



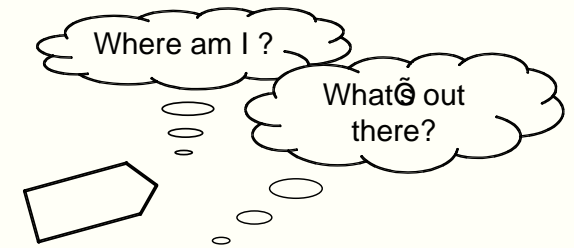
# Assistive Devices for Way-finding

John S. Zelek

Dept. of Systems Design Engineering  
Intelligent Human Machine Systems Lab  
University of Waterloo

# 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)

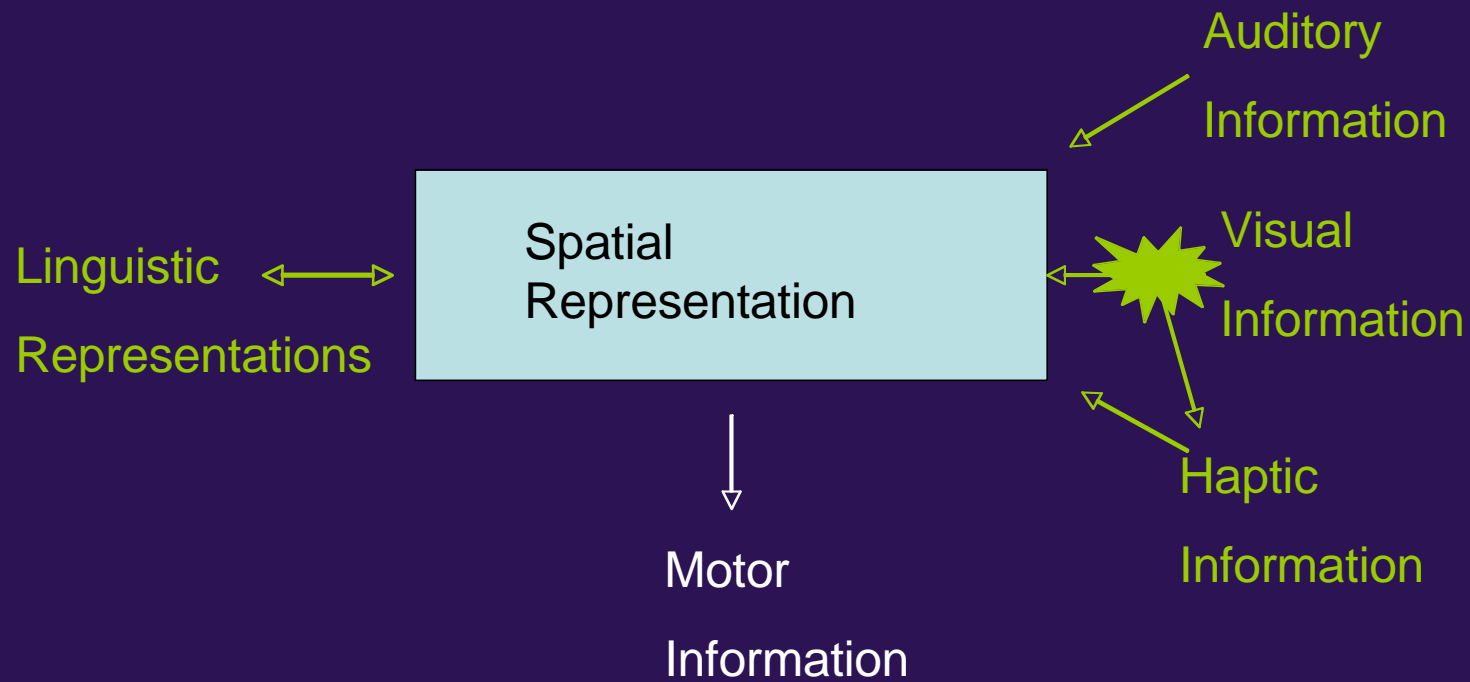


# Applications

- 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



# 1. Wayfinding...

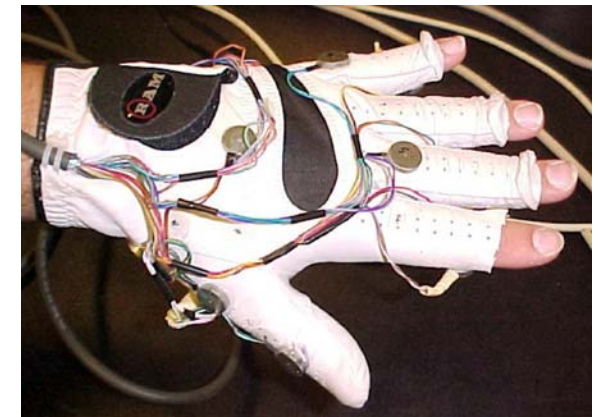
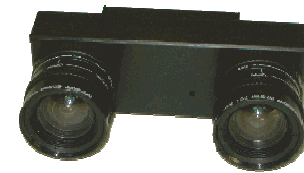
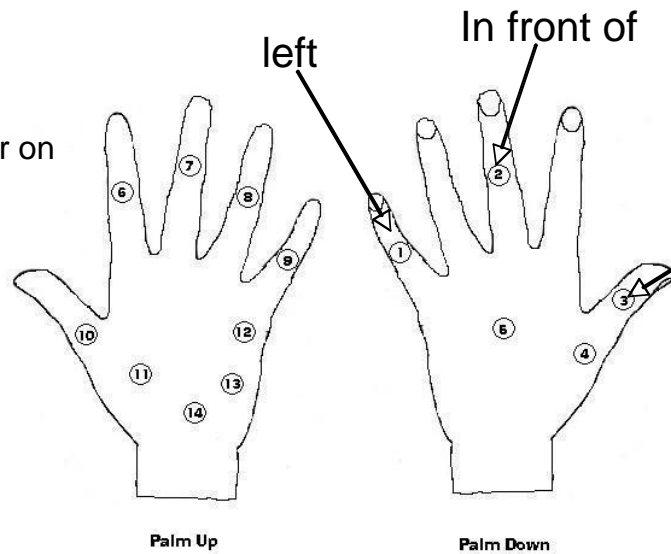
## Our Work

QuickTime™ and a  
