BBC Bitesize

Sound representation - GCSE Computer Science video for sound representation

(SINGS OUT OF TUNE)

NARRATOR: Ah yeah, sing it, girl!

Welcome to 'Sound Representation'.

Once you've found your great sound, you've got to convert it from analogue to binary so that a computer can process it.

A microphone measures changes in air pressure.

It translates those pressure changes into electrical voltage, which is then digitised into bytes of information by the conveniently named analogue-to-digital converter or ADC for short.

The computer stores that information as binary data, ready to be manipulated into a hit record.

Let's look at the three main factors which affect the quality of digital audio.

Factor 1: Sample rate.

SINGER: Could you put it up on the headphones?

NARRATOR: Most people think of samples as those loops of music used in hip-hop and such like.

SINGER: I went into the café, they asked me what I'll have, I said a grand latte with soya milk.

NARRATOR: In computer terms, a sample is a very short recording made of a sound wave at a certain point in time.

It's like a little slice of time in audio form.

The analogue-to-digital converter records each of those tiny samples and converts the sound into a binary equivalent.

In turn, the computer records those little slices of time, then joins them all together to make one long piece of audio as we know it.

Sample rate is the number of times each second that each of those time slices, or samples, are recorded.

The more samples taken, the more realistic and closer to the original that the final recording sounds.

Here's what low sample rate sounds like.

(SQUAWKY CRACKLY SINGING)

NARRATOR: Rubbish!

But at a higher rate, sounds ...

(SINGING)

NARRATOR: Amazing!

Sample rate is measured in hertz.

The sample rate of most recorded music is 44,100 hertz, or 44.1 kilohertz.

Factor 2: Bit depth.

Depth refers to the number of bits or how much data is used to store each of those individual little samples.

A commonly used bit depth is 16, and that gives a resolution of over 65,000 possible values.

But if you want super-good sound quality, then use a bit depth of 24.

That would give you over 16 million possible values and therefore, very realistic sound.

Factor 3: Bit rate. The bit rates of a file tells us how many bits of data are processed every second.

Bit rates are usually measured in kilobits per second.

The higher the bit rate then the better the sound quality.

Now you know the technicals, you can go forth and create fantastic music.

Take it away!

(PLAYS MUSIC BADLY)