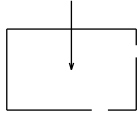


2 Motivating Examples

2.1 Example 1: Traversing a Corridor

To illustrate the idea behind task oriented localization we give an example where the robot is to go from one room to another through a long corridor. The corridor is shown in Figure 1, and the task is



3 Problem Definition

The basic question that we face in this paper is to determine how much effort need to be spent on localization to accomplish a particular task, formulated as reaching a certain

$\{ h() \}$ is the function that describes how the uncertainty is affected by a sensing decision $s[k]$ when going from $x[k]$ to $x[k + 1]$ along a trajectory P . It depends both of the odometric p

where Q_k is uncertainty induced by the motion. The elements of the Q_k matrix in (5) are then given by

$$Q_{k;11} = \frac{1}{2} (k_D^2 r_{kj} + r_k^2) \text{sign}(\dot{\theta}_k) + \frac{\sin(2\theta_{k+1}) - \sin(2\theta_k)}{2} + r_k^2 \text{sign}(\dot{\theta}_k) \cos^2 \theta_{k+1} - 2 \cos \theta_{k+1} (\sin \theta_{k+1} - \sin \theta_k)$$

$Q_{k;11}$

$$\sin(2\theta_{k+1}) - \sin(2\theta_k)$$

+ $r_k^2 \text{sign}(\dot{\theta}_k) \cos^2 \theta_{k+1} - 2 \cos \theta_{k+1} (\sin \theta_{k+1} - \sin \theta_k)$

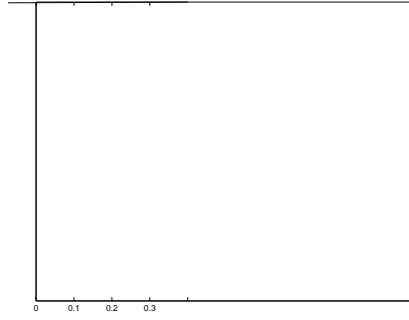
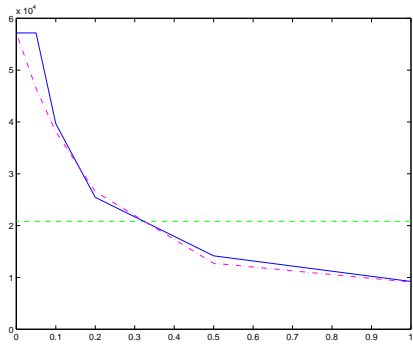
0399-315 48)-35

f 4.5600 1 - 8.0399 sin () Tj /R45 9.96264 Tf 8.27893 0 Td 54

$$11 =$$

$k^2 r_{kj} + r_k^2) \text{sign}(\dot{\theta}_k) + \frac{\sin(2\theta_{k+1}) - \sin(2\theta_k)}{2} + r_k^2 \text{sign}(\dot{\theta}_k) \cos^2 \theta_{k+1} - 2 \cos \theta_{k+1} (\sin \theta_{k+1} - \sin \theta_k)$

corresponding to the initial uncertainty. The rest of the levels are given by the uncertainty level at the end of each segment when the trajectory is traversed without using any external sensing. If the initial uncertainty is large there will be a large gap between the two first levels. In this case a few extra levels are inserted. It is



7 Summary and Future Work

In this paper we have presented ~~task~~