

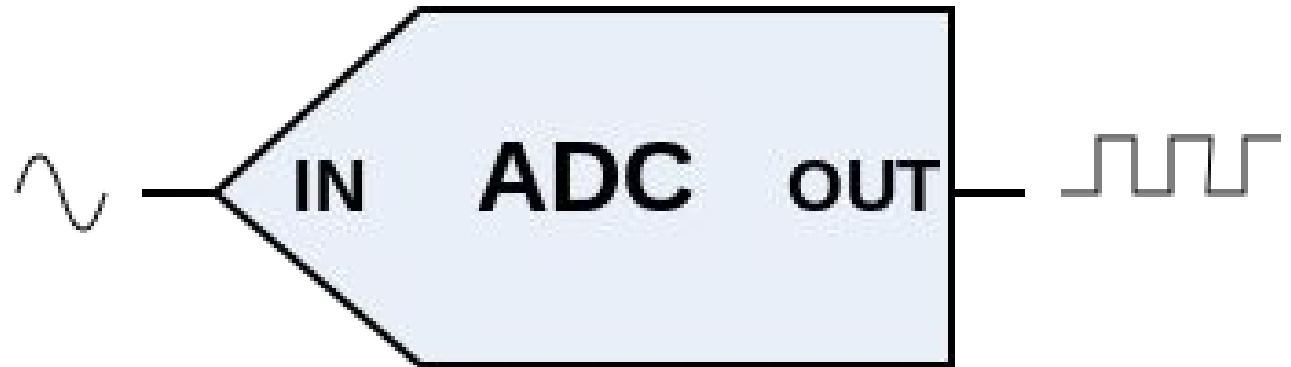
Analog til digital omformer

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ED-0

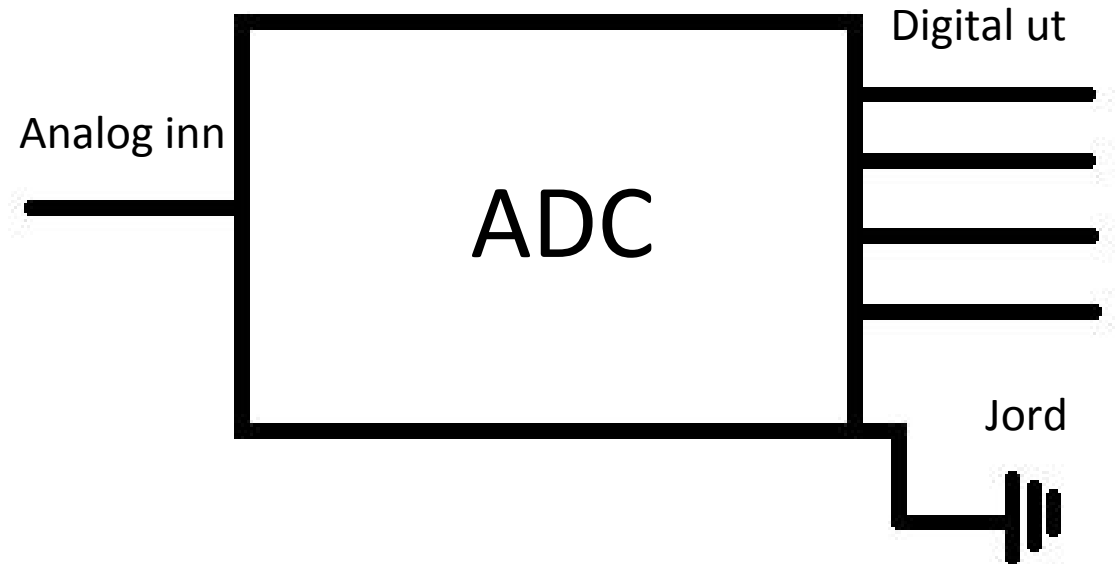
Innhold

- ADC krets
- Oppløsning
 - Støy
- Nøyaktighet og presisjon
- Metoder
 - Enkel tellekrets
 - Flash ADC
 - Successive approximation



