Navigation and Guidance System for the Blind

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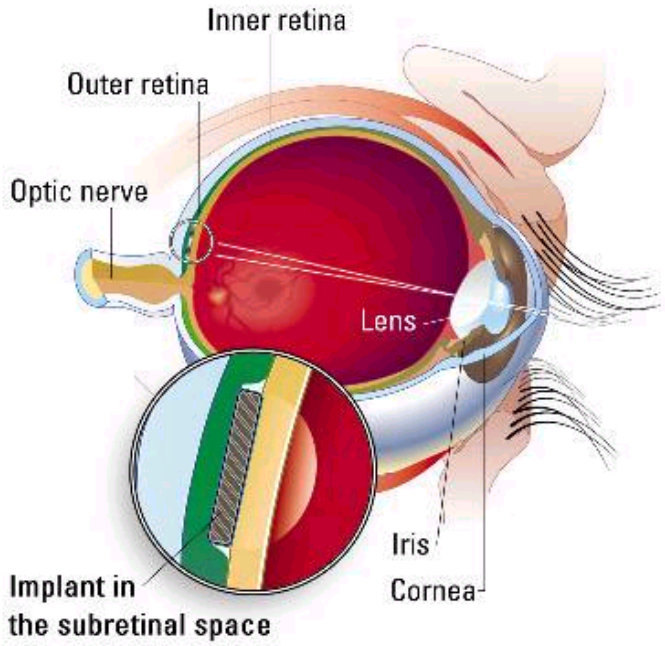
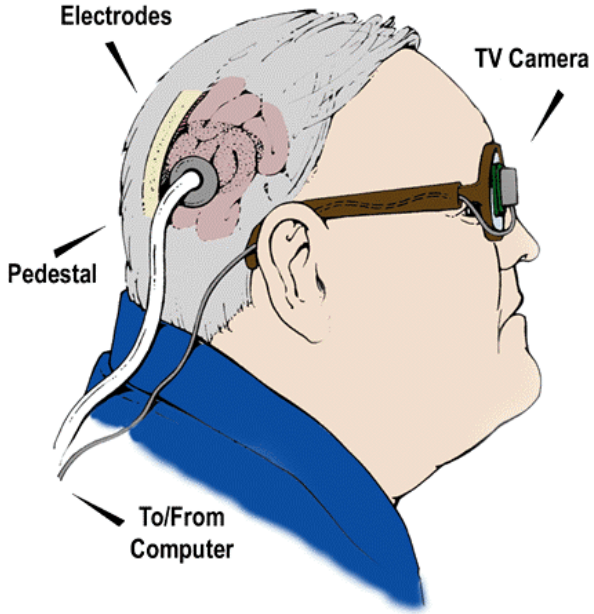
Visual impairment in Finland

- It is estimated that in Finland there are 80.000 persons with visual impairment. 10.000 of them are classified as blind and others have low vision. Less than five percent are totally blind.
- From the 80.000 persons near 70.000 are over 65, 10.000 are of working age, not over 1.500 are children and young
- 37 % have other disability or long term illness together with visual impairment, persons with diabetes 13 %, physical disability 8 % and hearing impairment 7 %

Restoring the vision

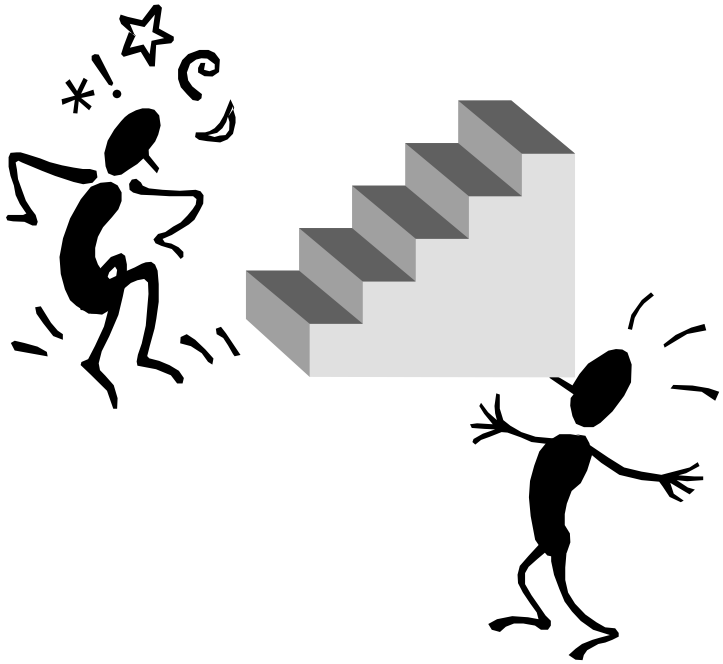
- Artificial retina when optical nerve is functional
- Activation of the visual cortex
- Laboratory experiments

