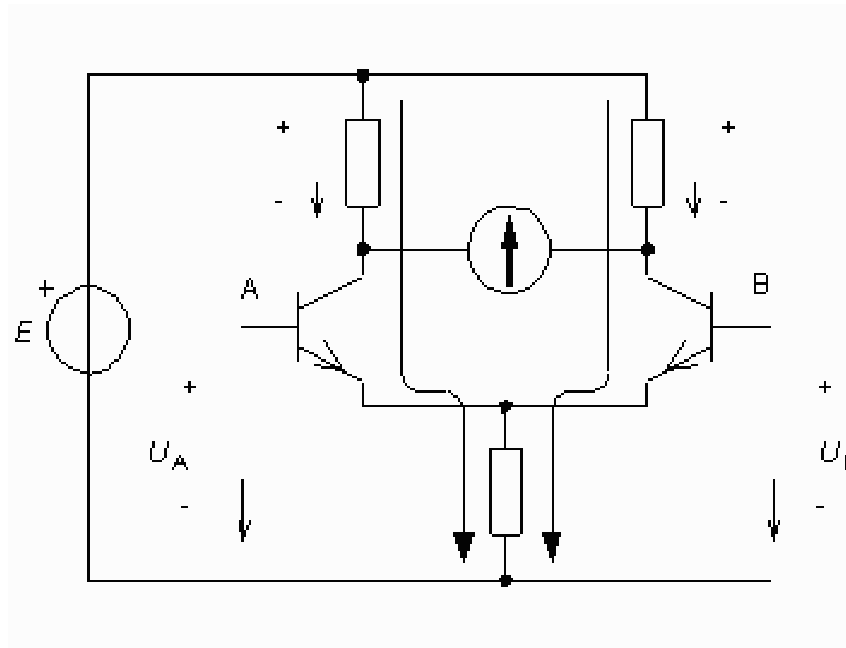
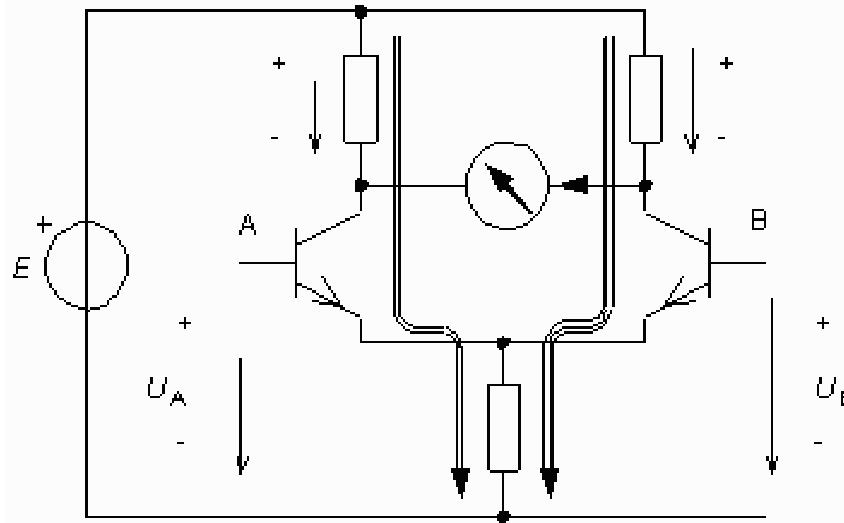


Differential amplifier



If A and B has the same voltage there will be no reading on the meter. (Common Mode)

