EL L301

02.04.2019

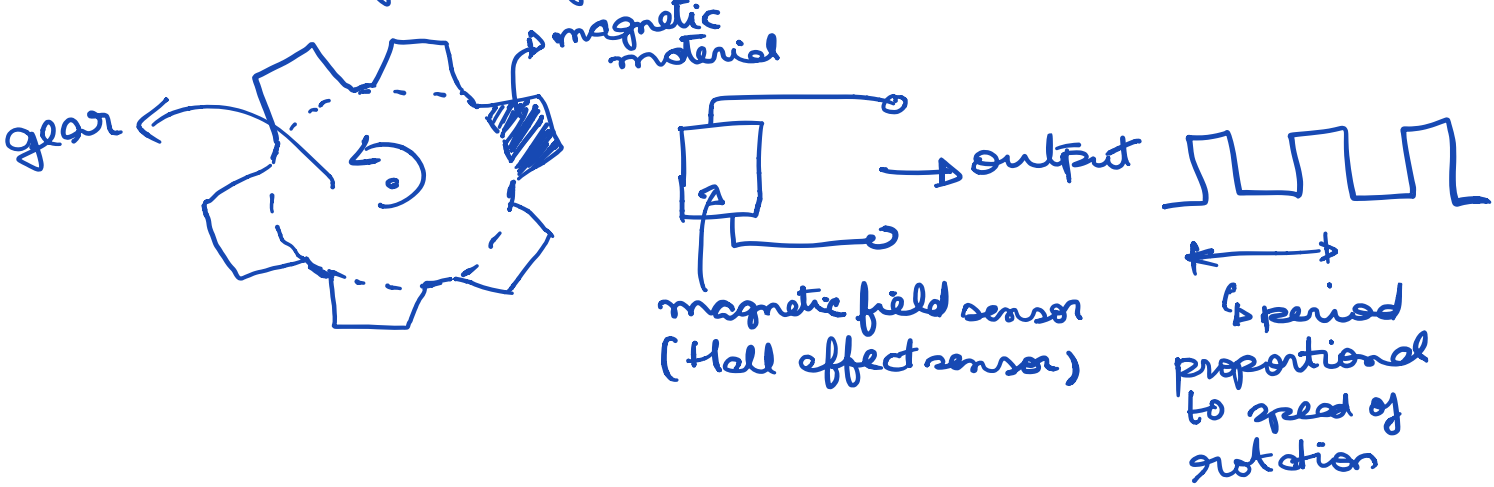
Digital transducers

Analog transducers, in a sense, give the "true" value. (For example, analog music vs digital music).

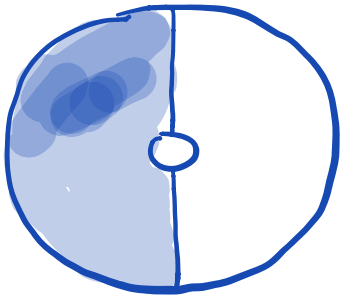
But, advantages of digital transducers exist,

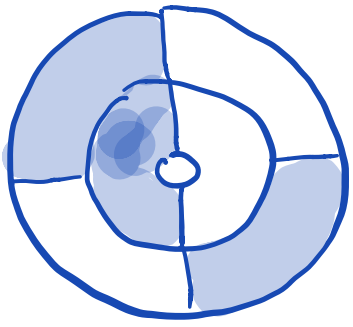
1. easy to read, portability
2. less memory / storage
3. varying levels of resolution
4. more robust to noise

Electromagnetic gear



Optical encoders



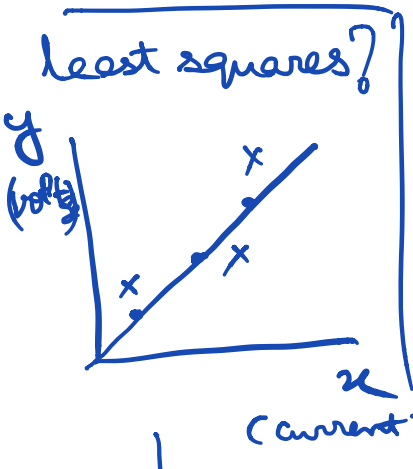


Instruments

Device to measure quantity of a variable

↳ Theory of Measurement

- What does it mean to measure?
  - ↳ 8 AM
  - ↳ 80 kg
    - number
      - ② How many digits?
        - 80
        - 80.0
        - 80.00
    - unit
      - ① Fundamentally, we view time and mass separately? So, have different units
      - standard
        - What does it mean 1kg?
        - What is the uncertainty in measurement?
          - ↳ fundamentally, Heisenberg's uncertainty principle
          - ↳ in UG labs, error in measurement
            - → least count uncertainty
            - → human error
            - → drift error



(3) ↳ actual $y = m$ (actual x) + noise

$$\text{Cost} = \sum_i (y_i - m x_i)^2$$

We find m by minimizing the cost w.r.t. m

Why not take cost $= \sum_i |y_i - m x_i|$

or $\sum_i (y_i - m x_i)^4$