

# ANALOG VS. DIGITAL

problem-solving

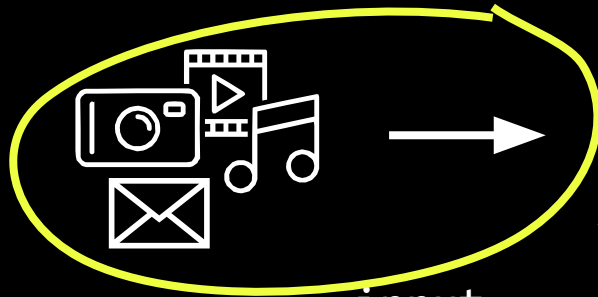
communication

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



# 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”

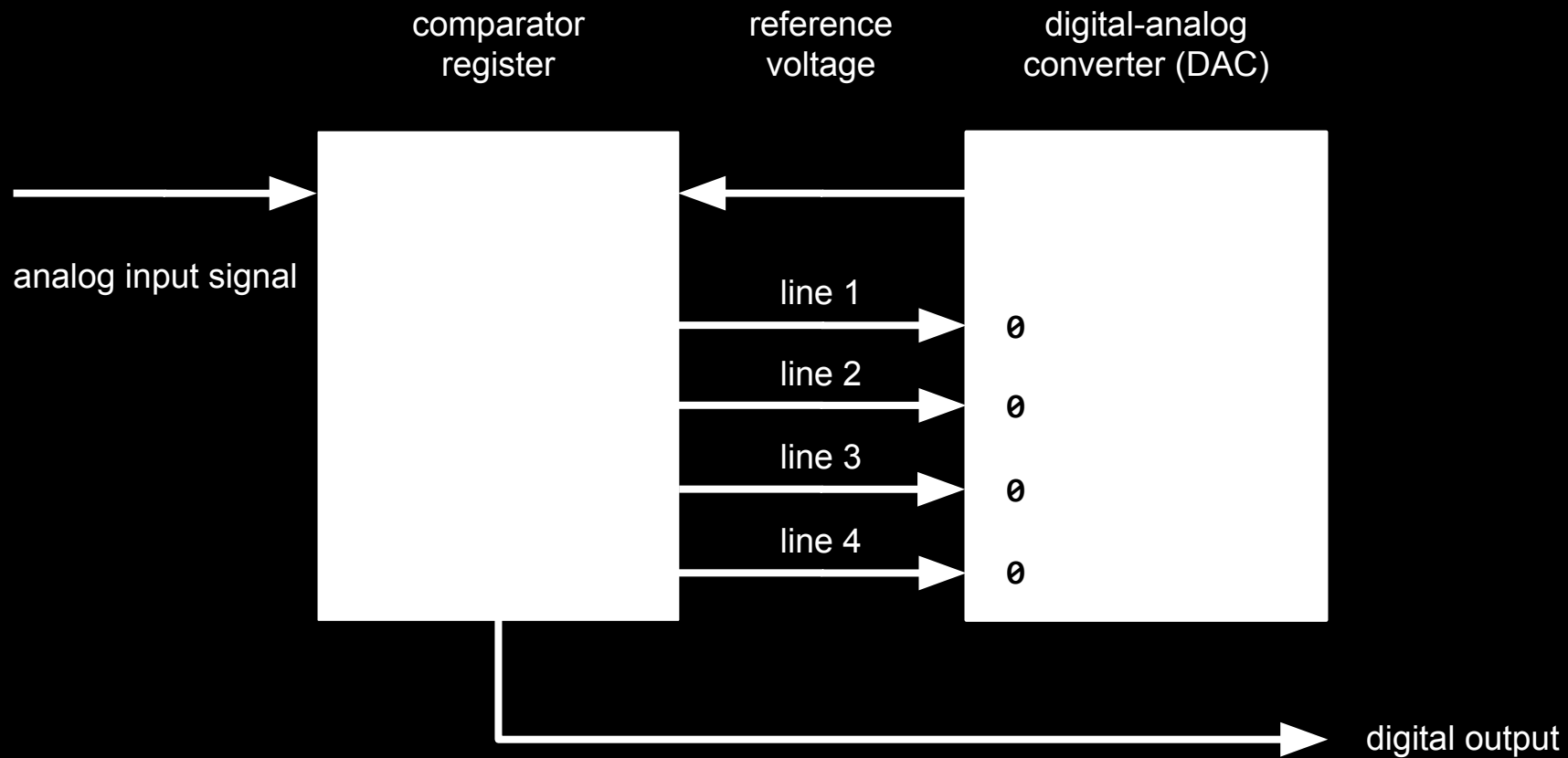
analog-to-digital converter (ADC)

