

ANALOG VS. DIGITAL

problem-solving

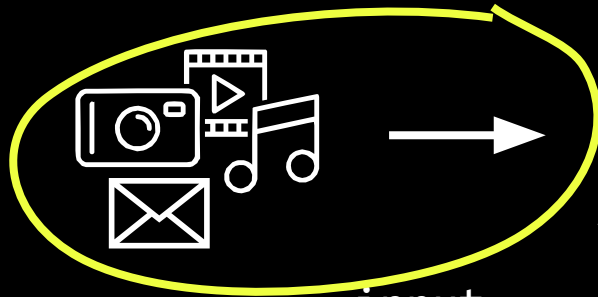
communication

algorithms

information
representation

information
processing

information
sharing



input



program



output



where can you stand on each side?



where can you stand on each side?



where can you stand on each side?



where can you stand on each side?



where can you stand on each side?

CONTINUOUS



DISCRETE

analog and digital clocks



Image source: [Wikipedia](#)



Image source: [Wikipedia](#)

“Digitization is the representation of an object, image, sound, document or signal by generating a series of numbers that describe a discrete set of its points or samples”

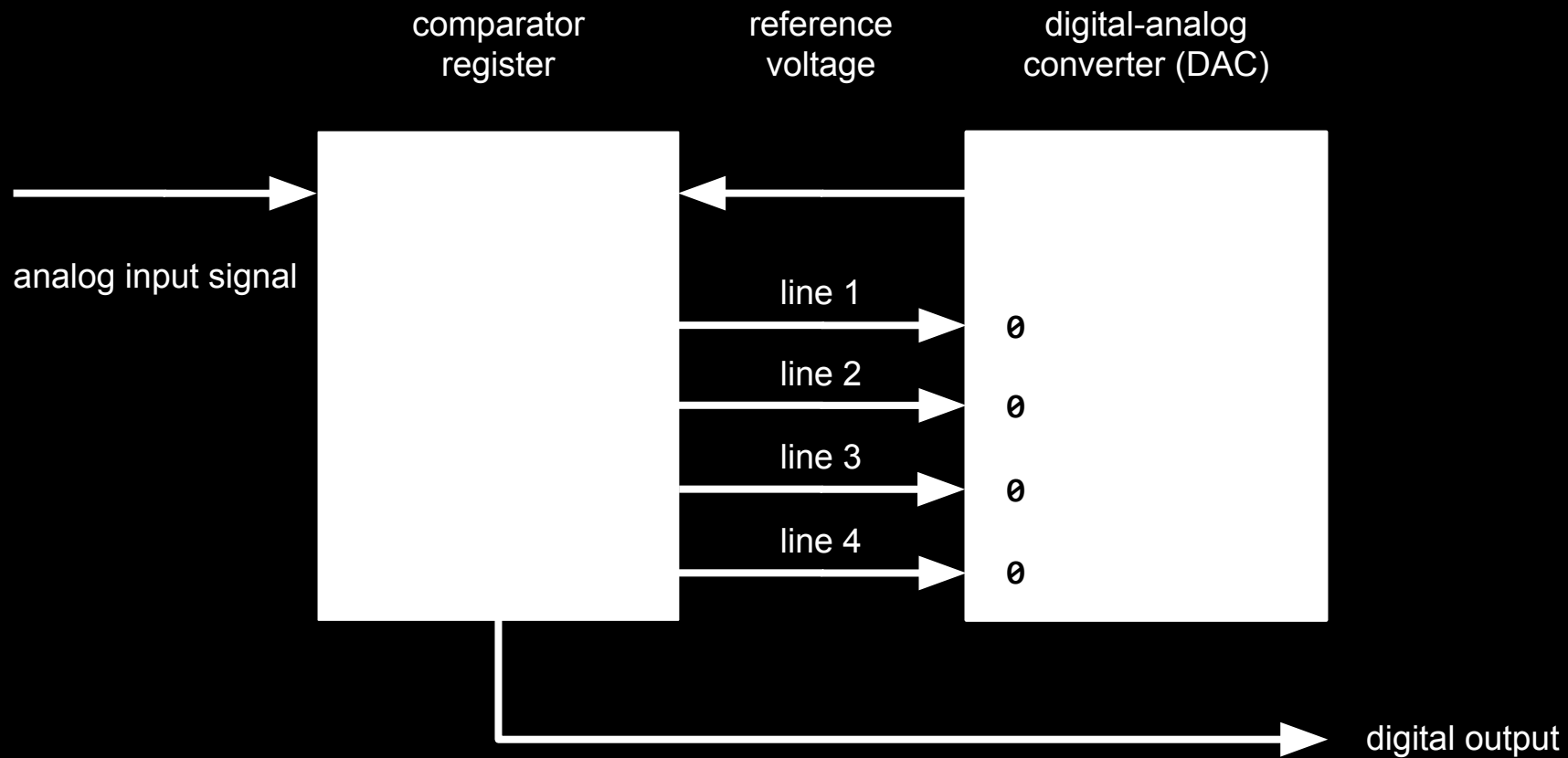
analog-to-digital converter (ADC)

