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On ontology-based indoor navigation for the visually impaired



My study – the field of interest



- Assoc. Prof. Kopecek
- social informatics
- dialogue systems



Motivation

- **easy to implement** solution for owners of buildings
- finding accurate and **reliable user location**
- avoid the **trial and error** process
- upgrade user's **familiarity** with an unknown environment
- **unique requirements** on a navigation system for blind or visually impaired users



Requirements I

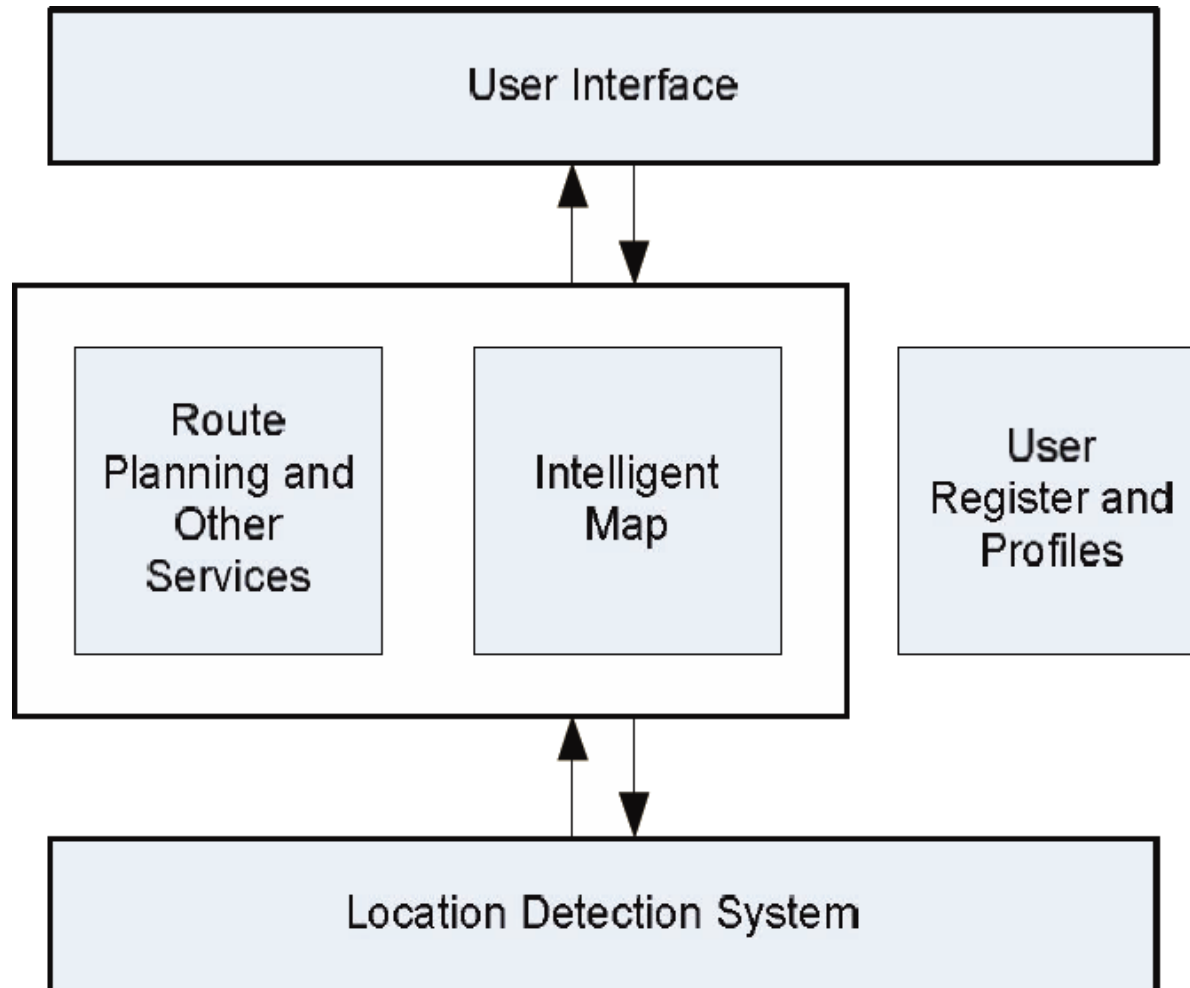
- **route planning** and management (save, edit, share)
- adaptive **start to end route** following
- accurate relative and absolute **progress feedback**
- up to date **hazard warning** and avoidance guidance
- general **environment information**



