**Controllers**

- is a eletrical device that controls the flow

**Device programming:**

**control registers,**

Control registers is a processor register which changes or control the genral behavior of a cpu or other digital device.

Common tasks performed by control registers include interrupt control, switching the addressing mode, paging control, and coprocessor control.

**data registers**

Data registers can hold numeric values such as integer and, in some architectures, floating-point values, as well as characters, small bit arrays and other data. In some older and low end CPUs, a special data register, known as the accumulator, is used implicitly for many operations.

data register to pass data to the device, or get data from

the device. By reading and writing these registers, the operating system

can control device behavior.

Bit masking: set, clear, toggle, operators | & ^ ~

**polling:** the program periodically checks for input. This wastes time looking for input and may easily miss an important event.

Polling, or polled operation, in computer science, refers to actively sampling the status of an external device by a client program as a synchronous activity. Polling is most often used in terms of input/output (I/O), and is also referred to as polled I/O or software-driven I/O.

**interrupts:** when a device has input, it sends the CPU an interrupt signal. The CPU jumps to a special routine called an interrupt handler to process the input. When the interrupt handler is done, the CPU returns to the code that was being executed before the interrupt occurred.

**priority interrupts.** different devices are assigned priorities. The CPU will call the handler for the highest priority interrupt device first. Many CPUs will interrupt an active interrupt handler if a higher priority interrupt occurs.

**vectored interrupts:** when there are many interrupt sources, the CPU will need to know which device is requesting the interrupt. The CPU will put out an interrupt acknowledge signal on the bus, and the highest priority device will respond and put a special number called the vector on the bus. The CPU will use the vector to choose the correct interrupt handler.

In Computer Science, a vectored interrupt is a processing technique in which the interrupting device directs the processor to the appropriate interrupt service routine. This is in contrast to a polled interrupt system, in which a single interrupt service routine must determine the source of the interrupt by checking all potential interrupt sources, a slow and relatively laborious process.

**Interrupt service routine**

In computer systems programming, an interrupt handler, also known as an interrupt service routine or ISR, is a callback function in microcontroller firmware, an operating system or a device driver, whose execution is triggered by the reception of an interrupt. In general, interrupts and their handlers are used to handle high-priority conditions that require the interruption of the current code the processor is executing.