

칼만필터 Kalman filter

	<p>상태방정식</p>				
	$\begin{bmatrix} \phi \\ \beta \end{bmatrix}_{k+1} = \begin{bmatrix} 1 & -dt \\ 0 & 1 \end{bmatrix}_k \begin{bmatrix} \phi \\ \beta \end{bmatrix}_k + \begin{bmatrix} dt \\ 0 \end{bmatrix} \omega_x + w_k$ <p style="text-align: center;"> $x \qquad A \qquad B$ </p> $y_{k+1} = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} \phi \\ \beta \end{bmatrix}_{k+1} + v_k$ <p style="text-align: center;"> $y \qquad H \qquad x$ </p> <p>http://ieeexplore.ieee.org/abstract/document/6842338/</p>				
	<p>칼만필터 구조</p>				
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 5px;">Time update</td> </tr> <tr> <td style="padding: 5px;"> $\mathbf{x}_k^- = \mathbf{A}_{k-1} \mathbf{x}_{k-1} + \mathbf{B}_{k-1} \mathbf{u}_{k-1}$ $\mathbf{P}_k^- = \mathbf{A}_{k-1} \mathbf{P}_{k-1} \mathbf{A}_{k-1}^T + \mathbf{Q}_k$ </td> </tr> <tr> <td style="text-align: center; padding: 5px;">Measurement update</td> </tr> <tr> <td style="padding: 5px;"> $\mathbf{S}_k = \mathbf{H}_k \mathbf{P}_k^- \mathbf{H}_k^T + \mathbf{R}_k$ $\mathbf{K}_k = \mathbf{P}_k^- \mathbf{H}_k^T \mathbf{S}_k^{-1}$ $\mathbf{x}_k^+ = \mathbf{x}_k^- + \mathbf{K}_k (\mathbf{y}_k - \mathbf{H}_k \mathbf{x}_k^-)$ $\mathbf{P}_k^+ = (\mathbf{I} - \mathbf{K}_k \mathbf{H}_k) \mathbf{P}_k^-$ </td> </tr> </table> <div style="margin-top: 20px;"> </div>	Time update	$\mathbf{x}_k^- = \mathbf{A}_{k-1} \mathbf{x}_{k-1} + \mathbf{B}_{k-1} \mathbf{u}_{k-1}$ $\mathbf{P}_k^- = \mathbf{A}_{k-1} \mathbf{P}_{k-1} \mathbf{A}_{k-1}^T + \mathbf{Q}_k$	Measurement update	$\mathbf{S}_k = \mathbf{H}_k \mathbf{P}_k^- \mathbf{H}_k^T + \mathbf{R}_k$ $\mathbf{K}_k = \mathbf{P}_k^- \mathbf{H}_k^T \mathbf{S}_k^{-1}$ $\mathbf{x}_k^+ = \mathbf{x}_k^- + \mathbf{K}_k (\mathbf{y}_k - \mathbf{H}_k \mathbf{x}_k^-)$ $\mathbf{P}_k^+ = (\mathbf{I} - \mathbf{K}_k \mathbf{H}_k) \mathbf{P}_k^-$
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	<p>참고 자료</p>				

<http://biosport.ucdavis.edu/lab-meetings/KalmanFilterPresentation>

실험영상 1 축

<https://www.youtube.com/watch?v=6JQQatpDG3s>

참고논문: "Improving Attitude Estimation Using Inertial Sensors for Quadrotor Control Systems"-
Ricardo Sanz 저

순서)
1. 상보필터에서 계산된 각도값 z와 자이로 센서에서 측정된 각속도값을 입력 받아서 각도 Angle를 계산함