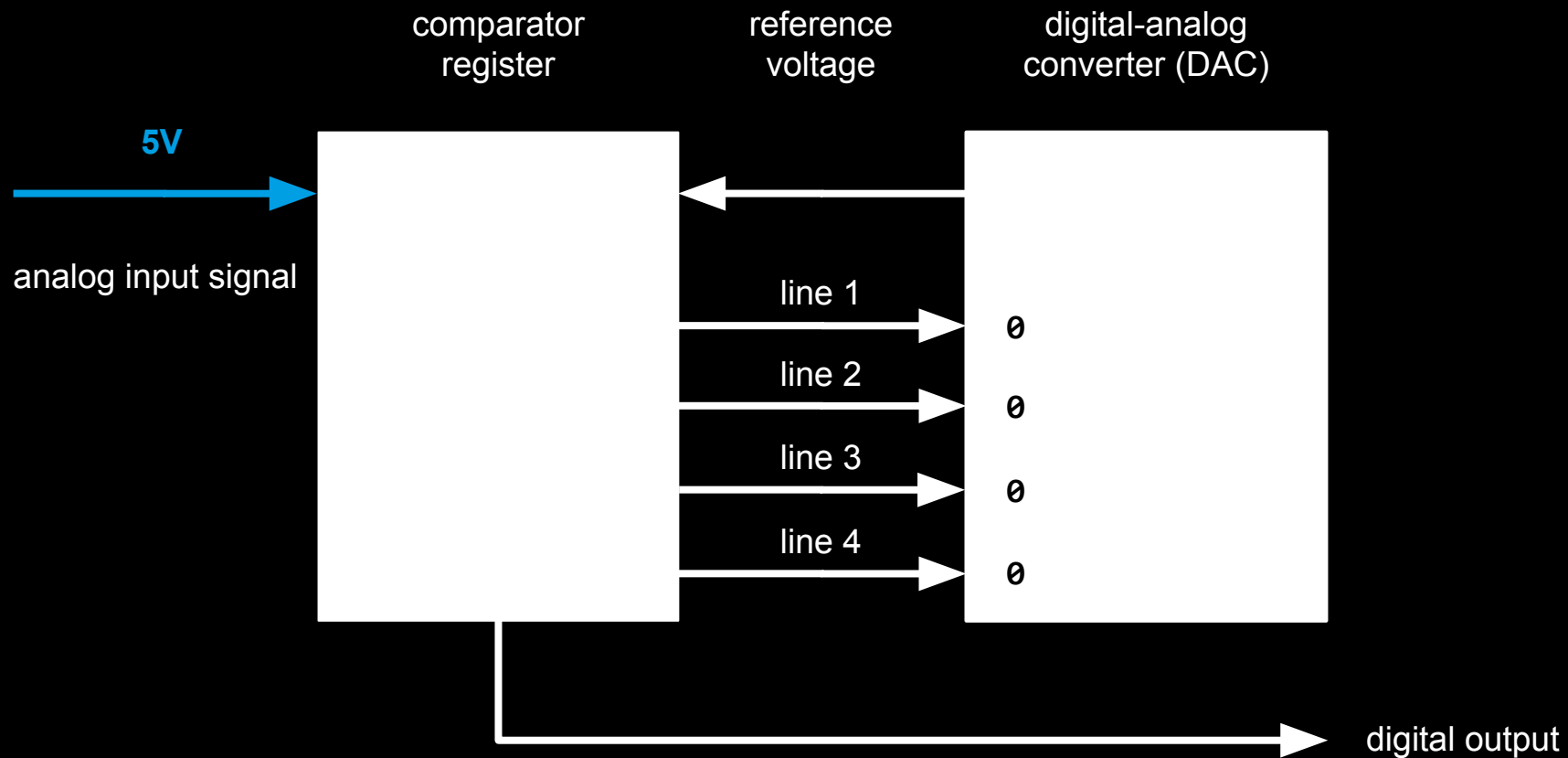


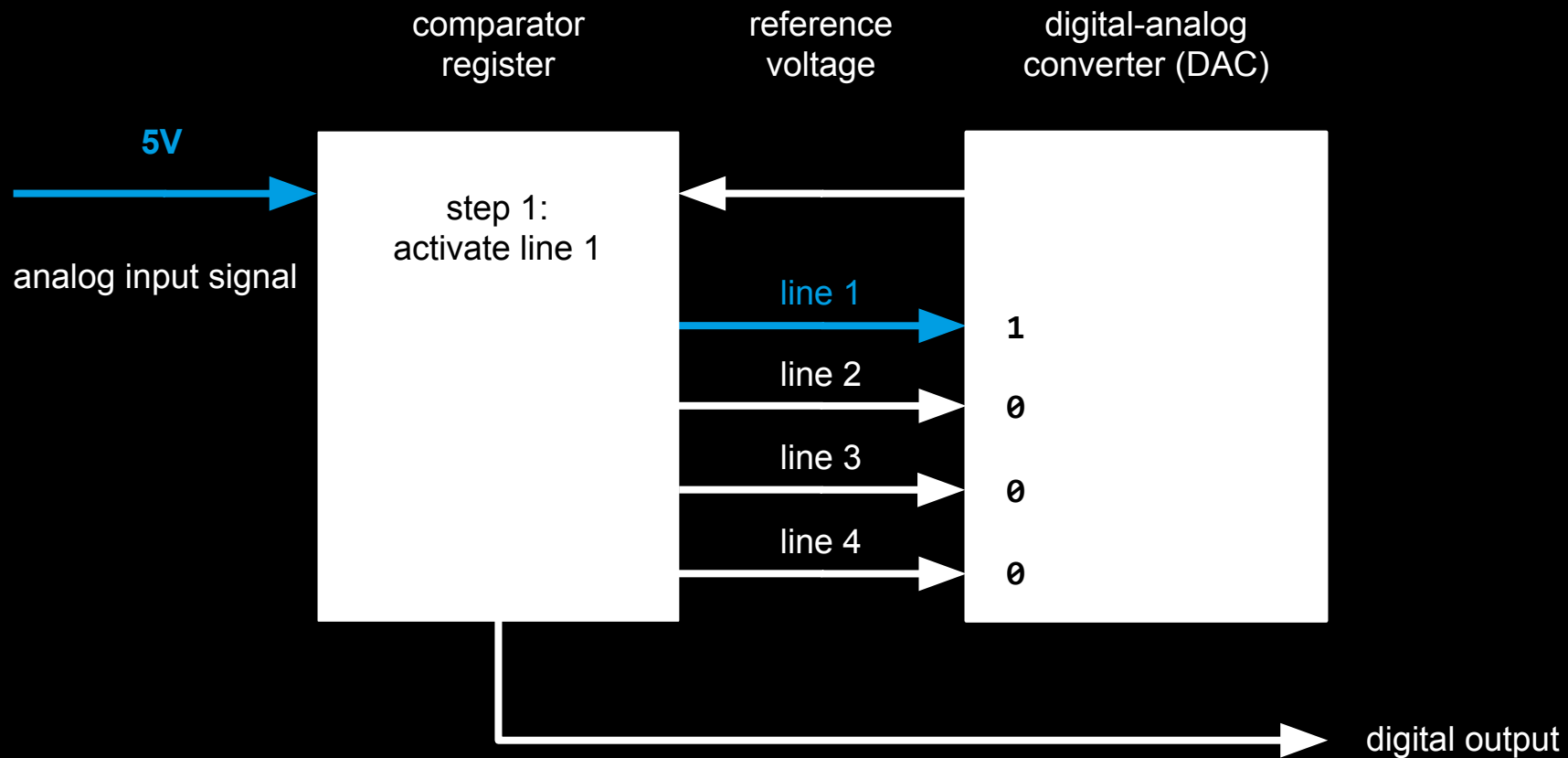
measuring of the
analog signal

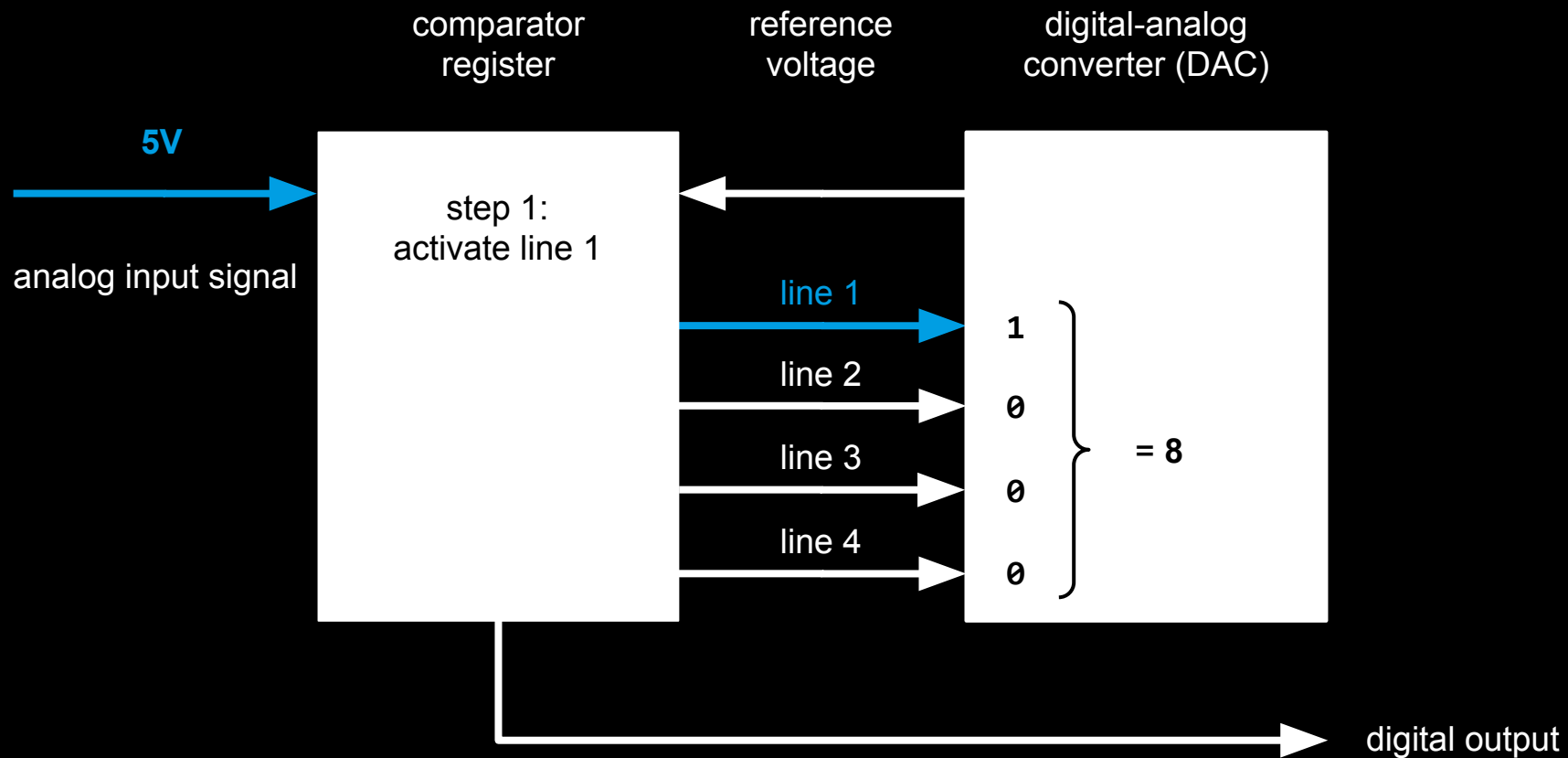
turning the
measurement into a
series of 1 and 0

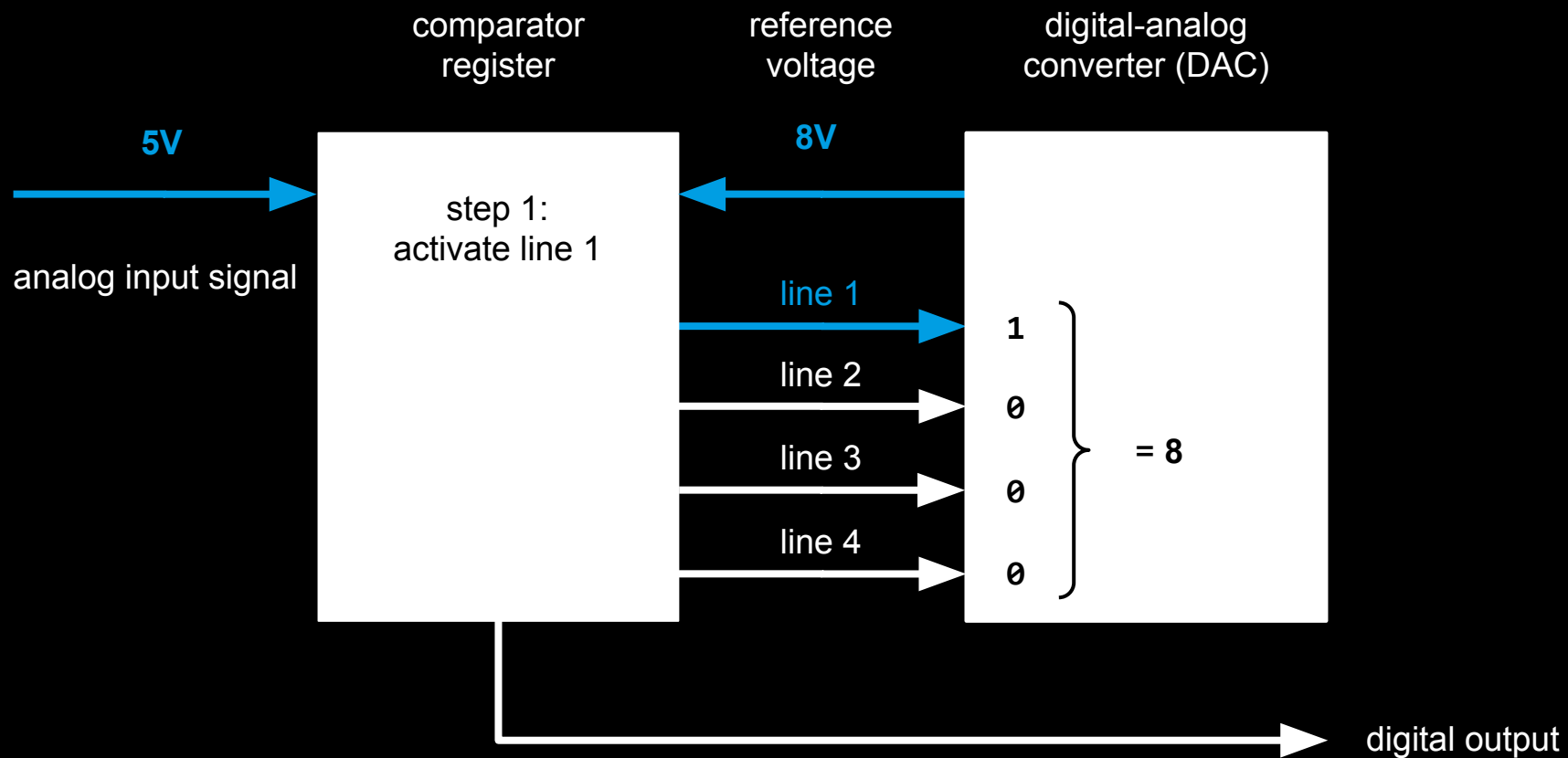
encoding the series of
numbers in binary
and assign meaning