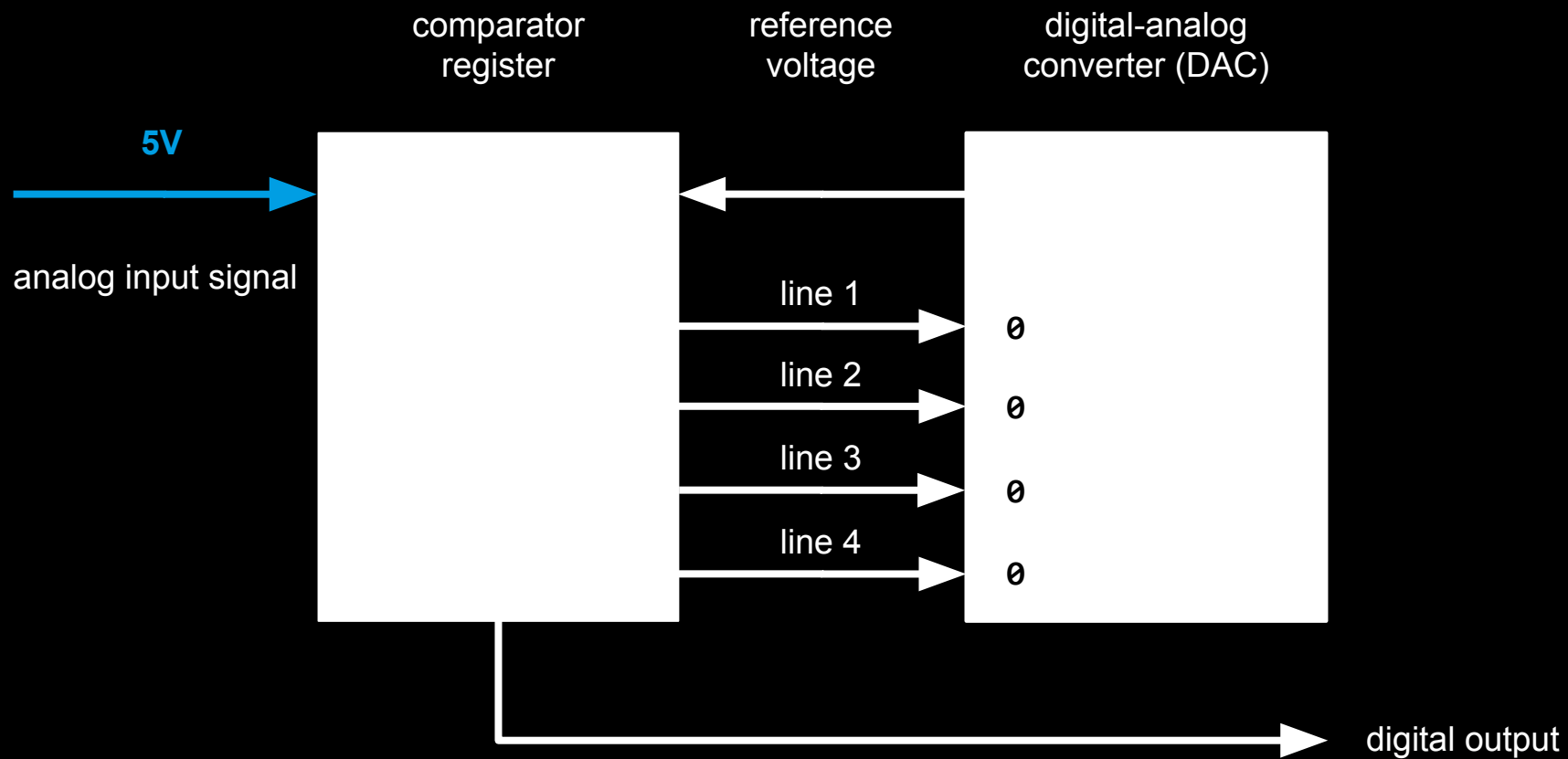


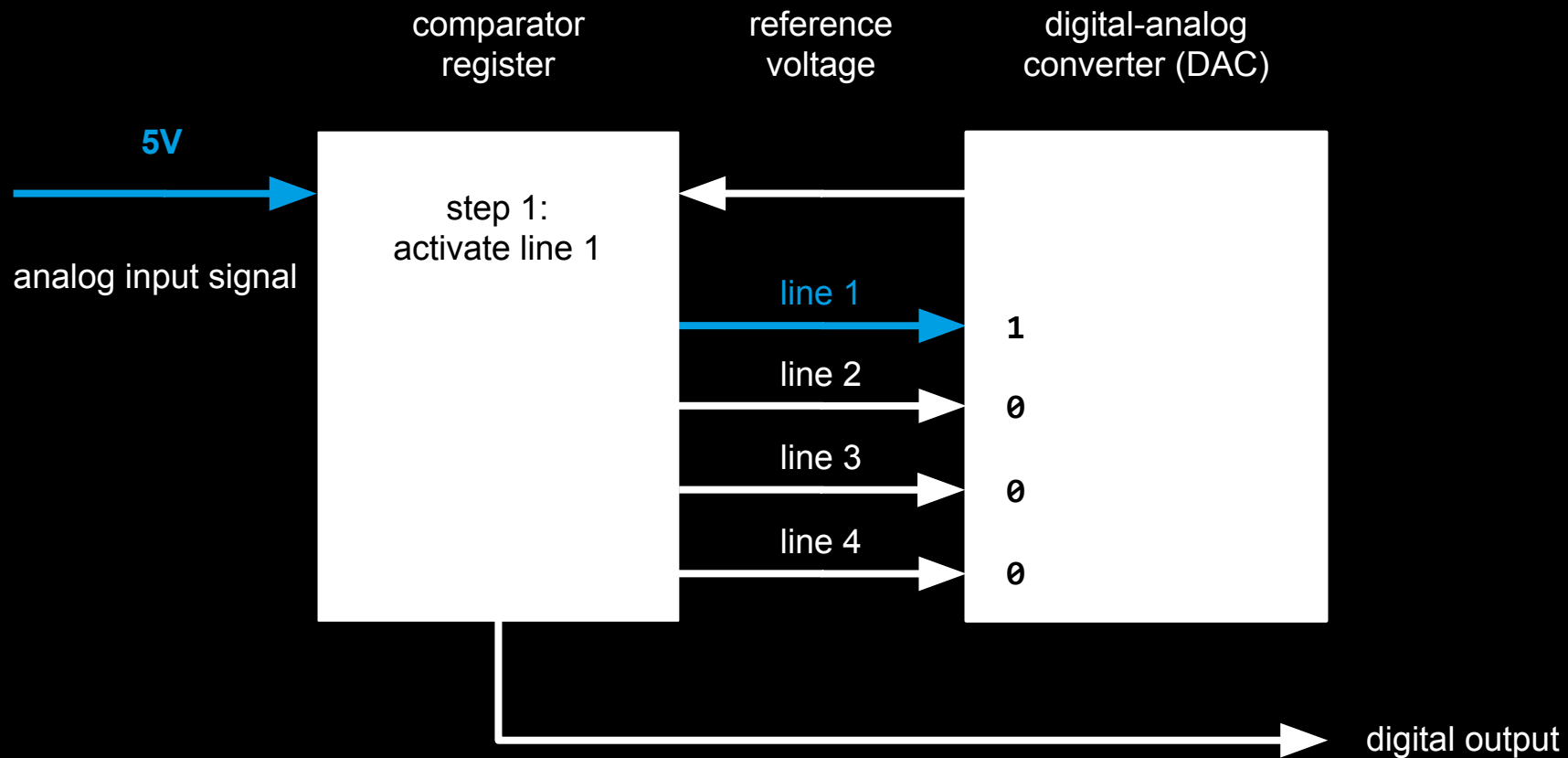
measuring of the  
analog signal

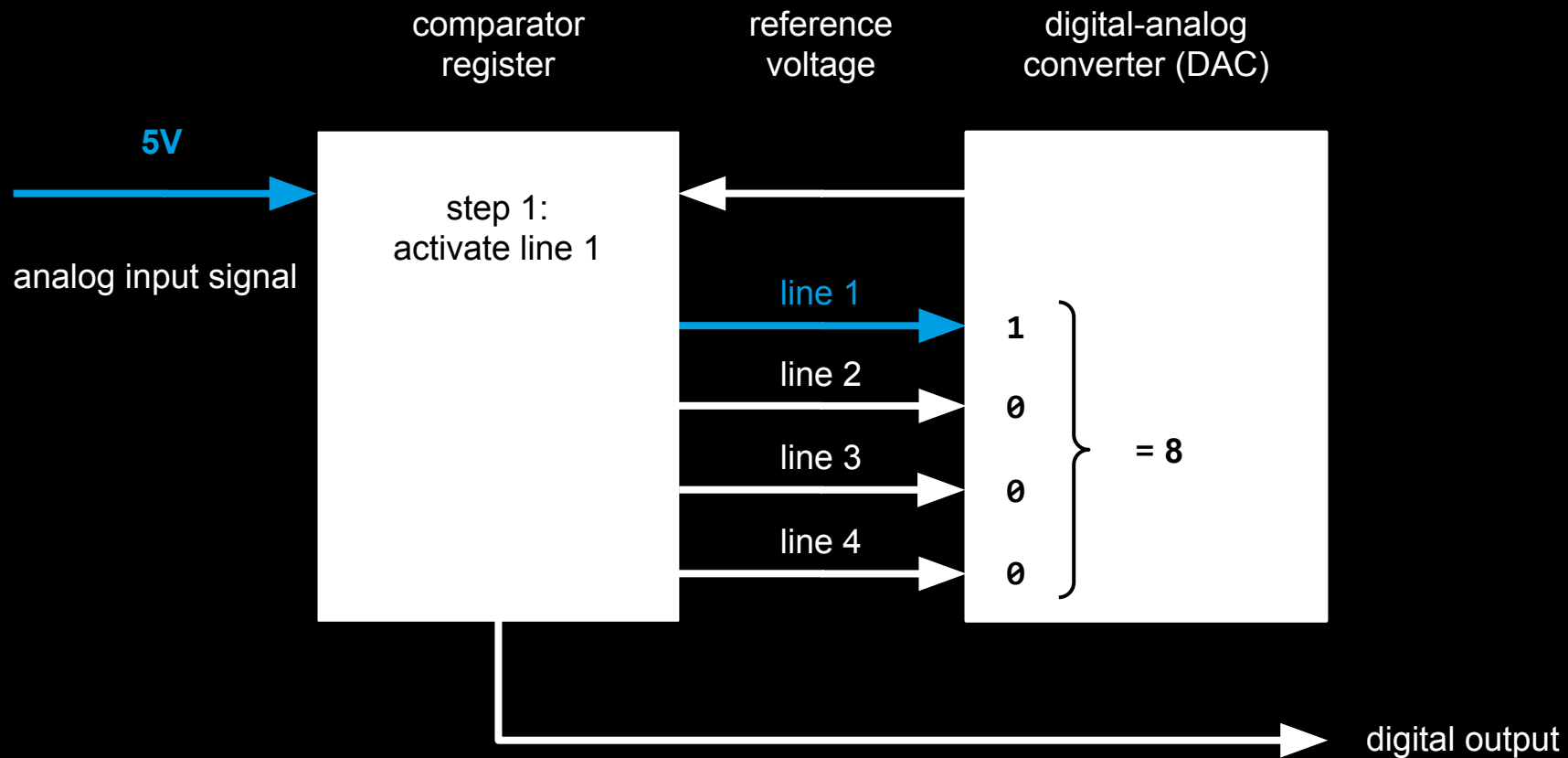
turning the  
measurement into a  
series of 1 and 0

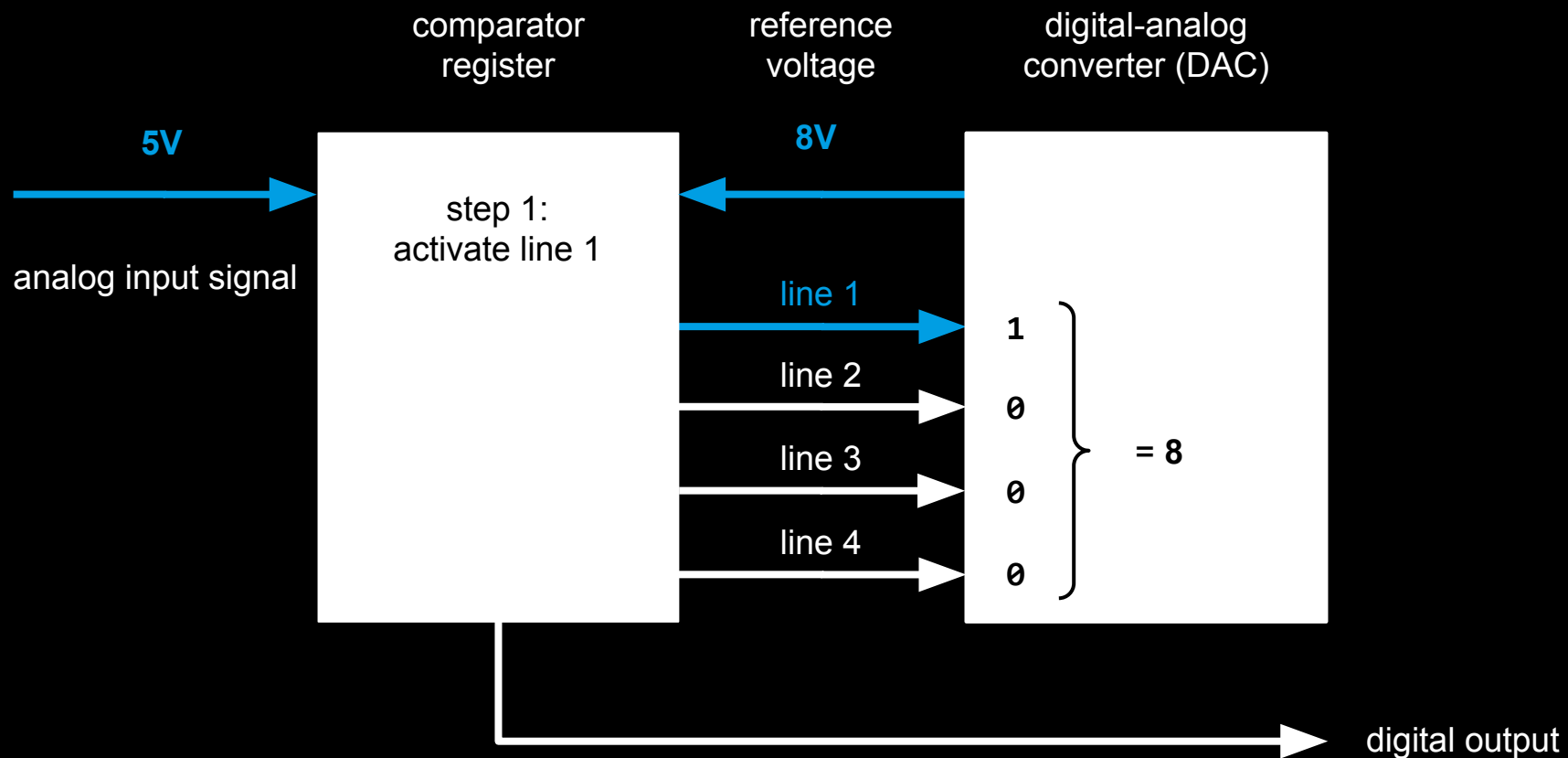
encoding the series of  
numbers in binary  
and assign meaning