ADC – Analog to Digital Conversion

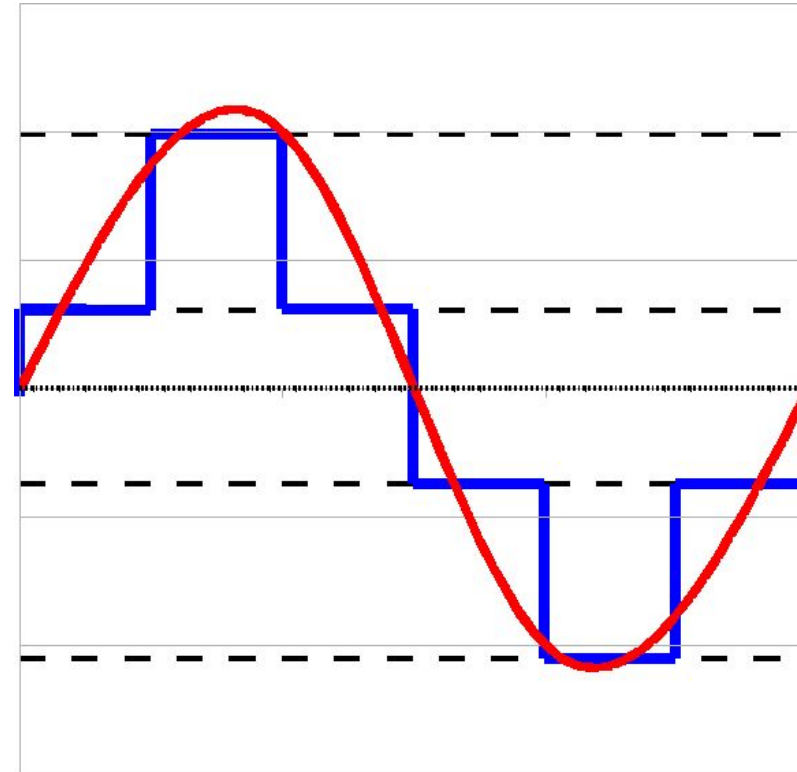
- En til flere pins
 - Antallet = bits
- Hvorfor?
 - For å kunne gjøre beregninger, kan ikke prosessere analoge verdier
- Hvor?
 - Sensorer
 - Temperatur, trykk



Oppløsning

- 8, 16, 24 ... bit
 - 0 V = 0000 0000
 - 5 V = 1111 1111
- Hvor mange verdier?
 - $2^8 = 256$

