

# Analog & Digital Sound



**FIRIA** LABS

# Analog to Digital Conversion

## You Live in an Analog World

From  
complete  
darkness  
.... to bright  
sunlight.

From the  
coldest  
glacier ....  
to the  
hottest desert.



**"Analog"** means **infinite variation** from *dark to light, cold to hot,* and so on.



# Analog to Digital Conversion


But what if you want to measure something like **temperature** with a computer?

- A digital computer can't handle an *infinite* number of temperature levels.
- So it converts **analog** measurements to just a few **digits**

**For example:**

- The CodeX  **light sensor** converts an *analog* sensor input into a **number** from **0 to 65,535**.

**Aw! Instead of *infinite* brightness variation, we get just 65,536 levels!?!**

Why **65,536**? The computer deals in  **binary** numbers, and this sensor has a 16-bit ADC:  $2^{16} = 65,536$ .



# Analog to Digital Conversion

Fortunately the digital *approximation* of analog measurements is perfectly fine for many applications, like sensing light or temperature with the CodeX.

Think about the online **video** and **music** performances you've seen. They all started as **analog** and were converted to **digital** so we could process, store, and distribute them using computers and **code!**

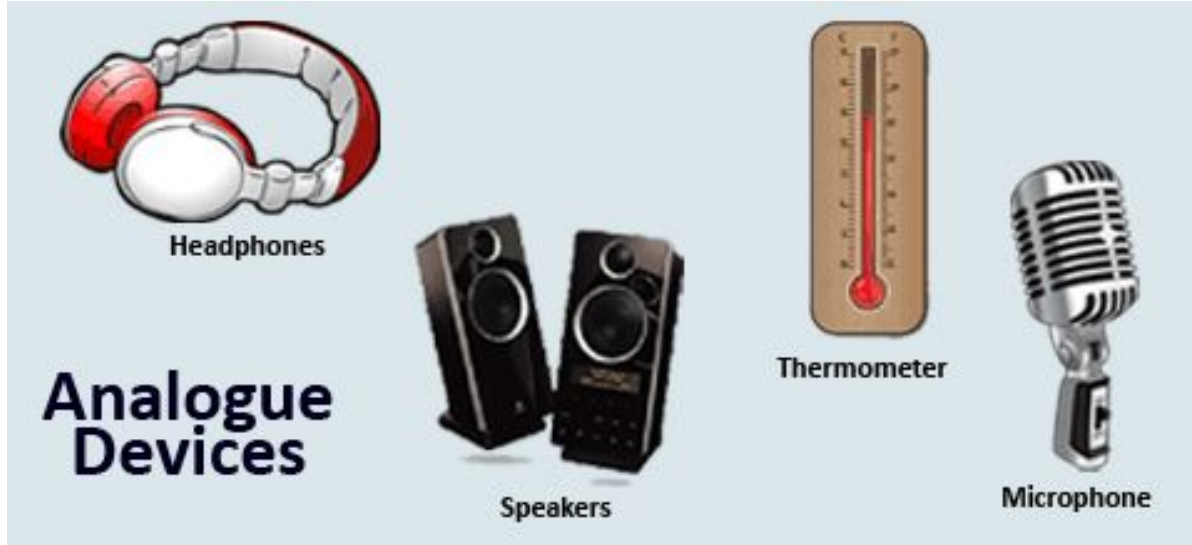