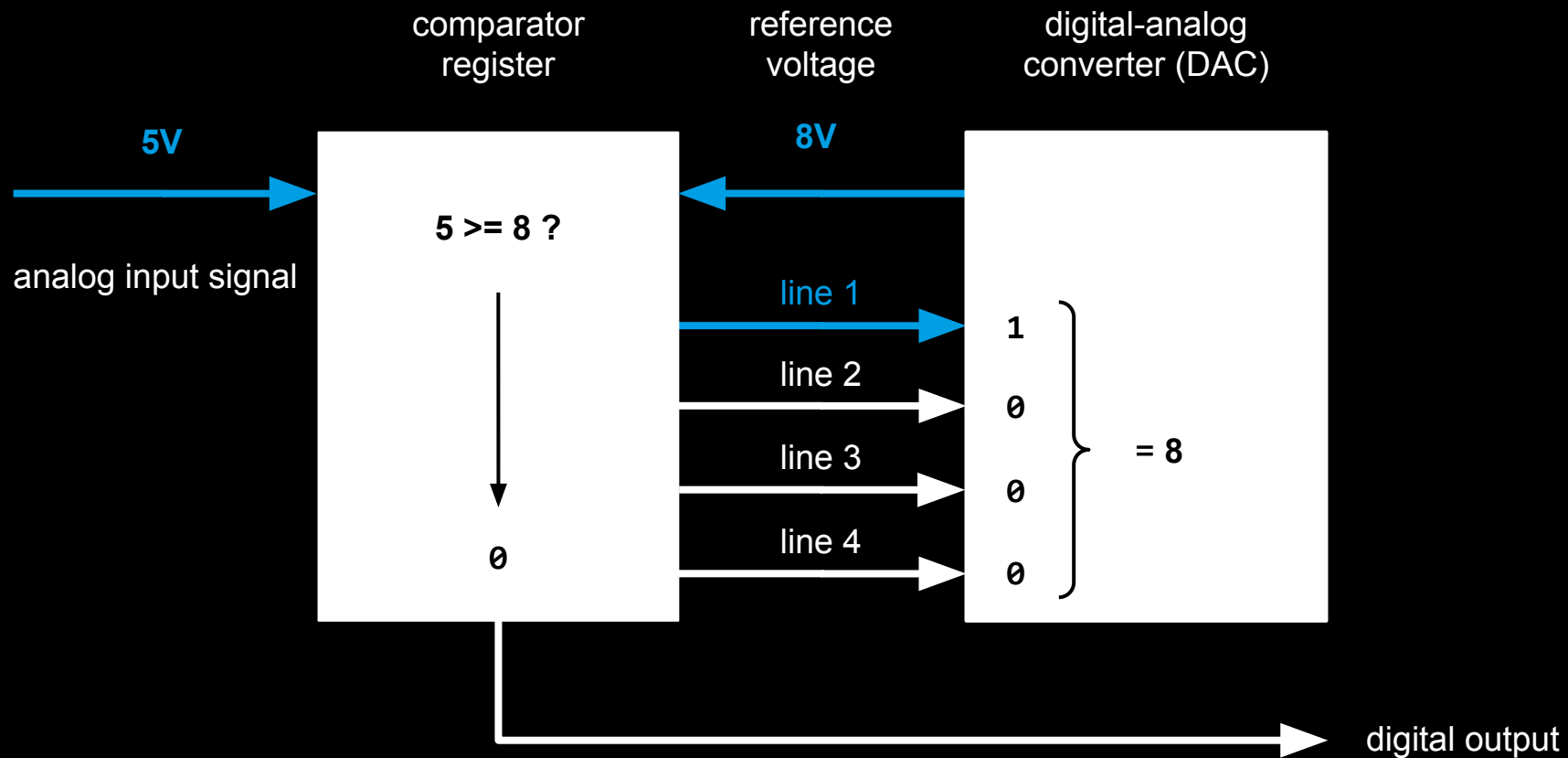


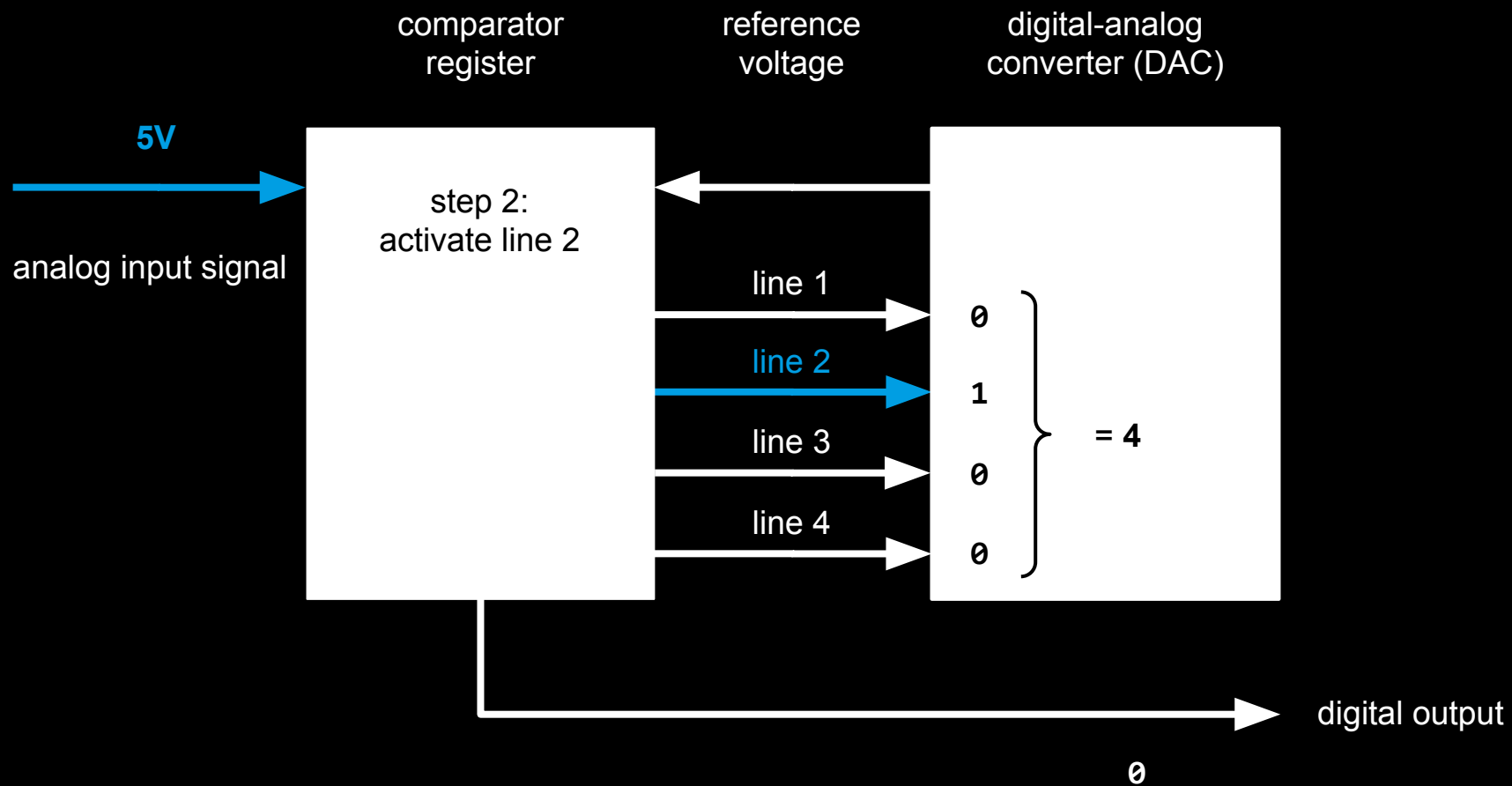


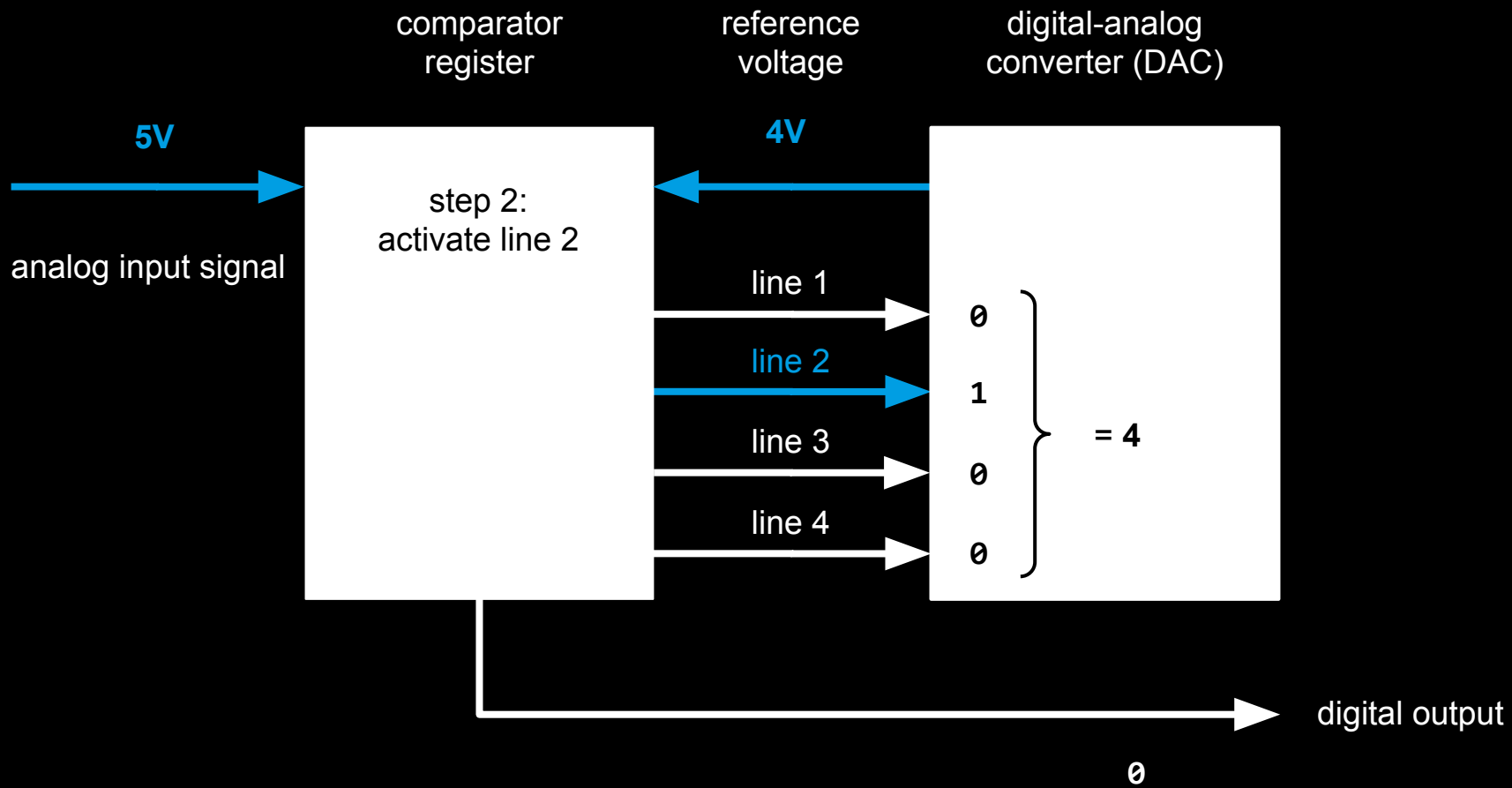


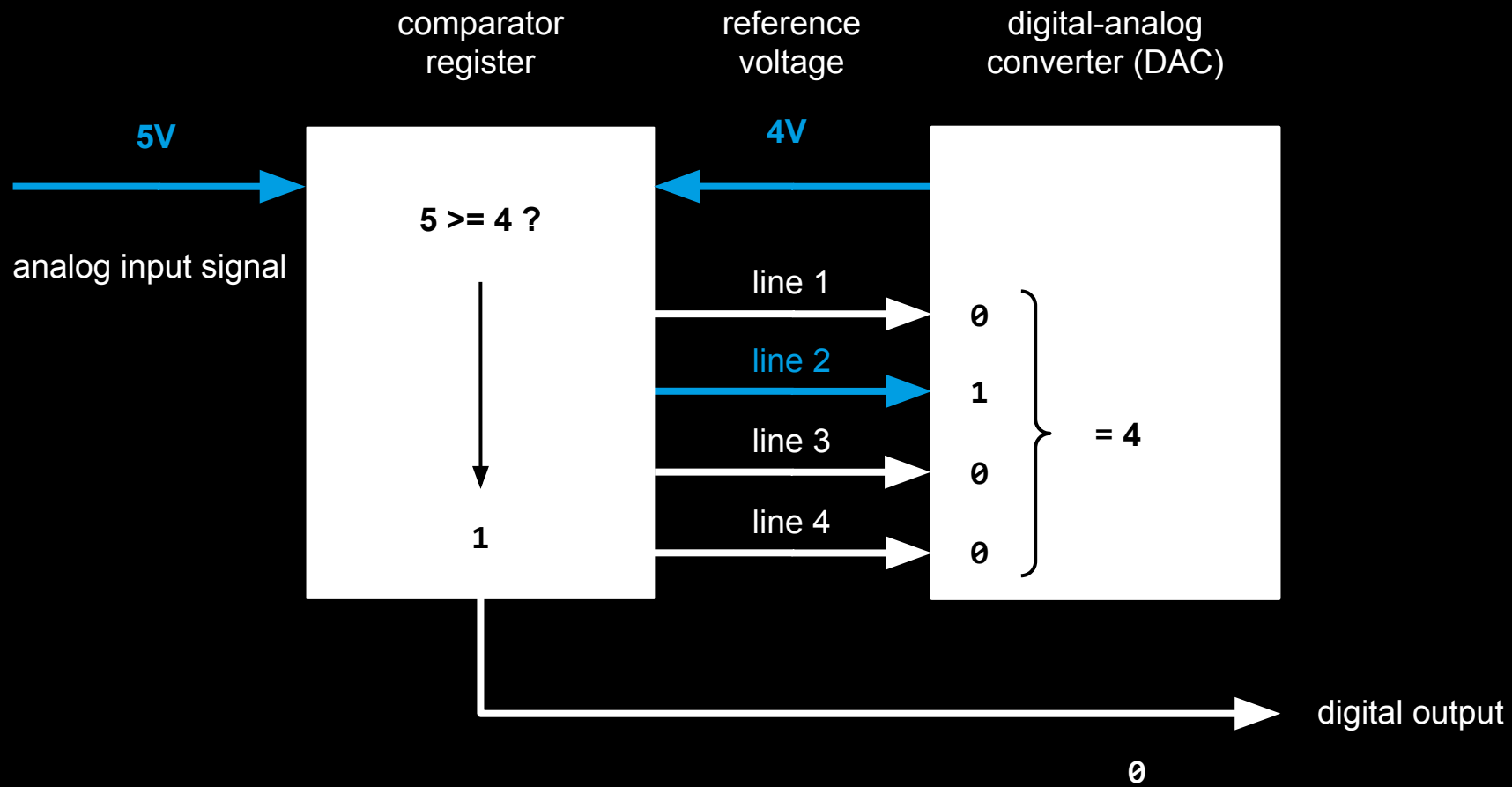


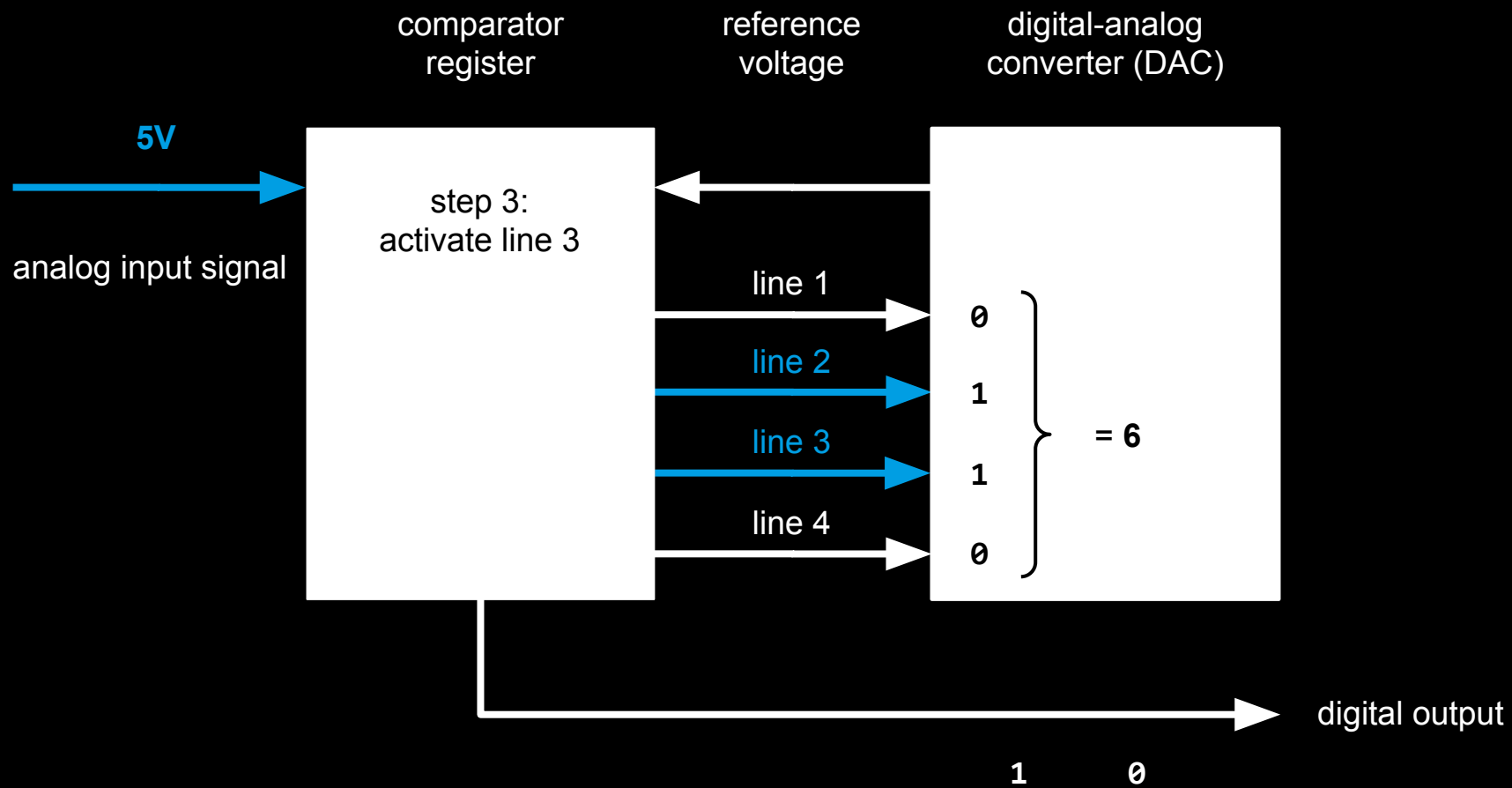