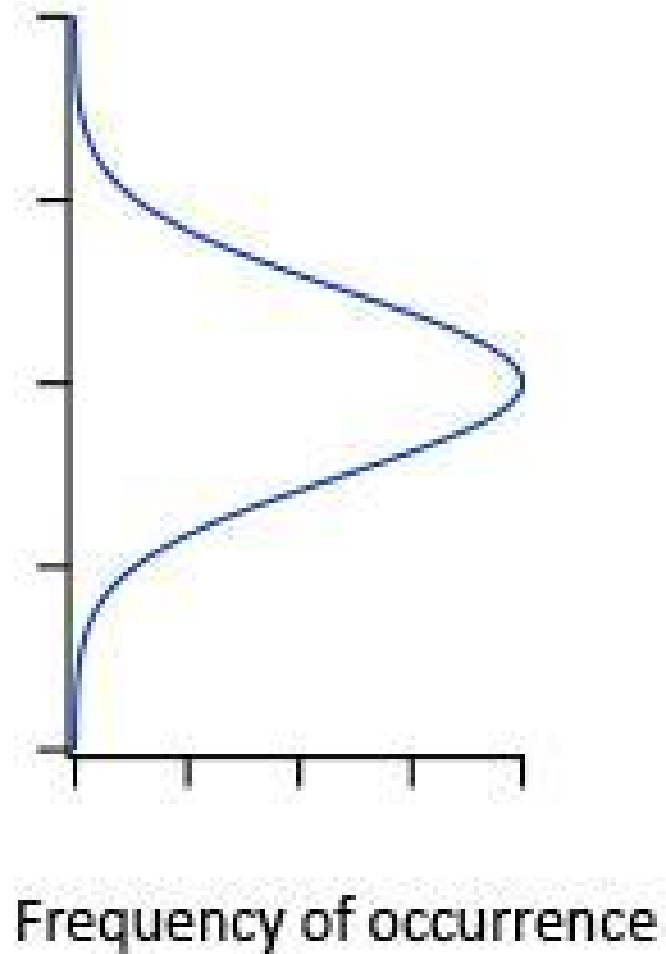
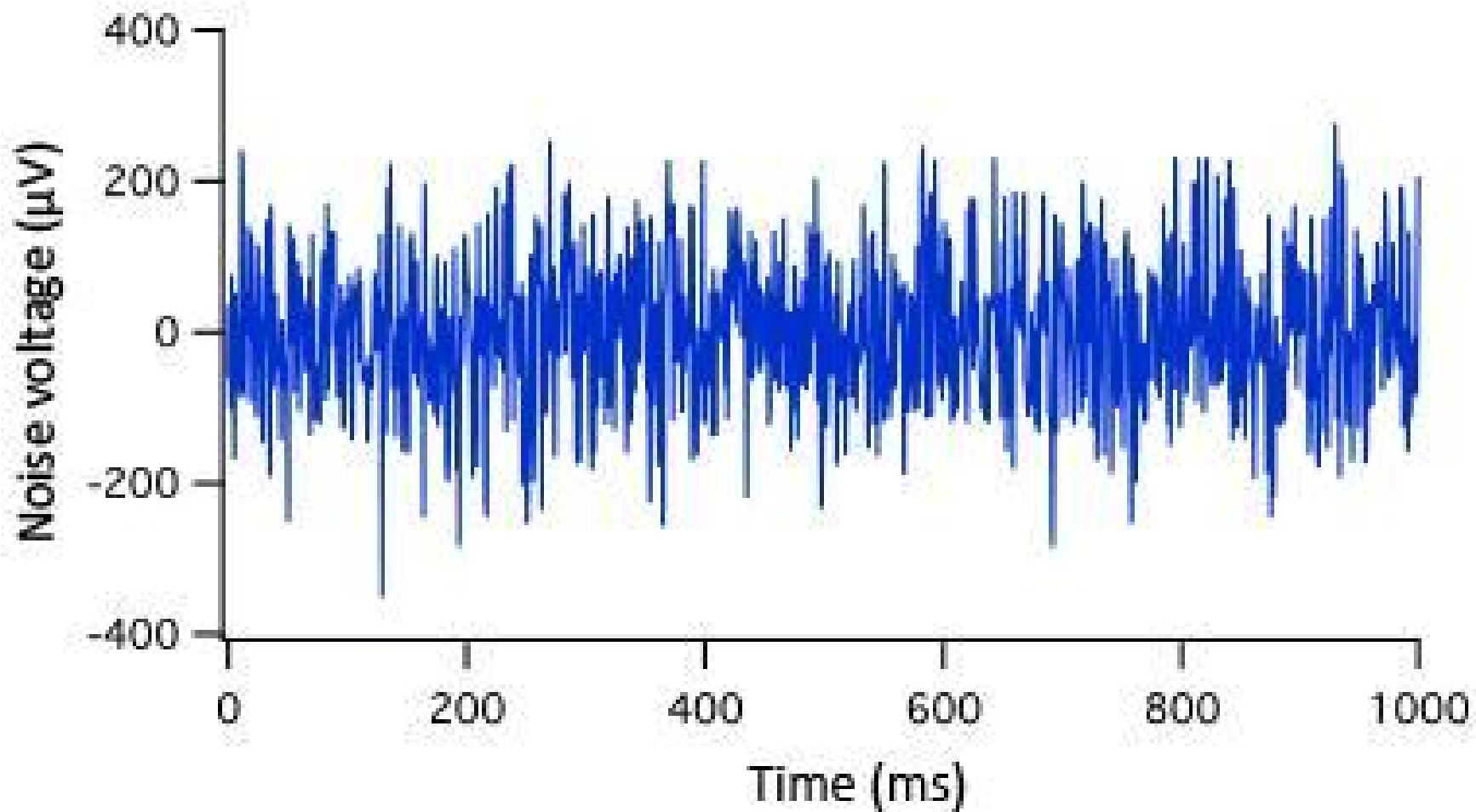
Bit	Nivåer	Endring per nivå
8	256	19.608 mV
16	65536	0.0763 mV
24	16777216	0.0003 mV



