**EKF-SLAM**

**Preliminaries:**

xk: The state vector describing the location and orientation of the vehicle.

uk: The control vector, applied at time k-1 to drive the vehicle to a state xk at time k.

mi: A vector describing the location of the *ith*landmark whose true location is assumed time invariant.

zik: An observation taken from the vehicle of the location of the *ith* landmark at time k. When there are multiple landmark observations at any one time or when the specific landmark is not relevant to the discussion, the observation will be written simply as zk.

Also:

X0:k = {x0, x1, … , xk} = {X0:k-1, xk} : The history of vehicle locations.

U0:k = {u1, u2, … , uk} = {U0:k-1, uk} : The history of control imputs.

m = {m1, m2, … , mk} : The set of all landmarks.

Z0:k = {z1, z2, … , zk} = {Z0:k-1, zk} : The set of all landmark observations.

**Vehicle Motion:**

where f(.) models vehicle kinematics and where wk are additive, zero mean uncorrelated Gaussian motion disturbances with covariance Qk.

**Observation Model:**

where h(.) describes the geometry of the observation and where vk are additive, zero mean uncorrelated Gaussian observation errors with covariance Rk.

**The mean:**

**Covariance:**

**Time Update:**

where f is the Jacobian of f evaluated at the estimate

**Observation Update:**

where

and where h is the Jacobian of h evaluated at and

Resource:

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