H.264 decompressor  
are needed to see this picture.

# 1. Wayfinding... Details

QuickTime™ and a  
YUV420 codec decompressor  
are needed to see this picture.

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



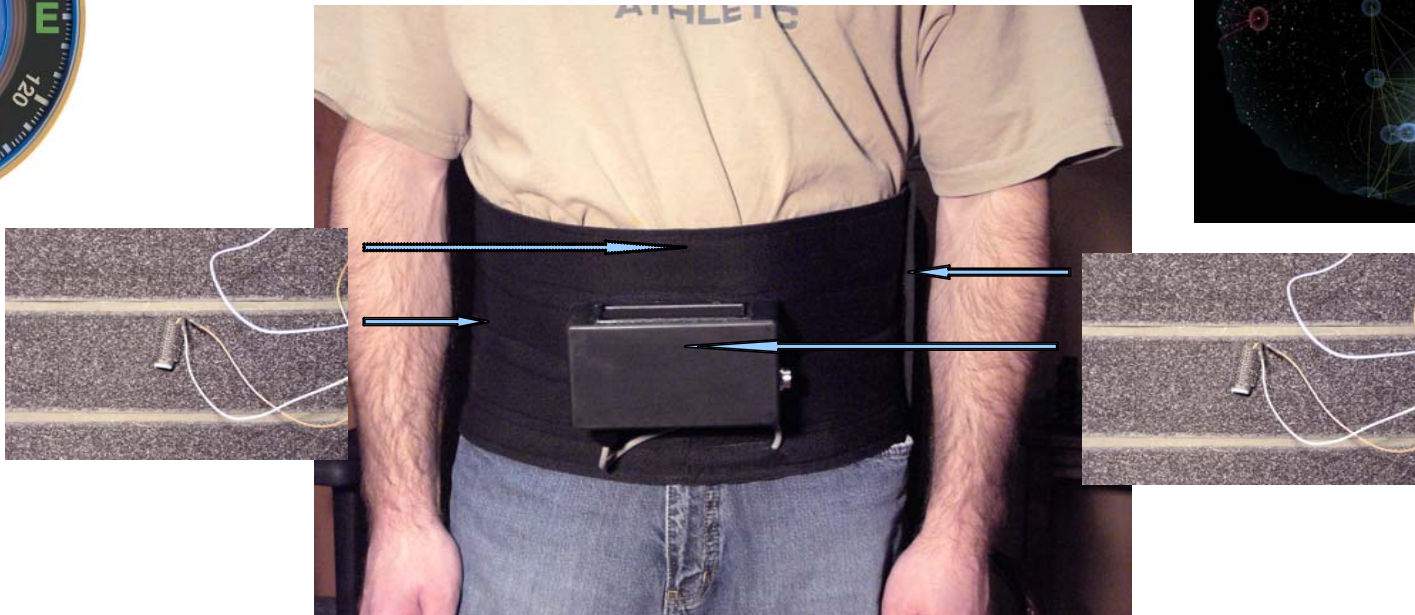
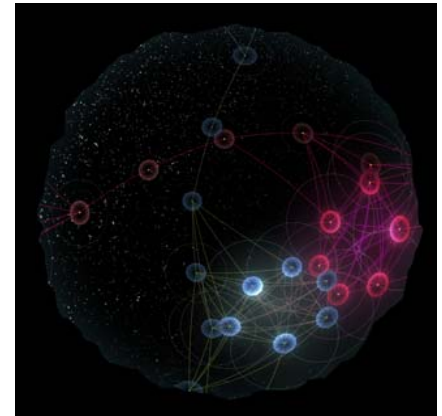
# 1. Wayfinding... Real Use?

QuickTime™ and a  
Sorenson Video 3 decompressor  
are needed to see this picture.

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.

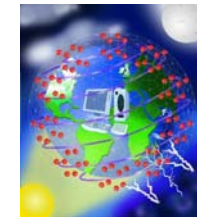


There is no visual display!  
You feel where you go.