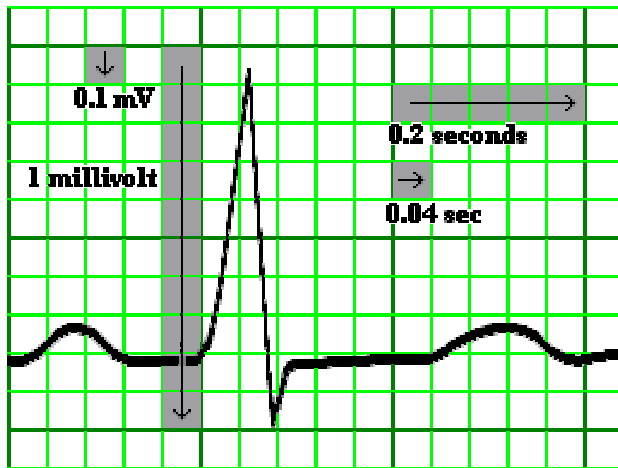
Differential amplifier



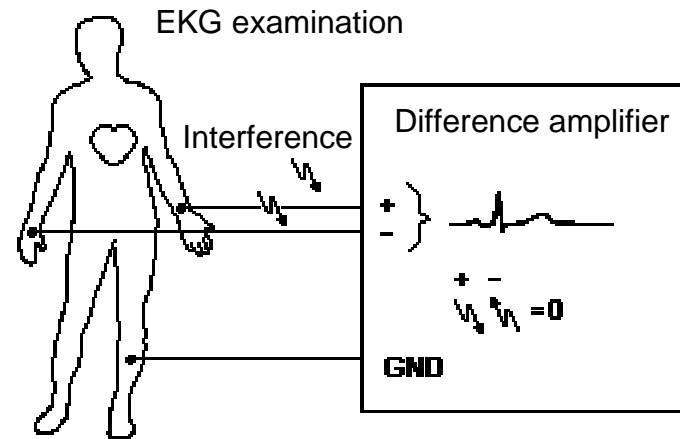
If A and B has *different* voltages there will be a large reading on the meter.

(Differential Mode)

Differential amplifier suppresses interference



EKG-signal is weak, max 1 mV.

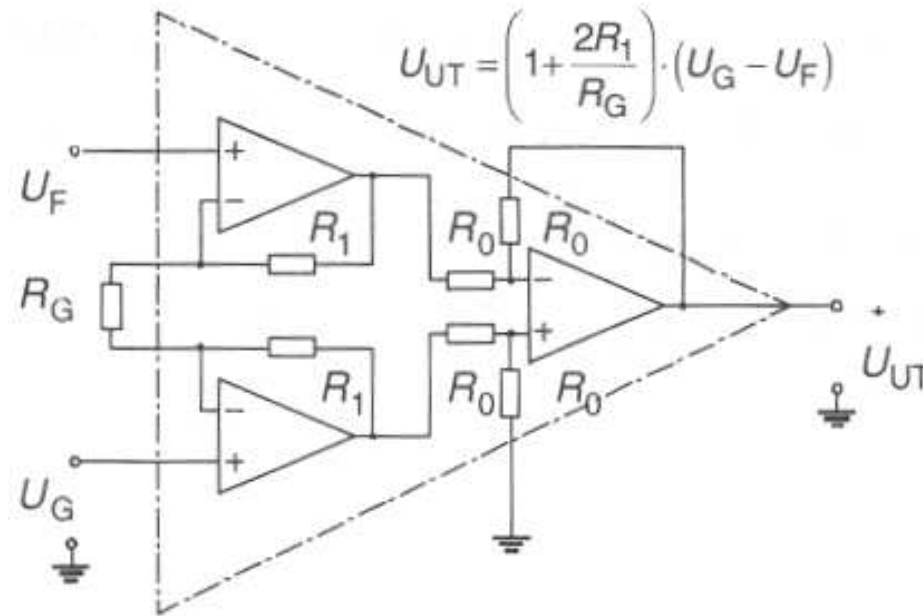
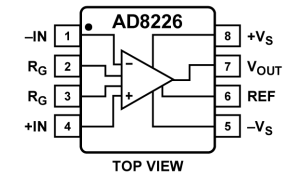


Interference will be the same on both inputs and will therefore be suppressed by the difference amplifier.

At a EKG-examination a differential amplifier is used. Other sensor signals are often equally weak – the solution is also then the differential amplifier.