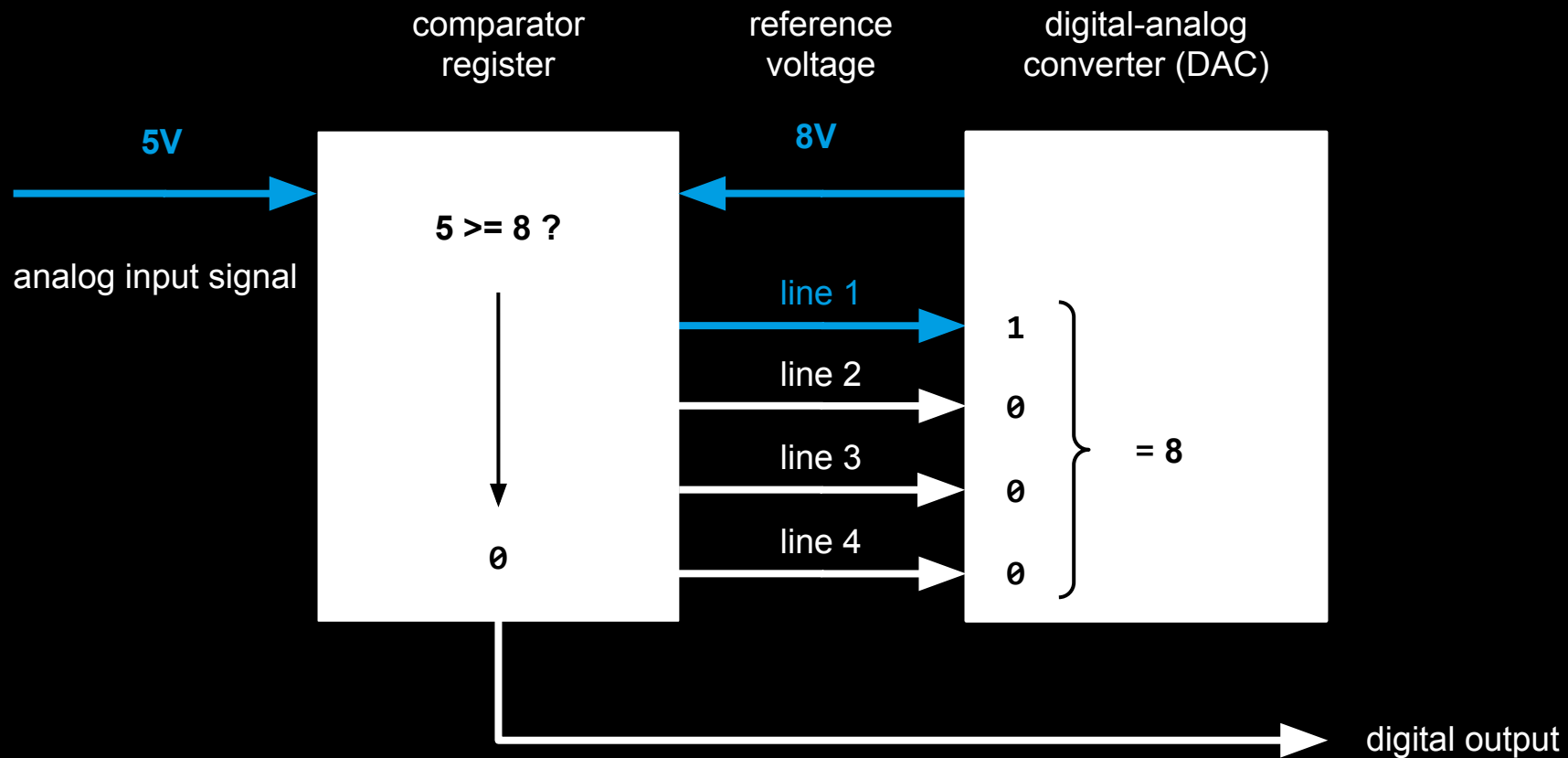


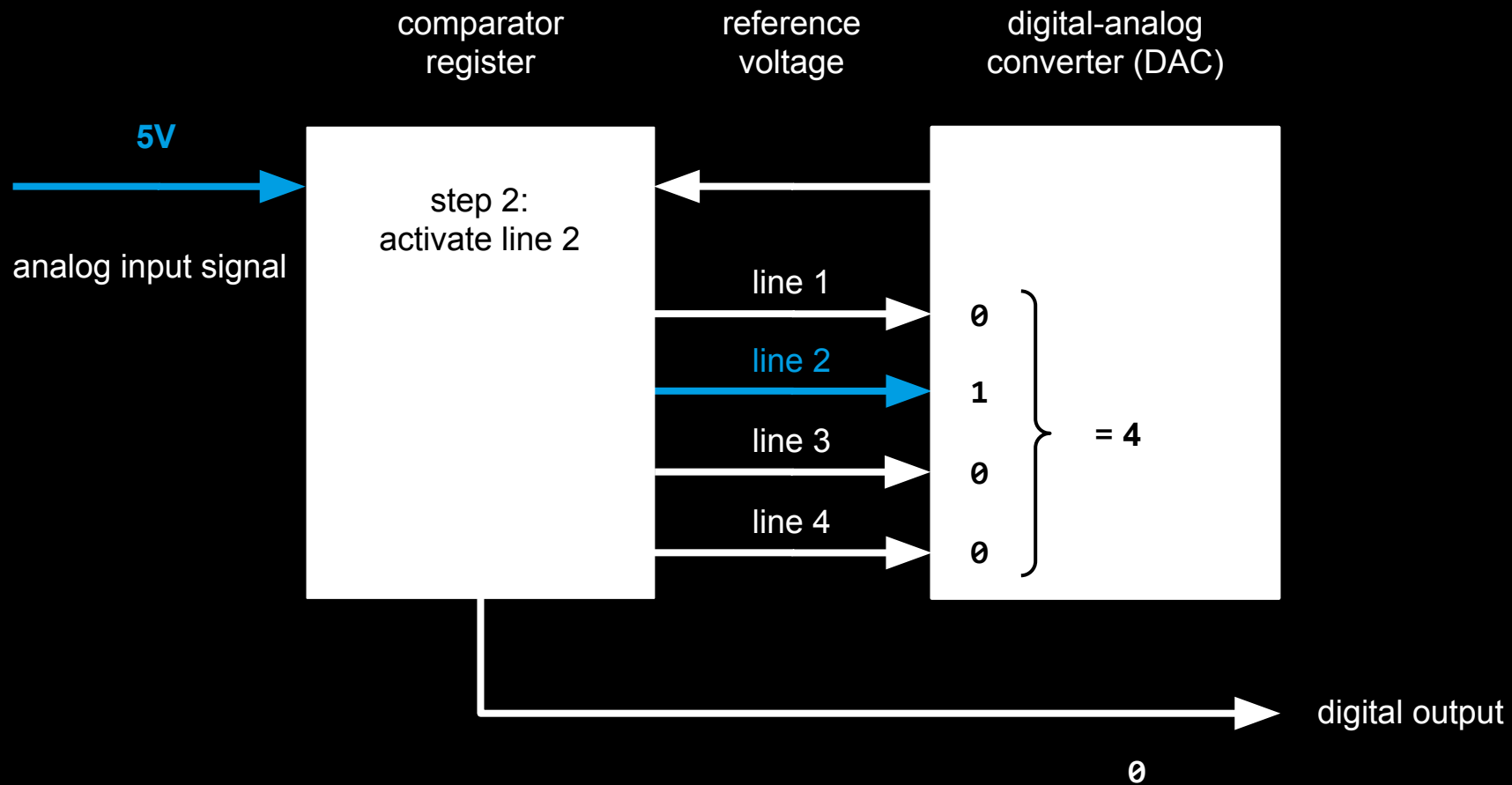


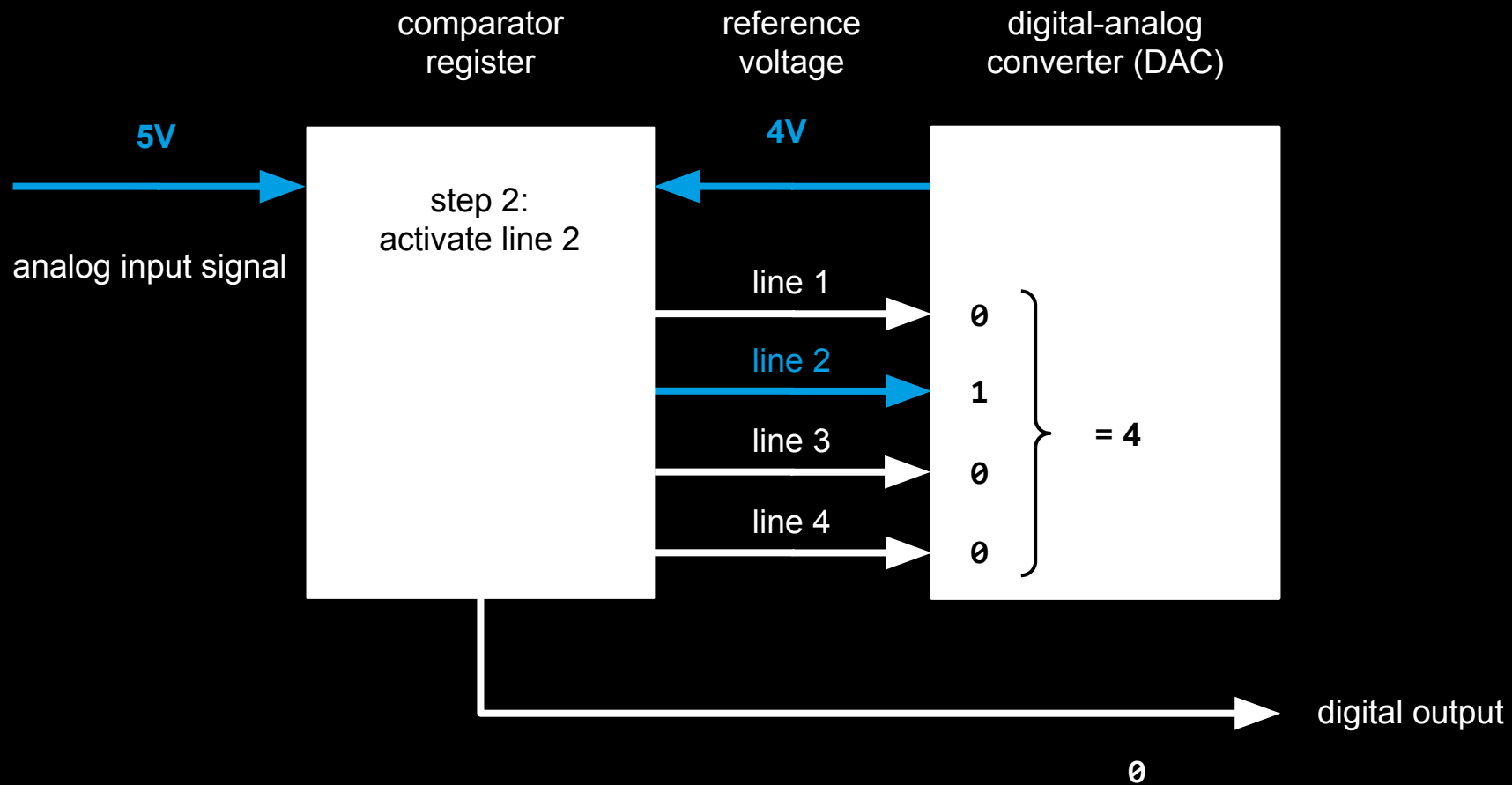


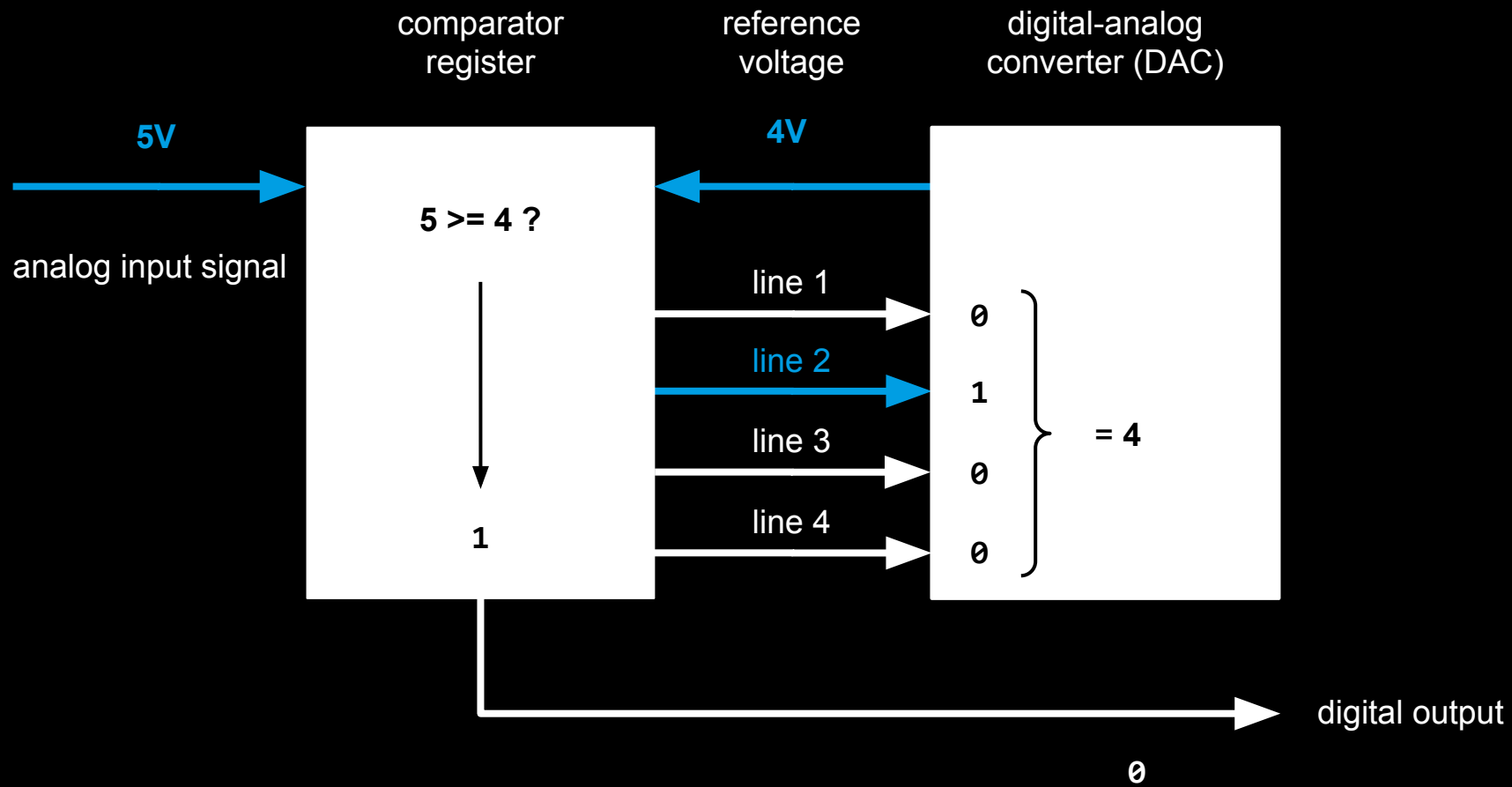


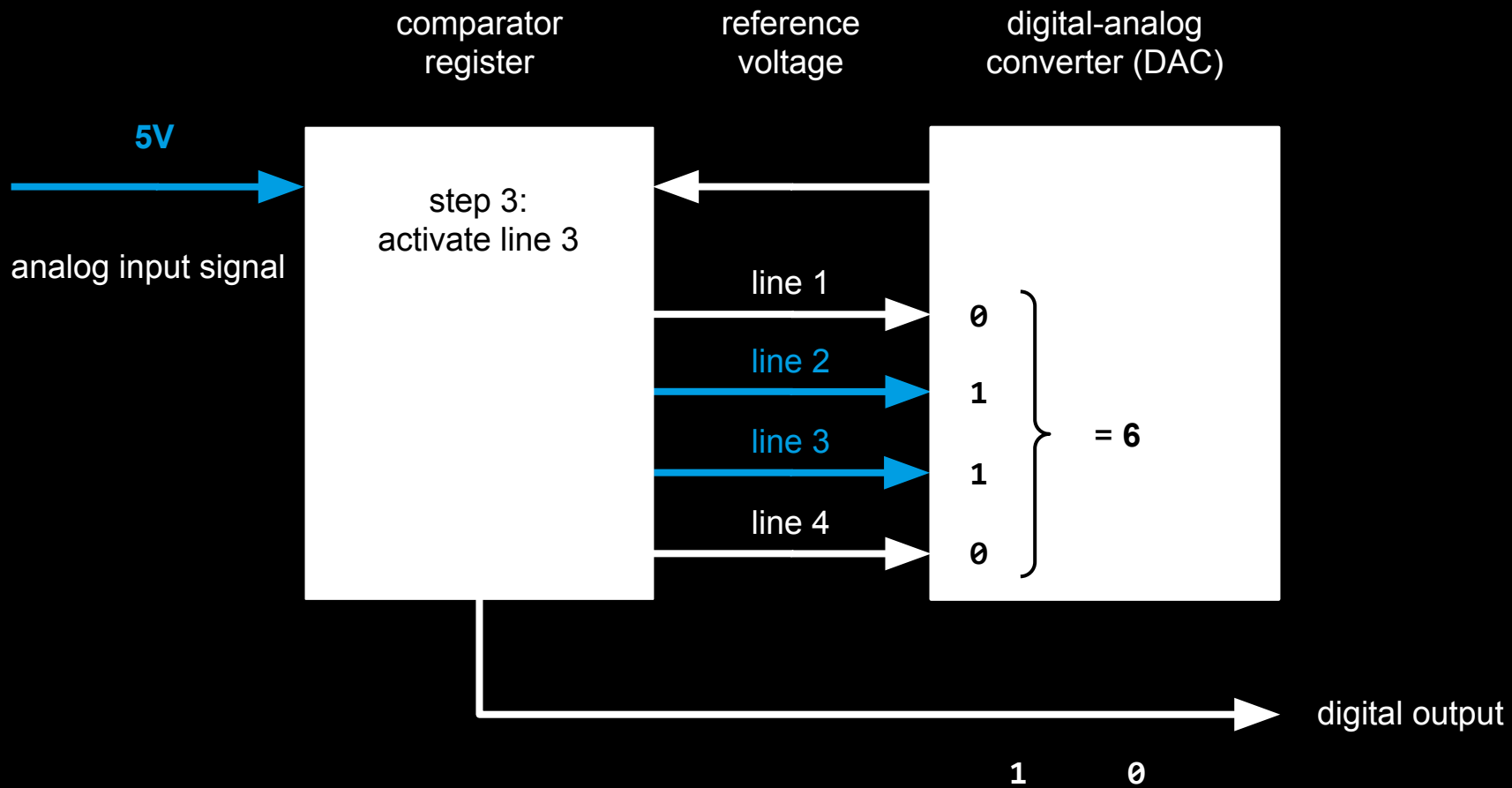


