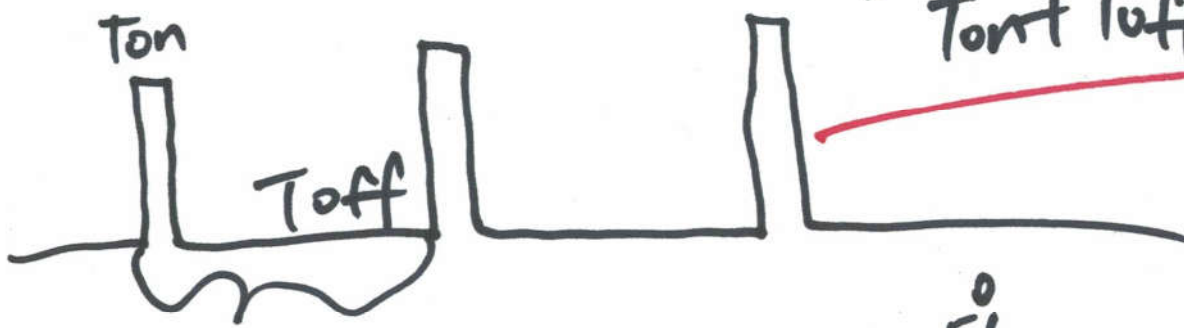


if  $T_{on} = T_{off}$ , duty cycle = 50%

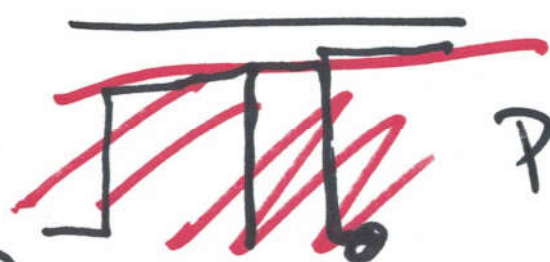
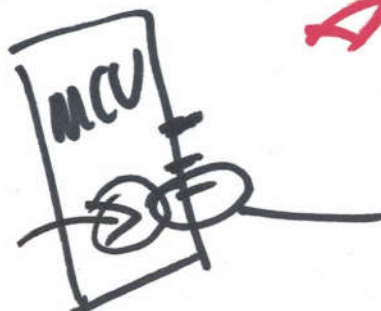
$$\frac{T_{on}}{T_{on} + T_{off}}$$

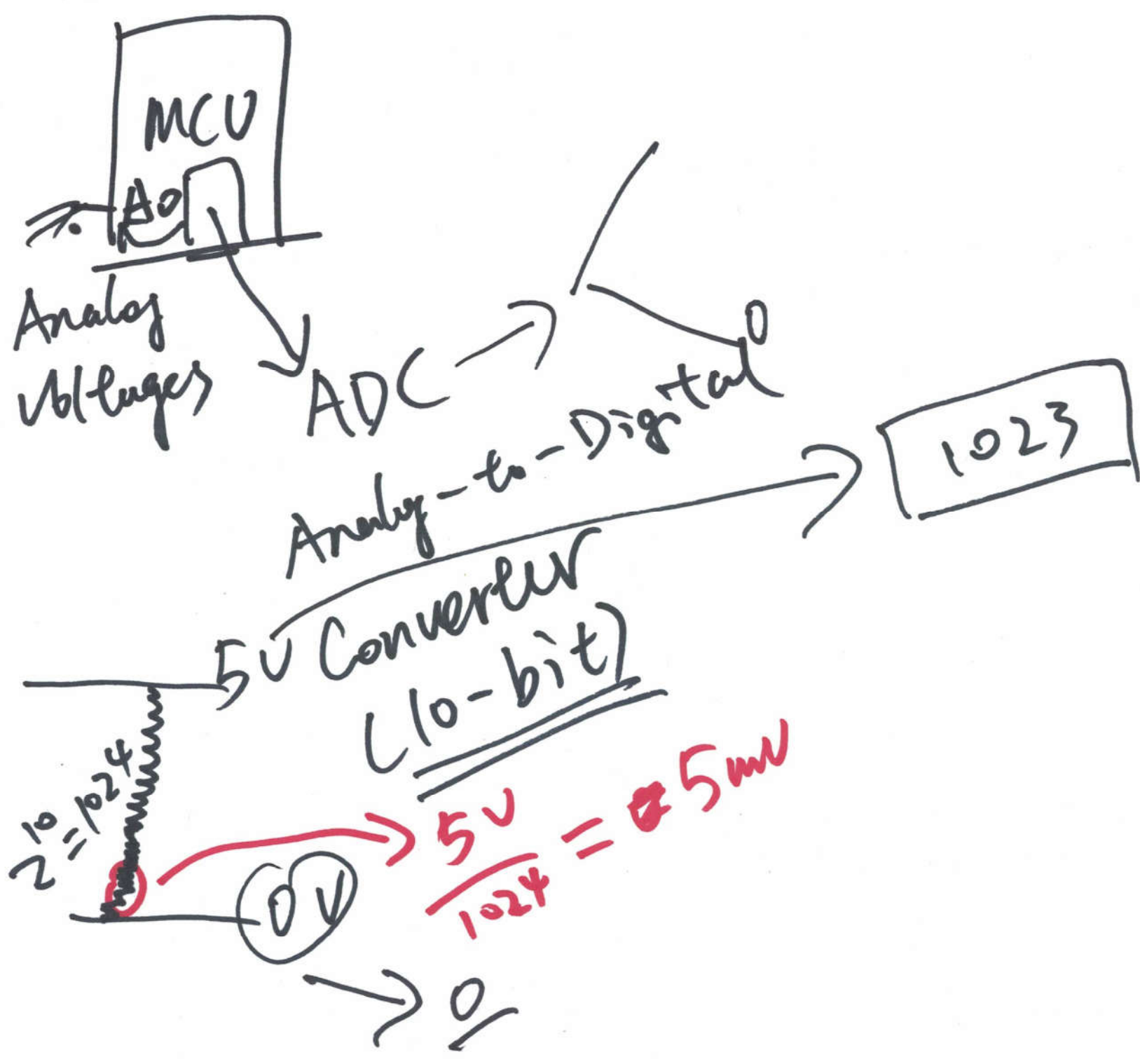
$$\begin{aligned} 8 &= 2^3 \cdot 2^1 \\ 2 &= 2^1 \cdot 2^0 \\ &= 16 \cdot 16 \\ &= 256 \end{aligned}$$



$T_{period}$  Duty cycle = 15%

Pulse Width Modulation (PWM)





②

Setpoint

loop ( ) {

Intensity = analogRead ( A0 )

error = Intensity - setpoint;

PID\_I = PID\_I + KI \* error

PID\_value = Kp \* error + PID\_I + Kd \*  $\wedge$  (error - last\_error)

last\_error = error.

st

}

(2)