11
10
01
00

Oppløsning ved 2 bit
Høyde = oppløsning
Lengde = samplingsrate

Støy



Nøyaktighet og presisjon

- Indusert spenning
 - Støy samme størrelsesorden som signal
- Nærhet til korrekt verdi
- Spenning offset
- Repeterbarhet
 - $X = Y$

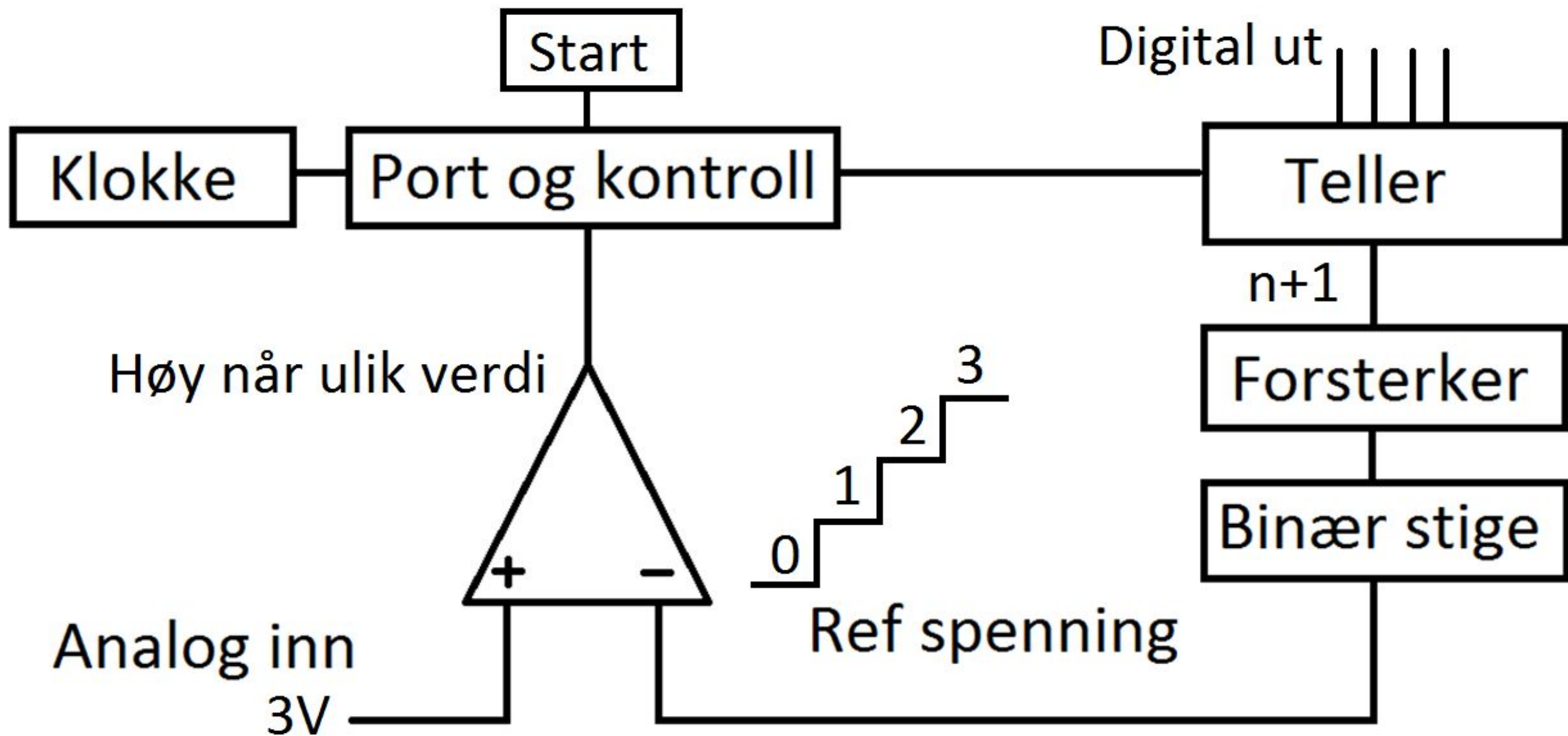
Hvilken verdi?