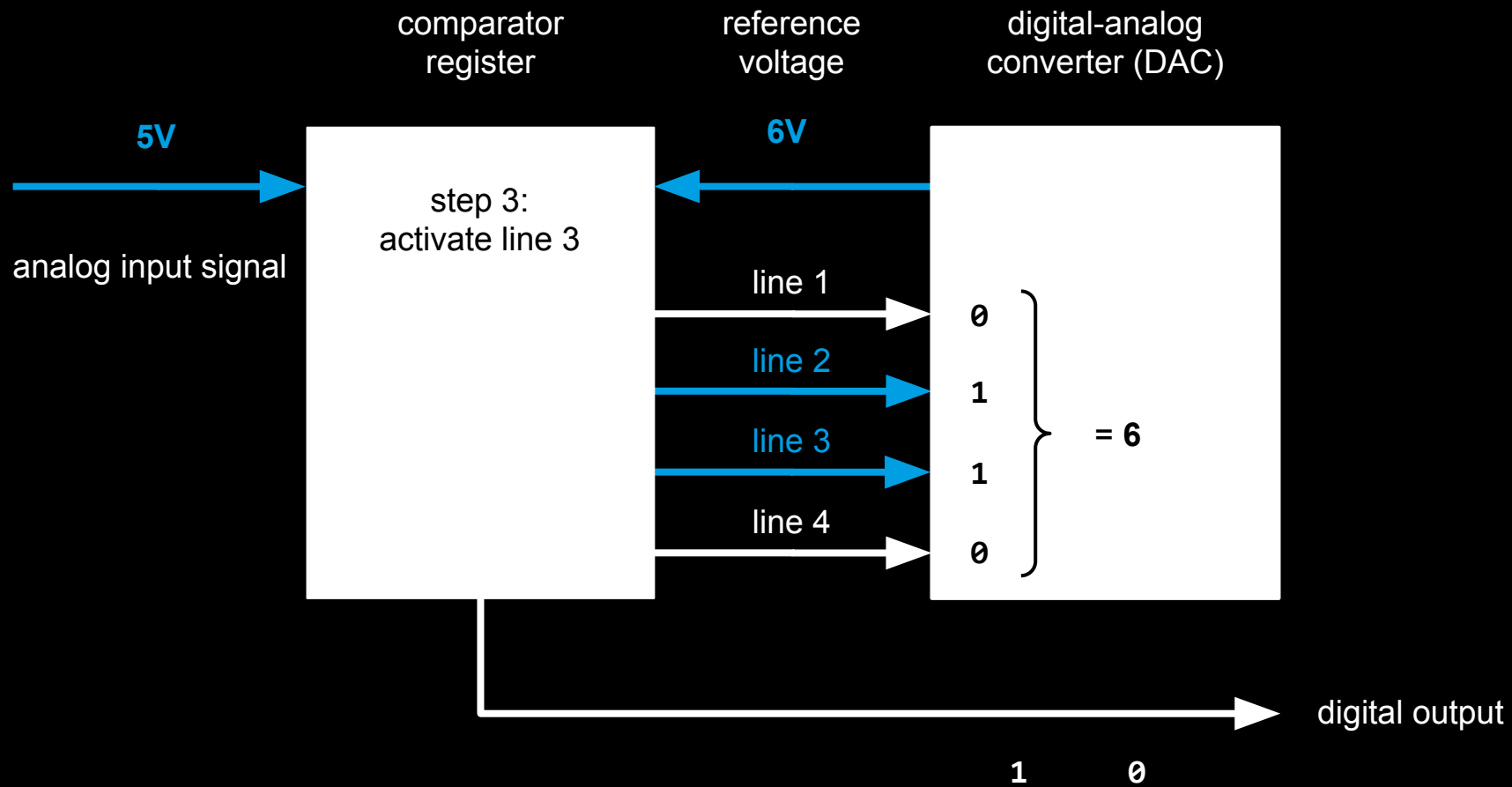


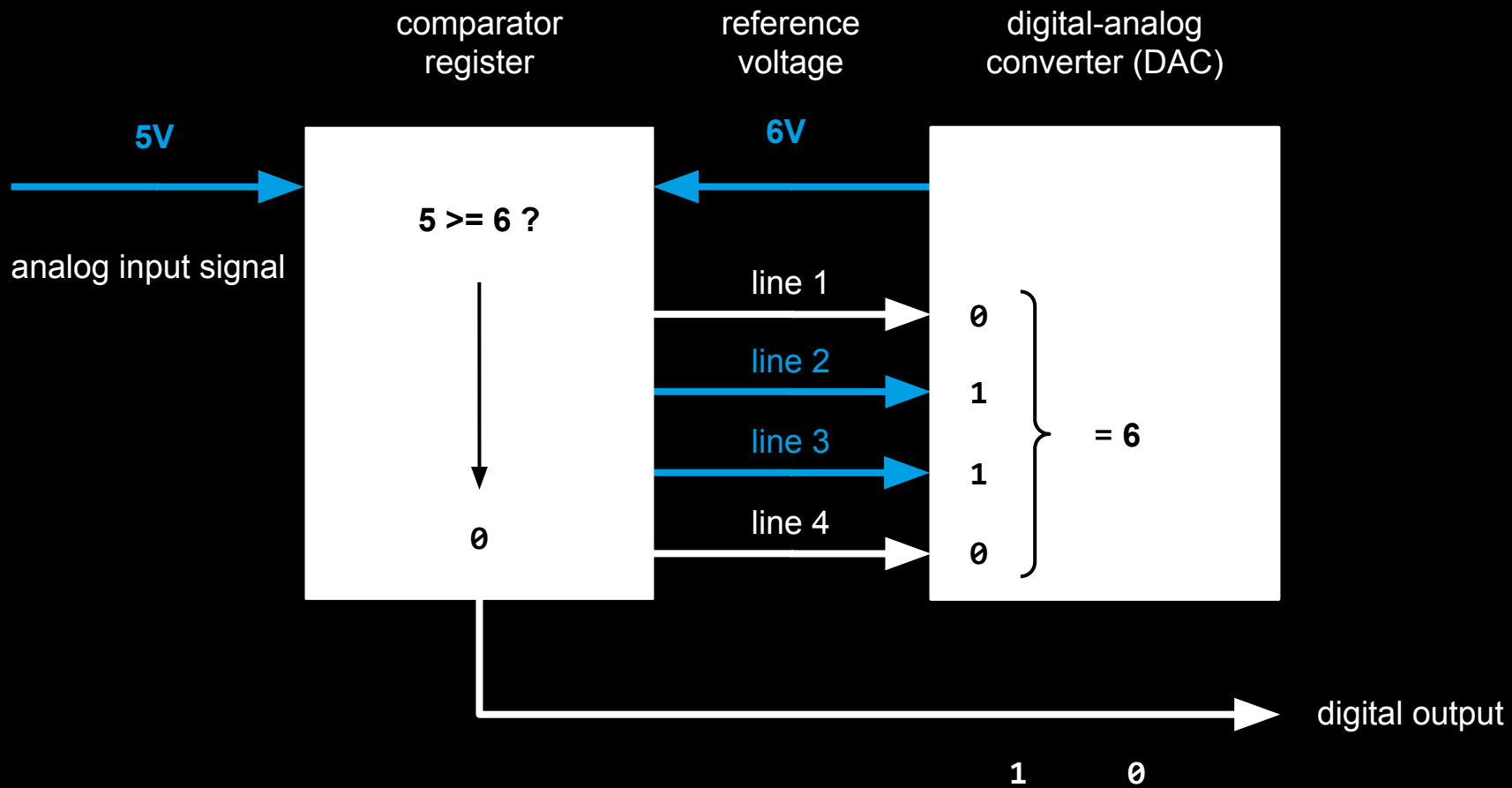


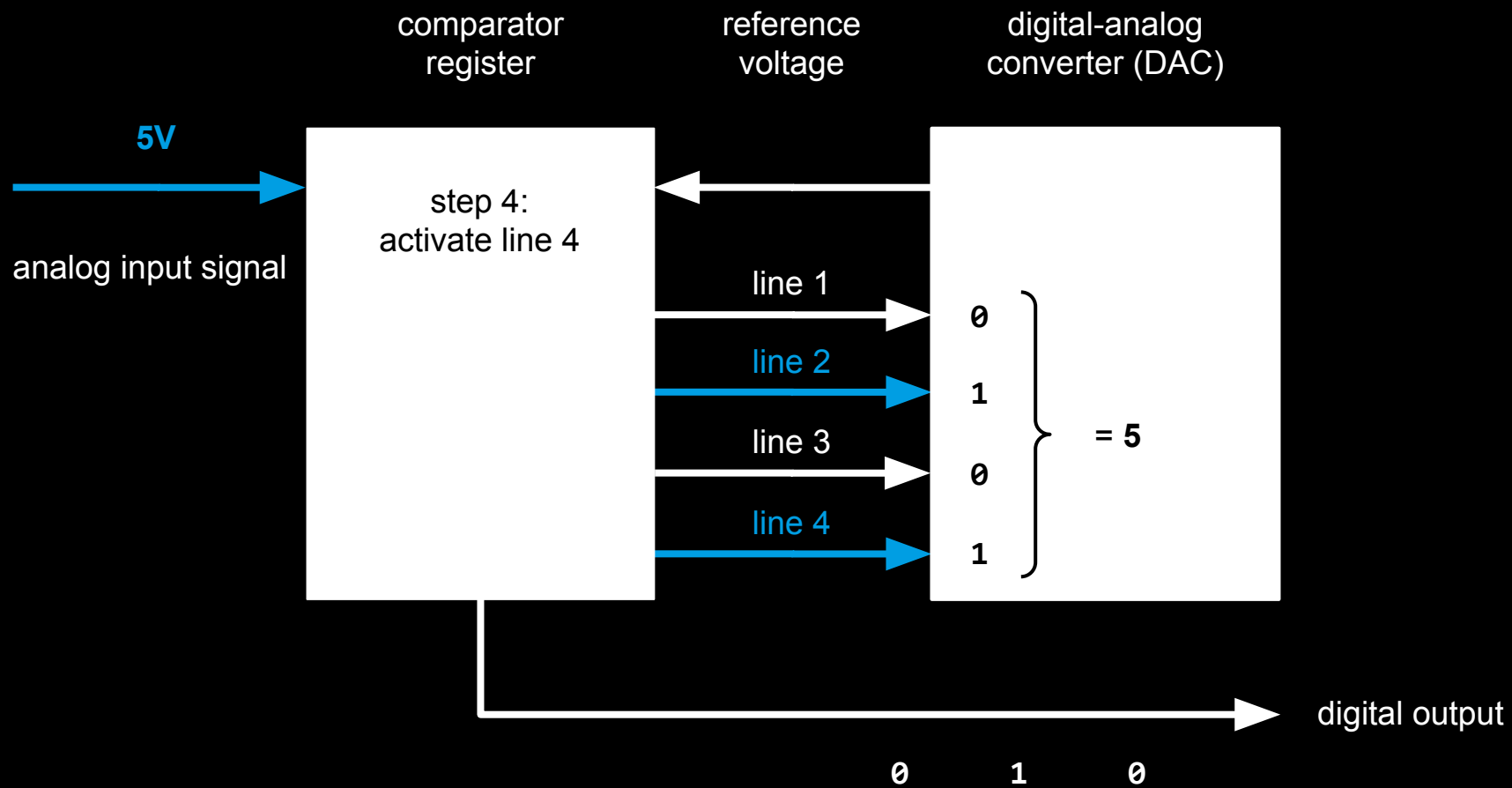




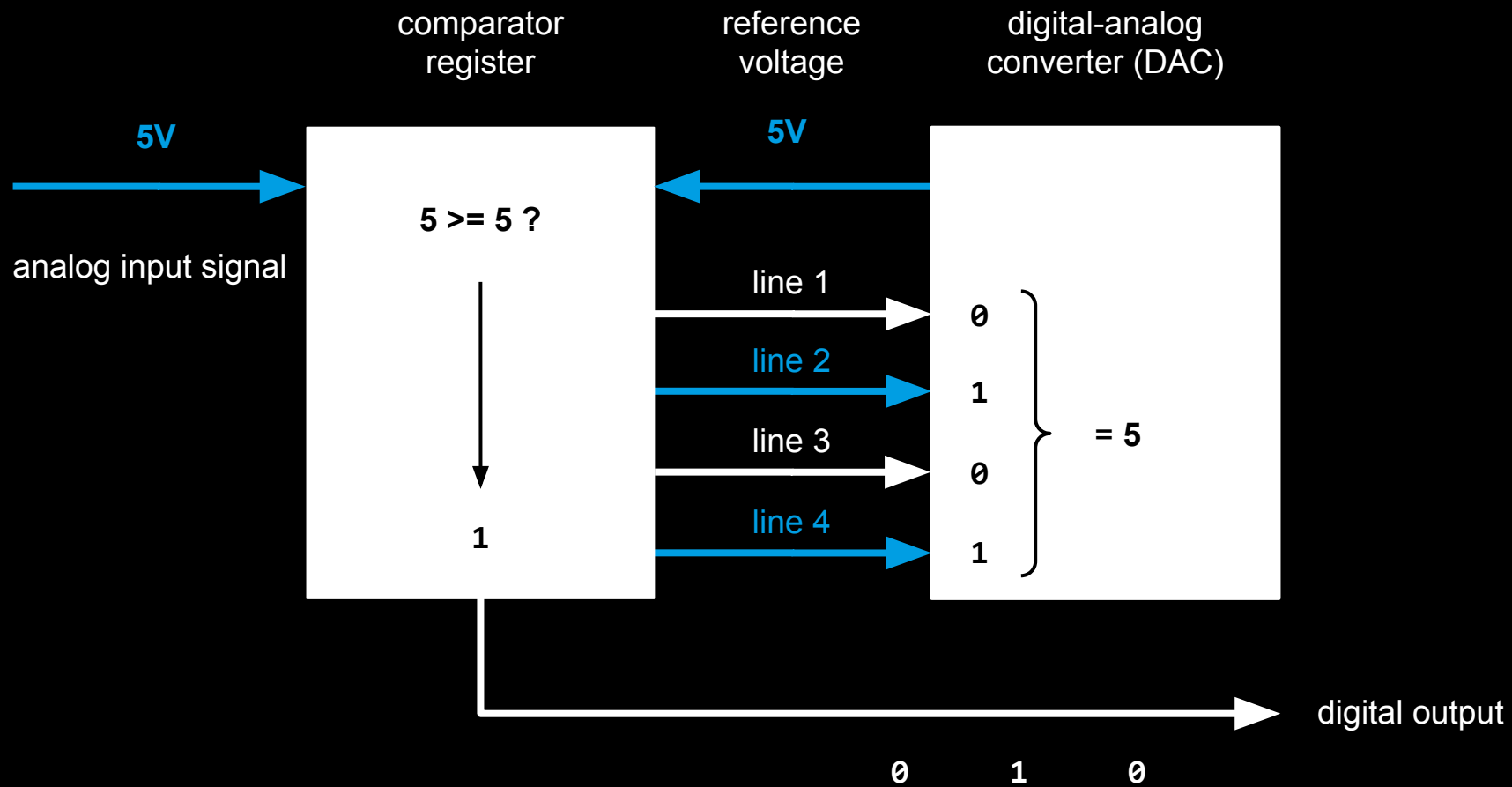


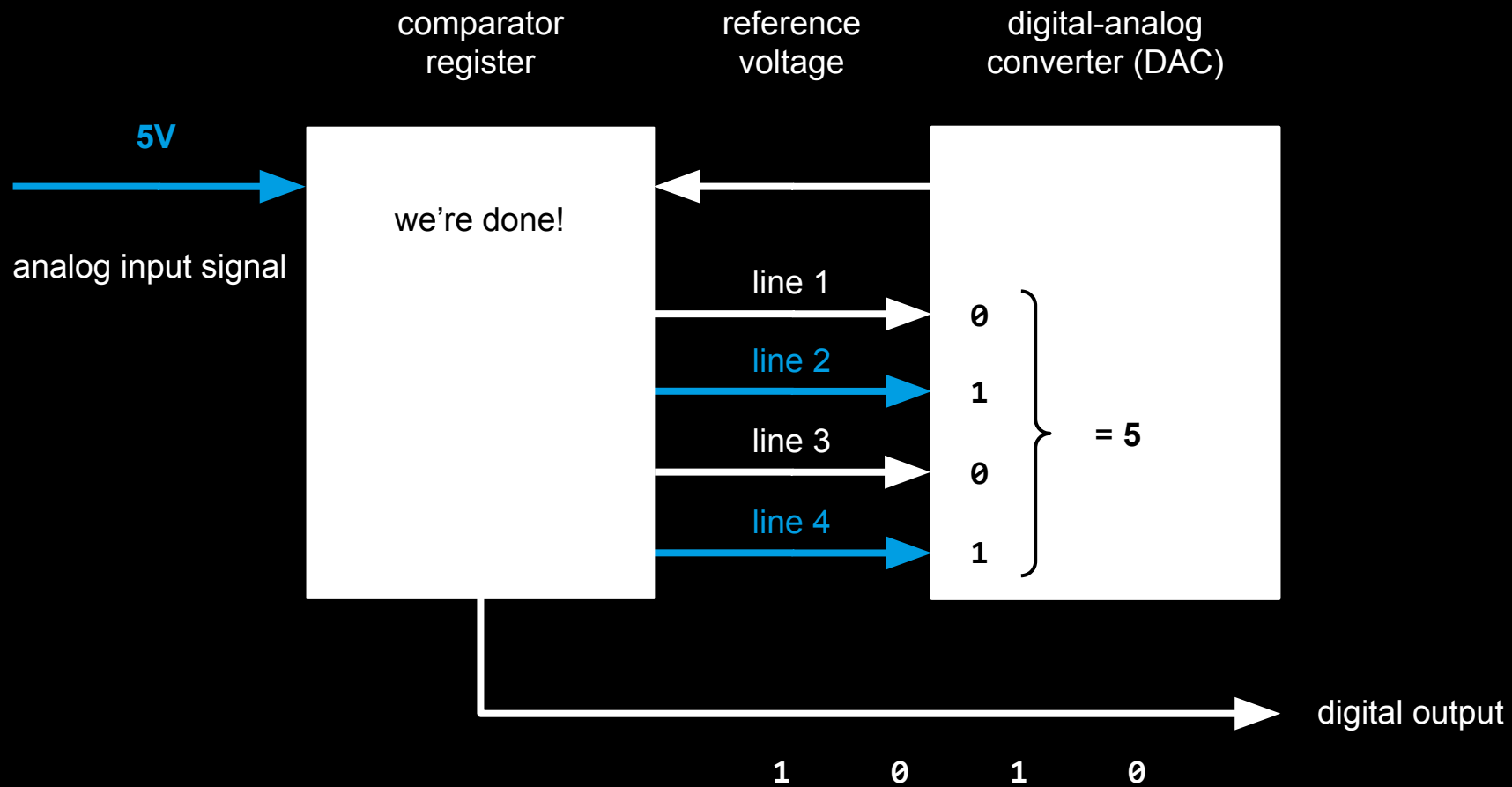




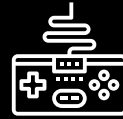


