**Definition and Objectives**

Consider a pedestrian navigation system which contains a set of inertial sensors connected with the map database. The problem to solve is to determine the user’s location using the map database and measurements of the inertial sensors. In this research we propose a solution based on statistical methods and map-matching. The determination of the absolute position is entirely represented by its probability density function (PDF) in the frame of Bayesian inference.

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**3D Link/Node model**

The map is represented by links passing through axes of the corridors and nodes, on the junctions.

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**Methodology**

A dedicated motion model is used to transform the user’s trajectory into a polygon in order to associate it with the link-node model of the map database.

**Bayesian Inference**

\[ p(x_t|Y_t) = \frac{p(y_t|Y_{t-1}, x_t) p(x_t|Y_{t-1})}{p(y_t|Y_{t-1})} \]

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**Application**

Using inertial measurements only, the process of localisation is entirely autonomous.

- Navigation
- Security
- Fire brigades

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**SMC simulation**

The aim is to find the placement and orientation of the polygon in the contents of the link-node model. All elements of the map database are involved in the simulation process.

An estimation of the location of the polygon is made every time a set of new measurements is available.

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**Concept**

- Map Database
- Map Matching
- Route Guidance
- Navigation system
- Geometry
- Topology
- Recalibration
- Position

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