$$\frac{\textit{Oppløsning til ADC}}{\textit{Systemets Spenning}} = \frac{\textit{ADC Verdi}}{\textit{Målt analog spenning}}$$

$$\frac{1023}{5.00V} = \frac{\textit{ADC Verdi}}{\textit{Målt analog spenning}}$$

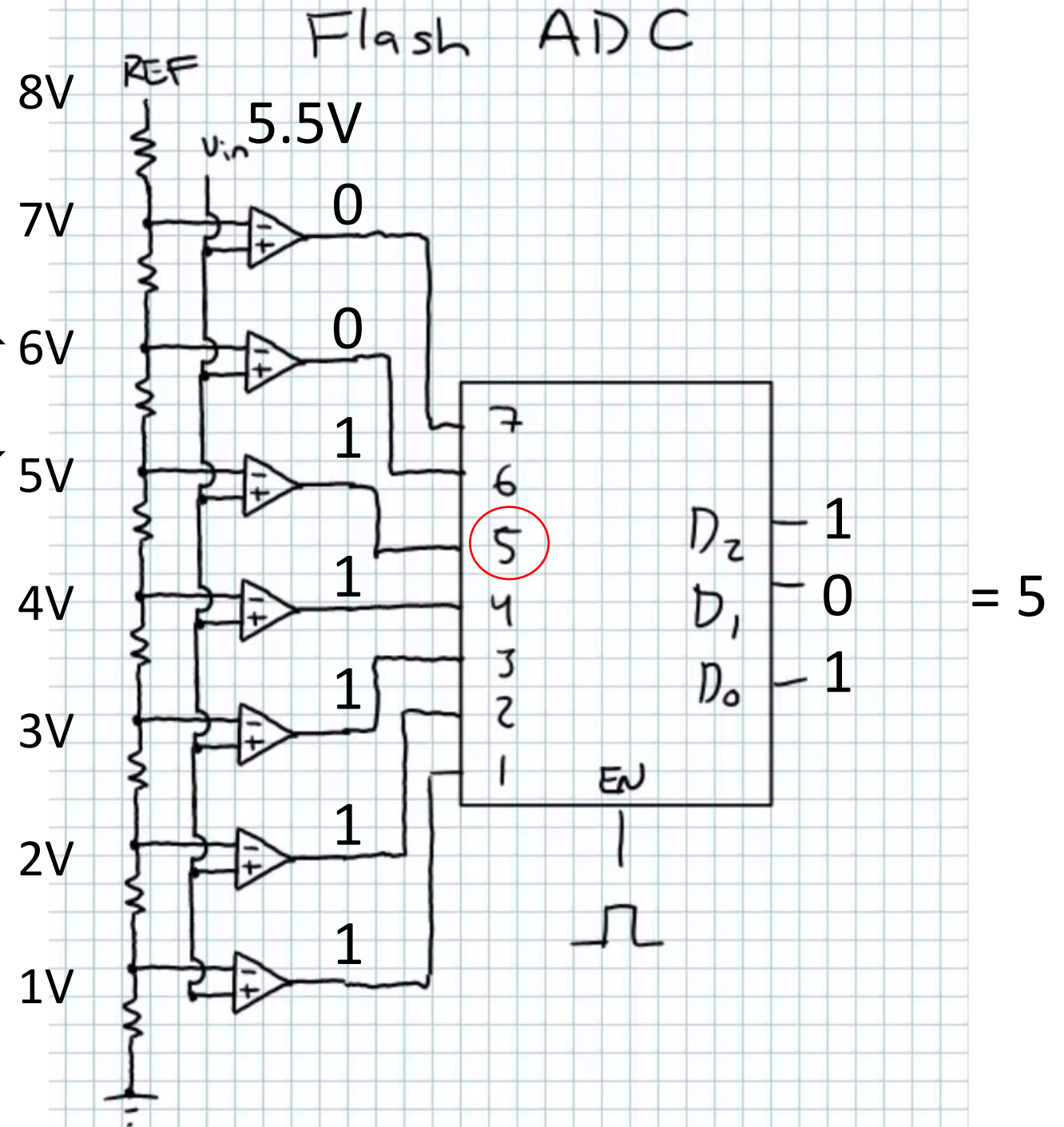
$$\frac{1023}{5.00V} * 2.12V = \textit{ADC Verdi}$$