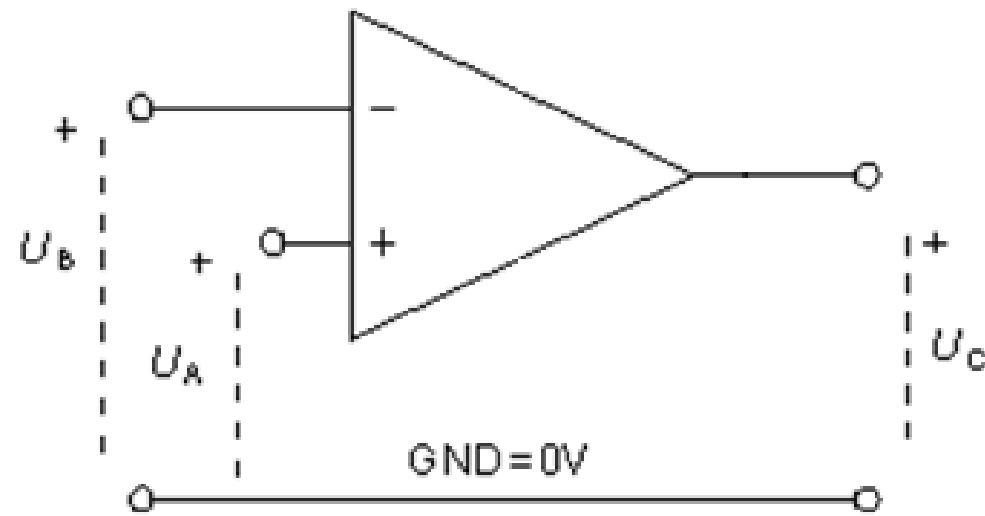


Instrumentation amplifier



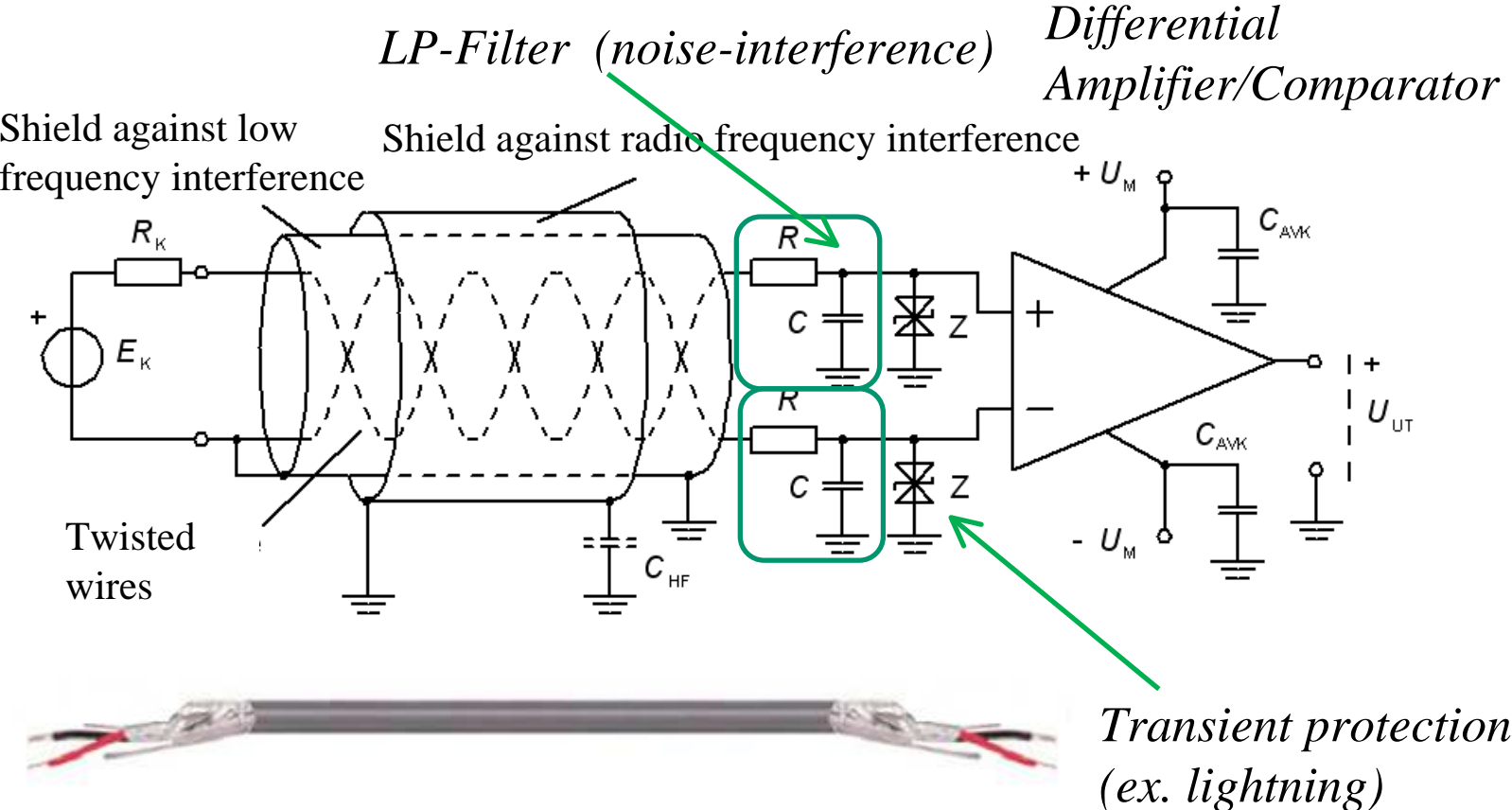
An amplifier circuit with three amplifiers are usually called Instrumentation Amplifier – this circuit is suitable to amplify weak sensor signals that are surrounded by electrical noise!

