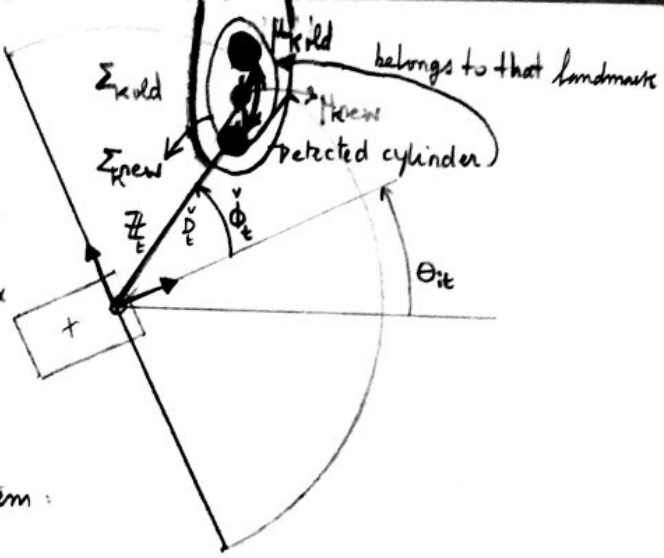
(c) Landmark Update



As a result of this update process, the landmark's position moves a bit and the covariance matrix get smaller.

Each landmark has an EKF to keep track them:

$$K_t = \Sigma_{k\,old} \cdot H_{tk}^T \cdot \underbrace{\left(\underbrace{H_{tk}\, \Sigma_{k\,old}\, H_{tk}^T}_{\text{Uncertainty of our landmark propagated through our observation}} + \underbrace{Q_{zt}}_{\text{Observation Uncertainty}} \right)^{-1}}_{Q_{tk}}$$

$$K_t = \Sigma_{k\,old} \cdot H_{tk}^T \cdot Q_{tk}^{-1}$$

$$\mu_{k\,new} = \mu_{k\,old} + K_t \underbrace{\left(z_t - h(P_{it}, k) \right)}_{\text{Innovation}}$$

We are going to use the coordinates of the old landmark stored at index k in the list of landmarks for particle i.

$$\Sigma_{k\,new} = (I - K_t \cdot H_{tk})\, \Sigma_{k\,old}$$