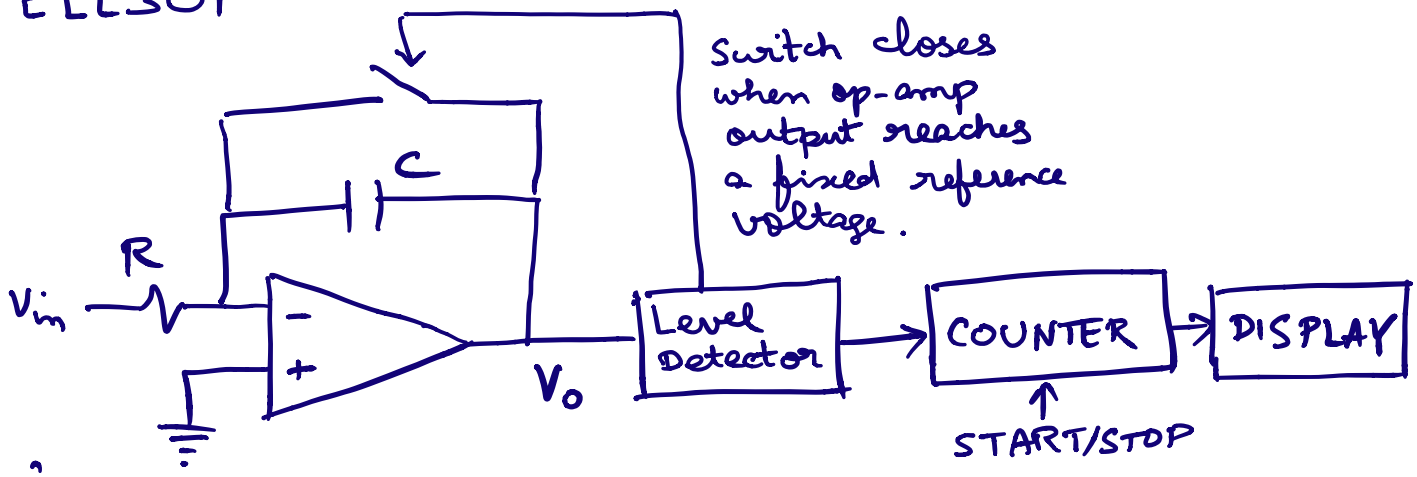
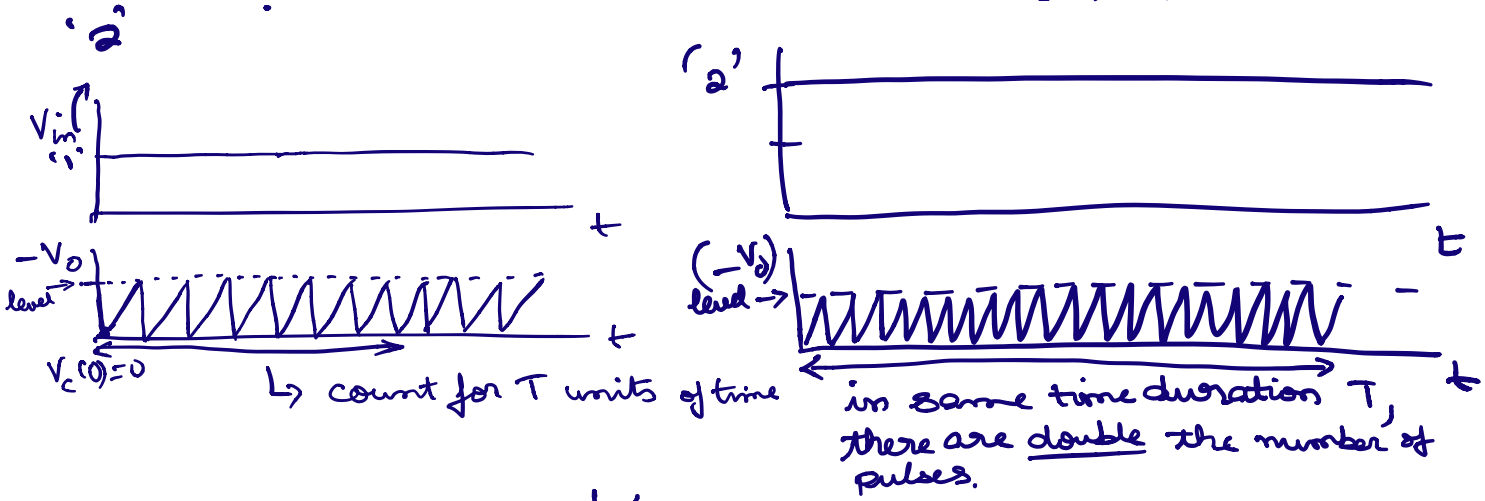
09.01.2019 Integrator-based ADC

