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Input Device

In simple terms, input devices are devices outside of a computer that can control computer applications. There are many input devices that are commonly used, but the most common include the keyboard and mouse. Keyboards are composed of several layers of buttons/switches that are usually used for typing words and letters, but can also be used to complete commands (shortcuts like ctrl v/c). Different applications may have their own commands, think video games using “wasd” to move a character, or editing video software using “B” to cut clips in two. Keyboards don’t only include the typical keyboards that people generally think of. External number pads, chorded keyboards (pressing multiple buttons at once like a piano chord), and keyers (a glove that senses hand movements to execute commands) are all versions of keyboards.

As mentioned, the mouse is the second most common input device. Mouses use spatial data to determine where the mouse appears on the screen. Other pointers versions are also used, including track pads, touch screens, trackballs (move a ball instead of the mouse), and graphic tablets, which often use a pen instead of a mouse.

With the increase in gaming demand, many types of input devices have been created or catered to these audiences. High-degree of freedom input devices such as VR controllers, allow users to point to objects in the game, but can also allow users to control camera angles. For gamers not on PC, composite devices are common input devices. Controllers use joysticks to control movement as well as buttons to click. Video recording devices such as the Xbox Kinect allow users to input their movement into the games (Just Dance). While not only used for games, microphones are often used to allow users to communicate virtually.

Central Processing Unit

The creation of CPUs, which are small integrated circuits, took over the computer market shortly after they were created. CPUs started off as simple configurations of a few dozen circuits with little versatility, however, they allowed computers to have a much smaller form factor. Over time, technology grew, and by 1974, the microprocessor took off. In modern times, CPUs are composed of billions of transistors in a tiny form factor and they erased the need for large bulky systems of vacuum tubes and wiring. The creation of CPUs also allowed computers to become more capable and reliable, while also cutting the cost and weight.

CPUs follow a common instruction cycle, where they fetch data, encode data, and execute steps. The first step “fetch” involves gathering an instruction, the next step “encode” turns the instructions into binary code and determines what to do with the instruction, and the last step “execute” completes the instruction. These steps are replicated billions of times a second on modern computers.

Output Devices

The most common output device for a computer is the monitor. The visual display allows messages to be displayed temporarily for users to view and interact with. Messages are displayed in pixels which are usually single-colored squares that create an image, but companies have also experimented with circles, rectangles, etc. The graphic processing unit (GPU) allows the computer to create and display images for users to interact with.

Other output devices include audio devices like headphones and speakers, which use a sound card to interpret and export signals to the headphones/speakers, printers, and even brail displays for blind users.

Computer Data Storage

The two most common types of storage include primary and secondary storage. Primary storage is “kept” in the RAM of a computer. RAM storage is temporary as it only stores information while the computer is turned on. Information is deleted once the computer turns of. The RAM basically functions as an intermediary, which connects the CPU and secondary storage. The CPU needs a function or instruction and the RAM connects the information needed from the secondary storage.

Secondary data in modern computers consists of hard drives and solid-state drives (SSD). SSDs retrieve information fast but come with a few trade-offs. SSDs are costly and have less storage per dollar when compared to hard drives. Conversely, hard drives are slower but are cheaper and offer more storage. Secondary data is also “permanent”, as data does not delete after the computer is turned off.

Computer Network

Overlay networks are networks that operate “on top” of other networks but are connected by similar connection points. For example, two people working together on a business network, but are connected through another network create an overlay. Similar connection points are created by the business network, but since the two are on a different network, it creates an overlay. Overlay networks are usually peer-to-peer like the example above and also usually take on a different form as the underlying network.

A computer network I had heard about a lot, but never understood is the Darknet. Darknets are overlay networks that can only be accessed with special software. Darknets utilize unique ports and protocols, as well as they do not display an IP address, which allows for maximum security and secrecy. The secrecy and security of Darknets allow for little government or corporate intervention, which is probably why the “Dark Web” has a scary connotation associated with it.