$$\textit{ADC Verdi} = 434$$

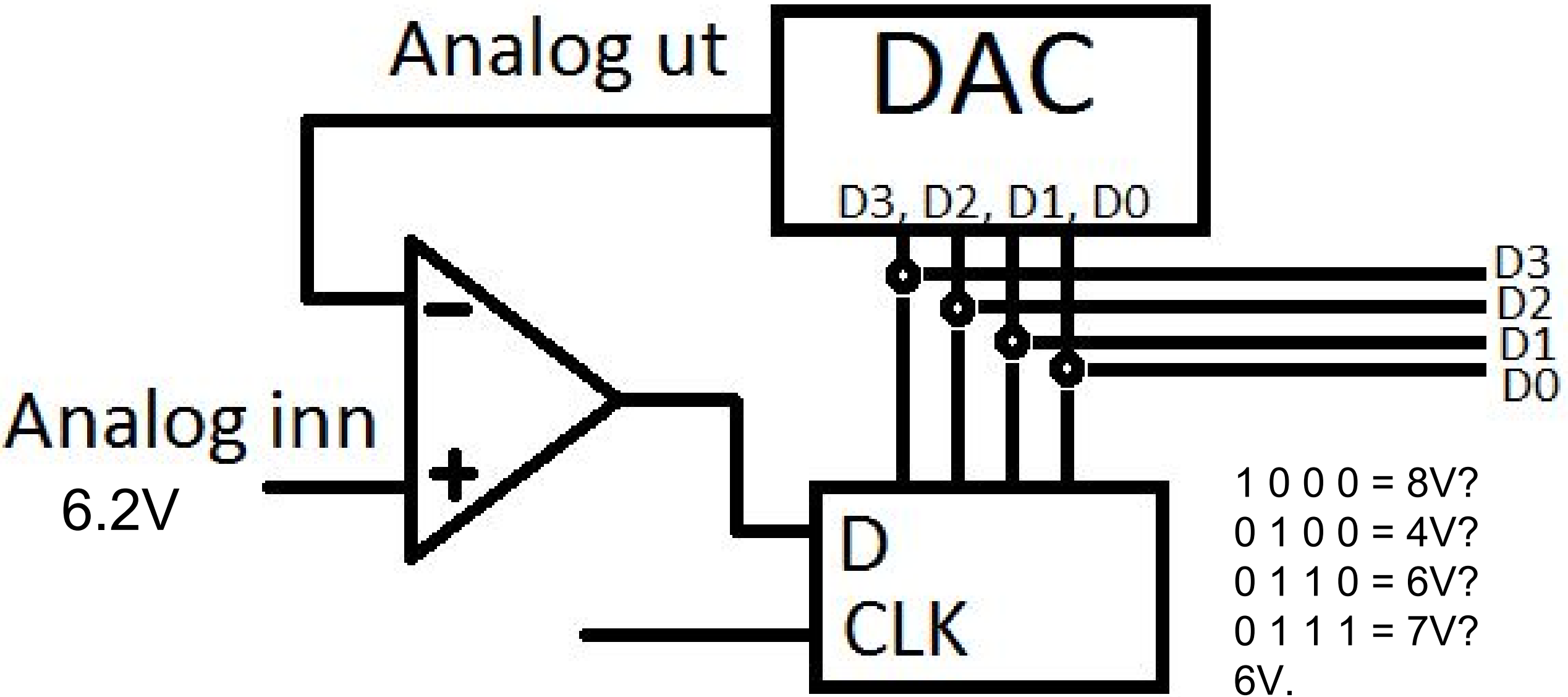


Flash ADC

Intervallet [5,6]



Successive approximation



Kilder

- https://upload.wikimedia.org/wikipedia/commons/b/b1/2-bit_resolution_analog_comparison.png
- http://www.falco-systems.com/Figure_1_Electronic_noise_example.jpg
- <https://www.youtube.com/user/vbdharm>
- <https://www.maximintegrated.com/en/app-notes/index.mvp/id/1041>
- <https://www.youtube.com/watch?v=UUBz-8PNZhA>
- https://en.wikipedia.org/wiki/Resistor_ladder
- <https://www.youtube.com/watch?v=71XWsoDI5SA>