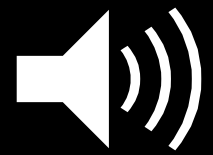






so, what analog signal is measured?





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

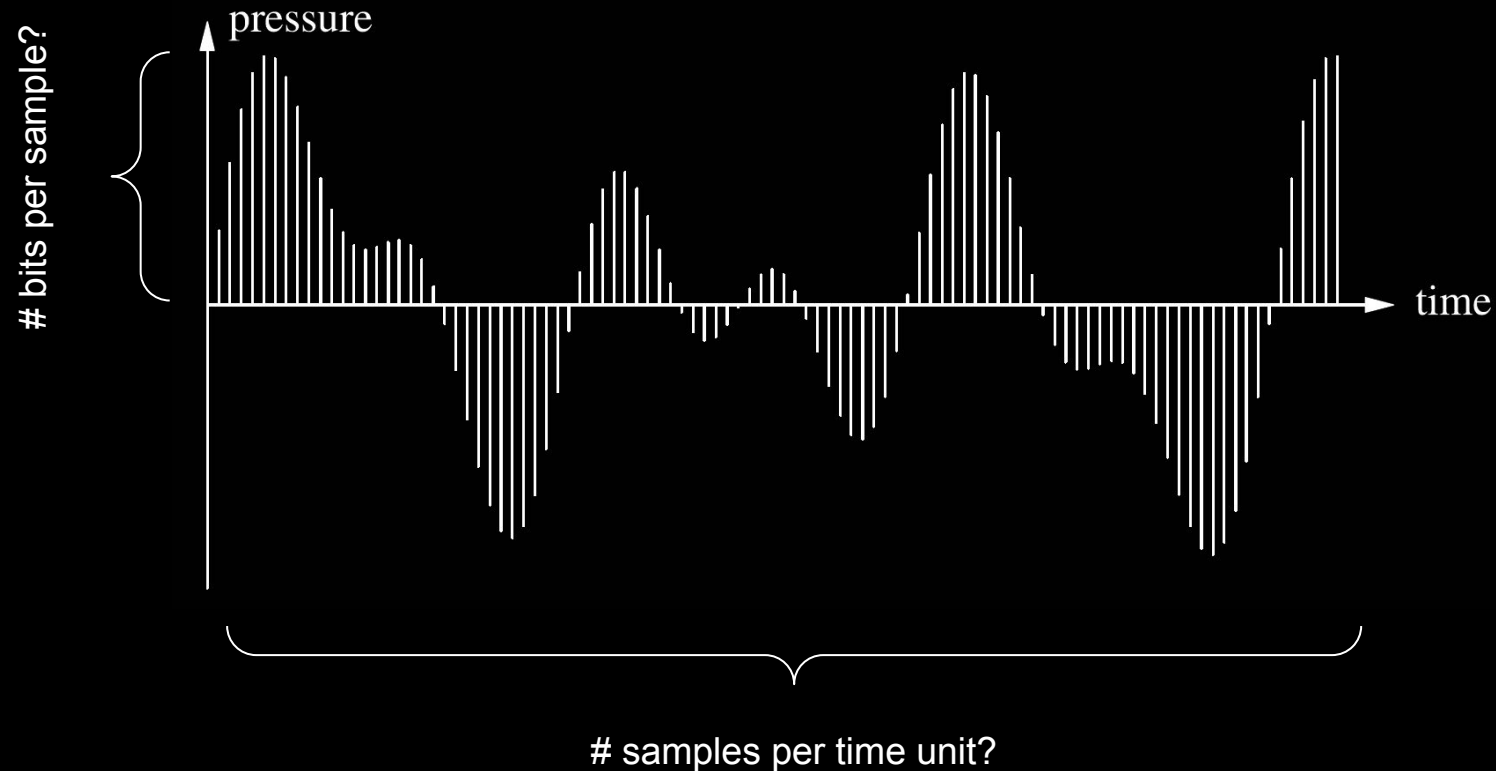
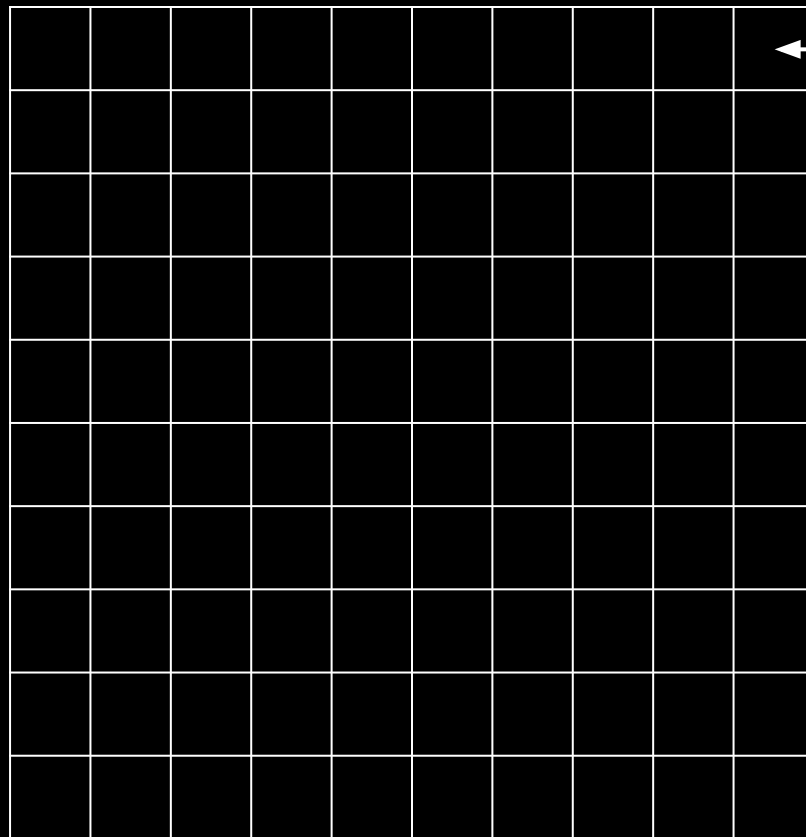


