Rushi Gandhi

J1A2 Analog & Binary Signals

1. **What does binary mean?**

   Binary means "two states." The two states are sometimes called "1" and "0", or called "true" and "false", or called "on" and "off", (or other names.) The essential characteristic is that a single binary device can be in just one of two possible states.

2. **What is a bit?**

   A bit is a single on/off value.

3. **Why do computers use binary? (4 reasons)**
   1. Binary devices are simple and easy to build.
   2. Binary signals are unambiguous (which gives them noise immunity).
   3. Flawless copies can be made of binary data.
   4. Anything that can be represented with some sort of pattern can be represented with patterns of bits.
4. **What is meant by the term 'unambiguous' signal? Explain using the light from a flashlight as an example.**

   Unambiguous signals are called discrete because they have a fixed number of definite states. Sometimes the word **digital** is used to mean the same thing. Ambiguity means uncertainty, thus unambiguity means certainty. Being certain is a great advantage of using binary.

   The website example of this is when Paul Revere was waiting for news of the attack of the British troops. He is expecting to see a signal lantern in the tower of Old North Church telling him how the British are attacking:

   1.32456 if by land, 1.71922 if by sea.

   The signal shines out! ...but Paul Revere's famous ride is delayed for several hours as he tries to figure out exactly how bright that signal is.

   Lack of ambiguity is a tremendous advantage. The signal that Paul Revere was actually waiting for that night in 1775 was:

   One (lantern) if by land, and two (lanterns) if by sea.

   Another example of this is the use of a flashlight. The flashlight has two states: ON or OFF. This can be related to an unambiguous signal as its is distinct and has a definite number of states. All the computer has to figure out is whether the flashlight is ON or OFF. This is a tremendous advantage as it allows for fast processing.

5. **Describe what an analog signal is. Give an example.**

An analog signal is a kind of signal that is continuously variable. Its values can be anything within a range of values, and its exact value at any time is important. Analog signals usually continuously change their value. The information they convey is contained in the exact value at any instant.

An example of an analog signal is the RCA signal.

6. **Describe what a digital signal is. Give an example.**

A digital signal is a binary signal. They deal in the realm of the discrete or finite, meaning there is a limited set of values they can be. The number of values can be 2, 4, 245, or 13412 (as long as it's not infinity). Using thresholds, a digital signal represents binary data ("on/off" data).

An example of a digital signal is the HDMI audio & video signal.