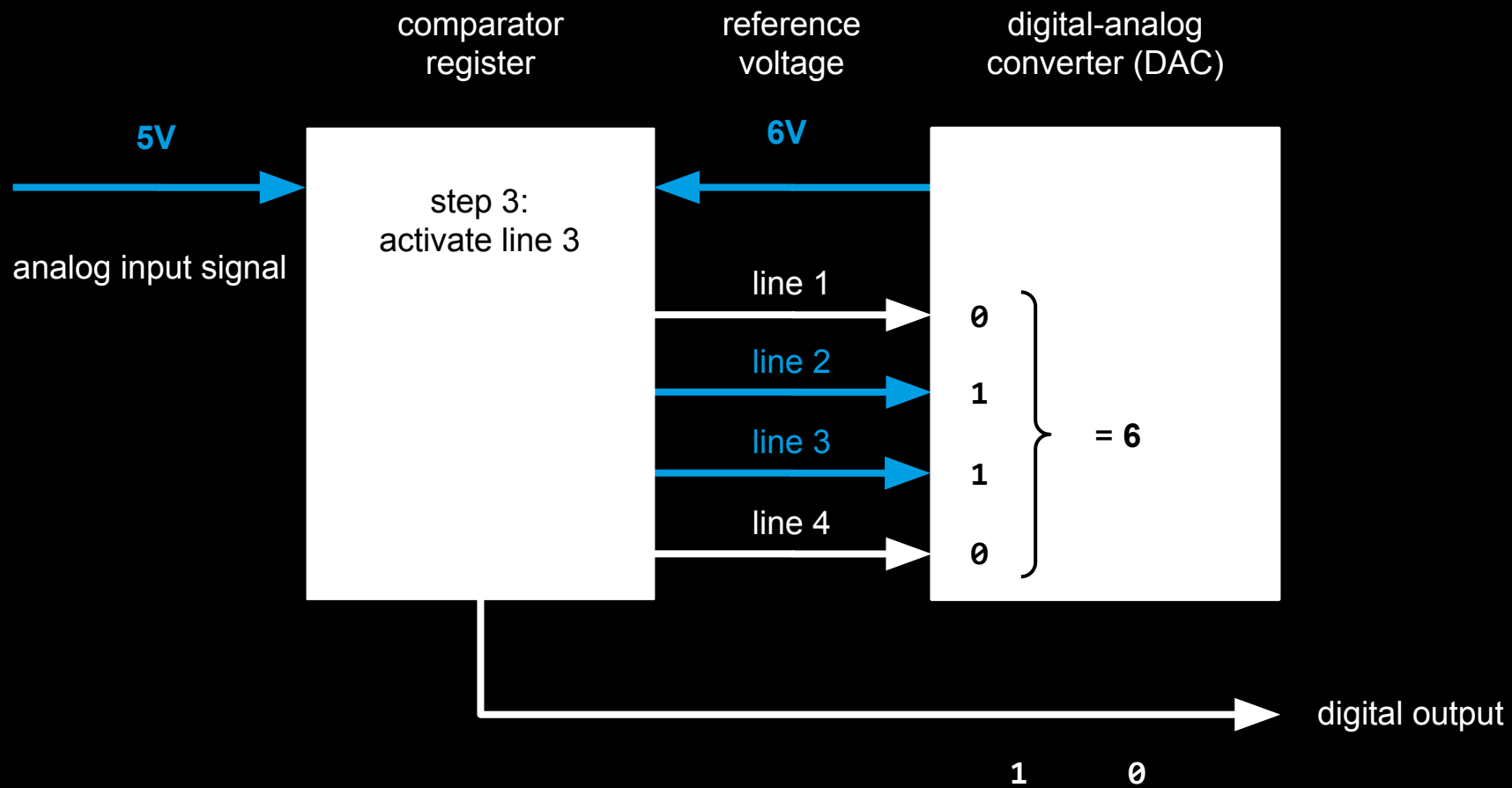


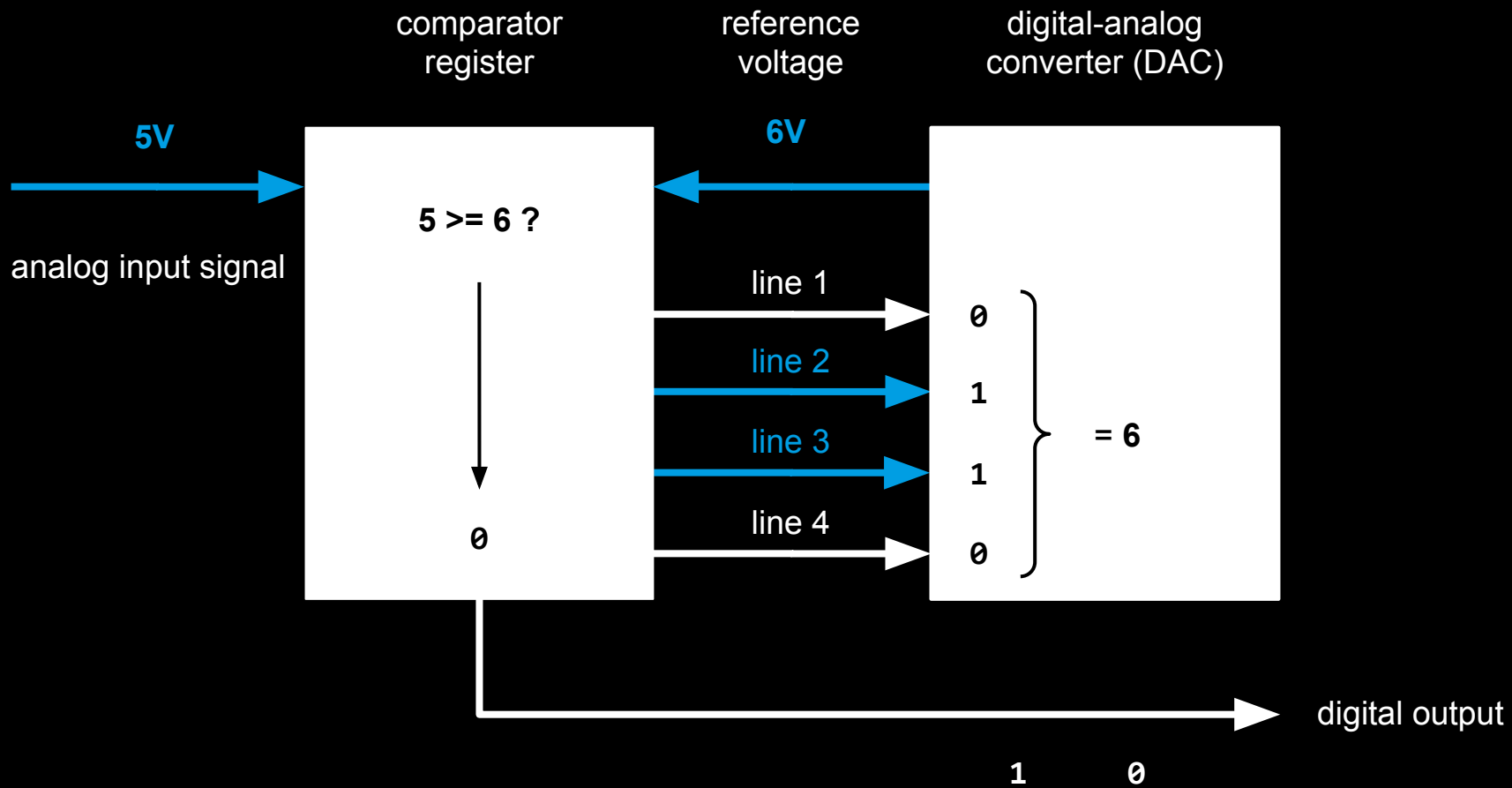


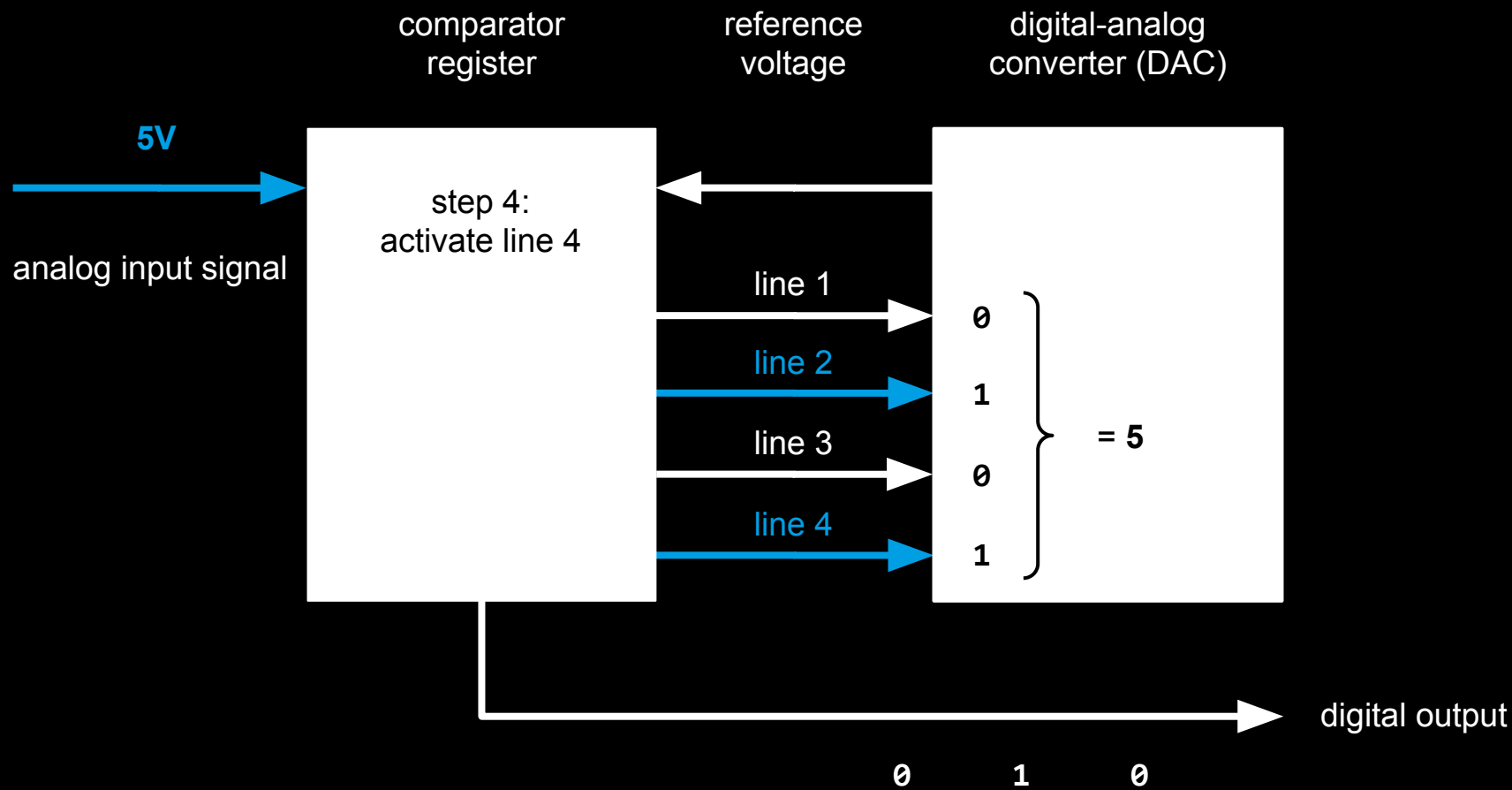


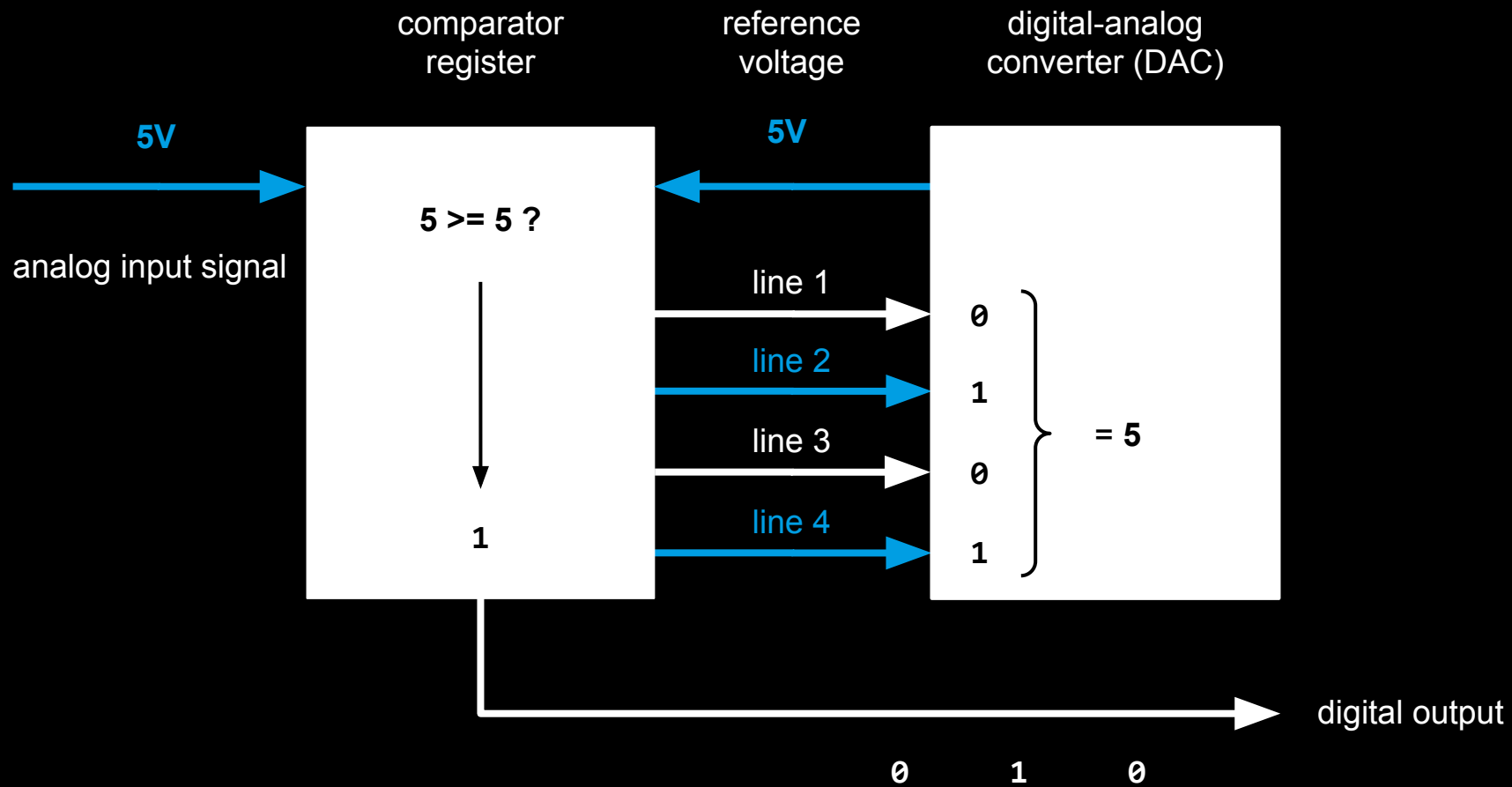


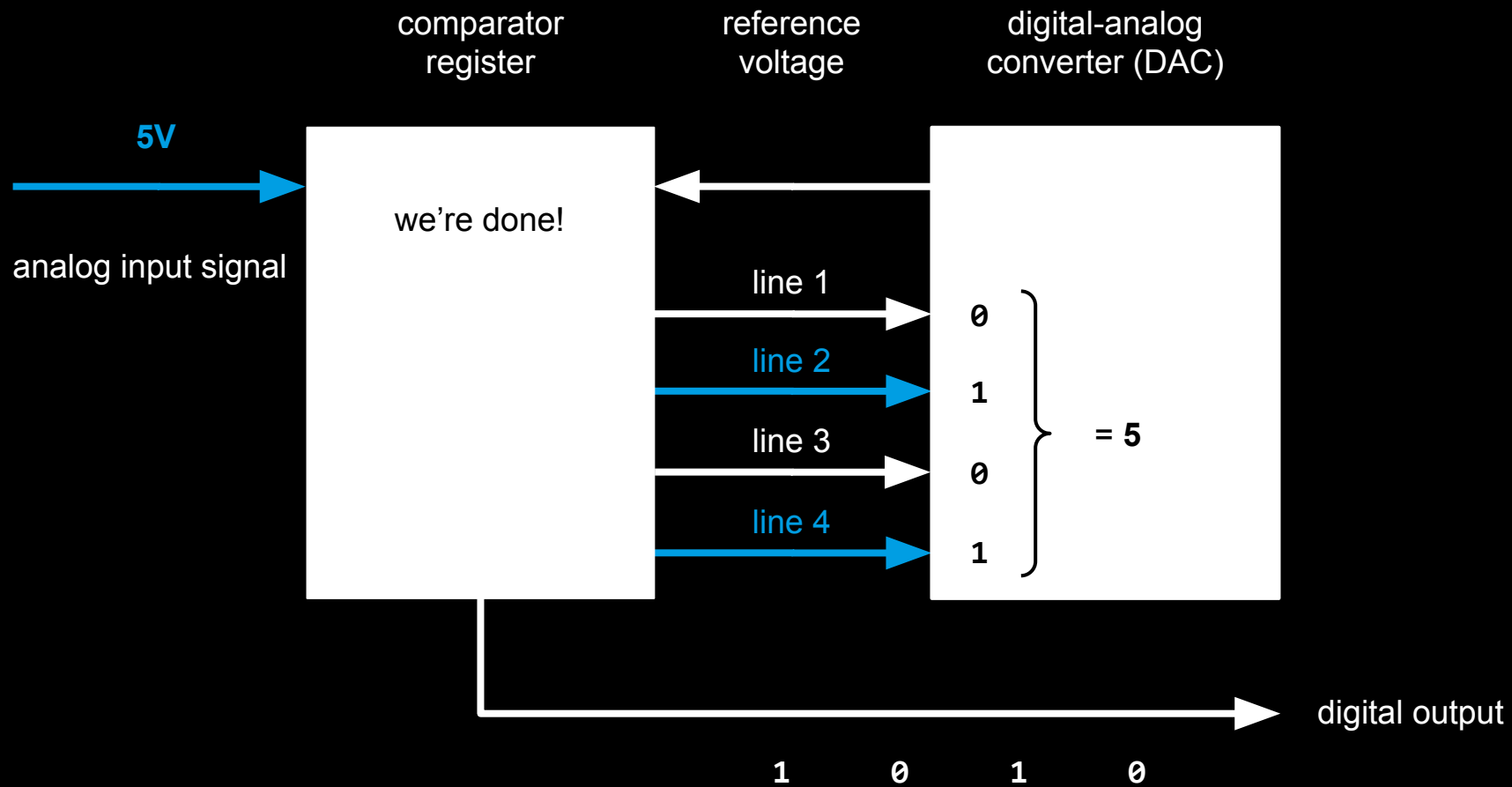






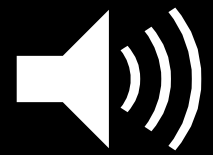






