Assistive Devices for Way-finding

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Research Problems

- making sense of where I am & what is around me (computer vision)
  - local, but global also (gps, compass)
- how to convey information in tactile form & provide telepresence (wearable haptics)
Applications

• Assistive Technology
  • way-finding for people who are blind
  • way-finding for people with Alzheimer’s

• Surveying & Mapping
  • robotics, vehicles, wearable computing

• MIS Surgery haptics
  • laparoscopic, robotic, rehabilitation
1. Wayfinding...

Spatial Representation

- Linguistic Representations
- Auditory Information
- Visual Information
- Haptic Information
- Motor Information
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1. Wayfinding... Details

obstacles upcoming = motor on
free space = motor off
intensity strength inversely proportional to depth

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1. Wayfinding... Real Use?

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QuickTime™ and a MPEG-4 Video decompressor are needed to see this picture.
1. Wayfinding...
Haptic Compass

Affordable, tactile interpolation, orientation & distance tactile communication
haptic compass

It is a compass.
It is a GPS navigator.

There is no visual display!
You feel where you go.

It tells you where you are, where you are to go & how to get there. It even can tell others where you are.

You wear it!
It is the size of an ipod.
It is inexpensive!

It talks with the internet (using your mobile or desktop device to download way-points on-the-fly & off-line).
2. Computer Vision

- Probabilistic Inference - Tracking
- Face Detection
- Object Detection/Recognition
- Depth - stereo, optical flow
- Context
- SLAM (Simultaneous Localization & Mapping)
- Other Modalities, Contexts (IR)
2. Computer Vision
SLAM

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Context Recognition

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2. Computer Vision
Object Category Detection/Recognition

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ISSUES

• technology research - computer vision, wearable haptics
• business/research - wearing 2 hats
  • demographics - economics of developed technology
  • funding business models/research
  • need other verticals
• testing of results - to market vs. understanding
• other verticals: military, consumer, automotive, medical, ...
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