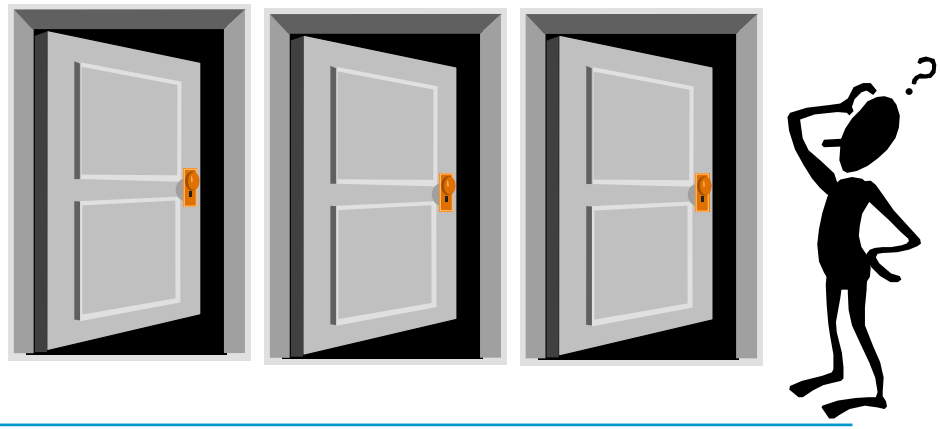




Mobility

- Obstacles on the route
  - possibility to trip over
  - possibility to fall down
  - obstacles above chest are dangerous
- Outlining the environment
  - What is around?
  - Which one is the right door?





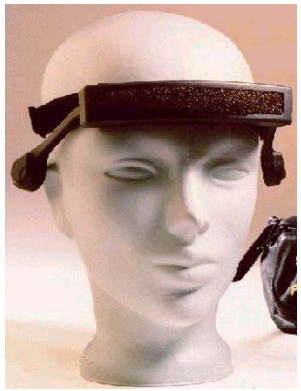
Mobility

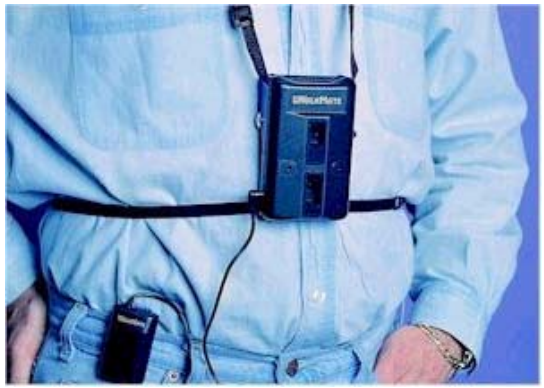
- Positioning
  - Where am I?
  - Where to go next?
- Direction
  - Which is the right direction?
  - How to keep the right direction when walking?
- Access to the visual information
  - What signs are nearby?

