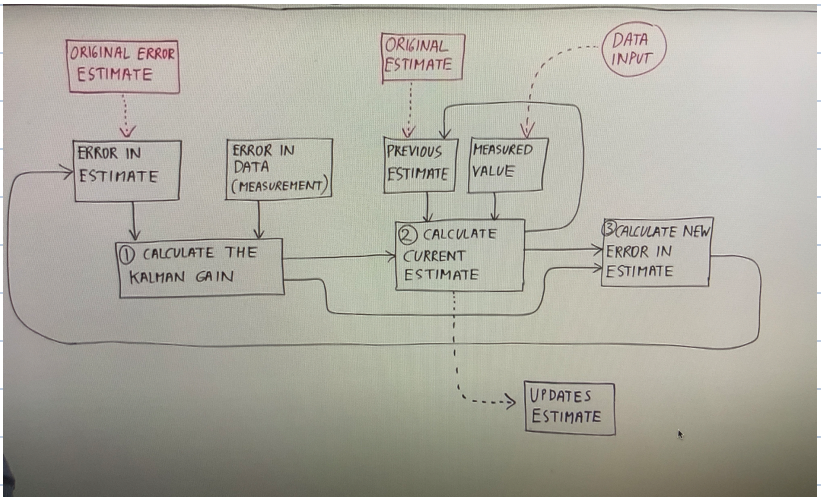
Why Kalman Filter? uses very little values to get estimate



Flow Chart for Kalman Filtering process

$$\text{Kalman Gain} = \frac{E_{est}}{E_{est} + E_{meas}} \rightarrow 0 \leq KG \leq 1$$

Current estimate ↑ ; Prev estimate →

$$\therefore EST_t = EST_{t-1} + KG[MEA - EST_{t-1}]$$

↳ current measurement

KG gets smaller over time

- 3 main Equations for process

1. $KG = \frac{E_{est}}{E_{est} + E_{meas}}$

2. $EST_t = EST_{t-1} + KG[MEA - EST_{t-1}]$

3. $E_{EST_t} = \frac{(E_{MEA})(E_{EST_{t-1}})}{(E_{MEA}) + (E_{est_{t-1}})} \rightarrow E_{EST_t} = [1 - KG](E_{est_{t-1}})$

↳ Essentially Inverse of KG

measurements are accurate ↑ KG ↑ Estimates are unstable

1
0.9
0.8
...
0.2
0.1
0

measurements are inaccurate ↓ KG ↓ Estimates are stable

Do if KG is large you want $[MEA - EST_{T-1}]$ to be important. you want to emphasize the difference over the estimate.

But if KG is small ie $E_{est} << E_{meas}$ then you trust your estimate and want to emphasize EST_{T-1}

If large KG means E_{est} is very small relative to E_{MEAS} thus our estimate is accurate and E_{est_t} is small

If KG is small, $[1-KG]$ is small, so you don't want to change E_{est_T} very quickly cuz you don't really trust your measurements