# What is Analog?

Smooth and continuous signals that represent a quantity, like sound waves

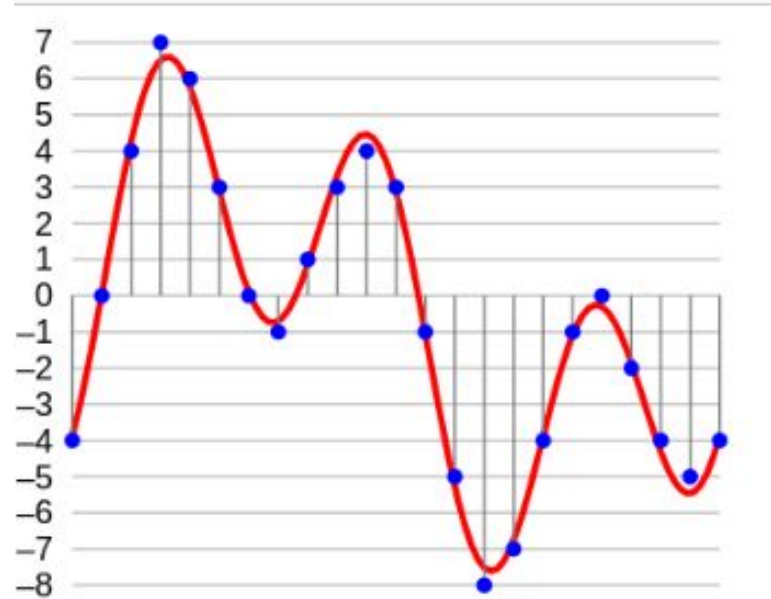


# Analog devices:

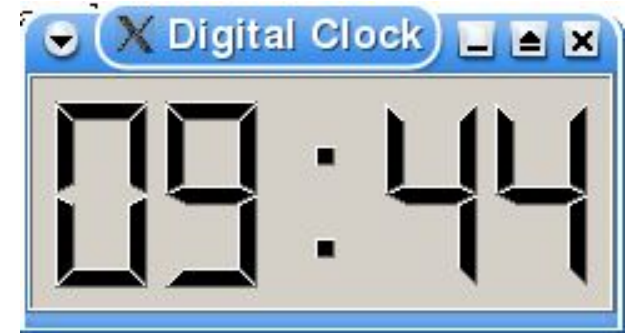


# What is Digital?

A numerical representation of an analog signal, represented in increments

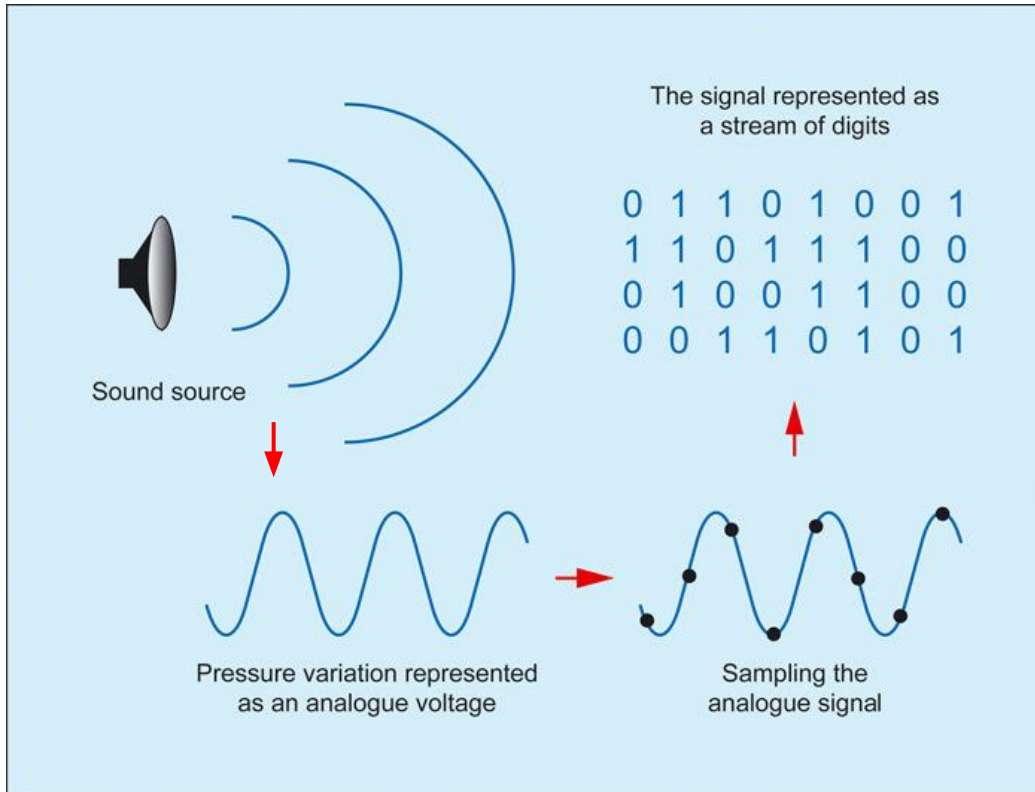


# Digital devices:





# Changing Analog to Digital:

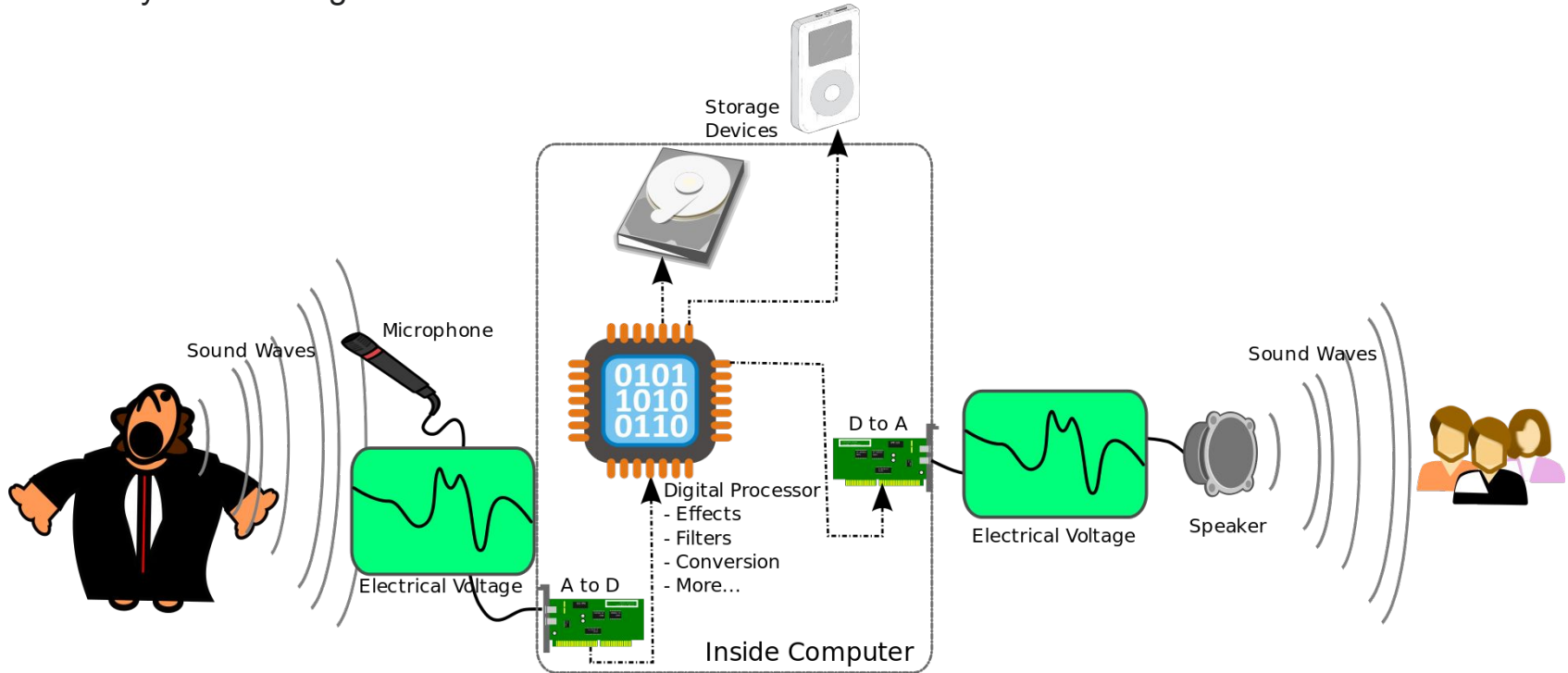


Source: <https://www.soundonsound.com/techniques/digital-myth>



# The lifecycle of sound

from its source, through an ADC (analog to digital), digital processing, a DAC (digital to analog), and finally as sound again.



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