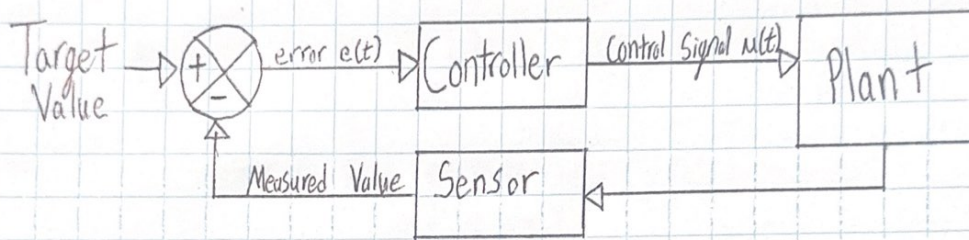
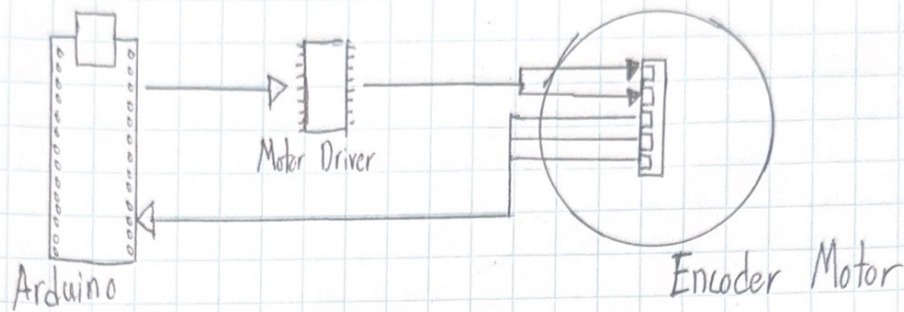


PID Controller feedback loop



$$\text{Error} = e(t) = \text{Target Value} - \text{Measured Value}$$

$u(t)$ = Control Signal configured to reduce error

PID (Proportional Integral Derivative) control:

$$u(t) = \underbrace{K_p e(t)}_{\text{proportional}} + \underbrace{K_i \int e(t) dt}_{\text{Integral}} + \underbrace{K_d \frac{de}{dt}}_{\text{derivate}}$$

$$\int e(t) dt \approx e_{\text{int}} + e \Delta t$$

↳ Accumulate error over time

$$\frac{de}{dt} = \frac{e - e_{\text{prev}}}{\Delta t}$$

↳ Computes how fast error is changing