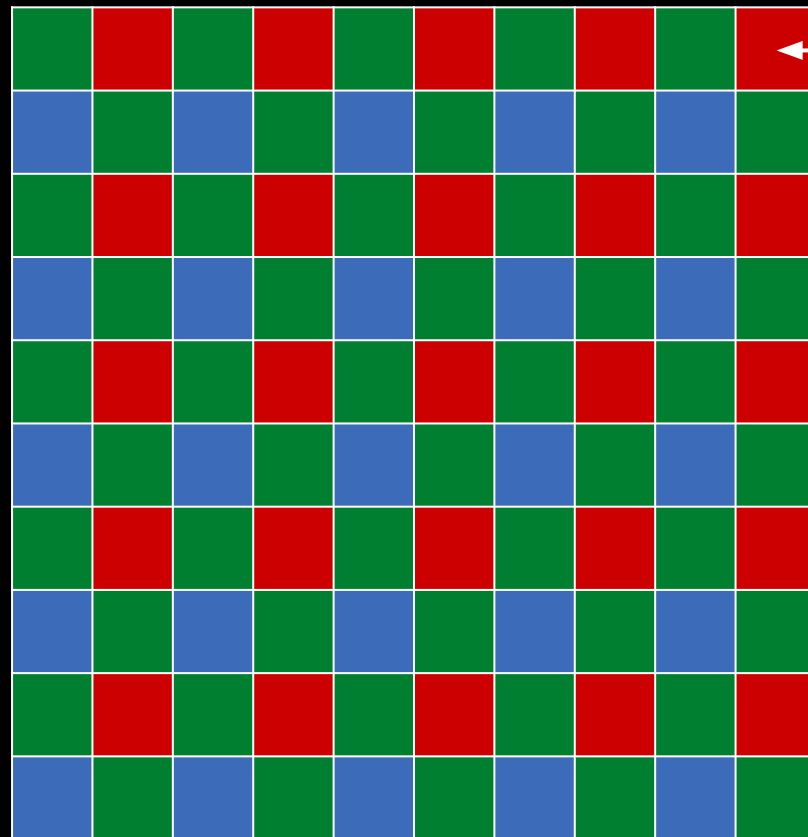


image sensor



← photodiode

# image sensor

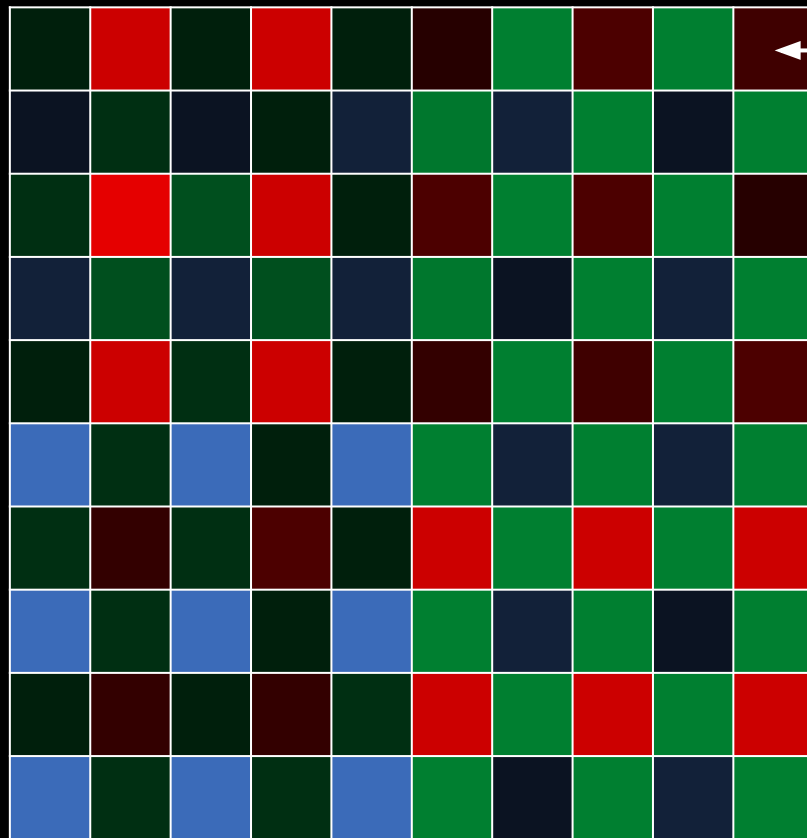


color filter on  
top of photo-  
diodes





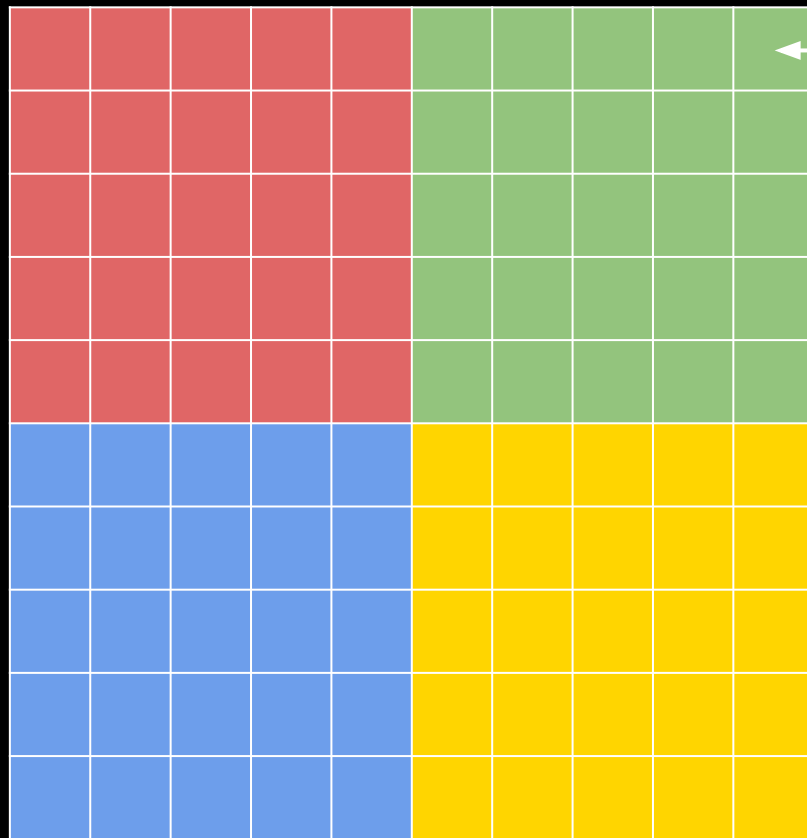
# image sensor



light passed  
through filter



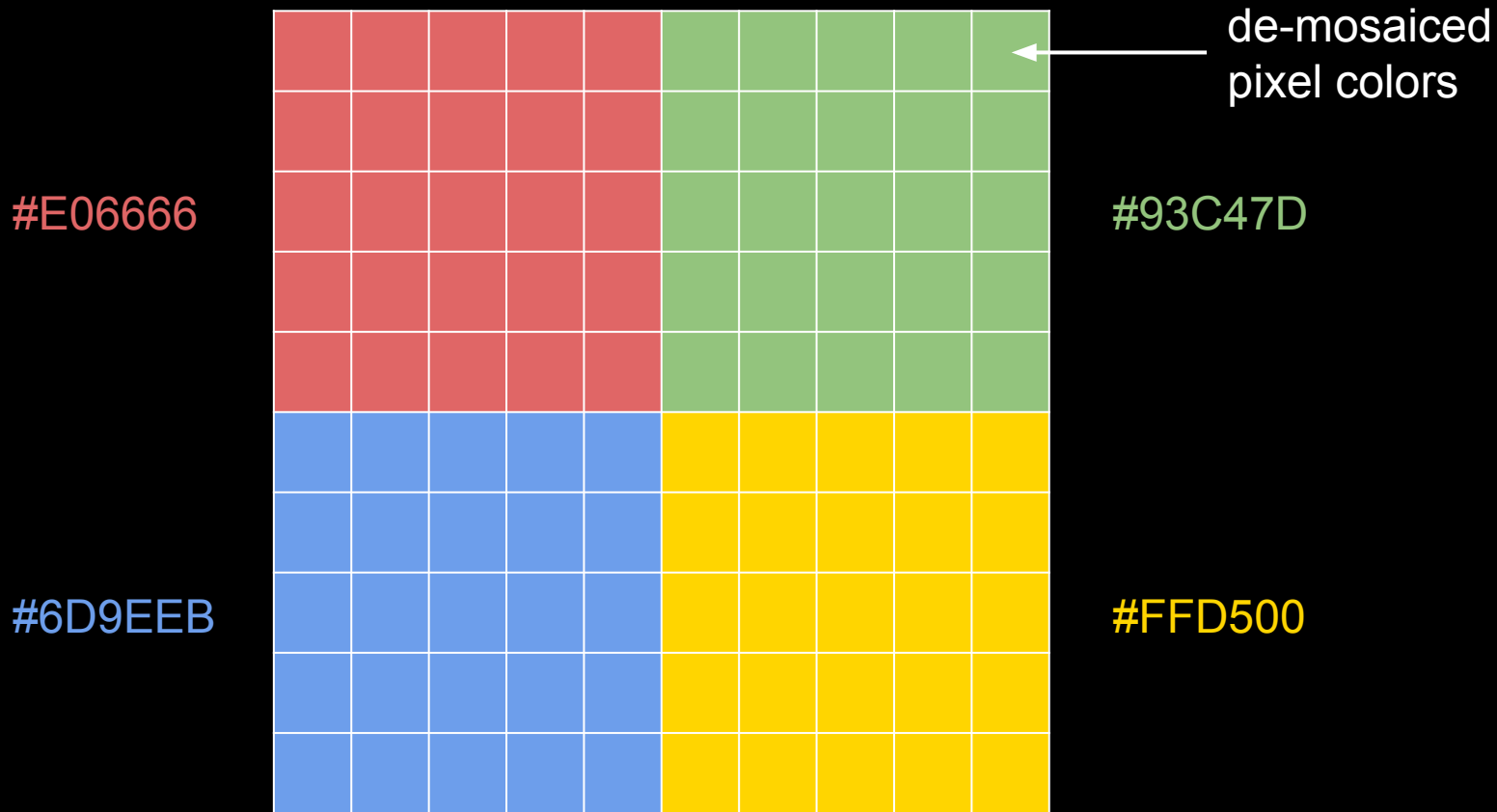
image sensor



de-mosaiced  
pixel colors



# image sensor

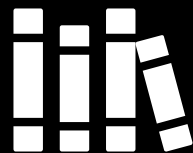