Comparator is a difference amplifier

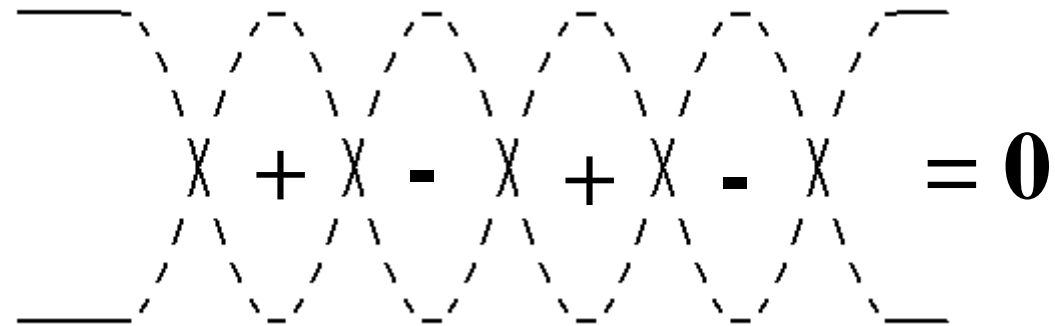


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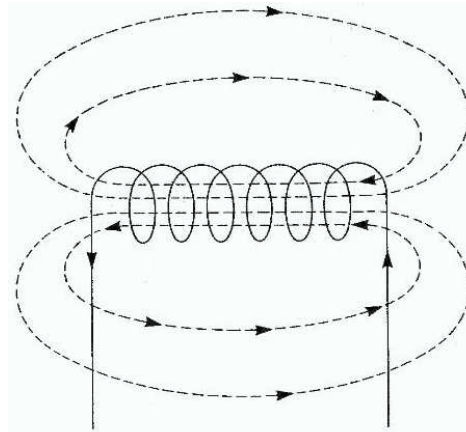
Supression of electromagnetic interference



Twisted pair cabling



A twisted pair cable is insensitive to **elektromagnetical** interference.



