analog/Digital circuit.

The digital sound signals which converted by A/D are sent to the computer for processing and preservation, and the processed data is converted into analog signals through the Digital/analog (D/A) conversion circuit, and then amplified and output to the speakers or headphones.

Digital information can be stored, edited and processed like text and graphic information. The conversion process from analog to digital includes three steps: sampling, quantization and encoding.

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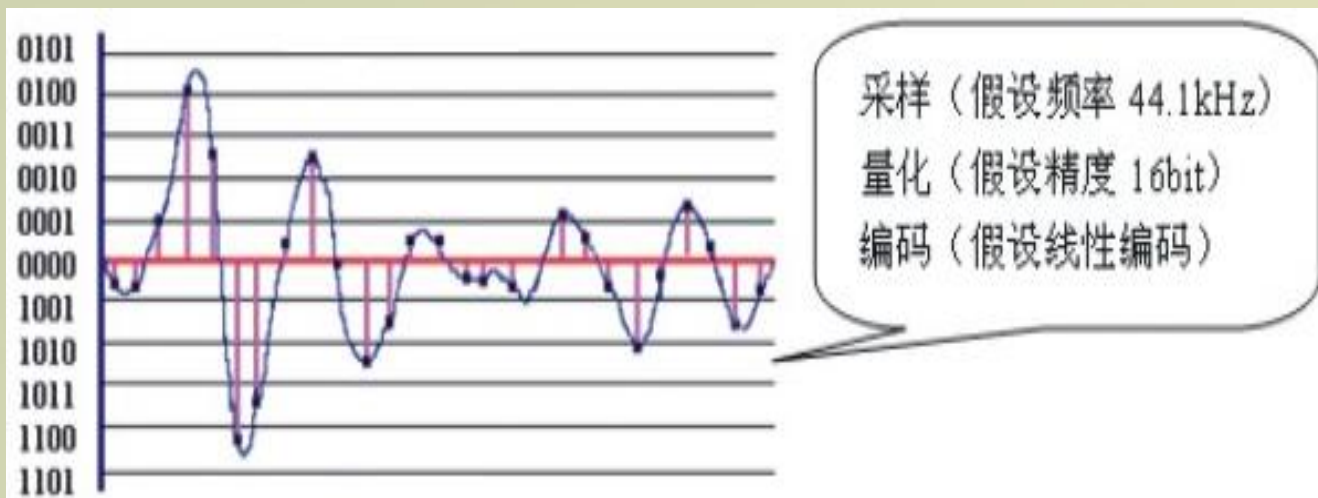
① Sampling

In the process of audio signal digitization, the most important thing is sampling, how is sampling ?The sampling is to read the amplitude of the sound waveform at the same time interval, and record the time of reading and the amplitude of the waveform. In this way, the recorded data is not continuous, and the values of amplitude are not continuous. The number of sampling per unit time is called the sampling frequency.

The higher the frequency, the closer the data points of the discrete amplitude obtained are to the continuous signal, and the larger the data is.

According to the sampling law of Harry Nyquist, the sampling frequency is twice higher than the highest frequency in the input, the original signal can be reconstructed from the sample signal. The range of human ear ranges from 20Hz to 20kHz, so high fidelity sound effects can be heard by sampling frequencies above 40kHz.

The common sampling frequency in the multimedia system is 44.1kHz, 22.05kHz and 11.025 kHz.

② **quantization**

The data obtained by sampling are discrete values, which are represented by bits of several binary. This process is called quantization.

Discrete data into binary representation generally loses some precision, mainly because computers can represent only a limited number of values.

For example, an 8-bit binary representation of a decimal integer can only represent 2^8 levels, or 256 quantization levels. If use 16-bit binary Numbers, it will have 2^{16} (65536) quantization levels. The binary number corresponding to the quantization level is called as "quantization precision". Although the higher the quantization number, the higher the accuracy, and the better the sound quality, the larger data.

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③ **Coding**

Sampling quantified binary data should be organized according to certain rules to facilitate computer processing, which is called coding. The simplest encoding scheme is represented directly by binary complement, also known as pulse code modulation (PCM). The theoretical knowledge of coding methods is very complex, it will be briefly introduced.

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There is also an important indicator in the sound signal: the number of tracks. It indicates whether one or two waveforms are generated when the sound waveform is collected, one waveform is single channel, and two waveforms are double channel, that is   stereo. Stereo sounds more full-bodied than mono, but the amount of data is doubled.

Summarize

This lecture is mainly introduced New media system composition，It mainly includes computer hardware and software components related to new media, and talk about the basic knowledge of sound digitization, Digital audio technology is one of the basis technology in multimedia，we will continue learn the images and video next time.

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