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!



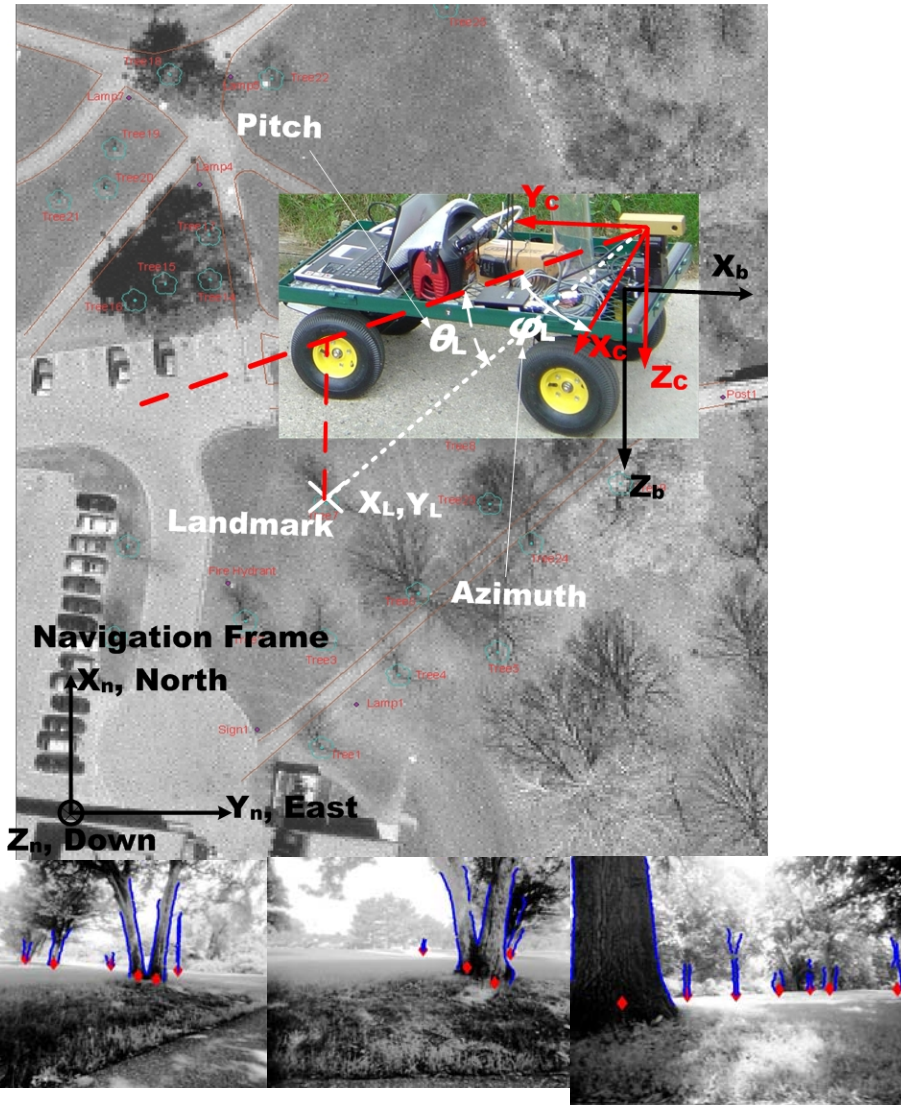
It talks with the internet (using your mobile or desktop device to download way-points on-the-fly & off-line).



## 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



QuickTime™ and a H.264 decompressor are needed to see this picture.

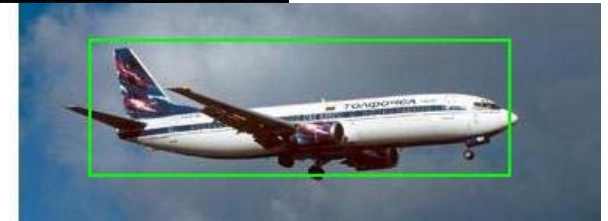
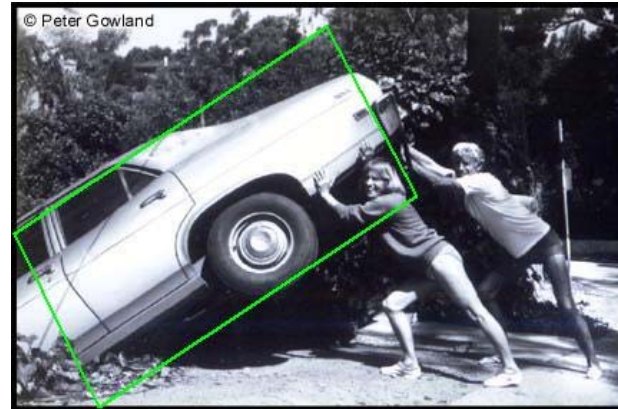
# Context Recognition

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h264 decompressor  
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# 2. Computer Vision

## Object Category Detection/Recognition

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H.264 decompressor  
are needed to see this picture.



QuickTime™ and a  
H.264 decompressor  
are needed to see this picture.

# 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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