Faraday cage

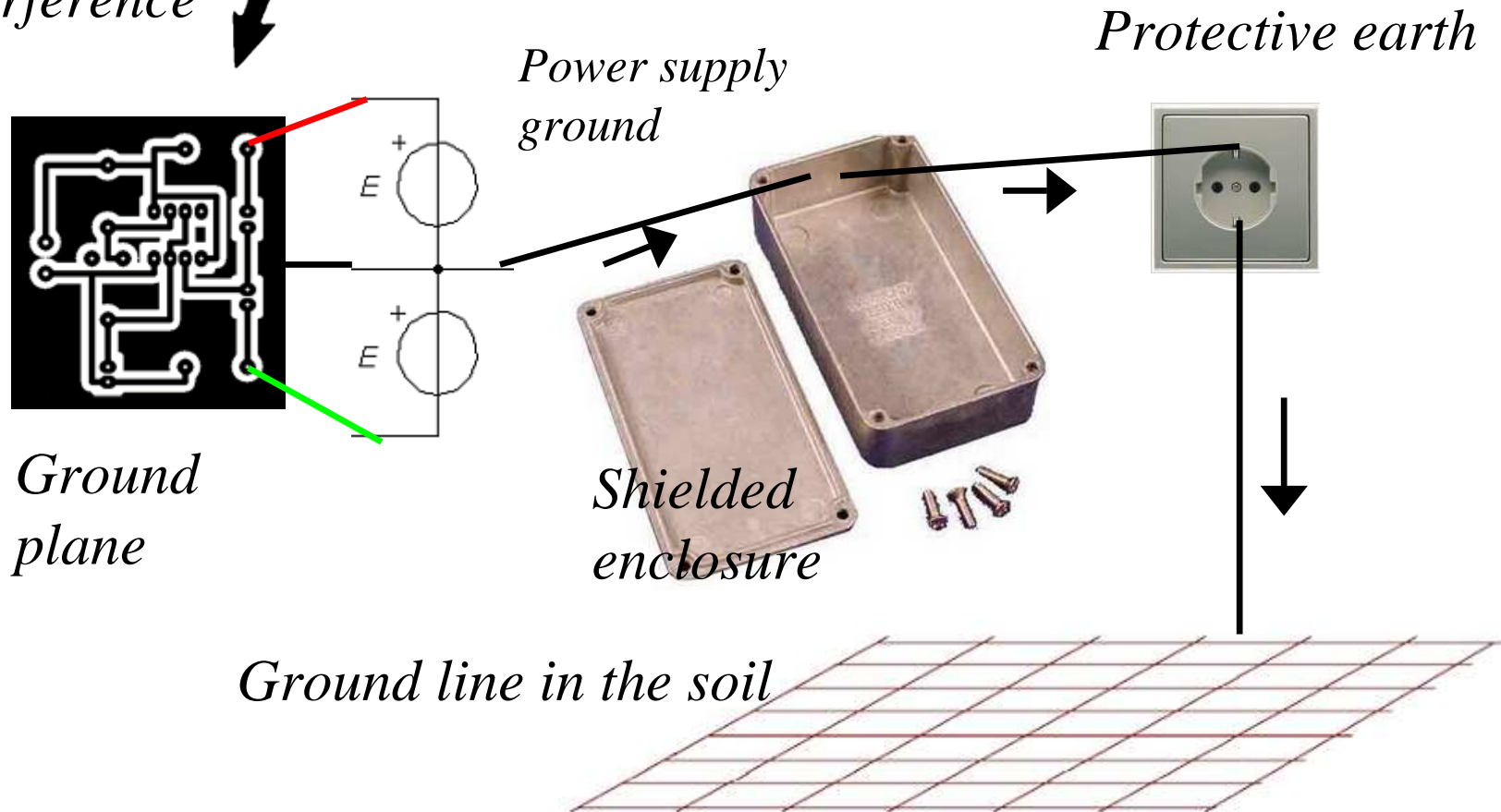
A shielded cable is insensitive to **electrical** interference/fields – like the Faraday cage.