so, what analog signal is measured?





A **continuous** wave is transformed into an array of **discrete numbers** representing pressure.

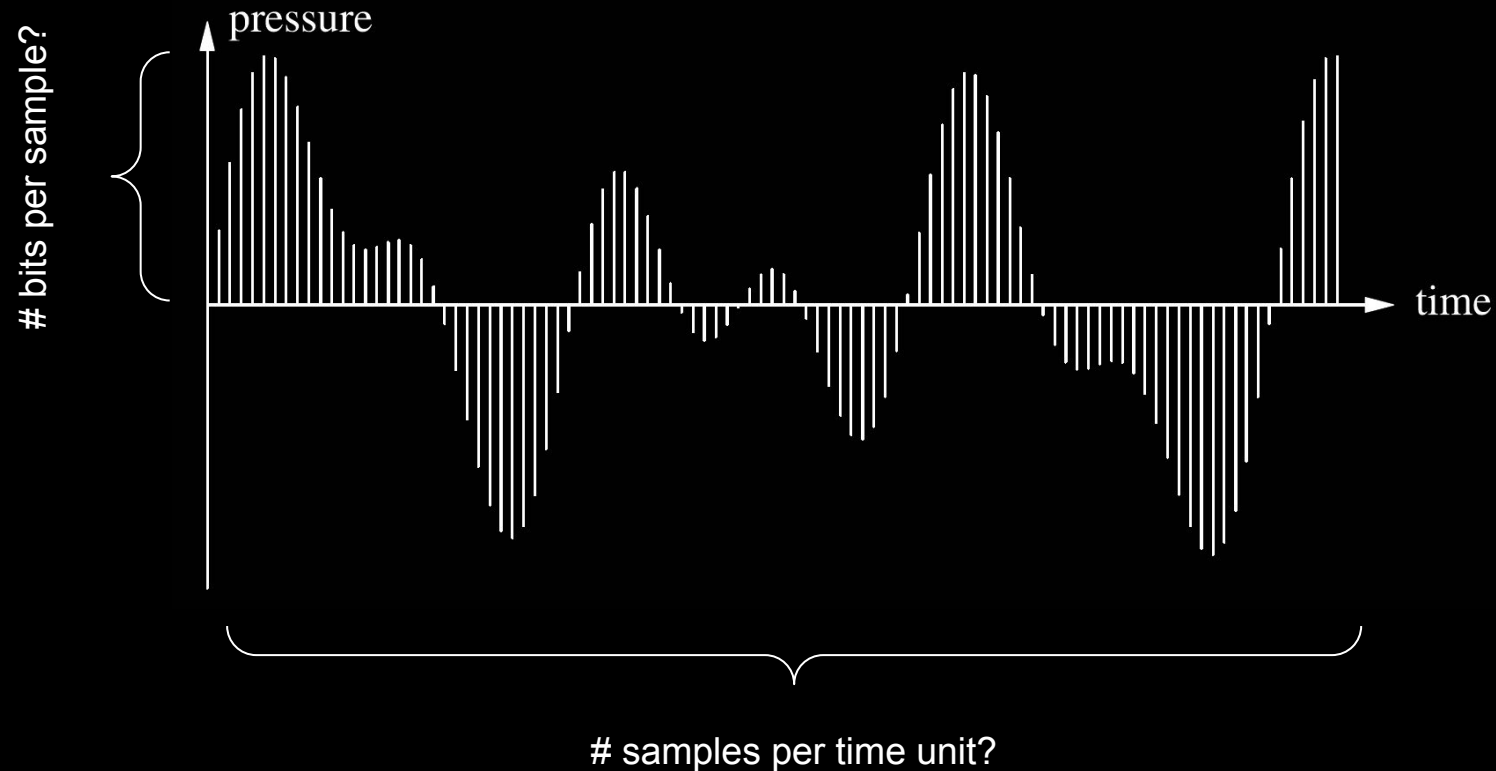
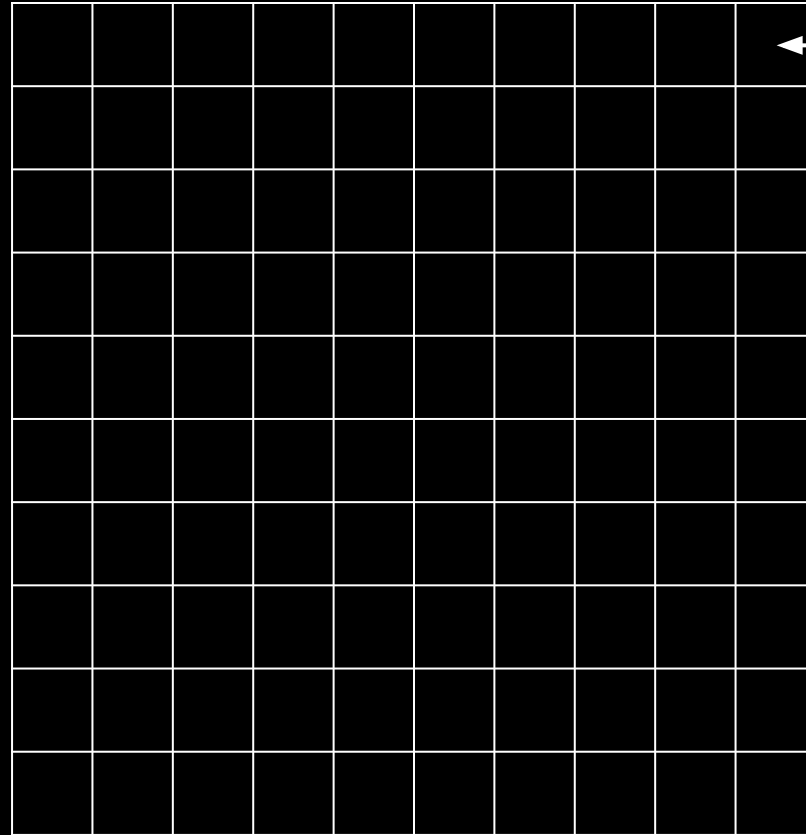