Solutions

Obstacle avoidance

- Ultrasonic distance measurement
- Target distance indication by sound
  - Sonic Pathfinder
  - Walkmate
  - GuideCane
  - NavBelt

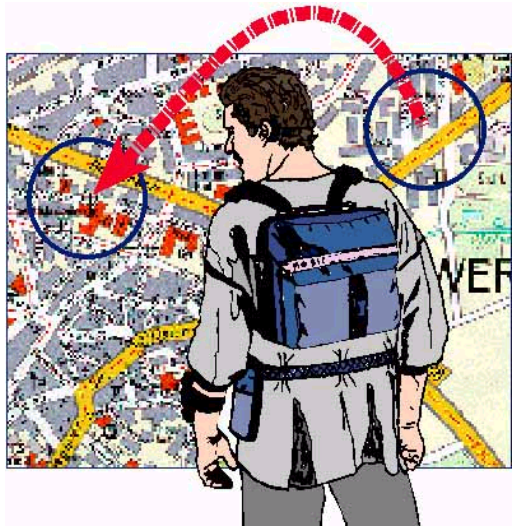


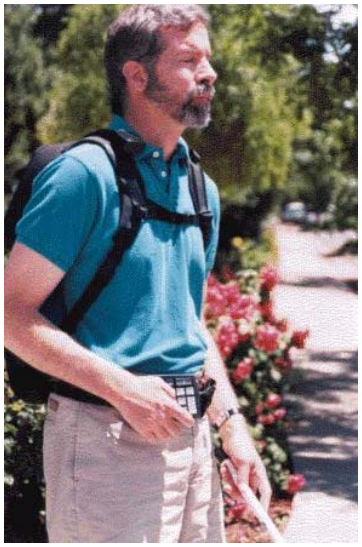


Solutions

Positioning and direction

- Global Positioning System (GPS) and digital map
- Pre-journey planning with PC
- Guidance and user interface by speech
  - MobiC (EU-project) University of Magdeburg
  - GPS-Talk (Sendero Group)
- Speaking Compass
  - Robotron Columbus
- Systems based on artificial landmarks
  - RF or Infrared tags, tactile tiles

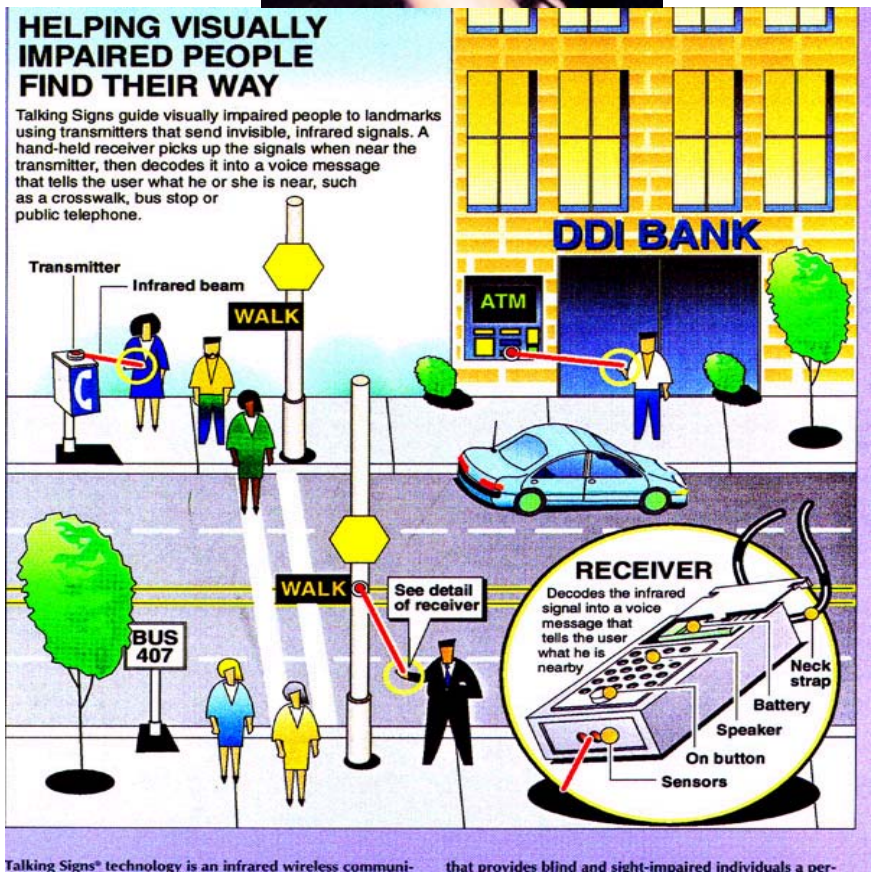




Solutions

Visual information

- Local infrared or radio connection
- Receiver converts signal to speech
- Useful for positioning (landmark)
- Talking Signs
  - Location information
  - Content information
  - Direction
  - Following a person
  - Returning to previous location