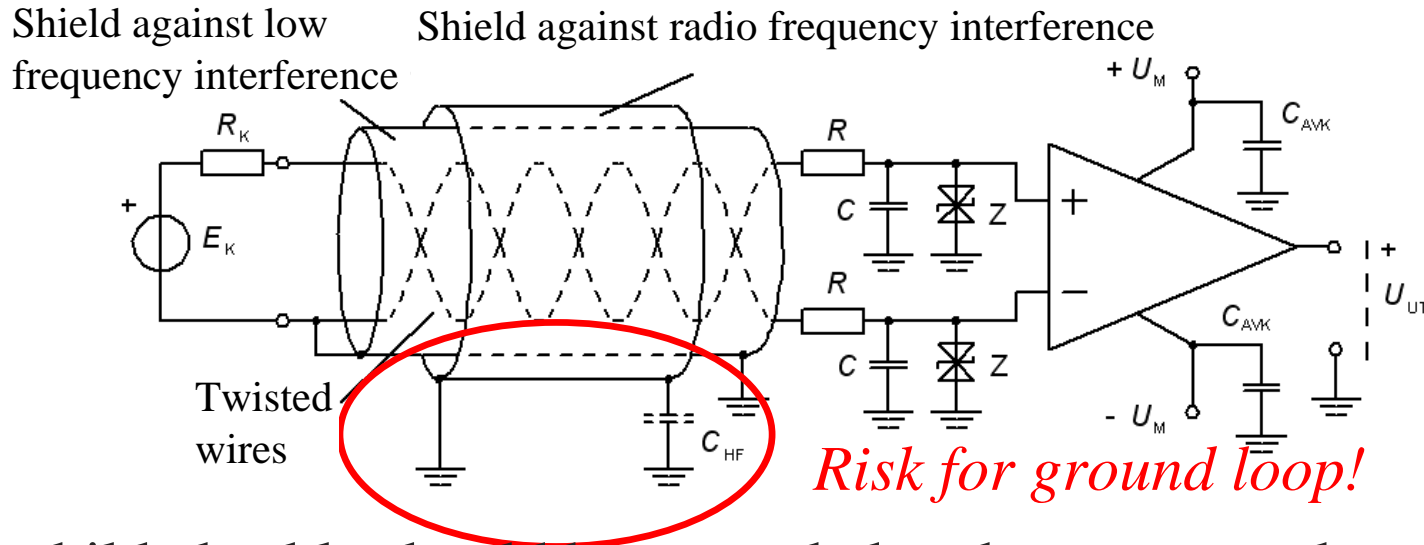
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Electrical interference  **What is ground?**

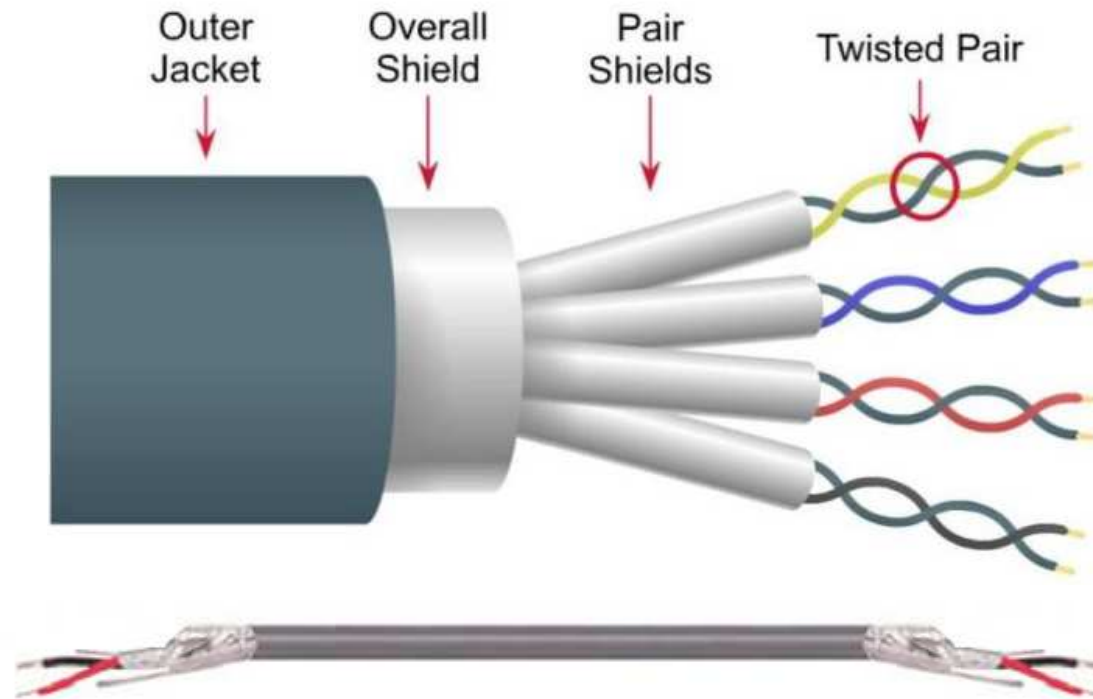


Grounding shielded cables?



