

## 1. PREDICTION

1. predicted estimate: state  $\hat{\mathbf{x}}_{k|k-1} = \mathbf{A}_{k-1} \hat{\mathbf{x}}_{k-1|k-1} + \mathbf{B}_{k-1} \mathbf{u}_{k-1}$
2. predicted estimate: state-covariance  $\mathbf{P}_{k|k-1} = \mathbf{A}_{k-1} \mathbf{P}_{k-1|k-1} \mathbf{A}_{k-1}^T + \mathbf{Q}_k$
3. innovation: measurement  $\tilde{\alpha}_k = \mathbf{y}_k - \mathbf{C}_k \hat{\mathbf{x}}_{k|k-1}$
4. innovation: covariance  $\mathbf{S}_k = \mathbf{C}_k \mathbf{P}_{k|k-1} \mathbf{C}_k^T + \mathbf{R}_k$
5. gain  $\mathbf{K}_k = \mathbf{P}_{k|k-1} \mathbf{C}_k^T \mathbf{S}_k^{-1}$

## 2. UPDATE

6. updated estimate: state  $\hat{\mathbf{x}}_{k|k} = \hat{\mathbf{x}}_{k|k-1} + \mathbf{K}_k \tilde{\alpha}_k$
7. updated estimate: state-covariance  $\mathbf{P}_{k|k} = (\mathbf{I} - \mathbf{K}_k \mathbf{C}_k) \mathbf{P}_{k|k-1}$

system model

estimate: state covariance

noise covariance