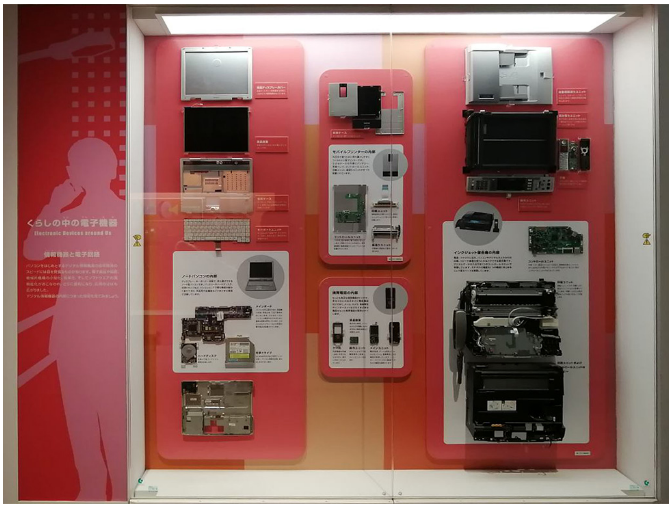
S320 Electronic Devices around Us

くらしの中の電子機器

■Purpose of Exhibition

Electric devices have made our daily lives more convenient. Electric devices such as televisions, personal computers, mobile phones, fax machines, refrigerators and electric rice cookers are indispensable for our lives. The purpose of this exhibition is to demonstrate the functions of electric devices by showing deconstructed and enlarged electric devices parts.



■Additional Knowledge

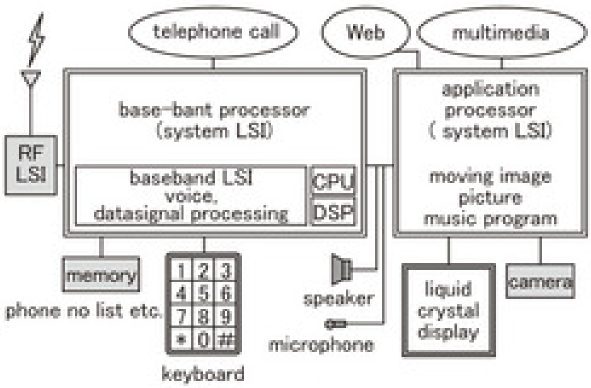


Fig. System of mobile phone

In this exhibition, you can learn about the following items, such as electric rice cookers, liquid crystal televisions, personal computers, portable printers, bulb-type fluorescent lights, digital cameras and fax machines. At the heart of those electric devices, the integrated circuit that deals with a lot of information is embedded. We will explain the function from the integrated circuit viewpoint.

[Electric Rice Cooker]
Like the personal computer and the mobile phone, the electric rice cooker also has an integrated circuit at its heart.
It takes 30 minutes to cook rice and takes about an hour in total, including steaming time. The electric rice cooker is designed for us to be able to cook tasty rice. Firstly, when you set the finishing time of the electric rice cooker, the starting time is determined by automatic calculation. Secondly, it adjusts the heating power, that is, the current of electricity to the heat transfer according to the quantity of rice. Not only that, it is designed to keep rice warm.
The microcomputer is installed in the electric rice cooker in order to do the best work and process much information. An integrated circuit is embedded in it.

[Bulb-type Fluorescent Light]
An integrated circuit is also embedded in lights. For drastic energy saving, the incandescent light bulb is shifting to bulb-type fluorescent light. When we use the bulb-type fluorescent light instead of using the same lighting level of an incandescent light bulb, it can save 20% to 30% of the energy. The bulb-type fluorescent light is a fluorescent light which you can use by directly attaching it to the socket for an incandescent light bulb. Thin fluorescent light is bent and embedded in the spherical shaped cover.
The electronic circuit, which is called the "inverter", is needed to light up the fluorescent light. The Integrated circuit is also used here. In the case of the incandescent light bulb, the integrated circuit can be directly attached to power supplies. On the other hand, the fluorescent light cannot work without it. In the case of the straight tube fluorescent, the inverter can be attached in the side of the appliance. On the other hand, in the case of the Bulb-type fluorescent light, the inverter is embedded in the appliance.

[Mobile Phone]
Many integrated circuits are embedded in mobile phones. The work of the integrated circuits of electric rice cookers and bulb-type fluorescent lights is much simpler. For mobile phones, the integrated circuits need to process much more information like sounds and images using sophisticated techniques in a single moment. Even though all of them use the same integrated circuits, the vital role each one plays is completely different.
Let's review the integrated circuit. The integrated circuit (IC) consists of a transistor, diode, capacitor and some other parts on the substrate of a silicon semiconductor. Higher degree integration is called "large-scale integrated circuit (LSI)", "very-large-scale integrated circuit (VLSI)"and "ultra large scale integrated circuit (ULSI)". We just call all of them as a group an integrated circuit here.
When we take note of the role of the integrated circuit, it is classified into memory, microcomputer and system LSI. We will not introduce each particular piece of information except the important system of LSI. The system LSI is the large IC of the system itself, which contains CPU (Note 1), memory, ASIC (Note 2) and multiple LSI and functions similar to LSI. The system LSI

Electronic Devices around Us

くらしの中の電子機器

is used for electric devices like mobile phones, digital cameras, portable audio devices and game machines that require low power consumption and compactness. (Note: 1) CPU: It is the central processing unit, and the heart of a personal computer.
(Note: 2) ASIC: An application-specific integrated circuit. It is the IC that electronic manufacturers design by themselves for use in their products such as mobile phones and game consoles.
Mobile phones have two systems of LSI which are called "baseband processor" and "application processor". The first one is in charge of communication and telephone calls. The second one is in charge of moving images, pictures, music and programs. The following chart shows the structure of a mobile phone.
DSP (in figure): Digital signal processing. It is the Microprocessor that focuses on the high-speed process for the digital signal of voices and images.

Cooperation:Panasonic CorporationHitachi Ltd.
Brother Industries, Ltd.
Zojirushi CorporationArticle by Koichi Mabuchi