A shielded cable should be grounded at the source end, otherwise there could be a ground-loop in which low frequency interference could be magnetically induced! But high-frequency interference can only be stopped if both cable ends are grounded? A double-shielded cable makes it possible to follow both rules.

Double-shielded cable ?



A double-shielded cable is not just a "wire" but an expensive component.

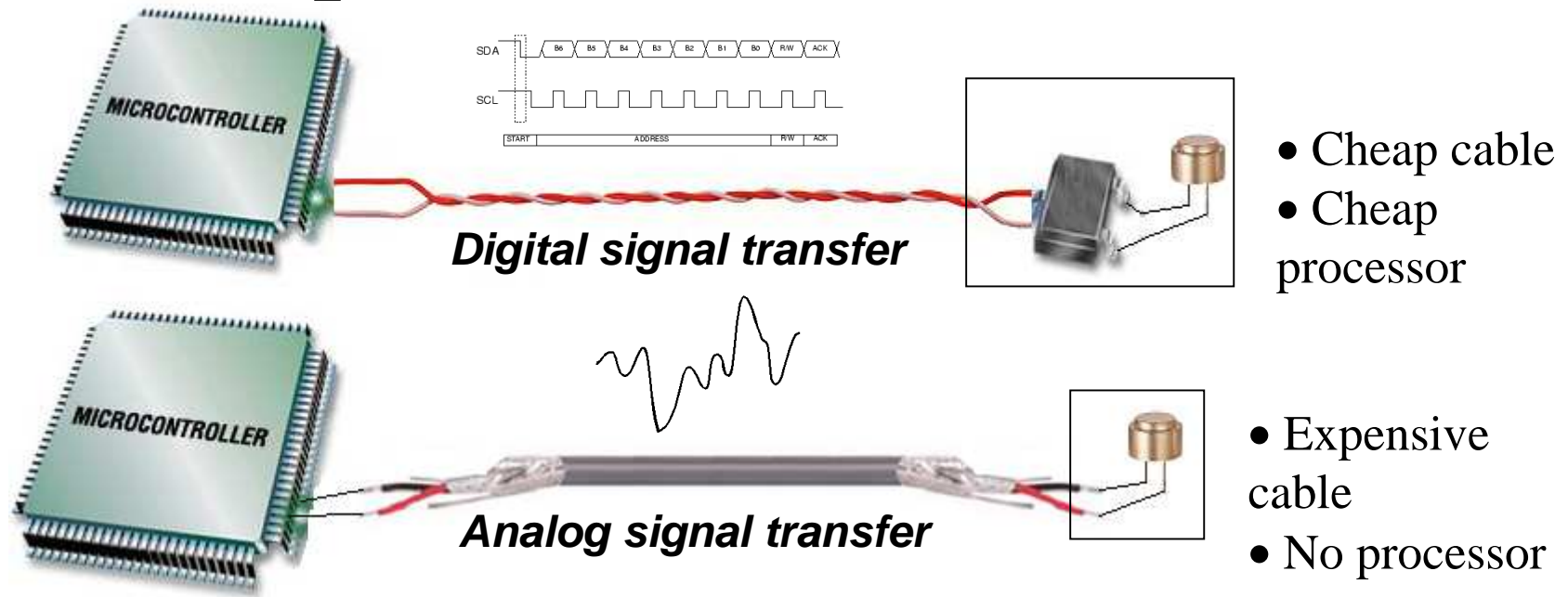
8-bit-processor close to the sensor?

- A simple sensor often has a weak output signal. It may need to be connected with an expensive cable.
- An expensive sensors with "integrated electronics" can get by with a simple cable.

The cost of both options can very well end up to be the same!

Thus smart to build an 8 bit processor inside the sensor!

8-bit processor as smart cable?



How many 8 bit processors can you get for the cost of a meter cable? The processor as cable replacement!

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