CSE 190: 3D User Interaction

Lecture #9: Travel

Jürgen P. Schulze, Ph.D.

Announcements

- Homework assignment #3 due Friday, February 22nd at 1pm in Sequoia lab 142
  - Grading starts at 12:30
- Reminder: paper presentations
  - Next lecture:
    - Velu: Touché: Enhancing Touch Interaction on Humans, Screens, Liquids, and Everyday Objects
    - Haronid: D-Flow: Immersive Virtual Reality and Real-Time Feedback for Rehabilitation
    - Amell: Lightweight Palm and Finger Tracking for Real-Time 3D Gesture Control

Paper Presentations

- Today:
  - Vivek: Olfactory feedback system to improve the concentration level based on biological information
  - Joey: TBD
  - Matteo: A discussion of cybersickness in virtual environments

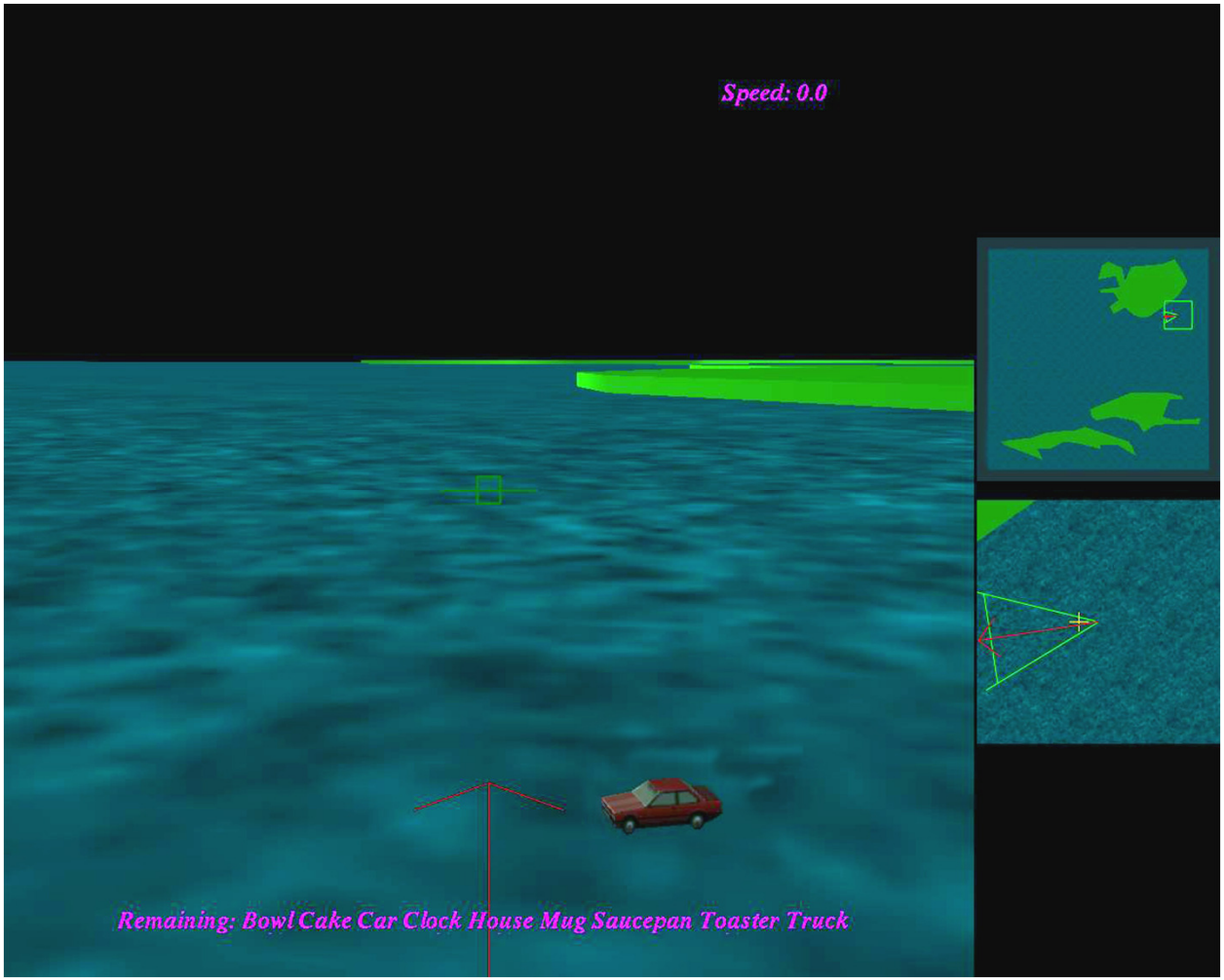
Navigation

Wayfinding – Cognitive Component

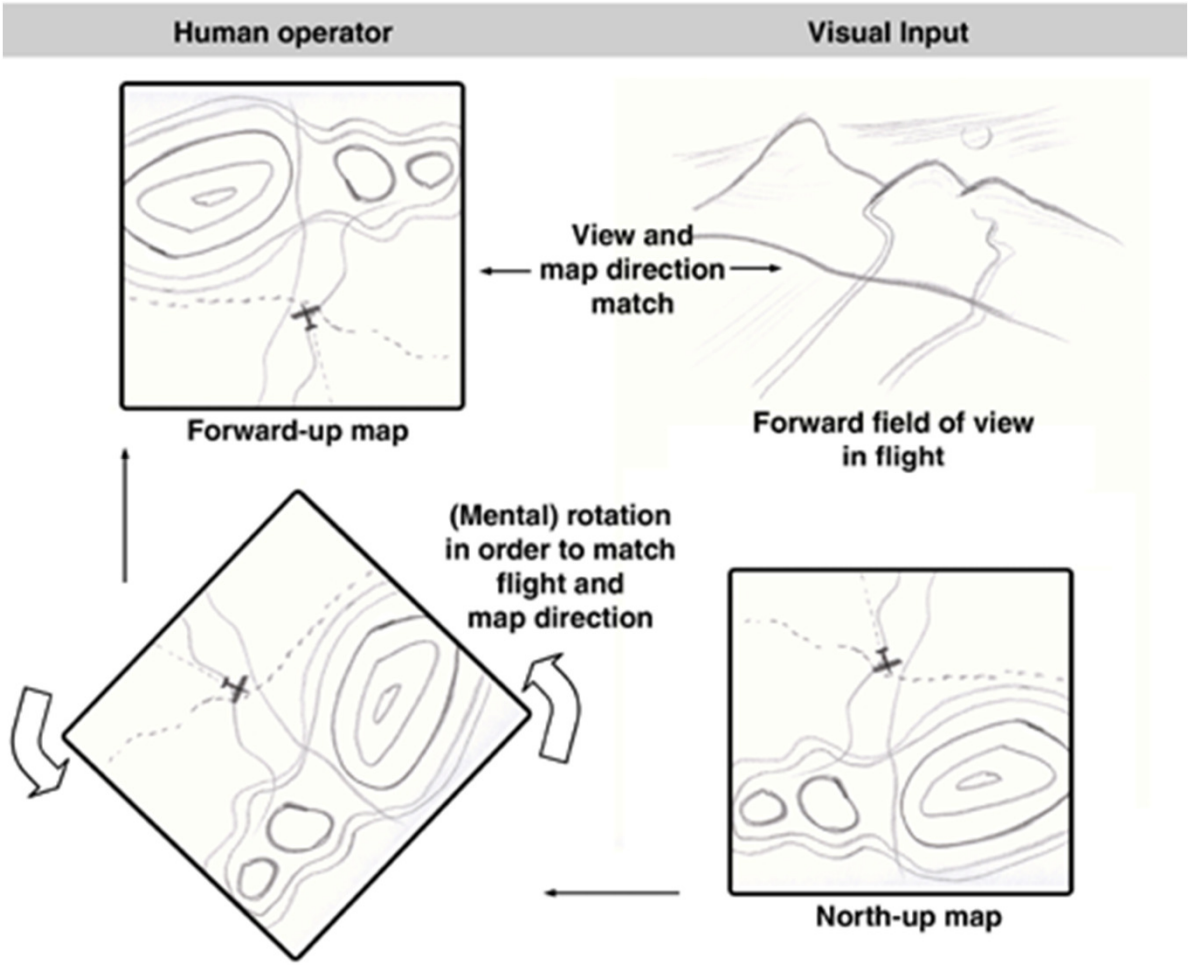
Artificial Cues

- Maps
- Compasses
- Signs
- Reference objects
- Artificial landmarks
- Trails

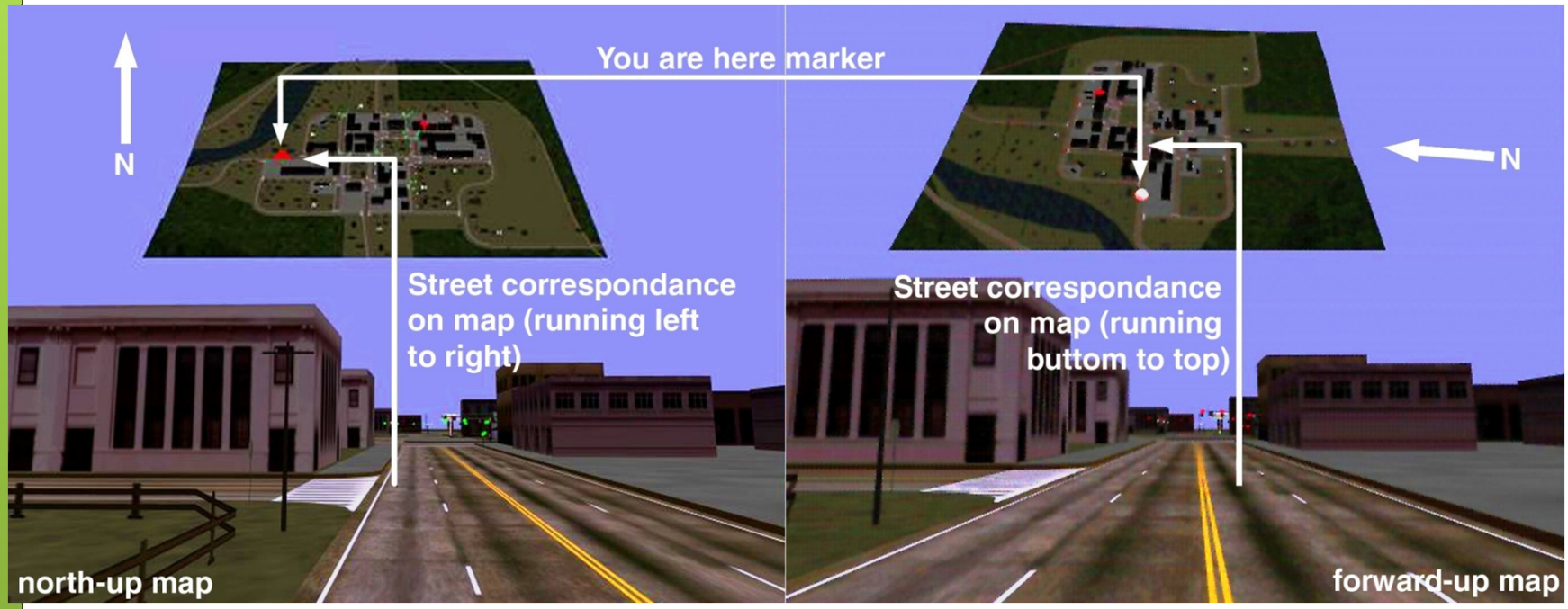
Maps (1)