Requirements II

- non-blocking of **other senses** (headphones)
- **voice navigation** on demand
- graduated **levels of functionality** (novice → expert)
- **emergency request** for assistance

Concept





Ideas

- adoption of **smart phones** as “the device”
- absence of **assistive tools** for navigation (e.g. the long cane, guide dogs)
- **QR** codes for fully sighted, “wireless” for blind
- routing in **ontology-based maps**
- advanced interaction based on **dialogue**
- **what-where** where-what **language**

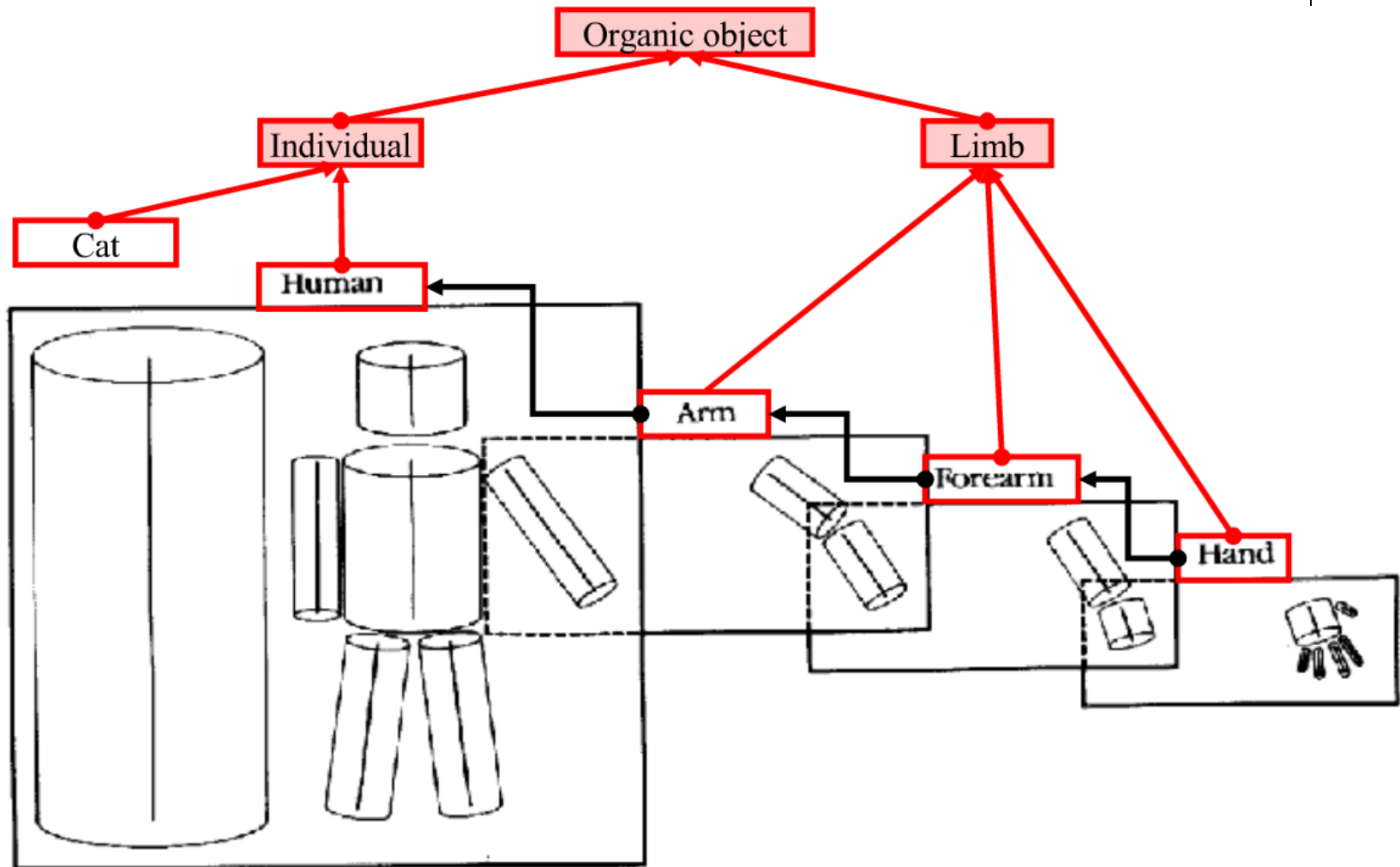
Ontology I

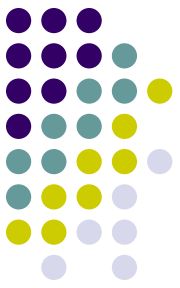


- **Def:** a logical theory which gives explicit, partial account of a conceptualization

- **Def:** an intensional semantic structure which encodes the implicit rules constraining the structure of a piece of reality

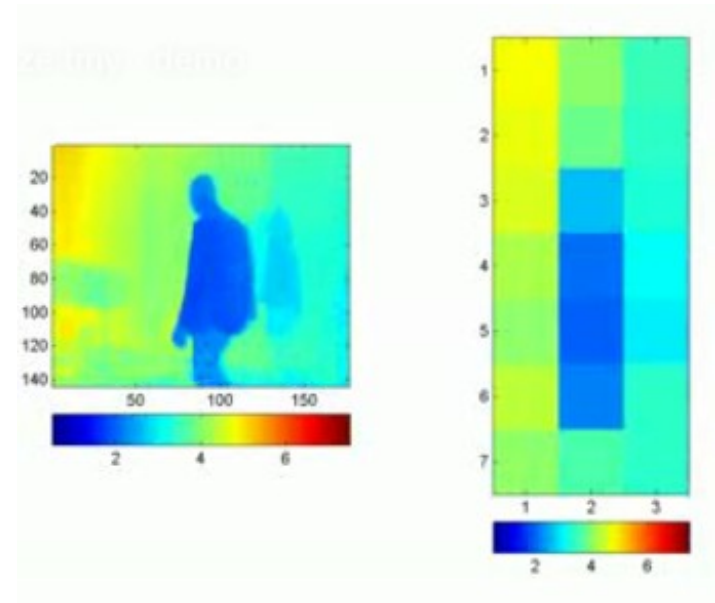
Ontology II

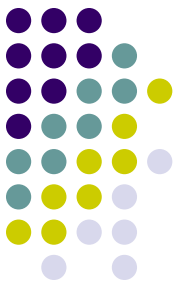




Special canes – Ven ze tmy

- detection based on stereo and 3D cameras
- **acoustics signals** overlays natural sound of the surroundings
- information is primary send to the **body skin**
- information about locale obstacles in front of **whole user body**
- representation of **depth map**





Special canes – RF Guide

- concept of intelligent buildings
- routes are *marked* by **RFID** and magnetic beacons
- **cheap and available** solution
- “You are at the second floor. There is door number 210 three meters behind you. Watch: on both sides of the corridor are benches.”





Summary

- to provide **assistance on demand**
- up to date **hazards identification** and level based warnings
- **sharing** of knowledge
- **independency** of visually impaired user
- to build **ontology-based maps**