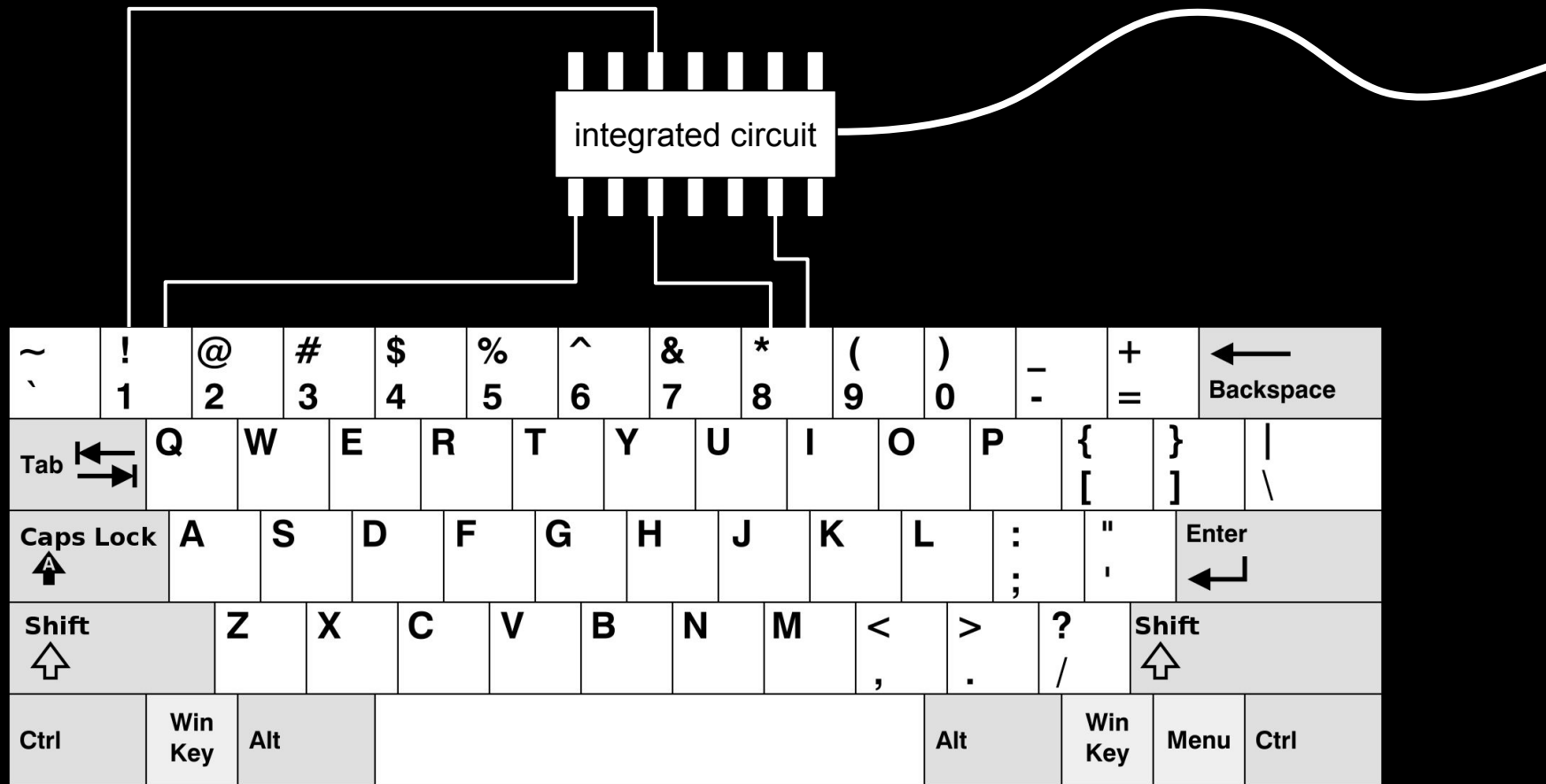
de-mosaiced pixel colors

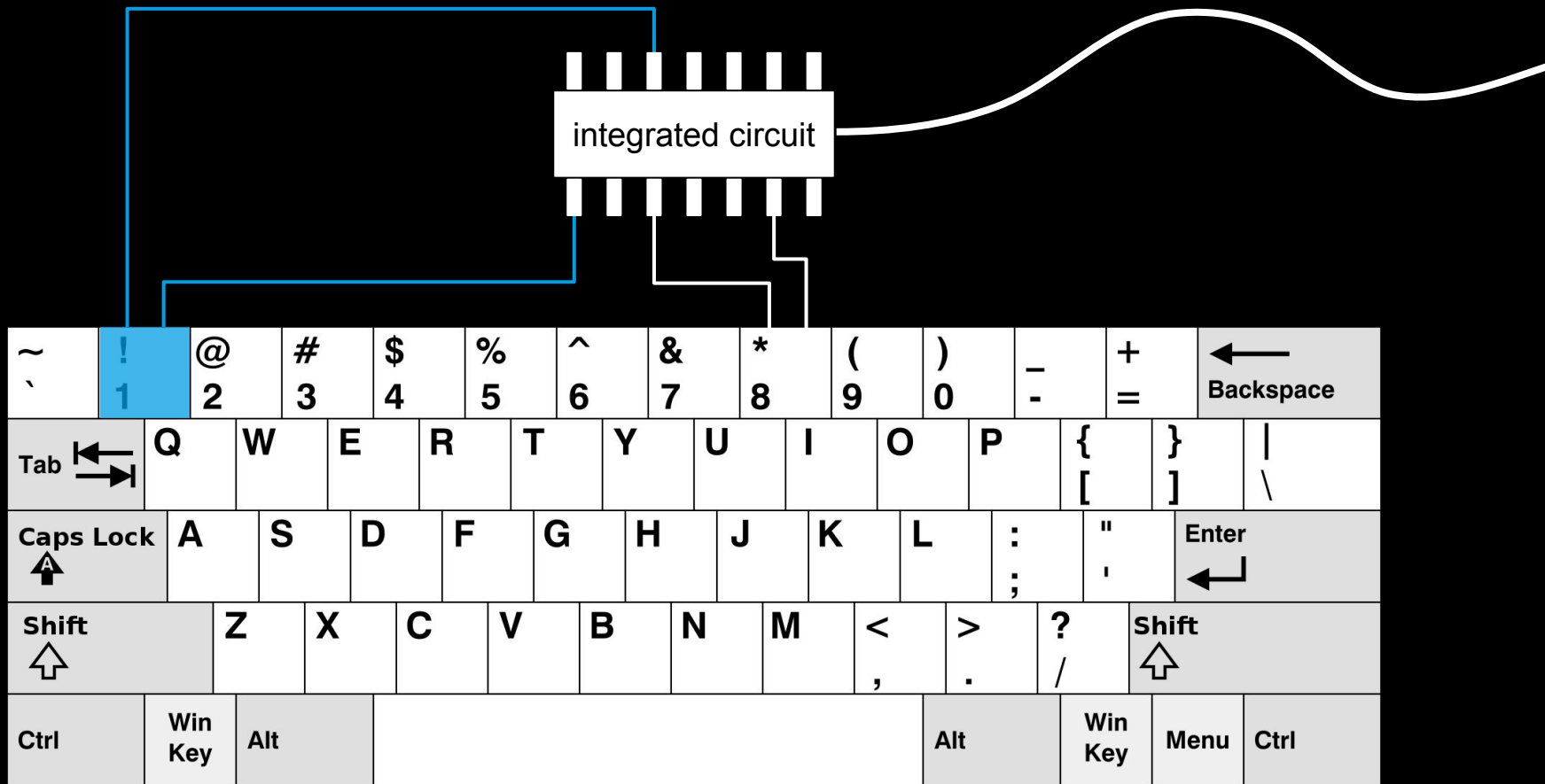
filtered light

color filter

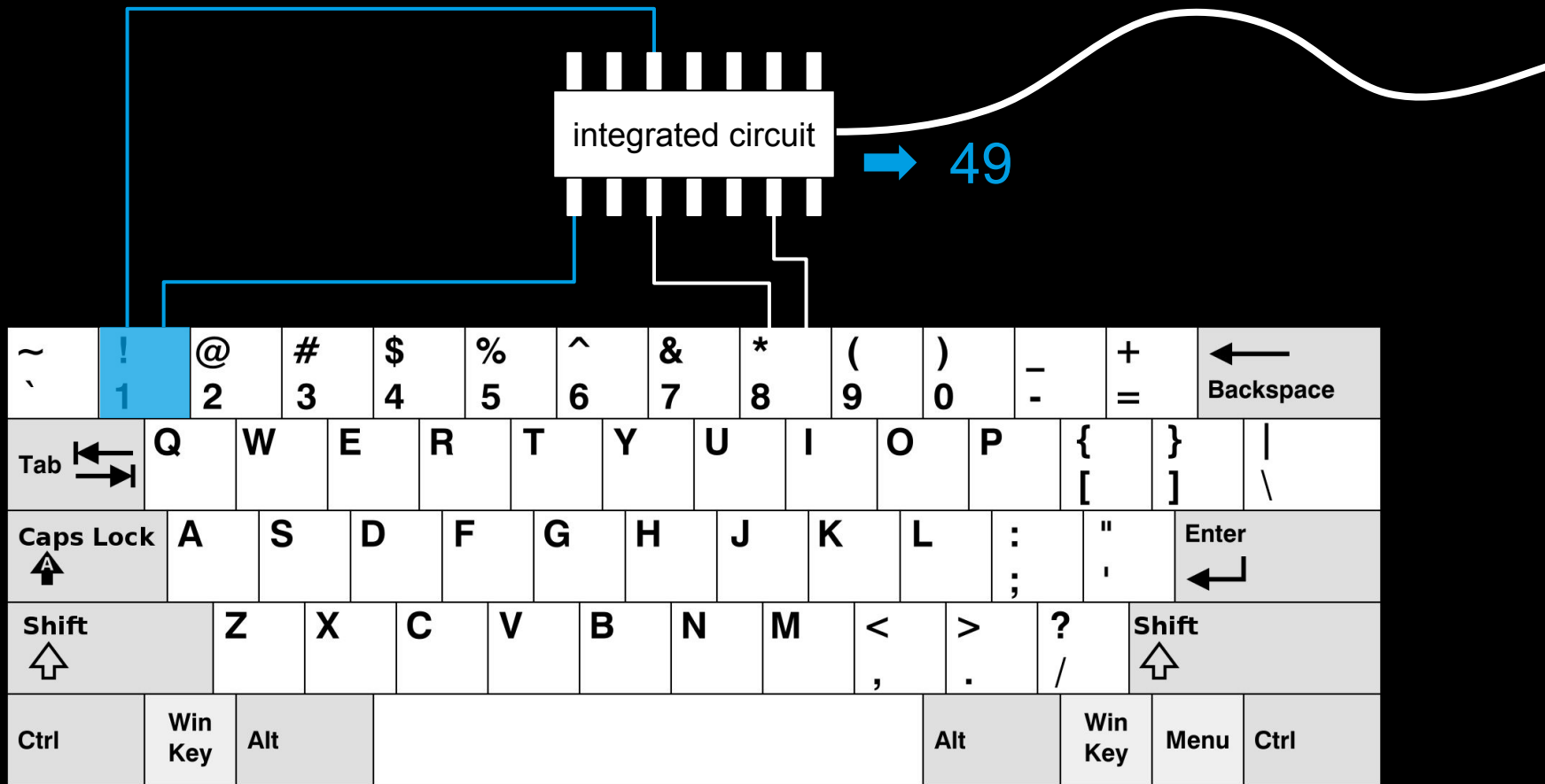


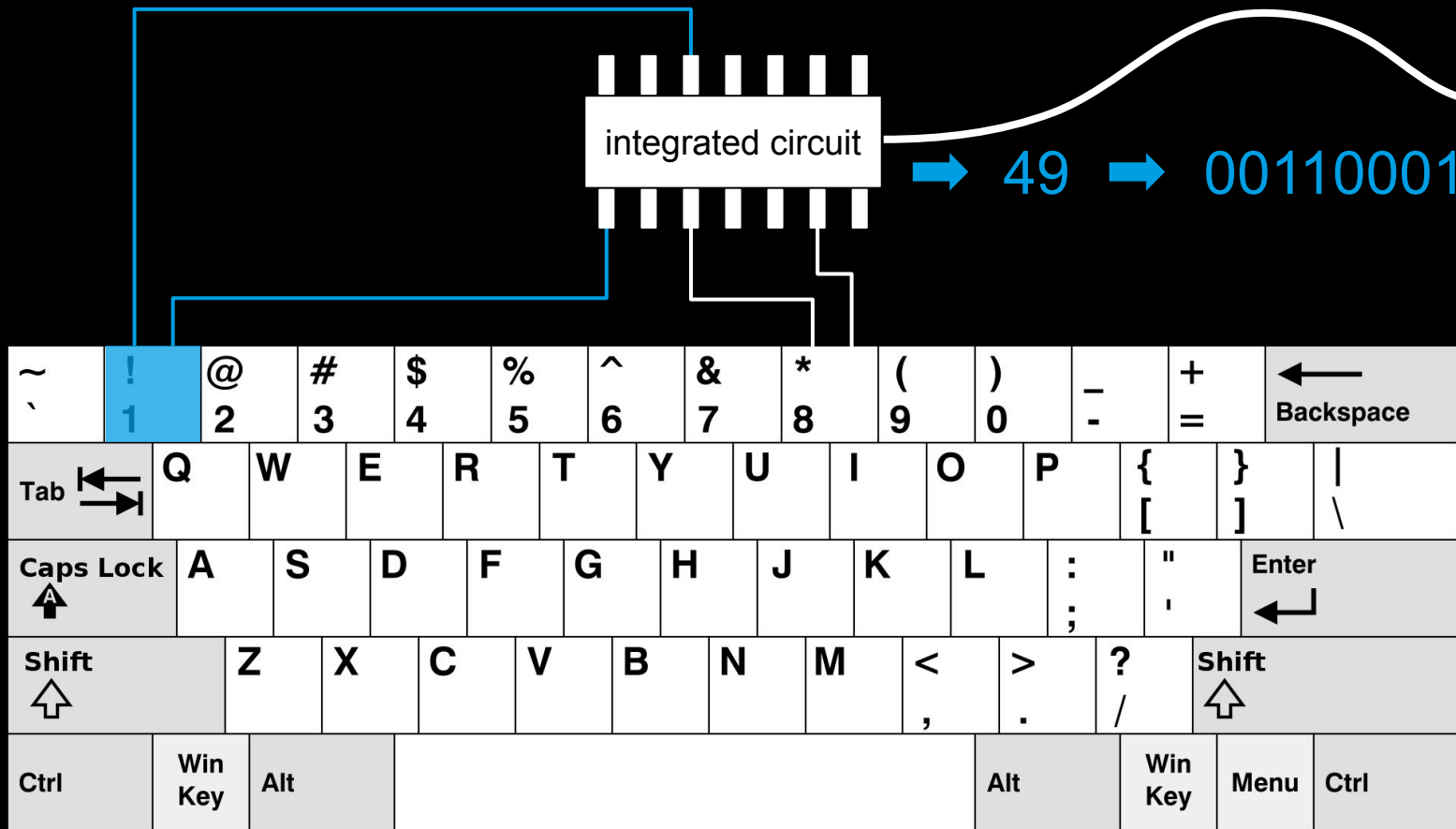
typing text











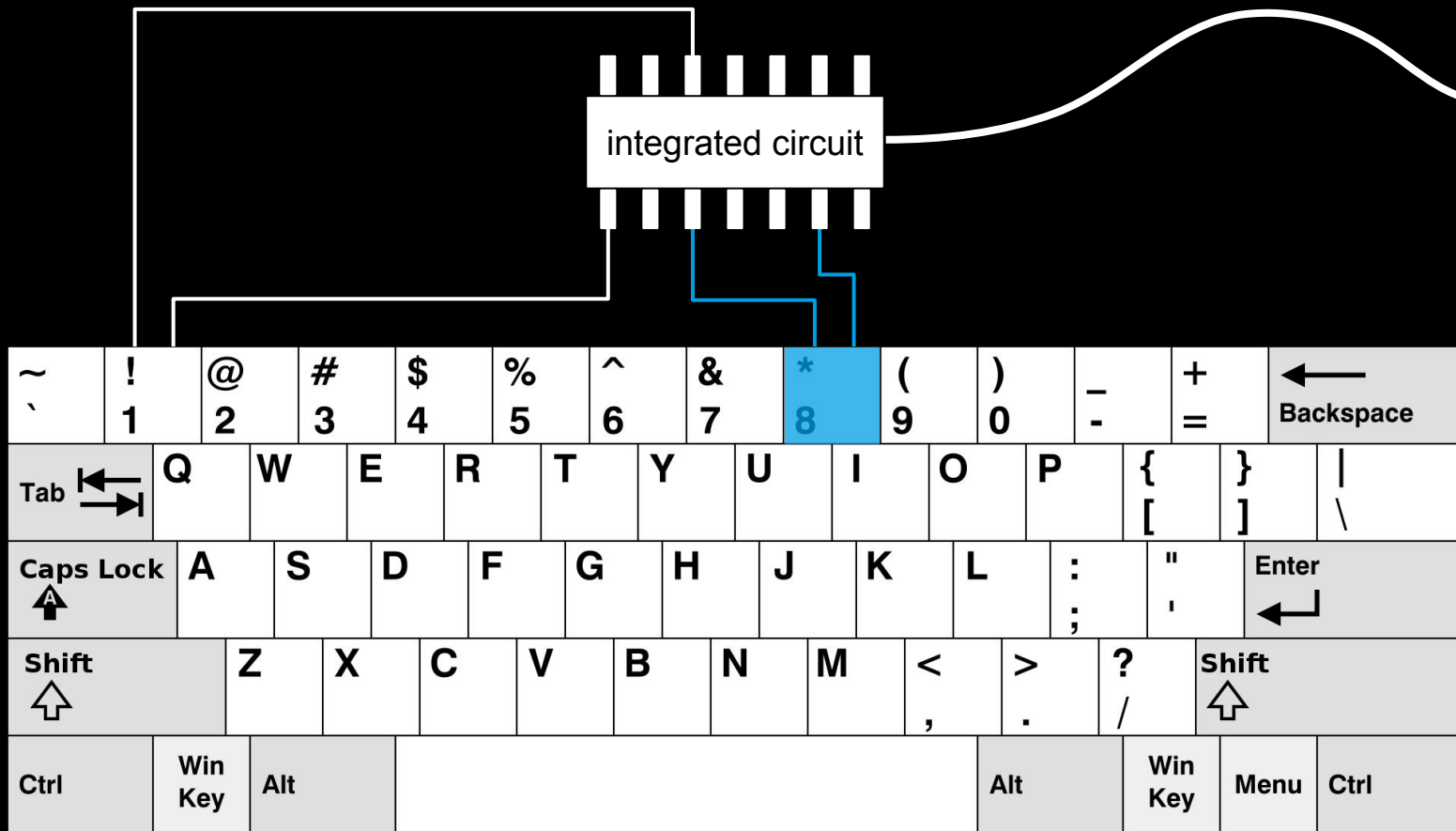
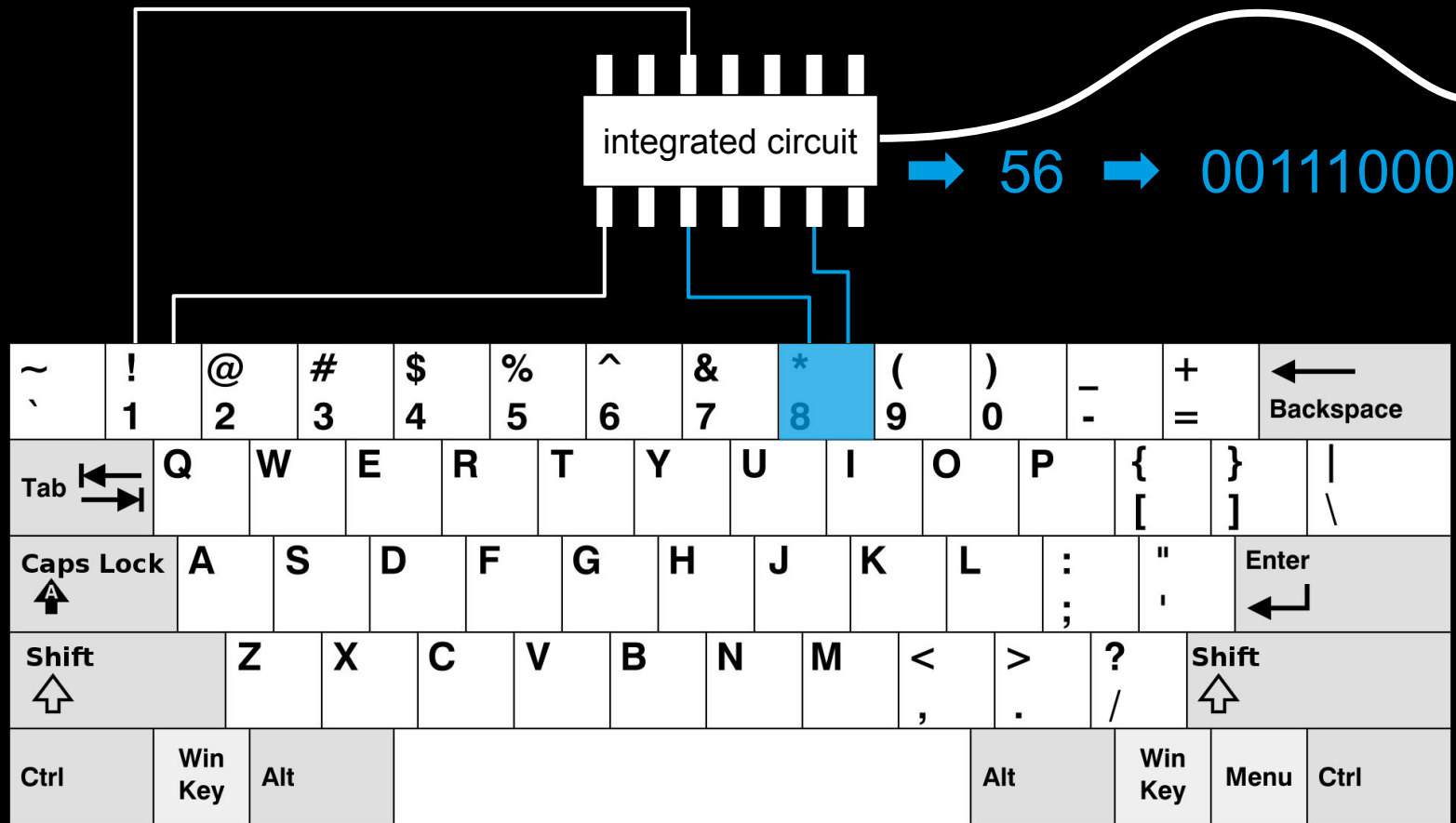


Image source: [Wikipedia](#)

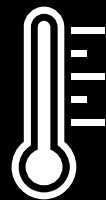


scanning text



+

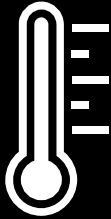
optical character recognition (OCR)



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
```

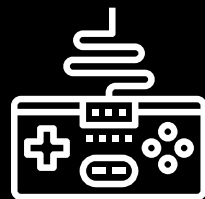




Image source: [Wikipedia](#)





Image source: [Wikipedia](#)

digital goods



computer processable

perfect reproduction

non-rival

near-zero costs of reproduction