Speed: 0.0
Remaining: Bowl Cake Car Clock House Mug Saucepan Toaster Truck

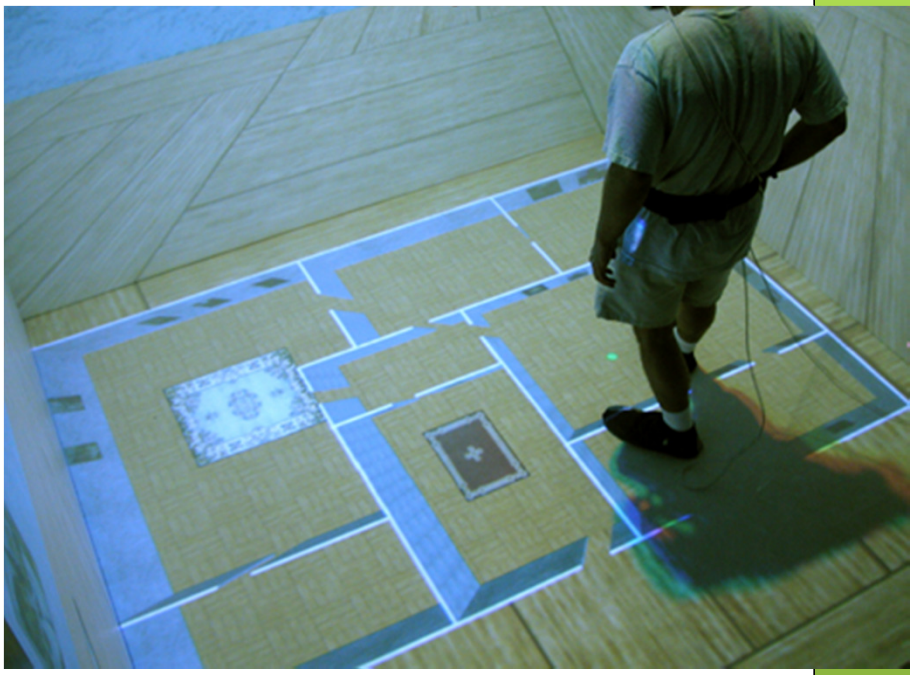
Maps (2)


Human operator
Visual Input
View and
map direction
match
Forward-up map
Forward field of view
in flight
(Mental) rotation
in order to match
flight and
map direction
North-up map

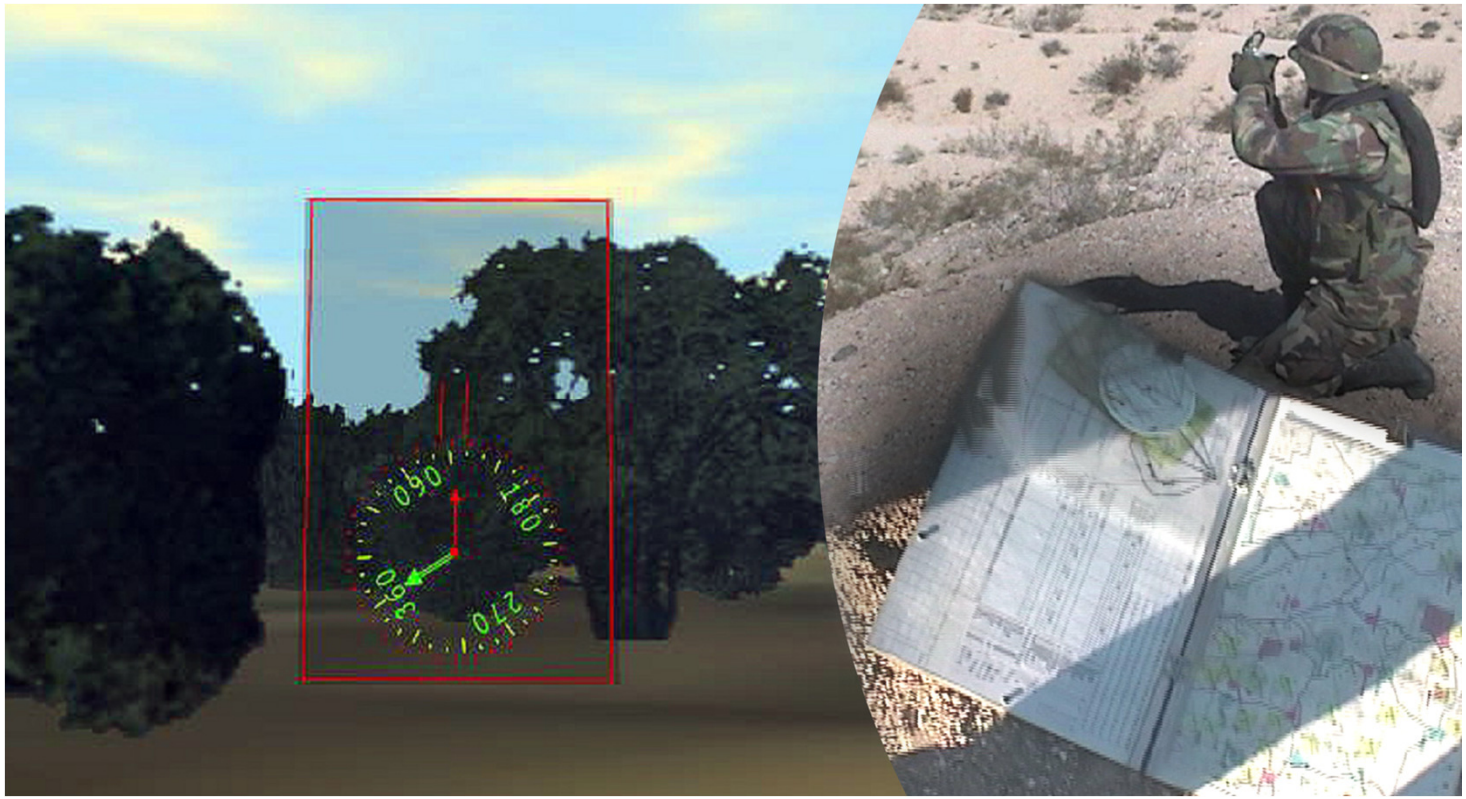
Maps (3)


