Prediction

Project the state ahead

$$x_{k+1} = g(x_k, u)$$

Project the error covariance ahead

$$P_{k+1} = J_A P_k J_A^T + J_G Q J_G^T$$

Correction

Compute the Kalman Gain

$$K_k = P_k J_H^T (J_H P_k J_H^T + R)^{-1}$$

Update the estimate via measurement

$$x_k = x_k + K_k (z_k - h(x_k))$$

Update the error covariance

$$P_k = (I - K_k J_H) P_k$$

Initialize R, P, Q once

J are the Jacobians