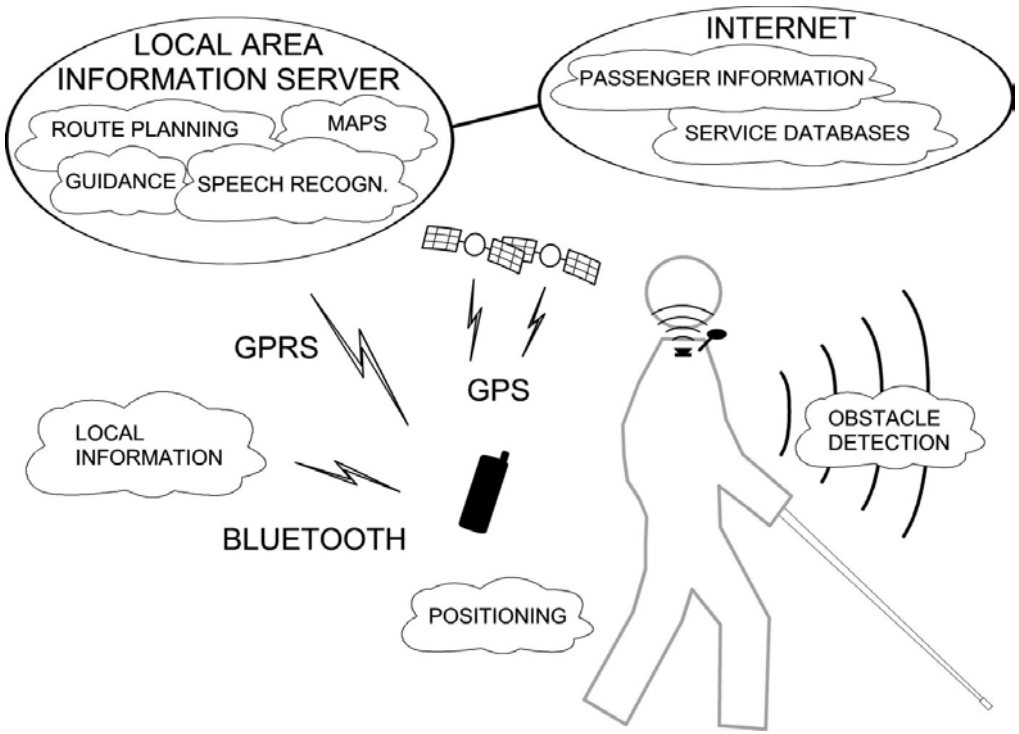


Comments

- Continuous beeping or squealing is disturbing
- Shared user interface is needed, if several devices is in use.
- Accuracy of the GPS possible not adequate. Urban canyons and interiors cause problems.
- Accuracy and availability of digital maps still problem in Finland
- Cost of the infrastructure (installation and maintenance)
- Do You want to look like a spaceman?

NOPPA Navigation and Guidance System

- Objectives
  - Easy-to-Use and affordable to the user
  - Flexibility, not only for pre-planned routes
  - Possibility to use public transportation
  - Possibility to use public services
  - Applicable both indoors and outdoors
  - Integration of the products and services for personal navigation



Pilot project (planned)

- Piloting area
  - Arla Institute (Espoo) and its surrounding areas
  - Service Centre of the Finnish Federation of the Visually Impaired (near Itäkeskus, Helsinki)
  - Public transportation used by visually impaired in both areas
- Years 2002-2004
- Budget approx. 500.000 €
- Participants
  - Arla Institute
  - Finnish Federation of the Visually Impaired
  - Ministry of Transport and Communications Finland
  - VTT
  - Universities
  - Tekes
  - Public transport operators
  - Municipal organisations
  - Finnish companies