You are here marker
N
Street correspondance on map (running left to right)
north-up map
N
Street correspondance on map (running buttom to top)
forward-up map

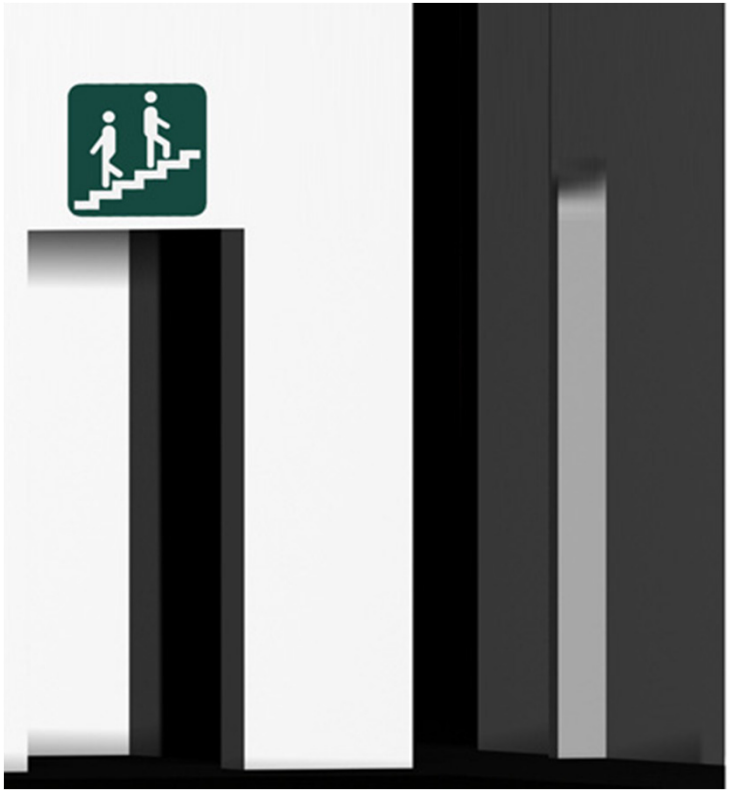
Maps (4)



Compasses



Signs



Reference Objects

- Objects that have well known size
  - chair, human figure, etc…
- Useful to estimate distances

Artificial Landmarks

- Local – help users in decision making processes
- Global – seen from any location