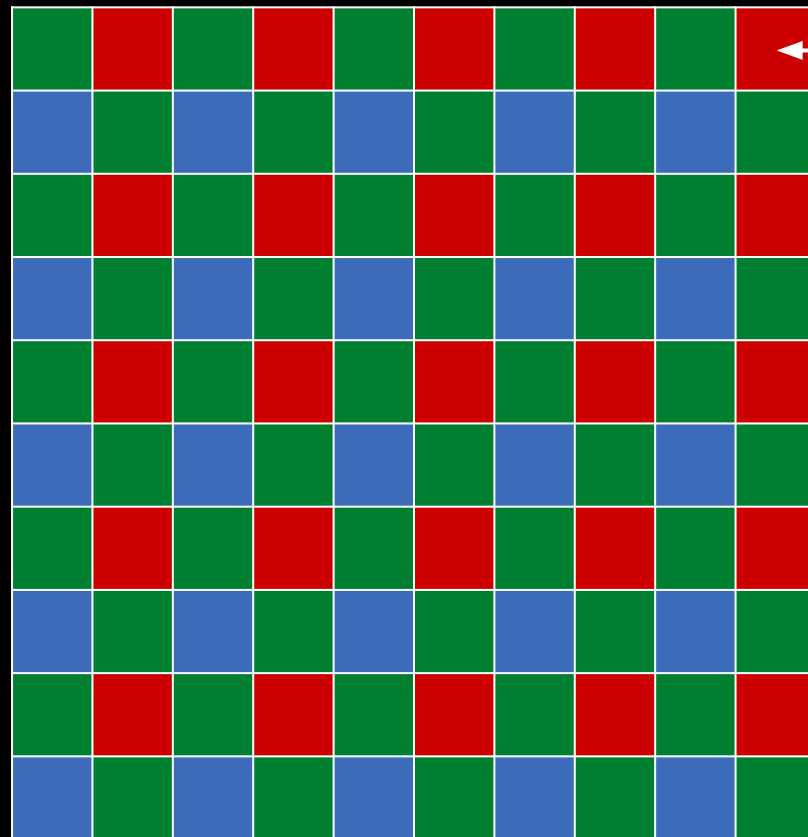


image sensor



← photodiode

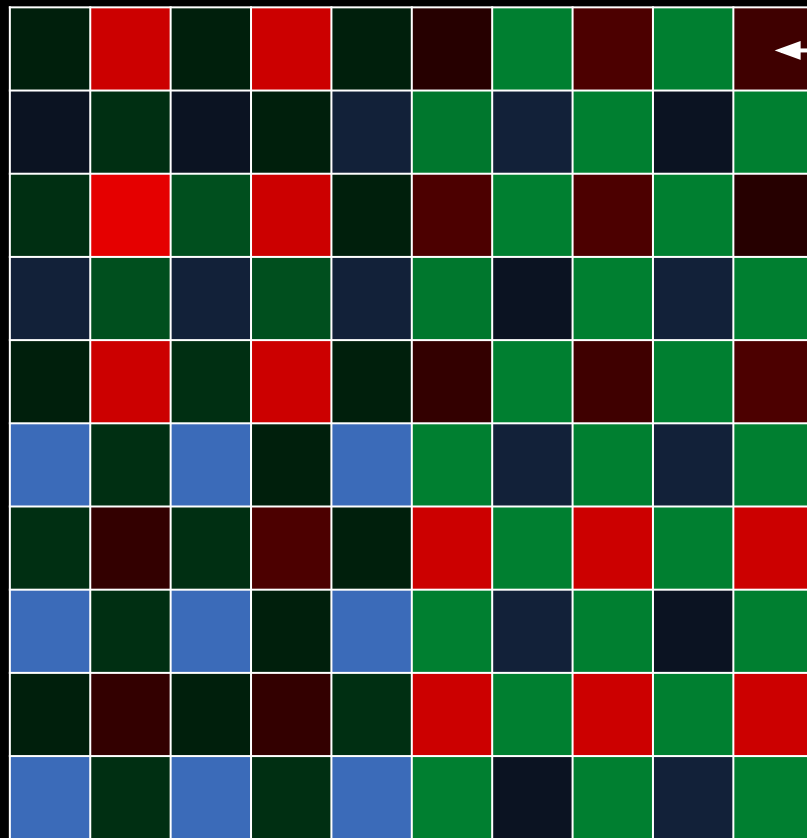
image sensor



color filter on
top of photo-
diodes



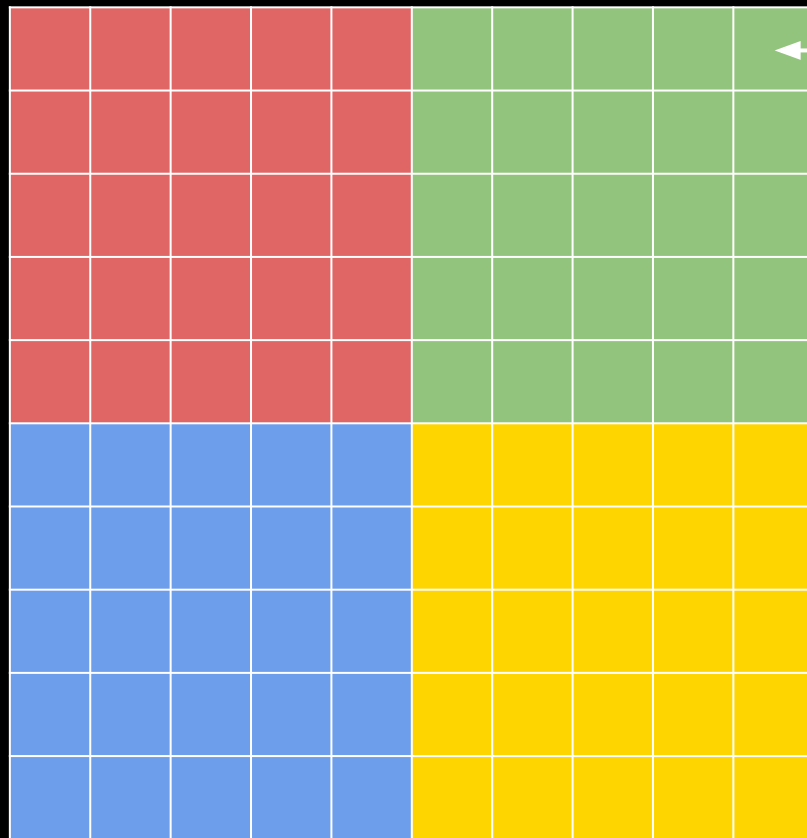
image sensor



light passed
through filter



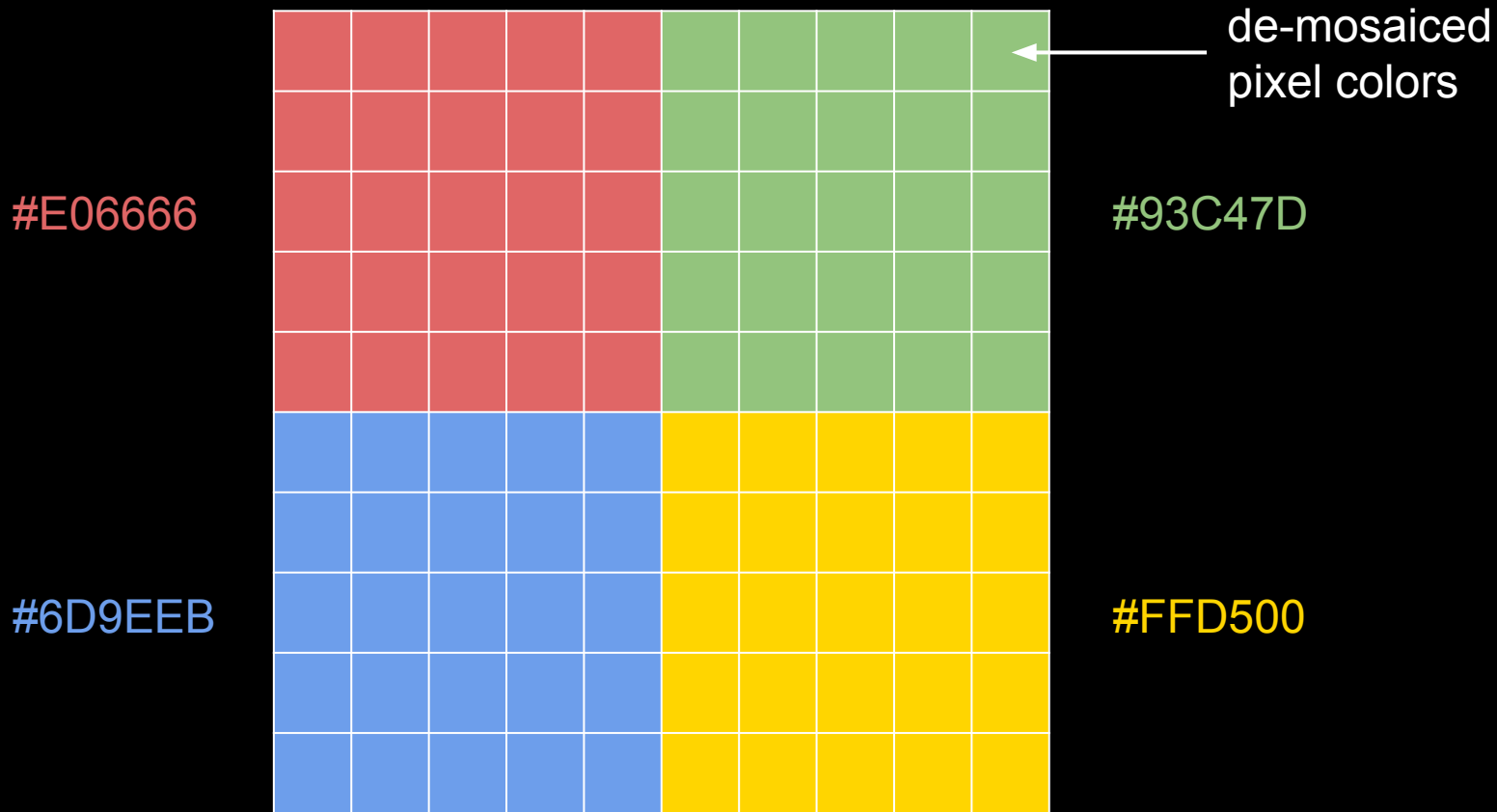
image sensor



de-mosaiced
pixel colors



image sensor

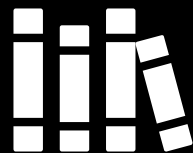




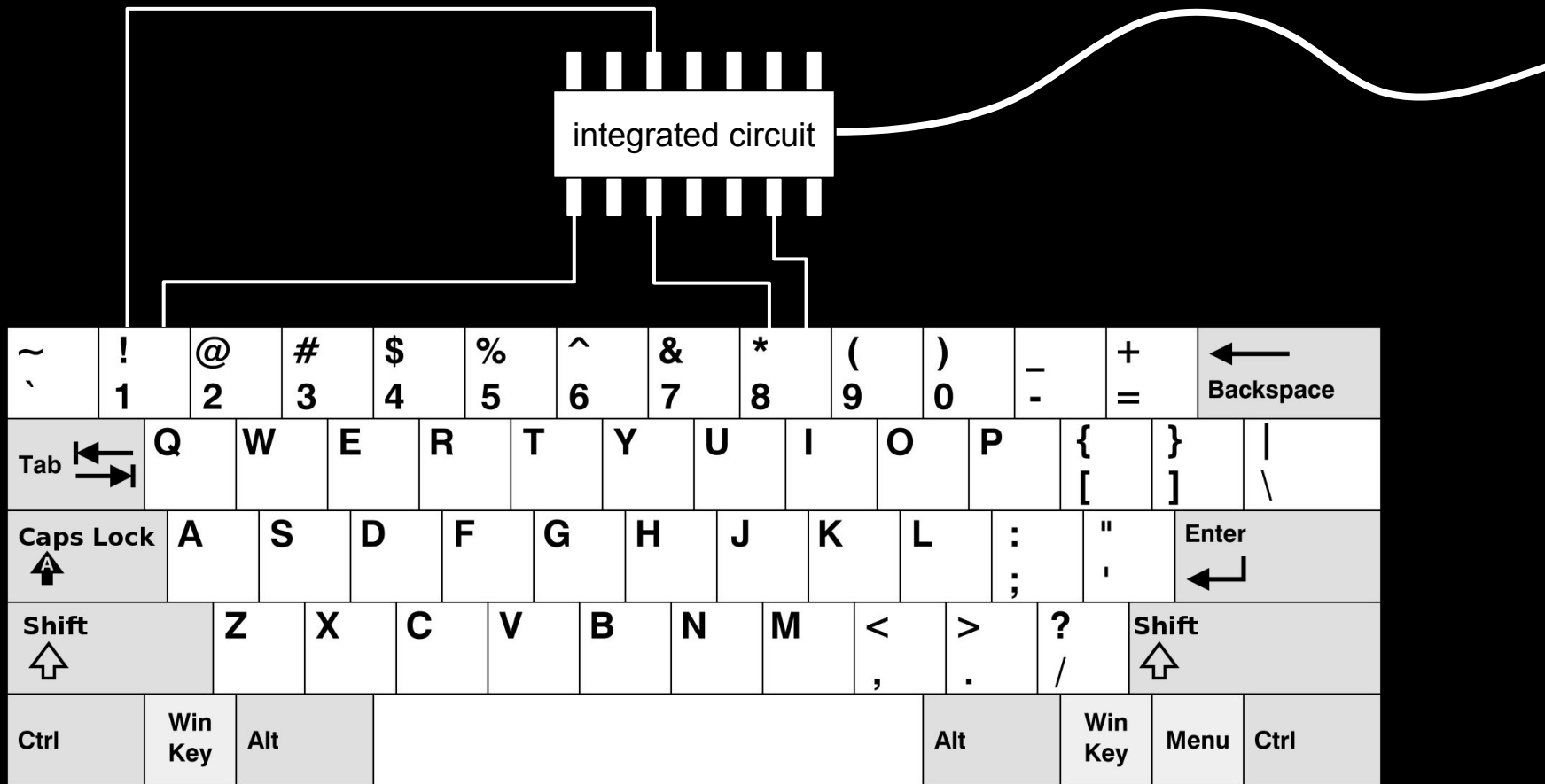
de-mosaiced pixel colors

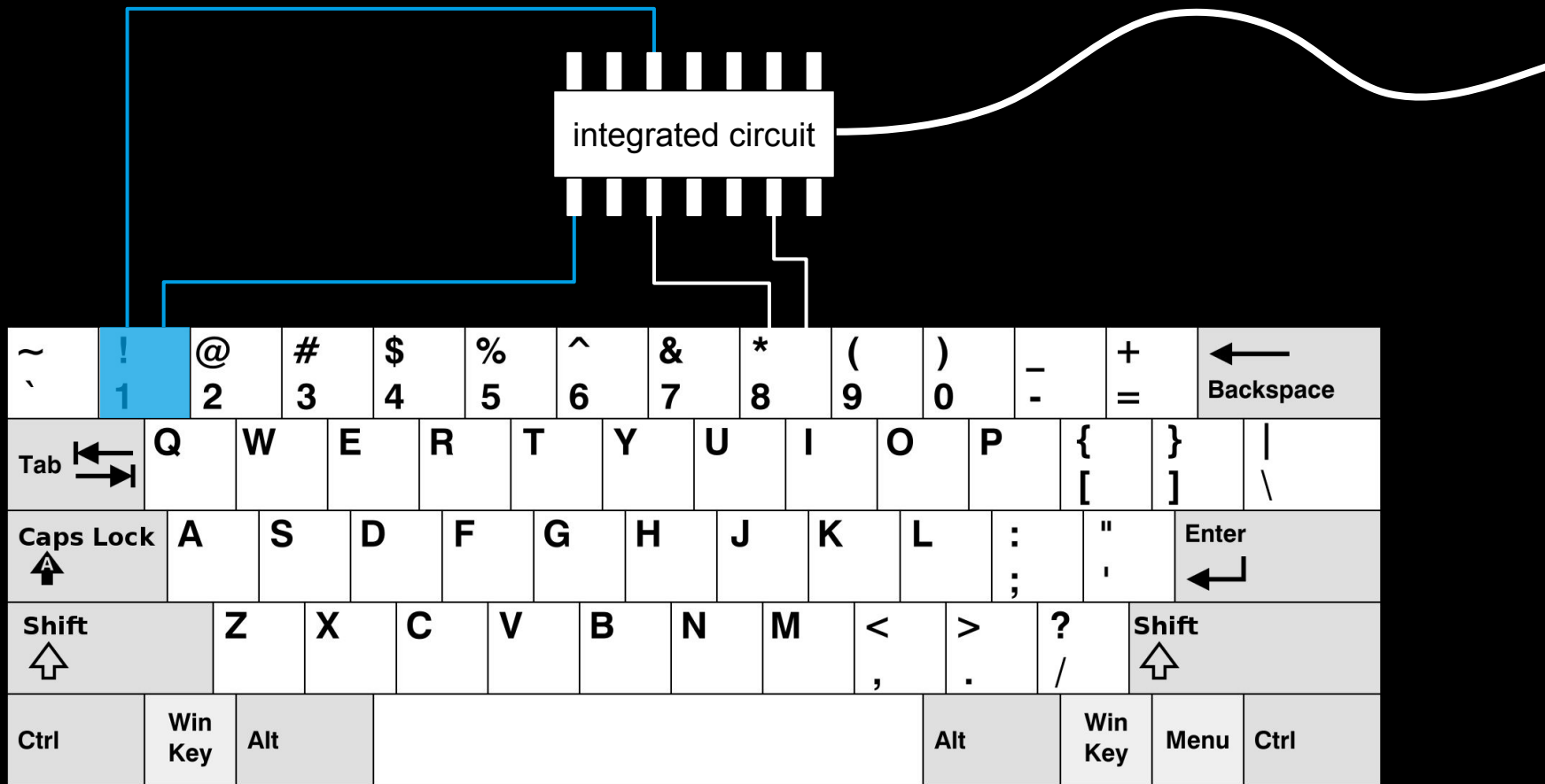
filtered light