ELL301



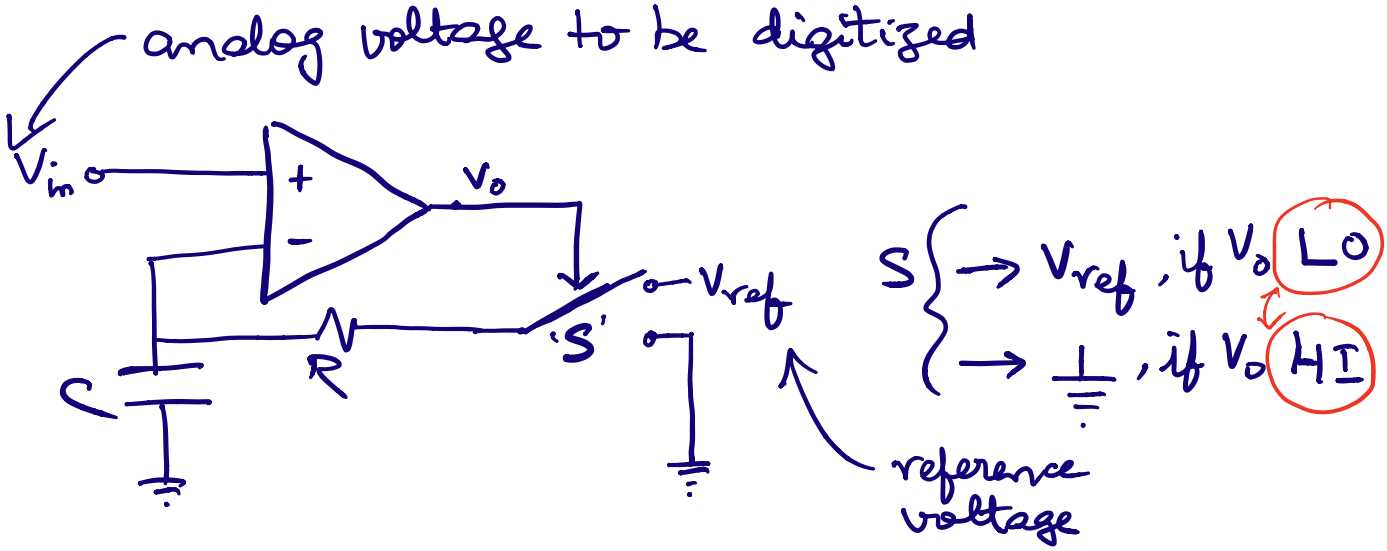


$$\frac{V_o(j\omega)}{V_i(j\omega)} = -\frac{1/j\omega C}{R} = -\frac{1}{j\omega}\cdot\frac{1}{RC}$$

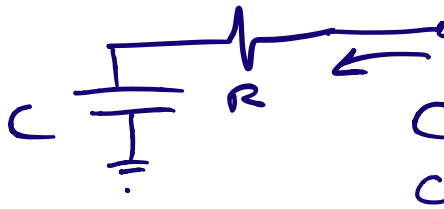
$$V_o(t) = -\frac{1}{RC}\int V_i(t)\,dt \quad \text{(when switch S is open)}$$

Question: How is this better/worse than the previous method?

Delta-Pulse-Modulation-based ADC

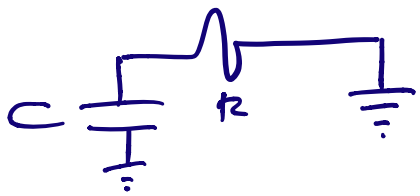


When S → V_{ref}



Capacitor charges, Charge goes into capacitor

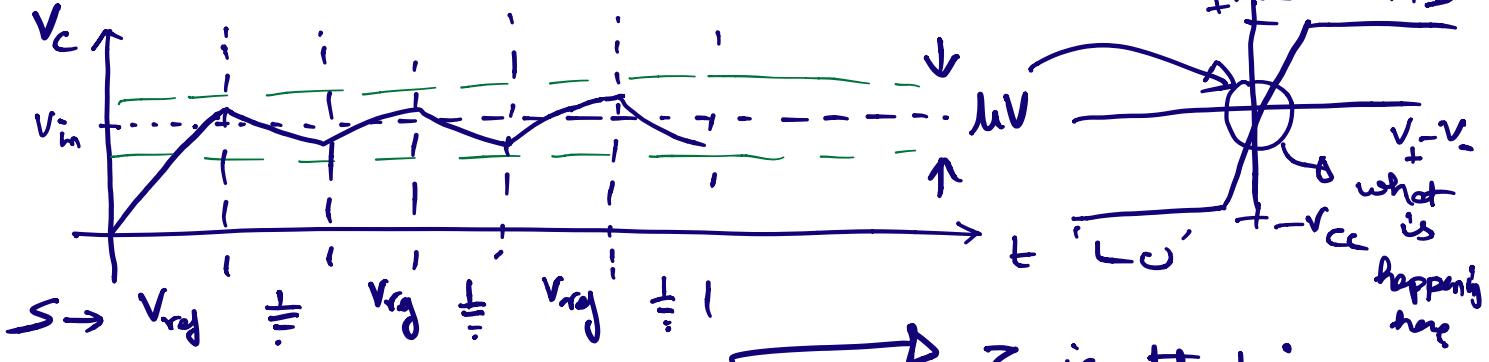
When S → ⊥



Capacitor discharges, charge goes out of capacitor

Assumption: V_{ref} should be larger than V_{in}.

Suppose $V_c(t=0) = 0$, and $V_{in} > 0$



→ duration of time consider } = T ← T is the time when S → V_{ref}

Charge going into capacitor, Q_{in}
Charge going out of capacitor, Q_{out} } ∅