The Tangible Augmented Street Map

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Rationale for TASM

- The restrictions of paper street maps
- The conventional interface to web-based maps
- Tangible Augmented Reality (via a cube) as an alternative
  - Mental spatial processing needed is lessened – rotating a physical object to align map (3D would add extra cue)
- But…
- Geographically important to have unbounded space
- The primacy of the four main cardinal directions
- Also a geographic coordinate system
Introduction

- TASM uses tangible AR, accessing linked maps via a cube
- Addresses recent research challenge in cartographic visualization
  - creation of new interface paradigms
- Demonstration will be laptop-based, with web camera
- Ultimately, usage scenario will be navigation outdoors
  - Palmtop, camera and head-mounted display
Based on ARToolKit software

Marker-based display of scanned street map tiles as VRML objects

From start map tile, cube is rotated

- e.g. to the right = move west
- towards you = move north

Can be repeated – maps are not fixed to specific markers (therefore movement is theoretically infinite)
Special arrangements

- Markers are linked in the code to neighbouring markers (topology)
- Angular deviations between neighbours are also recorded
- A running angular deviation is also kept (relative to square 1)
- Linked to a geographical coordinate system
- Current coordinate recorded and linked to current marker
The faces
Keeping track of the cube
Desirable attributes

- Geographically intuitive (e.g. cube “panning” is a good model for outdoor navigation)

- Advantages over the status quo
  - “continuity” of map tiles
  - ease of enquiry
  - efficient use of available space for display
Limitations

- Lack of orientation
- Tiled instead of continuous
- “Wrong” tile is sometimes shown
  - Change in orientation; confusion
- Would like to follow streets, rather than the cardinal directions
  - Real geographic data would help with this
Future Tasks

- Using data from GIS, GPS and web sources
- How to represent the “third tile”
- 3D cues
- Heuristic evaluation
- Cognitive assessment
- Qualitative and quantitative