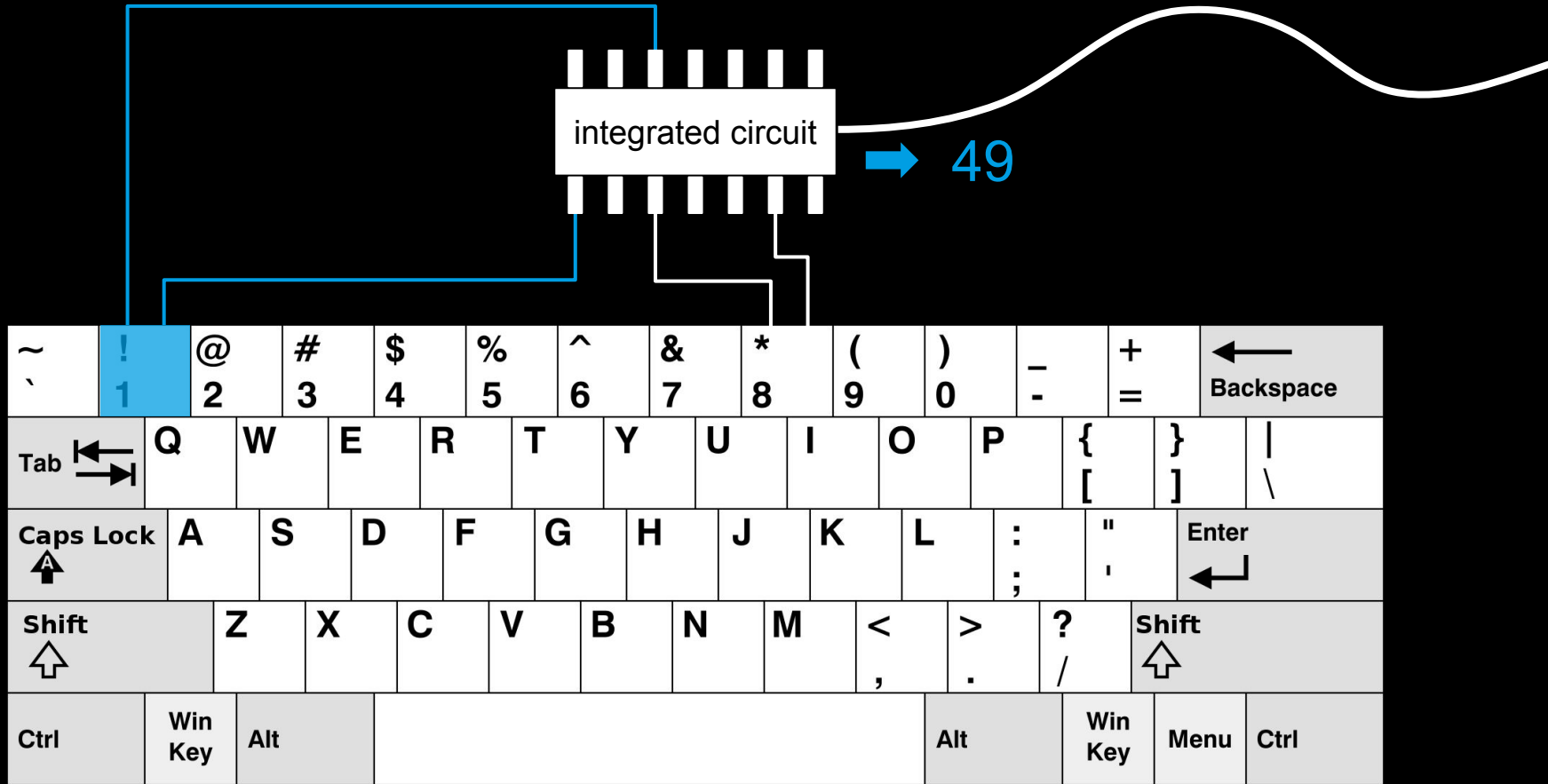
color filter

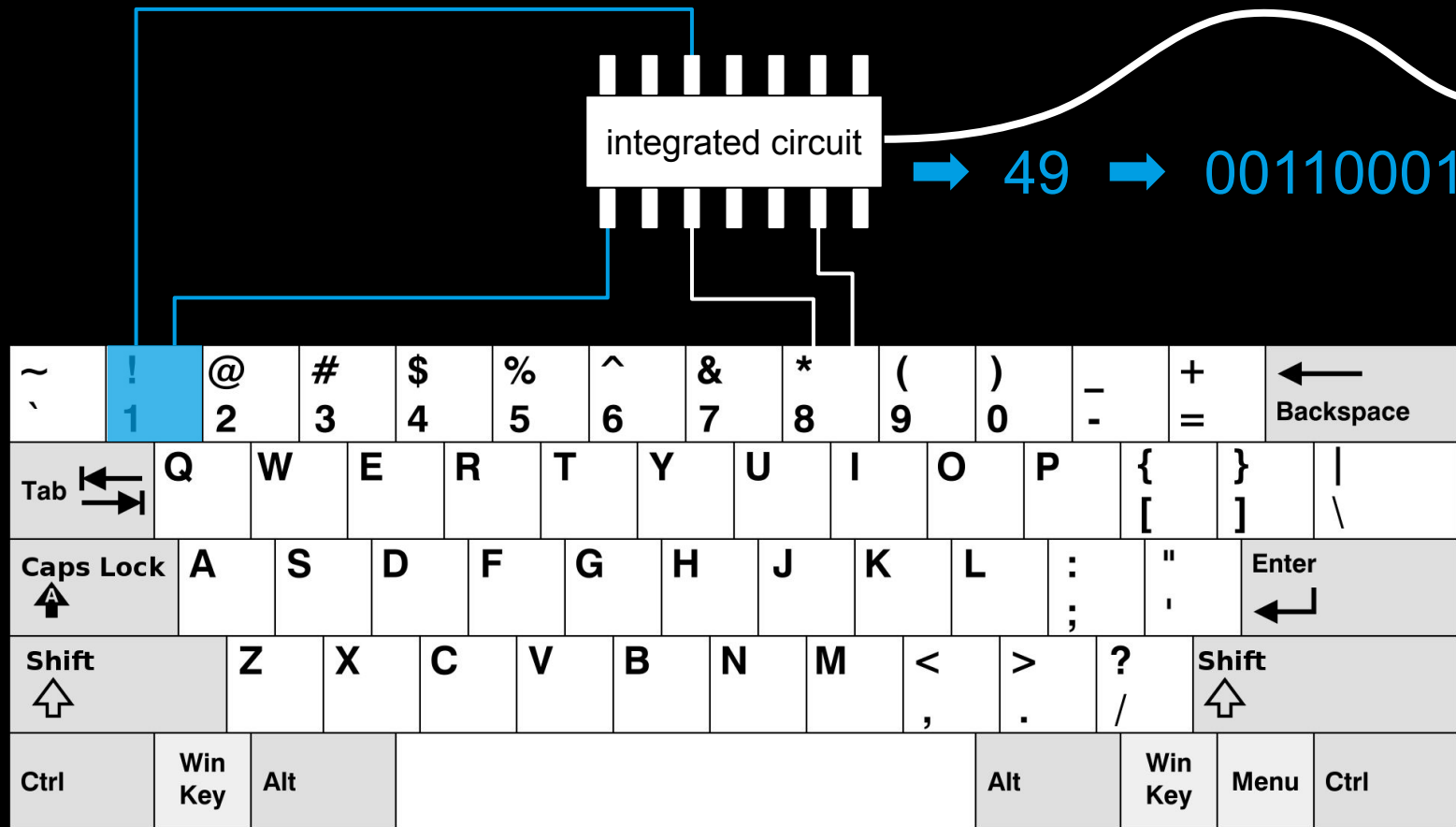


typing text









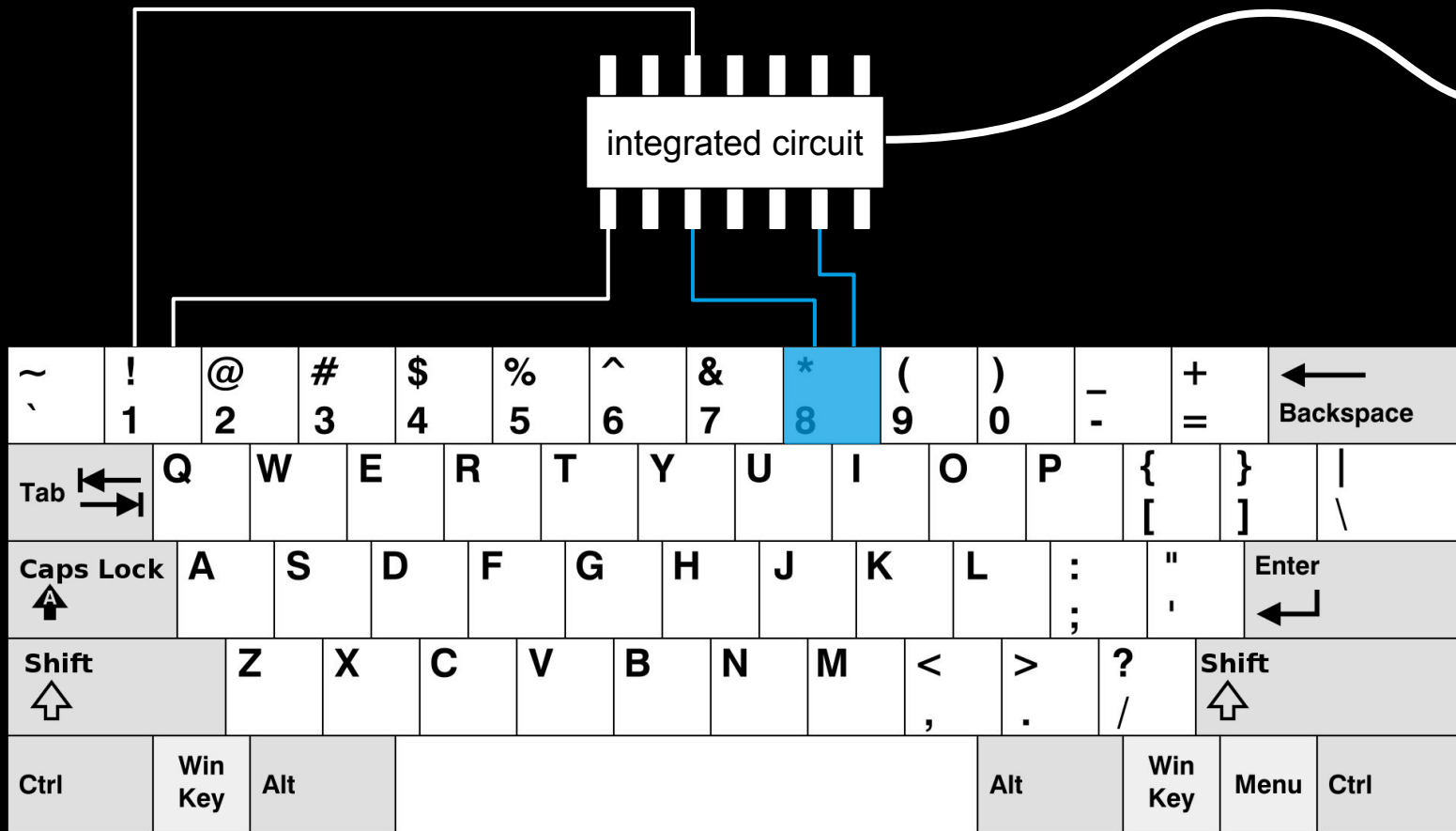
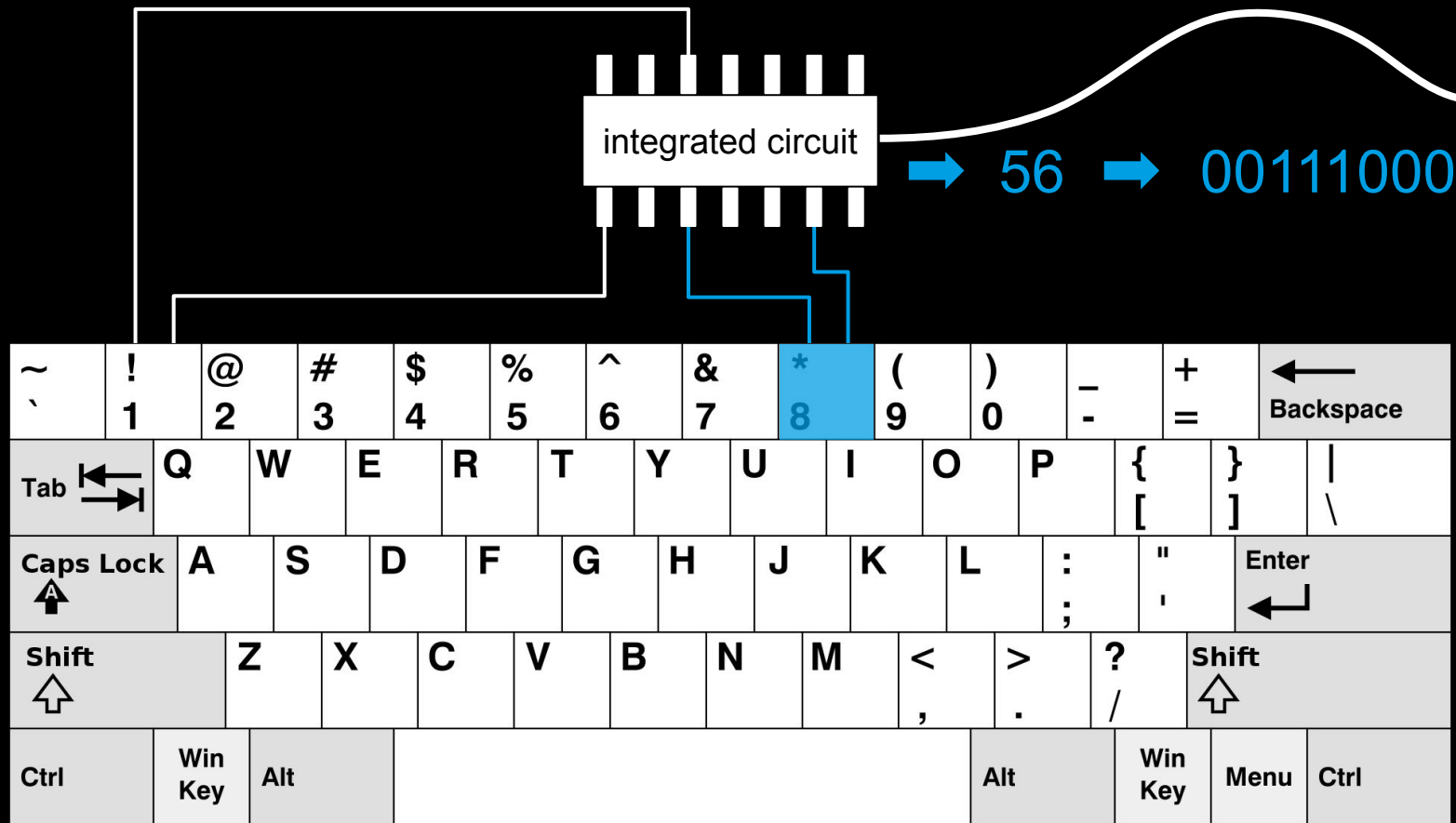


Image source: Wikipedia

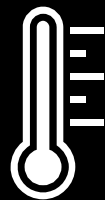


scanning text



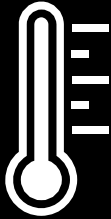
+

optical character recognition (OCR)



temperature sensor

A thermometer measures the temperature using a proxy, such as electrical resistance. The result is a change in voltage, which can be converted into a temperature.



