arm Education

# Embedded Systems Essentials with Arm: Getting Started

## Module 5

### KV1 (5): Analog-to-Digital Signal Conversion

Embedded systems often need to measure physical parameters, such as the temperature in your refrigerator, the light coming into your camera lens, or the oil pressure in a car engine.

Most signals in the real world are analog, meaning they are continuous signals that can represent a range of values relating to a physical parameter. Because of this, they must be converted into a digital form, which is a discrete signal, so that a microprocessor can process them. This digital signal can be one of a fixed set of values. In the example of binary, this could be 0 or 1.

After taking a measurement, a sensor must convert the analog signal into an electronic one. This is done using an Analog-to-Digital Converter or ADC, which converts the analog signal into time-discrete and value-discrete samples that the processor can read.

The conversion uses a sampling and quantization process, which results in some loss of data. This lost data cannot be recovered when the information is converted back from digital to analog. We'll explore this process in a later video.

A digital-to-analog converter or DAC reverses the process. It converts digital data into analog signals, for example, converting an mp3 audio file into electronic impulses that produce sound waves via a speaker amplifier.