Trails

- Help user retrace steps
- Show what parts have been visited

Navigation

Travel – Motor Component

Travel

- The motor component of navigation
  - Good travel techniques integrate aids to wayfinding
- Movement between two locations, setting the position (and orientation) of the user's viewpoint
- The most basic and common VE interaction technique, used in almost any large-scale VE

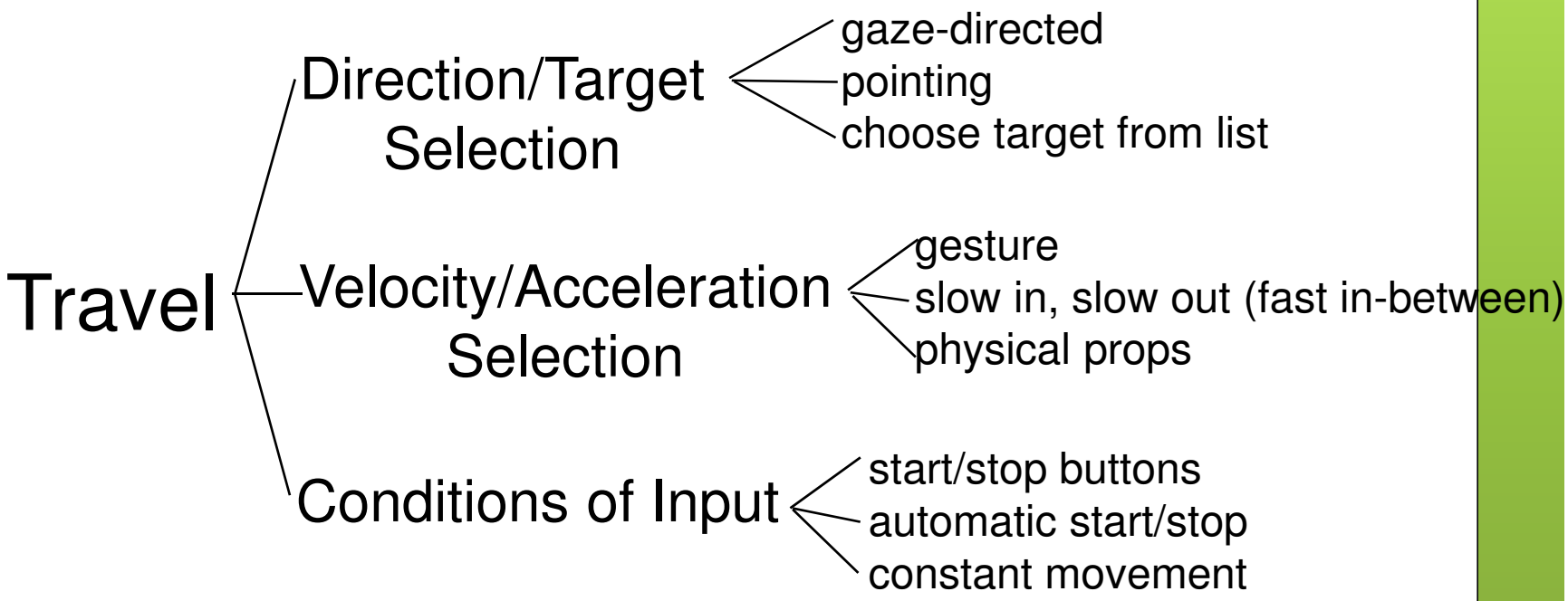
Travel Tasks

- Exploration
  - travel which has no specific target
  - build knowledge of environment
- Search
  - naïve: travel to find a target whose position is not known
  - primed: travel to a target whose position is known
  - build layout knowledge; move to task location
- Maneuvering
  - travel to position viewpoint for task
  - short, precise movements

Travel Characteristics

- Travel distance
- Amount of curvature/number of turns in path
- Target visibility
- DOF required
- Accuracy required
- Other tasks during travel
- Active vs. passive
- Physical vs. virtual

A Technique Classification – Component Decomposition



From: Bowman, Koller, and Hodges, Travel in Immersive Virtual Environments. IEEE VRAIS '97