```
1100 0101 1101 1110
1001 0110 1111 0100
0000 0111 1111 0001
```

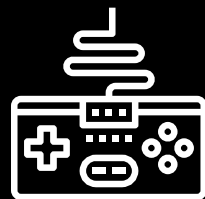




Image source: [Wikipedia](#)



Image source: [Wikipedia](#)

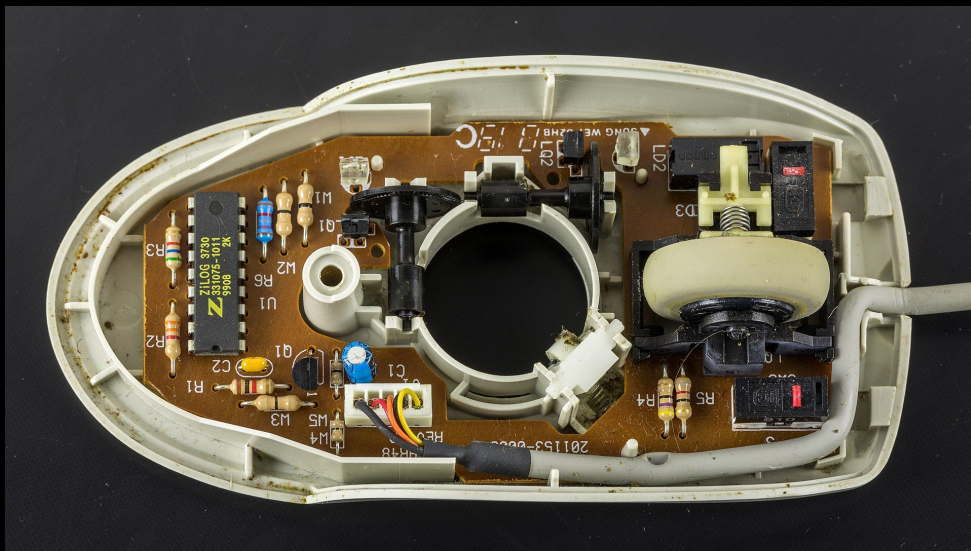


Image source: [Wikipedia](#)



Image source: [Wikipedia](#)

digital goods

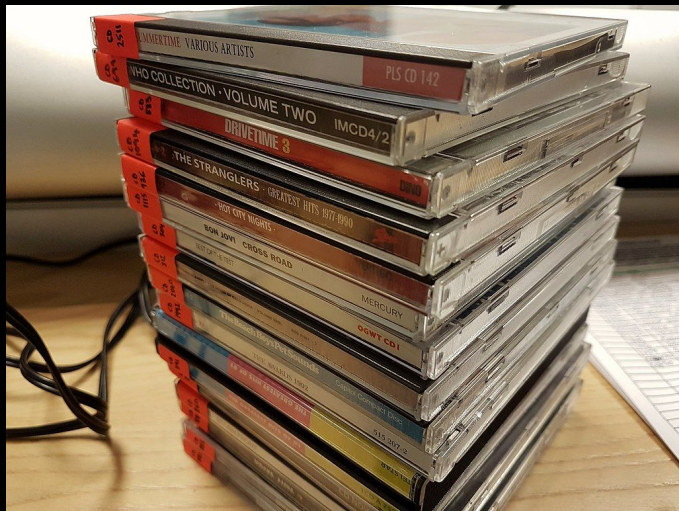


Image source: [Wikipedia](#)



Image source: [Wikipedia](#)

computer processable

perfect reproduction

non-rival

near-zero costs of reproduction